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**Development of Written Specific Discourse through
Content-Based Syllabus: Case of Master 1 Computer
Science Students at the University of TLEMEN**

Thesis submitted to the Department of English in candidacy for the degree of
Doctorate in Didactics and Assessment in English Language Education

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Statement of Originality

I hereby declare that this submission is my own work and that, it contains no material previously published or written by another person nor material which has been accepted for the qualification of any other institution. I also certify that the present work contains no plagiarism and is the result of my own investigation, except where otherwise stated.

Ms. Meryem KOURICHI

July 13th, 2020

Dedication

« Nostalgia is like a grammar lesson. You find the present tense and the past perfect... »

Owens Lee Pomeroy

As an expression of gratitude, I beg to dedicate this dissertation wholeheartedly to the name of Allah 'My Almighty God' for His Fruitful help to finish it, my angel and fairy godmother 'My Mother' who has been my source of inspiration and strength whenever I thought of giving up; her prayers of day and night made me able to get such success and honour, 'My Father' who continually provides me with moral and emotional support, My sister along with all My family members who shared their words of advice and encouragement.

To My beloved caregiver grandmother who raised me- may she rest in peace.

Your affectionate daughter

MERYEM

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Abstract

The chief interest of the current research pores over the investigation of written discipline-specific discourse of Master 1 Computer Science students as well as the detection of these learners' language requirements so that to enhance the linguistic competence to attain good specific writing proficiency. This was conducted by dint of a content-based syllabus elaborated to aid learners to accomplish their desired objectives. To reach this end, an exploratory research work was undertaken. It encompasses two sorts of research design. In the first stage, the study relied on an exploratory case study to examine the status of English language teaching within the Department of Computer Science, Tlemcen University, in general, and specific written discourse instructions in particular. Thereafter, a needs identification and analysis process was carried out by means of the succeeding research instruments: a questionnaire administered to Master 1 students, semi-structured interviews with English language teachers and computer scientists, and lastly, classroom observation undertaken among the same students' population. The data were analysed qualitatively and quantitatively. The results uncovered that specific written discourse is a crucial component in educational and professional settings. As a matter of fact, students specifically should enhance their linguistic knowledge and aspects, for instance, specific vocabulary comprehension, its significance, grammar, and other language skills. Therefore, a content-based syllabus was developed to incorporate a broad range of language skills, functions, and themes within interactive activities and tasks which correspond better to learners' demands. In the second phase, action research was conducted to implement and evaluate the effect of the designed syllabus content and the instructional practices in supporting students' specific writing abilities. The syllabus was implemented using communicative tasks, integrated skills activities, and language work exercises. The action research instruments used for evaluation purposes are pre-test, post-test, and focused interview. The findings revealed the positive impact of the intervention in helping students improve their linguistic competence to write scientific compositions in the discipline. Thus, it is recommended to adapt a content-based syllabus in Algerian ECP institution so as to promote written communication.

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List of Abbreviations

AF:	Absolute Frequency
CBA:	Content-Based Approach
CBI:	Content-Based Instruction
CLT:	Communicative Language Teaching
CS:	Computer Science
DAELE:	Didactics and Assessment in English Language Education
EAP:	English for Academic Purposes
ECP:	English for Computing Purposes
EFL:	English as a Foreign Language
ELT:	English Language Teaching
EOP:	English for Occupational Purposes
ESL:	English as a Second Language
ESP:	English for Specific Purposes
ESS:	English for Social Sciences
EST:	English for Science and Technology
EVP:	English for Vocational Purposes
FL:	Foreign Language
GE:	General English
GL:	Génie Logiciel (Software Engineering)
GUI:	Graphical User Interface
HTML:	HyperText Markup Language
IELTS:	International English Language Testing System
I:	Informant
ICT:	Information and Communications Technology
IT:	Information Technology
LMD:	License-Master-Doctorat
LSA:	Learning Situation Analysis

LS : Learning Styles

MID : Modèle Intelligent et Décision (Decision and Intelligent Model)

M: Mean

M1: Master 1

NIA: Needs Identification and Analysis

PhD: Doctor of Philosophy

PPP: Presentation, Practice, and Production

PPT: Power Point

PSA: Present Situation Analysis

RF: Relative Frequency

RSD: Réseaux et Systèmes Distribués (Networks and Distributed Systems)

SD: Standard Deviation

SE: Standard Error

SGML: Standard Generalized Markup Language

SIC : Système d'Information et de Connaissances (Information System and Knowledge)

TOEFL: Test of English as a Foreign Language

TSA : Target Situation Analysis

U1 : Unit 1

U2 : Unit 2

U3: Unit 3

VESL: Vocational English as a Second Language

XML: Extensible Markup Language

GENERAL INTRODUCTION

In today's globalized world, English has gained prominence over other languages. It has become the dominant language for imparting information throughout the globe. The English language, nowadays, is required in almost all academic and professional domains. As a result, there is an increasing need for learning the language and enhancing the basic skills for effective communication. In educational or workplace situations, the understanding of the particular domain literature, or exchanging ideas with experts in the field of specialization, is considered to be the utmost objective for workers or a group of students enrolling in the same subject area of specialism.

Teaching and learning the English language - the world lingua franca - is set as a must to accomplish the essential requirements of international trade and scientific development. As a matter of fact, teaching English to tertiary learners is closely linked to their field of specialism, i.e. it is the concern of ESP - English for Specific Purposes. ESP teaching is marked by the students-centred approach, which means permitting learners to direct their learning experience. The teaching practice of English is ruled by a series of approaches, which point at instructing the language from a wide range of angles. Alongside the instructional practices, the evaluation process is considered as an essential part of the English teaching/learning operation. The main perspectives of the English language teaching/testing process revolve around the communication-oriented language teaching/learning. That is to say, learners are presumed to be engaged in communicative exercises and tasks once being taught, and to be assessed after the courses of instruction if they develop the linguistic knowledge and skills to attain efficient English language proficiency in both oral and written discourses.

On the other hand, the scientific world is constantly advancing, and specialists certainly have to be informed of these alterations. Computer Science as one domain within the scientific field is continually progressing with reference to technological, industrial and engineering disciplines. By virtue of the findings of some semi-structured informal interviews carried out with a group of scientists at the Department of Computer Science, Tlemcen University (software engineers,

mechanical engineers, networking and artificial intelligence specialists), it is of great importance to emphasize the teaching/learning of English language for computing purposes. Besides, the ESP instructions in the site under investigation need to stress the learners' linguistic needs, especially to write scientific passages in the discipline for post-graduation learners, i.e. Master 1 learners. On account of the chief significance of written documents in such a progressing technological domain (research papers, articles, etc) so as to report the latest technical advancements. Seeing that designing a convenient syllabus with effective teaching pedagogy meet these English language requirements in the Computer Science discipline and fulfil the learners' target situation demands.

In Algeria, English is taught as a foreign language in the three levels of the educational system. The Algerian educational system promotes the teaching/learning of the English language (ELT) starting from the first year of middle school which lasts four years until the third year of secondary school, moving to the tertiary level. In what concerns the Department of Computer Science at Tlemcen University, not least the Master 1 classes, the English language is consolidated within the educational program, but the execution of an all-encompassing instructional design has not yet been carried out. Hence, the foremost concern is to elaborate an English syllabus for Computing Purposes (ECP) to address the learners' demands and the requirements of the scientific field. At whatever time or occasion, when interrogating the target population, it is shown that their information are their language requirements needed in order to develop suitable courses adapted to their demands (Gardner and Winslow, 1983). Consequently, it is preferable to emphasize the target and learning needs, since many syllabi developers have been blameworthy of stressing the intended end-product, without paying sufficient attention to the journey of fulfilling it (Kennedy and Bolitho, 1984).

GENERAL INTRODUCTION

For these reasons, the researcher's major impulses to carry out the current inquiry are as follows:

- The requisite to attain learners' demands and target situation requirements in parallel with the computer sciences discipline conventions.
- The need for written communication form to get the better of the newest updates in the computing field that are reported in English.
- The demand to develop an appropriate syllabus which best acts upon the variety of skills and linguistic aspects that computer science Master 1 learners need to compose scientific written discourse.
- The lack of effective evaluation procedures during the English classes.

Owing to the fact that the writing skill is important in English language learning besides the other skills listening, speaking, and reading, not least in the ESP context, and since evaluation operation is a backbone in every teaching practice, the chief aim of this current inquiry is to spot the significance of the discipline-specific written discourse in the students' study program, and to design a suitable language syllabus that can be put into action in the computer science classroom to aid learners to develop their linguistic knowledge to write technically in the discipline.

Accordingly, for the sake of elaborating a language course that best corresponds to the learners' needs that will permit them to perform regularly the requisite language skills, and enrich the linguistic knowledge so that to write computer sciences documents, the researcher endeavoured to make inquiries about Computer Science Master 1 learners' written discourse, their writing difficulties, and their linguistic needs in order to achieve good specific writing performance. This research work tends also to design a syllabus which is relevant to the learners' discipline requirements, i.e. the computer sciences conventions, and which focuses more on the in-class activities to practice the needed language aspects and skills to

GENERAL INTRODUCTION

achieve efficient communication (content, task-based syllabus). In view of this, this study is conducted to answer the following questions:

- 1- How is the discipline-specific writing taught in the ESP course at the department of computer science?
- 2- How is the specific writing assessed in the computer science discipline?
- 3- What are the main difficulties facing ESP learners while composing in English?
- 4- How can discipline-specific writing be best taught and assessed to achieve high performance?

On this matter, the researcher hypothesises what ensues:

- 1- ESP students at Computer Science Department receive general English instructions which do not meet their professional nor their discipline-specific language needs.
- 2- ESP teachers assess their students' performance in specific writing using specific types of tests (formative and summative assessments in the form of reading comprehension tests)
- 3- The main difficulties concern their awareness of computer science terminology (register) along with the grammatical structures to write in the discipline (i.e. linguistic competence: morphology, syntax, and semantics).
- 4- Designing an appropriate course (content-task-based) to meet the specific learners' needs in addition to a collaborative atmosphere where the language teacher is working hand-in-hand with the subject specialist could both have a positive impact on the learners' linguistic competence to be motivated and engaged in specific writing.

After elucidating the research questions and hypotheses that will be further examined in the inquiry, the current investigation caters to fulfil the following objectives:

- Elaborating an ESP study program in collaboration with the computer scientists that satisfies Master 1 Computer Science learners' needs and

supports the development of their communicative skills in both educational and professional settings, especially the written discourse in the discipline;

- Proposing and implementing new teaching methods and techniques with computing learners, such as, content-based instructions, communicative language teaching and authentic tasks that reflect real-world situations in academic and workplace contexts in order to invigorate the classroom atmosphere and bolster the language learning outcomes.
- Enhancing learners' linguistic aspects and knowledge (lexis, its meaning, and grammar) to write technical discourse.
- Foster the use of assessment procedures in the language classroom to achieve the course objectives.
- Emphasize the instructions of computer science terminology along with grammatical structures needed to reach good specific writing skill, i.e. linguistic competence: morphology, syntax, and semantics.

To investigate the validity of the proposed hypotheses and attain the intended research objectives, an exploratory research work is divided into two research designs are conducted: an exploratory case study and action research. The purpose of the mixed-method research approach is to obtain valid data which will tackle the several portions of the investigation questions. The research participants are Master 1 computer science students at Tlemcen University, their English language (ESP) teachers, and computer science teachers. The researcher's choice of Master 1 students is due to the fact that they are postgraduate learners who have some advanced English language level to express themselves in a complex language skill like writing. In addition to that, they are required to receive and produce technical English, mainly in the written discourse in both academic and workplace situations, such as scientific reports, articles, etc. Master 1 students are given a questionnaire whereas English language teachers and computer scientists are requested to take part in a semi-structured interview. These research tools permit the inquirer to evaluate teachers' instructions and students' production of the written discourse in the discipline, to indicate the learners' language demands in educational and

professional settings to develop the technical writing skill so as to elaborate an appropriate language syllabus (content-task-based) correspondingly.

The second stage of the current inquiry is composed of implementing a content, task-based syllabus by way of using an action research design. Besides, after the intervention phase, the evaluation stage is carried out for the sake of checking the implemented courses effectiveness on students' learning outcomes, especially specific writing skill and linguistic aspects. The post-intervention stage is categorised by two research instrumentations: testing procedures (pre-test, and post-test) and focused interview. These research tools aim at evaluating the students' written discourse before/after the intervention phase to gauge the courses of instruction efficiency, i.e. to note learners' perspectives and attitudes towards the implemented lectures, gathering their grades and standpoints regarding the intervention.

As for the organisation, the research study is divided into five chapters. The first chapter provides the theoretical underpinning overviews. These theoretical studies build upon the basic literature background of the present research and mapped out stages to accomplish the study objectives. Once again, the first chapter is made up of sections. The first part identifies in-depth the world of ESP and correlating topics: ESP methodology, evolution, etc. The next section focuses on the ESP pivotal constituents, that is, needs analysis, course design, and syllabus development (content and task-based syllabi). The following part provides insights into English for Science and Technology, first and foremost English for Computer Science. Afterwards, the writing skill is defined generally in ESP context, and particularly in the discipline under investigation. Subsequently, the inquirer clarifies the communicative competence, mainly linguistic competence and its aspects (morphology, syntax, semantics). The final part tackles the evaluation process of an ESP course alongside the assessment of learners, notably their specific writing skill.

The second chapter centres around giving a description of the situation analysis at the Department of Computer science, i.e. the current English language teaching situation in the study settings. In other words, it gives perspectives on the

English language status of Master 1 students, the computer science studies program, and chief functions of English language use in educational and professional situations. Then, it emphasizes the methodology considerations followed in the conduct of the field research. It thus denotes a detailed account of the sample population, research design, and research instruments. Consequently, a case study design coupled with an action research design are adopted to carry out this investigation. Lastly, further explanation is given on the data analysis approaches used in the research work: qualitative and quantitative analyses. The target is to proceed along the research field trails, i.e. to go from depiction, to track down data collection process, then data analysis qualitatively and quantitatively, and, at last, to emphasize the study program design and execution.

The third chapter focuses on the needs analysis process, i.e. the Needs Identification and Analysis (NIA) operation. It begins with data collection about the written discourse evaluation in the ESP classroom, the teaching situation of specific writing skill, and the learners' language needs from Master 1 students, English language teachers, and subject specialists' views. Thereafter, the data collected by means of questionnaires, interviews, and classroom observation are analysed qualitatively and quantitatively. Finally, the needs analysis findings are compared, cross-checked, and discussed to confirm or reject the proposed hypotheses.

Chapter four is about the elaboration of a content, task-based approach that best meets the Computer Science students' needs in educational and workplace situations. The suggested design need to enhance the learners' specific writing skill in computing field along with the linguistic aspects and skills to achieve good English language proficiency. The syllabus content for Master 1 learners is described thoroughly, indicating the several language knowledge and skills incorporated within instructive units, paralleled with tasks and communicative exercises.

The fifth chapter revolves around the syllabus implementation, teaching practices with new instructional methods and techniques. As a matter of fact, this stage is an action research design, carried out to test the suggested study program

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efficiency in developing learners' language components and skills in order to achieve a good command of the specific writing skill in particular and an effective English language communication in general. This phase deals with the intervention which aims at identifying the instructional operation by proposing communicative tasks and integrated skills activities to generate a relaxing and constructive learning atmosphere. It ends with providing further pedagogical recommendations and suggestions.

Chapter One

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1.1 Introduction

English for specific purposes has come into existence as a new offshoot of English language teaching due to the fact of globalization. Nowadays, many linguists and researchers in the field become more interested in ESP considering that the English language gained grounds as the global language. Consequently, students' needs to efficiently acquire the English language, not least in an ESP context are getting wider.

This chapter seeks to firstly explore in-depth the area of ESP tackling its methodology and evolution. Afterward, it highlights its basic elements which are needs analysis, course design, and syllabus development. Secondly, the part is devoted to English for science and technology, mainly computer science. Then, the writing skill in the ESP situation in general and in computer science in particular. Next, the researcher sheds light on communicative competence and its related components. Finally, the last section deals with the course evaluation and learners' assessment in an ESP context.

1.2 English for Specific Purposes: Definition, Methodology, and Evolution

The inhabitants of the City of ELT (English Language Teaching) have paid scant attention to the way teaching and learning has changed throughout time. They were more concerned about the people who want to learn the language, especially foreign language for precise purposes. Those purposes vary from the attainment of academic courses in a school program to those who are seeking to pursue a professional career. Consequently, different fields of specialism come with various oriented purposes. In very practical terms, these purposes tend to pave the way for a new way of learning a language that catches the fancy of huge crowds of learners.

Moreover, and due to the significant importance of English as the global language goes on with the growth while people want or require to learn English (Kennedy and Bolitho, 1984:1). They continue saying that:

.... Governments are introducing mass education programs with English as the first, and sometimes only, foreign language; the growth of business and increased occupational mobility is resulting in a need for English as a common medium of communication, and access to much scientific and technical literature is difficult for those with no knowledge of English (Ibid).

As a result of these necessities and requisites for learning and teaching English, the valiant ELT inhabitants' main concern was to get the City of ELT expanded to fit its dwellers. This gave birth to the discovery of a brand new city beyond the mountains with rich landscapes and fertile land, they named it ESP (English for Specific Purposes). ESP, thus, is about teaching/learning English to foreigners who have a demand for studying English for more specific reasons related to their studies or their jobs. That is to say, ESP means the fact of dispensing lectures to those students with more specialized register connected to their needs whilst learning English. In other words, ESP has the tendency to teach English and make others learn the language as well for particular subjects keeping an eye on certain academic and professional purposes.

ESP is an approach to language teaching/learning that stood on learners' demands. As explained by Hutchinson and Waters (1987:19): "ESP is an approach to language teaching in which all decisions as to content and method are based on the learner's reason for learning". As a matter of fact, ESP teaching is to instruct learners English which is related to their field of specialization. Hence, ESP is a goal-directed approach to meet learners' needs (Basturkmen, 2006), there are several needs for different specialties like English for Law, English for Economics, English for Medical Purposes, not least technical English for computing. Within the same token, ESP takes aim at giving its learners a set of linguistic aspects of the subject-specific discipline. Besides, ESP targets the improvement of learners' required skills and competencies to perform efficiently in the target situation of their discipline-specific discourse. Consequently, ESP should be considered simply as an "approach" to teaching, not a product.

Sharing the same line of thought defining ESP, Mackay, and Mountford (1978:2) stated that it is a language made-to-order depending on linking both the particular learners' needs with the required certain situations. Correspondingly, they said that ESP:

....is generally used to refer to the teaching of English for a clearly utilitarian purpose, this purpose is usually defined with reference to some occupational requirements, (e.g. for international telephone operators) ... or vocational training programmes, (e.g. for hotel and catering staff) ...or some academic or professional study, (e.g. engineering) ...

According to them (Mackay and Mountford 1978), ESP is a constrained scope of lexis and expressions top qualified from the general repertoire of the language due to the fact that this restricted linguistic scope embraces the requests of every determined context, activity or job. In addition to this, Munby (1978:2) claimed that ESP courses of study are about designing programs and syllabi in accordance with a beforehand educational needs assessment of the ESP learners. Those two facets: the ESP program and needs analysis are of great importance in an ESP setting. Another view on defining and featuring ESP is proposed by Strevens (1988: 48) in which he highlighted the specific characteristics of ESP asserting that « ESP is designed to meet the learners' needs, related in content to particular disciplines, occupations, and activities, centered on the language appropriate to those activities in syntax, lexis, discourse and semantics, and in contrast with general English ». This quote by Strevens (1988) declared the fact of highlighting the language (lexis, grammar, register, and semantics), skills, discourse acquired which have to be relevant to the required learners' activities to be used. This is literally the aim of this study, that is, to define the ESP learners' linguistic needs (lexis, grammar, and semantics) at Computer Science Department so that to design an appropriate course in order to make them write technically in the field for their both academic and professional purposes.

The evolution of ESP can be traced back to the 1960s due to the fact that General English use (GE) started to decrease owing to the lack of success when it

comes to meet learners' needs (Robinson, 1989). Hence, English language learning became a consequence of job-market requirements. Workers in multinational companies, associations, and institutions or students enrolled in different college programs are doomed to enhance their English language mastery (Widodo, 2015). The significance of English at that time and its awareness grow the capability to assimilate multi-disciplinary fields by designing appropriate courses that involved the required language, skills so that to run into students' educational and vocational needs. As claimed by Strevens (1977 qtd in Robinson 1989: 399) that « ESP goes back to the sixteenth century, with the production of specialised vocabularies and phrasebooks for diplomats, businessmen, and other travelers». Thus, this shift of interest has resulted in taking immediate impetus.

According to Hutchinson and Waters (1987: 6) “ESP was not a planned and coherent movement, but rather a phenomenon that grew out of a number of converging trends”. One can deduce that ESP has directed in so many modes worldwide, “but we can identify three main reasons common to the emergence of all ESP.” (Ibid, 1987: 6): the demands of a brave new world, a revolution in linguistics and a new focus on the learner. In the fast lane, Barnett (1977: 12) continues to say that ESP culminates in three main reasons for the change:

- Extraneous political and economic factors.
- Increasing disillusion with materials and methodology that have failed to find the answer.
- The pioneering work and insight of a relatively small group of teachers and scholars not working as a group but in the time influencing each other to form the foundation or fountainhead of new developments in ESP.

Hutchinson and Waters (1987) and Barnett (1977), as well, review the evolution of ESP: “it is as old as specific reasons for learning a language and anyone who learns it sufficiently well is likely to use it for specific purposes” (Barnett 1977:11). Henceforth, ESP genesis is at the root of ELT identification of learners' needs by forming intelligible aims and objectives. For Barnett (1977: 11):

“such people have entirely different aims....and we may omit from their programme everything which does not lead directly towards the limited and special end they view”. ESP teaching materials are a matter of general English adjustment according to the learners’ requirements.

At the end of the Second World War, after 1945, the new world brought new influences and changes and, accordingly, new growth relating to business and trade at an international scale. Needless to recall that this new world and its effects have to a great extent marked economic, scientific, political and mainly cultures throughout the world (Dakhmouche, 2008). It is evident to assert that the two forces: technology and commerce are further gaining ground and taking prominence over the other domains. Those international exchanges in these two domains result in a strong impulse to learn and master languages, mainly English for different motives in order to make these exchanges prosperous. Progressively, English has come into sight standing as the first international language, i.e. the lingua franca that is used for crucial and certain objectives of communication. In this perspective, Hutchinson and Waters (1987: 6) have this to declare:

But as English became the accepted language of technology and commerce, it created a new generation of learners who knew specifically why they were learning a language - businessman and – women who wanted to sell their products, mechanics who had to read instruction manuals, doctors who needed to keep up with developments in their field and a whole range of students whose course of study included textbooks and journals only available in English.

Worth mentioning at this level of analysis that linguists were aware of these influences so that they started to emphasize their research on the way in which the used language differs considerably according to various domains in real-life situations. This gave birth to ESP as a stand discipline on its own. Firstly, as an SP-LT (Special-Purpose Language Teaching) programmes¹ for certain students, but it did not prove either successfulness or setback owing to the overuse of translation in

¹ SP-LT: Strevens (1977 cited in Robinson 1989: 399) stated that it implies "specific purposes".

classes. Afterward, the emersion of English for specific purposes in which communication is represented under the guise of ESP main focus which tends to point out « preparing learners for chosen communicative environments », as stated by Mohan (1986, in Kareva, 2013: 1479). Nowadays, the aims for learning the English language have been addressed towards inevitability and effectiveness.

The ESP teaching methodology refers to the selection of teaching methods and techniques based on mainly the students' linguistics and discipline-specific needs to perform effectively in the target situation (Donesch-Jezo, 2012). It is based on the students' curve of the learning process and their strategies to learn as well. As a consequence, the ESP teacher's choice of his/her teaching materials including the specificity of the used texts depends heavily on these elements which are the context of the particular language instructed along with the pace of the students' learning process and their strategies to approach learning (Ibid). Owing to the fact that students are likely to face situations and cases where they have to react genuinely like problem-solving tasks, observation, role-plays and so forth. Therefore, ESP experts tend to favor the use of content-based and task-based approaches (See section 1.6) to teach English courses and exercises in an ESP context among different other teaching approaches (Richards and Rodgers, 2001). Figure 1.1 displays the ESP methodology.

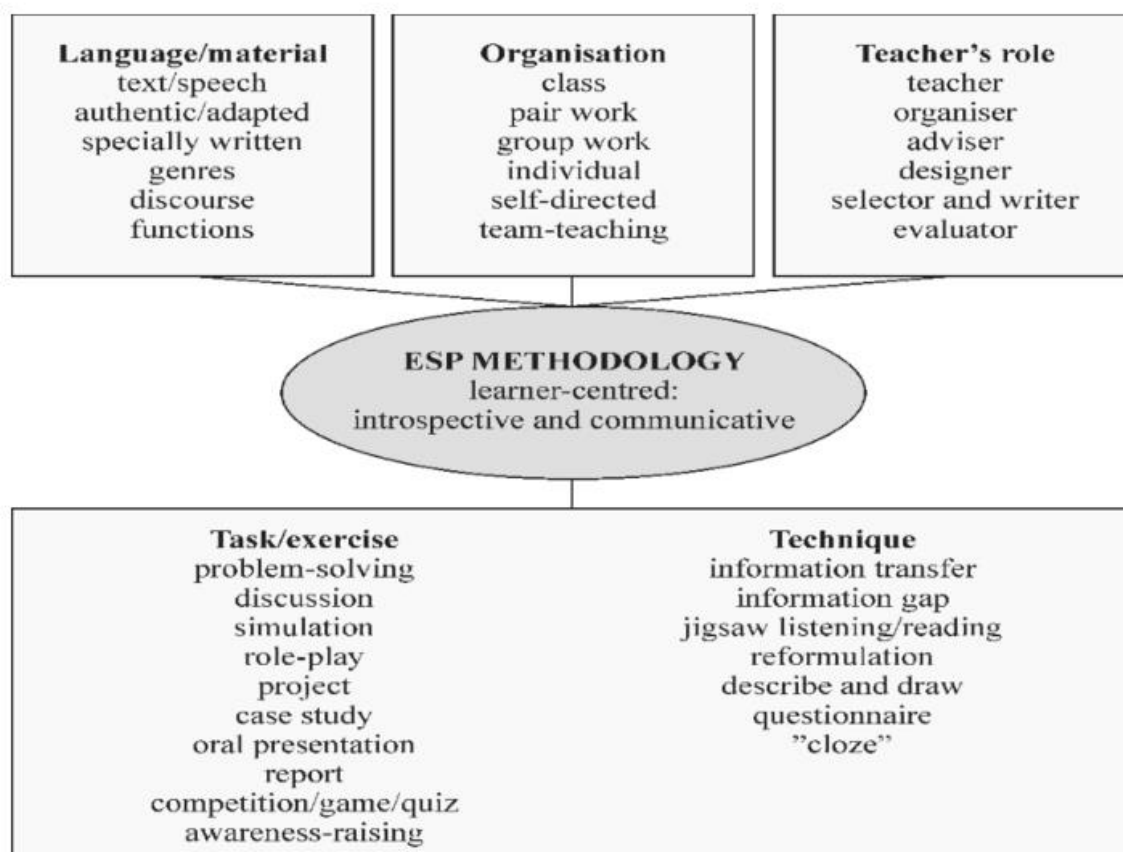


Figure 1.1: ESP Methodology (Adopted from Richards and Rodgers, 2001; Nunan, 2004 qtd in Donesch-Jezo 2012:4)

In the above diagram, ESP is characterized by meeting learners' needs and make use of tacit methodology and activities which are centered on language (lexis, grammar, discourse, genres....), teaching methods and techniques (organization of the classroom, ESP teacher's role in the class, the tasks used and their technicality). Moreover, since it is a learner-centered approach to teaching/learning in an ESP context, ESP methodology is based primarily on the students' communicative and linguistic demands, that is, it relies heavily on students' learning styles and strategies (Donesch-Jezo, 2012). Students, in an ESP class, tend to read and produce texts in given situations in which the teacher is required to teach first grammar focusing on the relationship between the grammatical structure and its function based on more authentic materials. Second, the same could be said about teaching vocabulary which is done effectively by instructing chunks (lexical phrases:

collocations, See section 1.9.1.3) preferably than single words again in more realistic situations (Ibid).

1.2.1 Characteristics of ESP

ESP is an identifiable movement of English Language Teaching (ELT) with highly definite characteristics. Dudley-Evans and St. Johns attempted (1998: 03) to put in an application of a set of features, some of them are absolute and some variable, to condense the foremost attribute of ESP.

- Absolute Characteristics :

- a) ESP is defined to meet the specific needs of the learners;
- b) ESP makes use of underlying methodology and activities of the discipline it serves;
- c) ESP is centered on the language (grammar, lexis, register), skills, discourse and genre-appropriate to these activities.

- Variable Characteristics :

- a) ESP may be related to or designed for specific disciplines;
- b) ESP may use, in specific teaching situations, a different methodology from that of General English;
- c) ESP is likely to be designed for adult learners, either at a tertiary level institution or in a professional work situation. It could, however, be for learners at the secondary school level;
- d) ESP is generally designed for intermediate or advanced students. Most ESP courses assume some basic knowledge of the language systems, but it can be used with beginners.

(Dudley-Evans & St. John, 1998:04)

In their definition, Dudley-Evans & St. John gave a twofold definition of ESP by specifying 'absolute' and 'variable' attributes. Absolute characteristics are definite to ESP because learners' requirements are of foremost value when devising linguistic and communicative activities. On the other side, variable attributes are

about ESP programs that are designed for a given group of students using distinct teaching/learning methodology. Accordingly, Dudley-Evans and St. John posit that ESP should be considered as an 'approach' to teaching and learning by symbolizing it as an 'attitude of mind'. Correspondingly, Hutchinson and Waters (1987:19) affirmed that 'ESP should properly be seen not as any particular language product but as an approach to language teaching'.

1.2.2 Types of ESP

English for Specific Purposes has emerged as a worldwide movement that keeps going forward toward more and is still continuing with more intensity and dominance. It released from the long-established flow of TEFL/TESL (Teaching English as a Foreign Language/Teaching English as a Second Language) and has gradually ascertained itself as an independent contemporary current affecting entirely the process of teaching and learning English. The ESP subdivision knew manifold views throughout time. Therefore, many linguists have conducted research on the types of ESP. Hutchinson and Waters' subdivision (1987) refers to the ELT Tree in which they rooted English Language Teaching offshoots considering that it is one possible form of language teaching. They divided ESP into three main types with regard to the nature of learners' specialty:

1. English for Science and Technology (EST),
2. English for Business and Economics (EBE), and
3. English for Social Sciences (ESS).

Each kind has to do with an identifiable area of exact knowledge as human sciences, business, technology, and economy. Here come the uppermost branches of the tree which show the occurrence of ESP courses. Those two branches could be distinguished depending on whether the learners demand English for academic study: English for Academic Purposes (EAP) or for work, training: English for Occupational Purposes/English for Vocational Purposes/Vocational English as a Second Language (EOP/EVP/VESL) (Hutchinson and Waters 1987: 16). Besides, as an illustration (see Figure 1.2) of EOP for the ESS stem is 'English for Psychology' while in EAP for the ESS branch is 'English for Teaching'. Kennedy

and Bolitho (1984: 04) agreed upon this division by Hutchinson and Waters adding to both EAP and EOP English for Science and Technology (EST). In other words, Carter's division of ESP (1983) highlighted three other types which are: a) English as Restricted Language, b) English for Academic and Occupational Purposes, and c) English with Specific Topics. As he got along with the fact that both EAP and EOP are not completely distinct as they have the same aims but its methods and activities are undeniably poles apart.

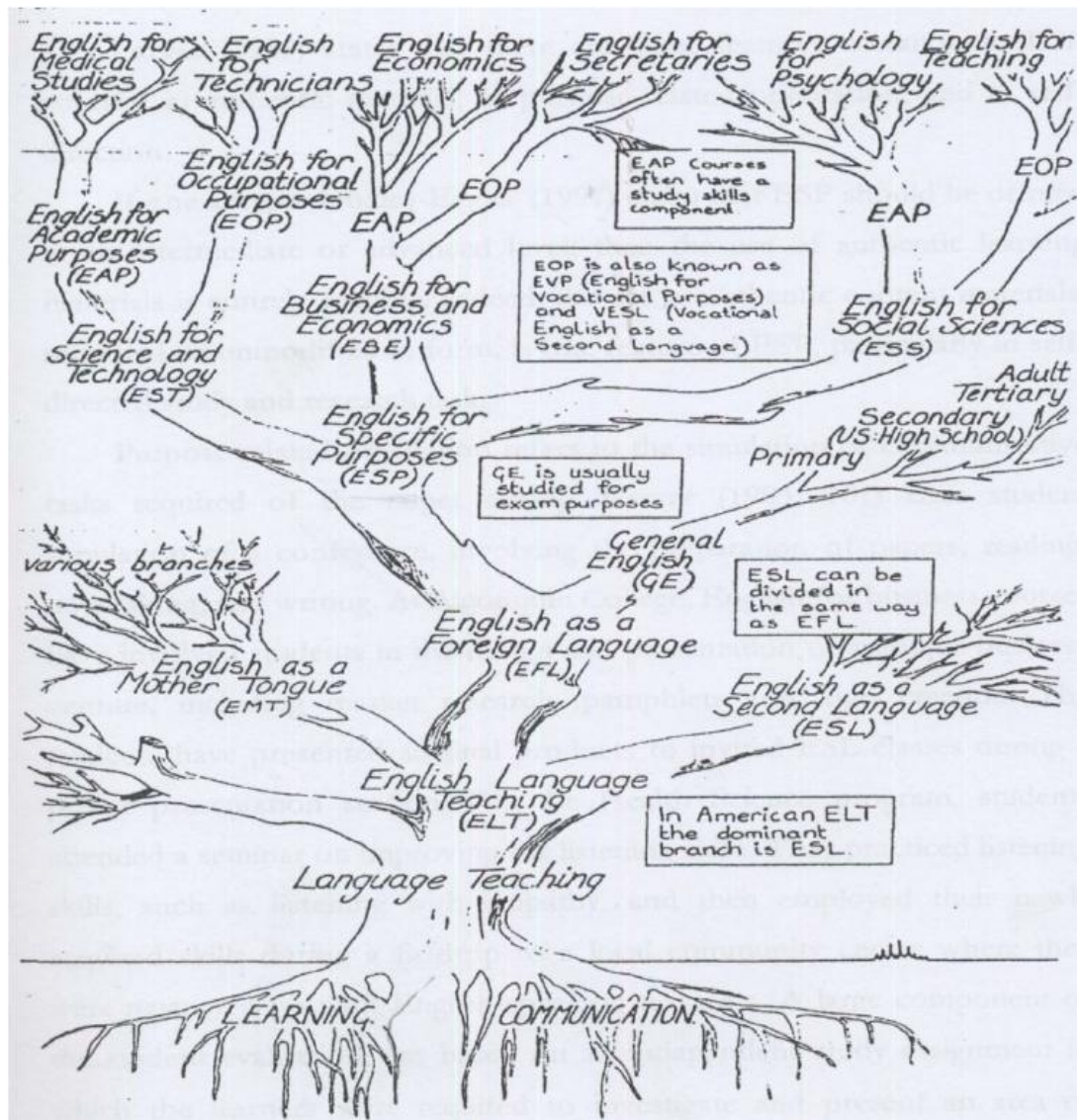


Figure 1.2: ELT Tree (Adopted from Hutchinson & Waters 1987: 17)

1.3 Needs Identification and Analysis (NIA)

Learners' needs are the basic principle in ESP. Hence, the paramount phase in ESP is needs identification and analysis. Needs analysis is the keystone of ESP which directs to a purposeful programme (Ellis and Johnson, 1994). Within this framework, Robinson (1991:7) stated that "needs analysis is generally regarded as critical to ESP, although ESP is by no means the only educational enterprise which makes use of it". However, and according to Hutchinson and Waters (1997) who pointed out that language courses should be built upon needs identification and analysis. On the other hand, Dudley-Evans & St John (1998:121) have this to say concerning needs analysis:

Needs analysis is the process of establishing the *what* and *how* of a course.... needs analysis is neither unique to language teaching-needs assessment, for example, is the basis of training programmes and aid-development programmes-nor, within language training, is it unique to LSP (Language for Special Purposes) and thus to ESP.

ESP needs analysis, thus, is a cornerstone of a course design process be it for academic or vocational purposes. For that reason, in the EOP/EAP context, needs analysis is vital in defining the elements of language that are important for a given field of teaching (West, 1994). They further added the three facets of NIA which are:

First, needs analysis aims to know learners as people, as language users, and as language learners. Second, the needs analysis study also aims to know how language learning and skills learning can be maximized for a given learner group. Third, a needs analysis study aims to know the target situations and learning environment so that data can appropriately be interpreted.

(Dudley-Evans & St John, 1998: 126)

Robinson (1991: 3) insisted on the main principle of NIA which refers to the fact that 'English is used for which purpose ?' by saying that "...which aims to

specify as closely as possible what exactly it is that students have to do through the medium of English". That is to say, it seeks to determine the learners' needs precisely as far as possible so that to identify the several functions of English for carrying out educational or professional purposes. Worth noting that Robinson (1991) countered that needs analysis process ought to be formative and frequent. In addition to this, she said that it is a very revealing investigation of ESP practitioners, subject-specialists, learners and sponsors to uncover views about English language elements (Robinson, 1991).

As a result, needs identification and analysis research has to be conducted by ESP practitioners for valid results. They can obtain data from some sources which are learners, people working, documents related to the discipline, users, colleagues... (Dudley-Evans and St John, 1998). ESP practitioners may use investigation instruments for carrying out a needs analysis process that are interviews, questionnaires, analysis of discussions or written texts, observations and assessments (Robinson, 1991; Dudley-Evans & St John, 1998).

From an historical perspective, the concept of « analysis of needs » first came into sight in the 1920's in West Bengal, a state of India when Michael West brought in the term of "needs" to encompass what learners will be compelled to do with the English language in the target situation and how learners may possibly best command the language during the learning phase (West, 1994). Thereafter, Munby was the first linguist who asserted the term and fundamentals of 'target situation analysis' in 1978 in his significant work called "Communicative Syllabus Design" (Dakhmouche, 2008). The first version that he proposed is known as "Communication Needs Processor" or "CNP" and offers "a highly detailed set of procedures for discovering target situation needs...". As for Hutchinson and Waters (1987: 54) who maintained that "the CNP consists of a range of questions about key communication variables (topic, participants, medium, etc.) which can be used to identify the target language needs of any group of learners." On top of that, one can ask if any ESP course depends heavily on a needs analysis that seeks to identify the

learners' needs and what they have to do by using English. Hence, here arises the question which says what is meant by the word “needs” (Brown, 1995).

1.3.1 Types of Needs

All ESP authorities (Hutchinson & Waters 1987; Robinson 1980, 1991; West 1993), were in agreement with the fact that the concept « needs » is the learners' demands addressing the achievement of some communicative competences successfully in the target situation. “An ESP course will not only involve these requirements but will also consider the different levels of language knowledge of the learners in order to specify the conditions of their learning situation” (Benyelles 2009:26). In view of that, this implies that NIA categorization may be perceived variously. Nevertheless, Target Needs and Learning Needs are the crucial types of needs used by ESP specialists in both the body of literature and in practice (see Figure 1.3).

1.3.1.1 Target Needs

Hutchinson and Waters (1987:54) define “target needs” as « what learners need to do in the target situation ». So to speak, the linguistic aspects required by the learners to attain certain communicative purposes. Moreover, Robinson incorporates elements of the target situation and learners' educational settings: "study or job requirements," "what the user-institution or society at large regards as necessary," "what the learner needs to do to actually acquire the language," "what the students themselves would like to gain from the language course," "what the students do not know or cannot do in English" (Robinson 1991:7-8 qtd in Lamri 2016:12). Besides this division, Hutchinson and Waters suggest additional sections of target needs which are: Necessities, Lacks, and Wants.

- **Necessities:** refers to the academic or occupational demands of the target situation. In other words, what the learners have to be aware of so as to function efficiently in the target situation (Hutchinson and Waters, 1987:55). Correspondingly, needs “are perhaps more appropriately described as objectives” (Robinson, 1991: 7) to be achieved.

- **Lacks:** are linked to what the learners are lacking, that is, what they disregard or are not able to execute in English. Consequently, lacks are the gaps between the actual situation of the learners pertaining to language mastery, and the one which is needed subsequently to the completion of the language instruction or training (Lamri, 2016).
- **Wants:** are related to the learners' personal assumptions and desires for developing English, that is, what they would like to obtain from the language programme. In order to construct the programme content, ESP practitioners should take into account the learners' intentions. In spite of this, in roughly all instances, these diverge with the lacks determined by the ESP teacher or the necessities of the target situation. This variance guides West (1993) to put in 'constraints' as the fourth type of target needs. They are about non-pedagogical restrictions which have power over the course design process owing to this the needs analysts ought to consider them in the NIA study (Benyelles, 2009).

1.3.1.2 Learning Needs

Hutchinson and Waters stressed that the needs analysis of the target situation can make known "What the learners need to learn". Whereas, it is not plentiful, in ESP setting the question "How will the learners learn" in order to learn, is of paramount significance to identify the content of the programme. Accordingly, Hutchinson and Waters (1987:54) label learning needs as "what learners need to do in order to learn". In the same vein, Robinson (1991: 7) states that learning needs are "...what the learner needs to do to actually acquire the language". Along the same lines, learning needs explore information regarding the learning situation which take into account learners' type, learning styles and strategies, cultural backgrounds and English language proficiency, the accessible materials, the available sources of all information which are capable of helping the teacher to

provide the learners with the suitable programme.

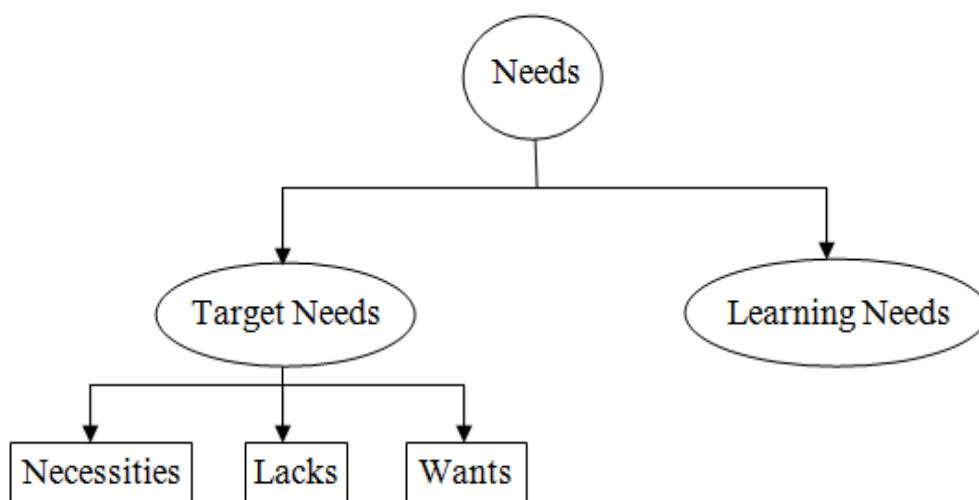


Figure 1.3: Categorization of Needs (Adopted from Hutchinson and Waters, 1987)

1.3.2 Constituents of Needs Identification and Analysis Process

The investigation of the learners' needs seeks to gather information. These information are concerned with describing the Target Situation Analysis (TSA), Present Situation Analysis (PSA) and Learning Situation Analysis (LSA). The three stages are considered as the main components of a needs analysis process.

1.3.2.1 Target Situation Analysis (TSA)

Target Situation Analysis (TSA) refers to a variety of needs analysis, which emphasizes the identification of the learners' language requirements in the vocational or educational situations they are being trained for (Ewer and Hughes-Davies, 1971: 66, qtd in West, 1994). Moreover, Robinson (1991:8) explains that "a needs analysis, which focuses on students' needs at the end of a language course, can be called a TSA (Target Situation Analysis)". Dudley-Evans and St. John (1998:124) put forward that TSA is viewed as « tasks and activities where learners are/will be using English for target situation». In their opinion, TSA broadly utilizes

a questionnaire as the instrument. Dudley-Evans and St. John (1998:124) explain that "TSA includes the objective, perceived and product-oriented needs".

1.3.2.2 Present Situation Analysis (PSA)

Robinson (1991:8) takes the view that "PSA (Present Situation Analysis) seeks to establish what the students are like at the start of their language course, investigating their strengths and weaknesses". Dudley-Evans & St. John (1998) affirm that PSA alludes to strengths and deficiencies in language, skills and learning experiences. ESP practitioner looks for data concerning students' proficiency, perspectives and sources of language teaching and learning. He/ she can gather information from three main sources: the learners, the language-teaching institution, and students' place of work (Richterich and Chancerel, 1980). Besides, ESP practitioners might also examine the encircling community, culture and attitudes carried towards the English language and towards the learning (Richterich and Chancerel, 1980).

1.3.2.3 Learning Situation Analysis (LSA)

According to Dudley-Evans & St. John (1998:124), "Learning Situation Analysis (LSA) includes subjective, felt and process-oriented needs". Furthermore, LSA implies the fact that 'what do learners want to learn'. Dudley-Evans and St. John (1998) posit that LSA denotes valuable ways of learning the skills and language. In their view, LSA refers to 'why do learners want to learn'. They note that the learners' needs are more subjective and derived from cognitive and affective factors (Dudley-Evans & St. John, 1998). They add that process-oriented needs originate from the learning situation.

1.4 Course Design

Once the information are stated after the analysis of learners' needs, the ESP teacher can undertake the next stage which is course design. The course design in an ESP context means the operation of collecting information to develop tasks of use, activities and creating a suitable climate for learning. Hutchinson and Waters (1987: 65) have asserted that a course is "an integrated series of teaching-learning

experiences, whose ultimate aim is to lead the learners to a particular state of knowledge". It is, therefore, the process of choosing and ordering content that suits the teaching/ learning aims and objectives. It comprises of those linguistic aspects, skills, beliefs, and techniques which come across the learners' needs. In this respect, Coffey (1984:4) points out that:

Before a course can be designed, in any of its parameters, the process that Strevens calls 'restriction' must take place: the selection of items and features from the corpus of the language that are relevant to the designer's intention and the student's needs.

He widens Strevens' definition to a large extent, considering that the ESP practitioners have to take different levels of 'restrictions' which are related to the four language skills and the selection of lexis, grammar, and topics that best suit the learners' needs. Additionally, Munby (1978: 2) insists that ESP programmes are "those where the syllabus and the materials are determined by the prior analysis of the communication needs of the learner". This conveys that after exploring the resulting learners' demands from the needs analysis process, ESP teacher designs an appropriate course for his/her learners depending on the availability of teaching materials and the number of his/her students, motivation and interests (Jordan, 1997). Hence, course design is the planning and development of a course to reach the required objectives. As claimed by Graves (1996: 17) that « goals are general statements of the overall, long-term purposes of the course. Objectives express the specific ways in which the goals will be achieved ». That is to say, goals are the final destination, and objectives denote the paths which show how this destination could be reached.

According to Robinson (1991), who accurately concurs with these factors and further adding some others which are the teachers' approaches to the course and syllabus design and the teaching methodology. In this vein, she (1991:34) comments that: « ESP course design is the product between a number of elements: the results of needs analysis, the course designers' approach to syllabus and methodology, and the existing materials (if any) ». In addition to this, Belcher

(2006: 135) has this to say about course design, “ESP assumes that the problems are unique to specific learners in specific contexts and thus must be carefully delineated and addressed with tailors to fit instruction”. The linguist's view refers to the base of a course design which must be the linguistic and communicative learners' needs and requirements. By the same token, Strevens (1977: 90, qtd in Assassi 2017:19) supports this definition noting that « those in which the aims and the context are determined principally or wholly not by criteria of general education but by functional and practical English language requirements of the learner ».

As reported by Hutchinson and Waters (1987:21), the planning and development of an ESP course are focused on wondering about a range of common and definite questions that aid course designers settle on what should be incorporated in the course with reference to methodology, materials, and syllabus. These questions make sure that the designer will take in addition to a course design procedure both time, energy and finances to answer them in order to have appropriate language knowledge for his/her students. Thereby, in order to develop an appropriate ESP course, a number of variables should be genuinely considered. These variables are originality, incorporating the findings of NIA, adapting new and suitable teaching materials and approaches to fit the learners’ needs. Hutchinson and Waters (Ibid) assume that course designers have to take into account the following questions:

- Why does the student need to learn?
- Who is going to be involved in the process?
- Where is the learning to take place? And what potential does the place provide? What limitation does it impose ?
- When is the learning to take place? How much time is available? How will it be distributed?
- What does the student need to learn? What aspects of language will be needed and how will they be described? What level of proficiency must be achieved? What topic areas will need to be covered?

- How will learning be achieved? What learning theory will underlie the course? What kind of methodology will be employed ?

1.4.1 Approaches to Course Design

As stated before, the ESP course design is confined to specific parameters that ought to be considered for an accurate ESP programme. By noting either side of the coin, starting with the information obtained and analysed from the NIA process to the realization of the course aims and target situation linguistic and communicative requirements, the designer goes along with restricted stages. In spite of that, the ESP practitioners are approvingly asked to be creative while designing and implementing the courses, that is, a sense of originality and personal touch must be found in any approach to ESP course design. This has been highly recommended by Hutchinson and Waters (1987: 65), who assume that « there are probably as many different approaches to ESP course design, as there are course designers”. Therefore, ESP experts think that within an ESP context in which certain requirements need to be fulfilled, there must be some sense of creativity so that to bridge the gap between the learners' actual knowledge and what they are supposed to know after the course of instruction. In order to do so, given approaches to ESP course design are presented which are: language-centered, skill-centered and learning-centered approaches.

1.4.1.1 Language-Centred Course Design

A language-centered approach to course design intends to establish a connection between the analysis of the target situation and the content of the ESP course. It is the most prevalent in ESP settings. According to Hutchinson and Waters (1987:67), who claimed that this approach begins with the analysis and examination of the target situation needs of the learners in regards to the adaptation of effective theoretical perspectives of the language. Basically, the information collected from the target situation analysis will be further investigated to determine the essential language elements required. Thereafter, the ESP practitioner will plan an ESP programme or syllabus in which aspects of language and teaching materials are taken into account so that to elaborate an utmost suitable evaluation of the

suggested process and plan of action for the syllabus components. If so to speak, it aims at improving the linguistics competence of learners which is a prerequisite requirement in the learning environment.

Figure 1.4 condenses the whole process of a language-centered approach to course design. As it is shown, this approach is a logical process as it begins with the fact of investigating the learners' target situation needs to the design of adequate materials and then to the evaluation procedures. Despite the fact that this approach looks as if it meets the foremost aims and objectives of any ESP course by identifying the target situation linguistic/communicative demands and make use of them as the base of the planned materials, Hutchinson and Waters (1987:67-68) still discover some weaknesses. As they claim, this approach is deficient in conceding the significance of the learner in every step of the process of designing a course. Weaknesses of language-centered approach to course design demonstrated by Hutchinson and Waters (Ibid qtd in Brahimi 2018: 21) are as follows:

- The learning needs of students are not considered at all in the design process. It is then not learner-centered but merely learner-restricted.
- This approach is a static and inflexible process and contrary to the needs analysis, which is characterized as an on-going process.
- The language-centered approach does not acknowledge the factors playing part in the design of the course such as the types of texts chosen to be incorporated in the course. These texts may be uninteresting to students.

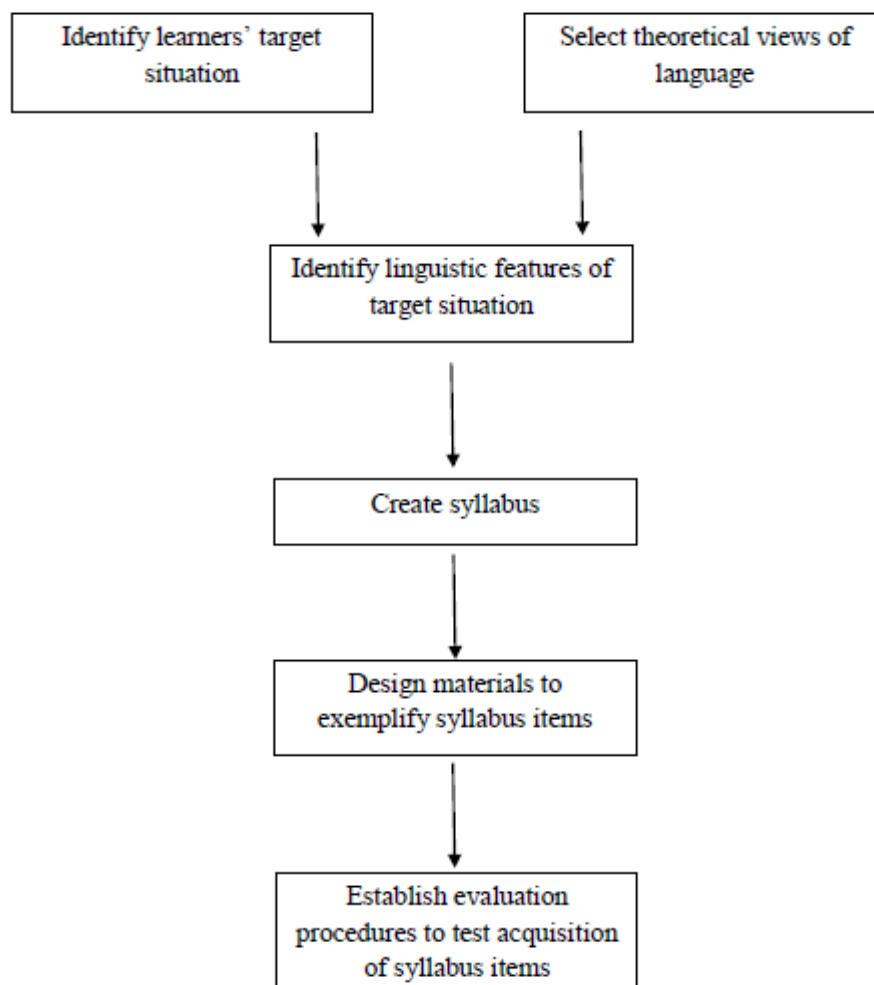


Figure 1.4: Language-Centred Approach to Course Design (Adopted from Hutchinson and Waters (1987: 66))

1.4.1.2 Skills-Centred Course Design

Another approach to course design put forward by Hutchinson and Waters (1987) is a skills-centered course design. It is unlike the previously proposed approach – language-centered course design – the skills-centered approach to course design seeks to improve learners' language skills, strategies and carries on to build up the learners' knowledge even after the end of the course. The figure below illustrates the main stages of the process. As indicated by Hutchinson and Waters (1987: 69) that « the skills-centered course [...] will present its learning objectives (though probably not explicitly) in terms of both performance and competence ». In

other words, it pays more attention to the learner's competence as opposed to the language-centered approach. Moreover, it highlights the skills and strategies that learners need to perform so that to perceive and produce discourse in the target situation. Considering this approach from Holmes' (1982) perspective, skills-centered approach to course design is more than just a goal-oriented operation, i.e. to meet specific aims and objectives at the end of the course of action, but rather it focuses on the learners' achievement regardless to the ESP restrictions which are the available timing along with learners' level.

This approach was first used to meet the learners' demands of the English language in Latin American universities where students have a little mastery of the language at their command. Hence, here lies the first attempt to make the students read specialized texts in English as a bud from which an ESP project flourishes. For Hutchinson and Waters (1987: 70), this approach integrated the learners in its process more than the previous model does (see Figure 1.5). They suggested some features of this approach which are stated below:

- It views language in terms of how the mind of the learner processes it rather than an entity in itself;
- It tries to build on the positive factors that the learners bring to the course, rather than just on the negative idea of 'lacks';
- It frames its objectives in open-ended terms, so enabling learners to achieve at least something.

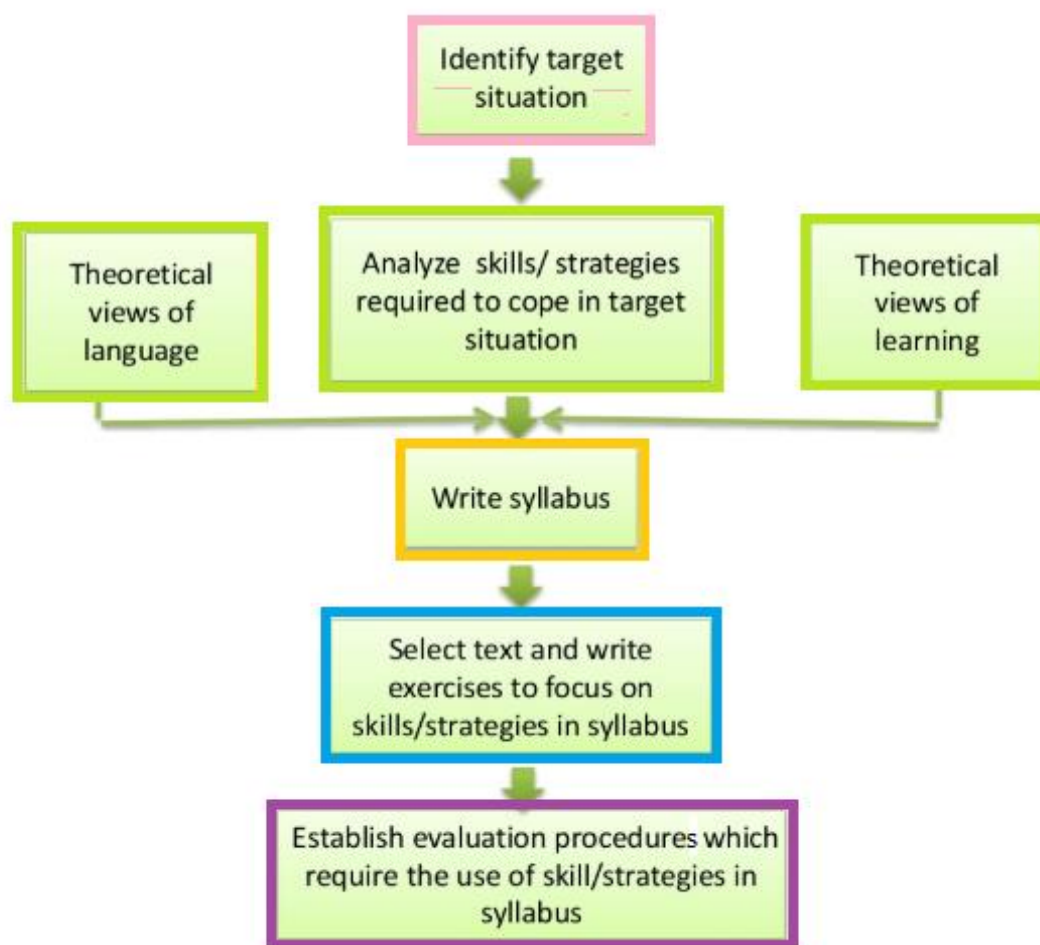


Figure 1.5: Skills-Centred Approach to Course Design (Adopted from Hutchinson and Waters (1987: 71))

1.4.1.3 Learning-Centred Course Design

Notwithstanding the foregoing, a skills-centered approach to course design regards learners as users of the language more than a learner of a language. Accordingly, this directs Hutchinson and Waters (1987) to propose the third approach to course design that is the learning-centered approach. In contrast to the two previous approaches of course design, learning-centered course design considers a learner as a cornerstone of the whole process. This has been clarified by Hutchinson and Waters (1987: 72) « learning is seen as a process in which the learners use what knowledge or skills, they have in order to make sense of the flow of new information ». That is to say, this approach deems learners as the utmost

element in the action plan by identifying their knowledge and skill so as to get hold of new pieces of information.

It refers also to the way the learner acquires information. In the same vein, they (Ibid) carry on saying that « learning, therefore, is an internal process which is crucially dependent upon the knowledge that learners already have and their ability and motivation to use it ». Thus, the main principles of a learning-centered approach to course design are learner competence, motivation, and performance. As an explanation of this, motivated learners in this approach acquire new aptitudes based on the prior knowledge and competence that they had so that to achieve an efficient performance.

The framework of a learning-centered approach to course design points up the significance of the learners in the process since they determine the paths they desire and the speed rate which best fit their needs to perform effectively in the target situation. The whole process starts (see Figure 1.6) from the identification of the ESP learners, then goes to the analysis of both the learning and target situations based on the theoretical views of language learning. Worth mentioning that the ESP practitioner has to elaborate an appropriate syllabus without paying attention to the constraints of the teaching and learning situation which its importance is not to be taken for granted. Syllabus development comprises the selection of teaching materials, language elements, skills needed by the learners in the target situation. Finally, evaluation refers to the constant operation in which the ESP practitioners test the learners' achievement and evaluate the efficiency of the course.

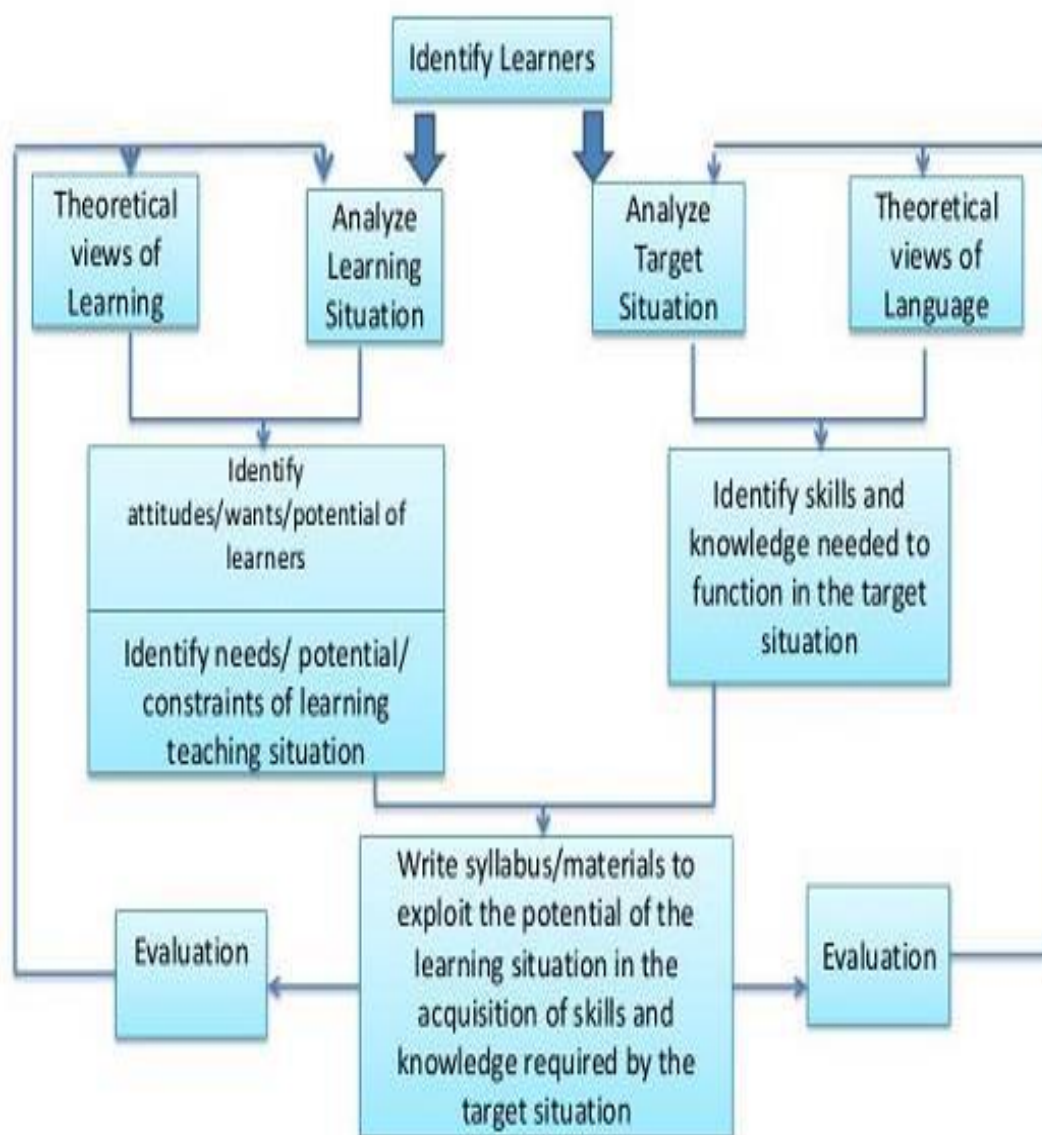


Figure 1.6: Learning-Centred Approach to Course Design (Adopted from Hutchinson and Waters (1987: 74))

All in all, the three approaches to course design, as asserted by Hutchinson and Waters (1987:72), can be deemed as compatible (see Figure 1.7). Whilst the language-centered approach neglects learners' needs and learning constraints, the skills-centered approach focuses on students' learning demands by aiding them to accomplish the planned objectives and goals within the particular restrictions. The learning-centered approach draws a conclusion on that matter considering from the very beginning theoretical perspectives of language and learning for syllabus and materials elaboration. Hence, syllabus development depends heavily on the nature

of the course and the learners. For this reason, ESP practitioners can opt for a suitable approach for teaching ESP. As a summary, Hutchinson and Waters (1987:72) have this to say about the three approaches in integration:

- A language-centered approach says this is the nature of the target situation performance and that will determine the ESP course.
- A skills-centered approach says that it is not enough. We must look behind the target performance data to discover what processes enable someone to perform. Those processes will determine the ESP course.
- A learning-centered approach says that it is not enough either. We must look beyond the competence that enables someone to perform, because what we want to discover is not the competence itself, but how someone acquires that competence.

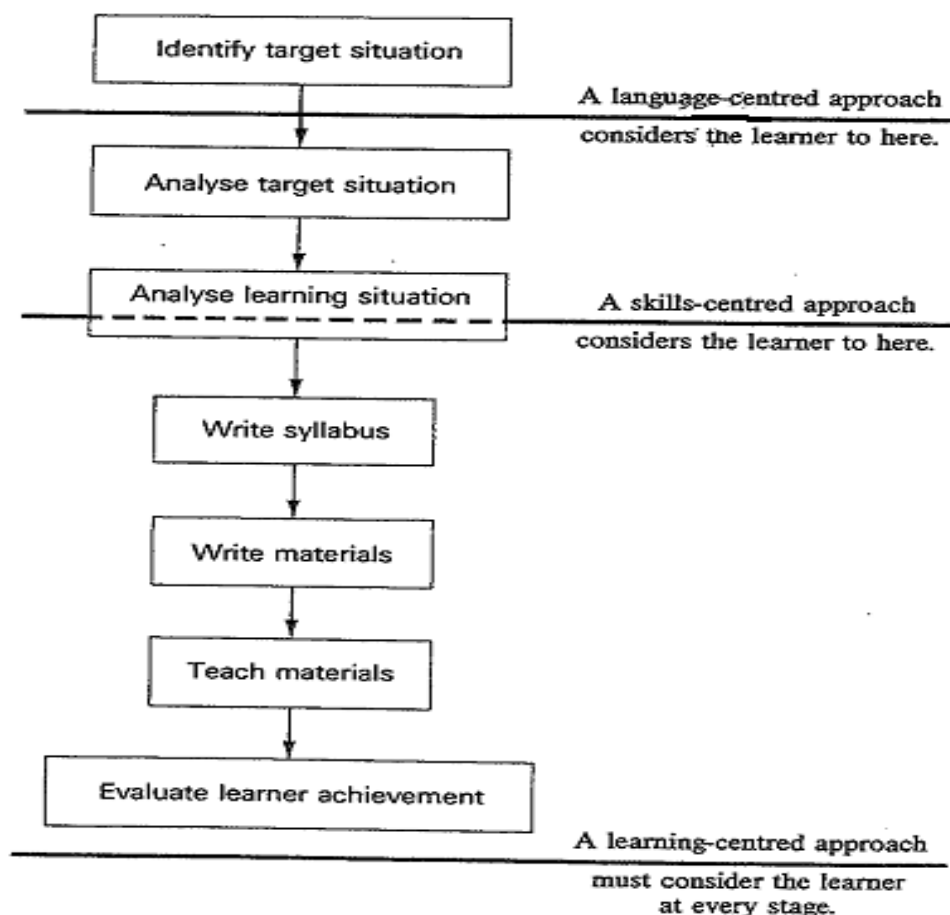


Figure 1.7: Comparison of Approaches to Course Design (Adopted from Hutchinson and Waters (1987:72))

The ESP researcher or practitioner must take every element of each stage into account so as to ensure the smooth running of the teaching/learning process. Moreover, the course designers need to deem several variables before elaborating the content of their programme. For the simple reason which indicates the fact of the components interrelatedness. That is to say, each section is closely connected to the other and they affect each other. As a matter of fact, both learning and target situations, for instance, influence the development of the syllabus, its nature, the teaching materials along with both the teaching methodology and the evaluation operation. In order to carry out this study, the researcher opted for Hutchinson and Waters' model of Needs Identification and Analysis (NIA) in view of its adaptability regarding data collection tools. It, also, considers learners' needs from various perspectives which warrant the designers to create balanced content for the programme based on his/her students' personal requirements which should not be taken for granted. ESP practitioners ought to consider some features of the ESP course so as to fulfill the proposed goals and objectives along with the course effectiveness.

1.5 Features of ESP Course

The main characteristics of an ESP course are said to be authentic materials, purpose-related orientation and self-direction. ESP experts like Gatehouse (2001) and Carter (1983) declare that these features are of great importance when designing an appropriate course for ESP learners. They are discussed briefly in the following lines.

1.5.1 Material Authenticity

The development of ESP teaching materials is not as straightforward as it might seem to be. Nevertheless, selecting mainly authentic materials to be implemented in the ESP teaching/learning environment may help both the ESP teacher and his/her learners to assimilate the course of instruction while being engaged and motivated. As stated by Dudley-Evans and St. John (1998) besides Safont and Esteve (2004) that authentic materials are crucial playing pieces in the board of ESP chess which should be moved in terms of special rules. These rules of

authentic materials have an immediate link to the selection of reading materials. The implementation of reading materials in an ESP class must look for texts that are within reach of learners' target situation in terms of their academic or professional purposes (Wegner, 2008:137). This was highly proposed by Sznajder (2001: 390 qtd in Assassi 2017:32) saying that authenticity "refers not only to the form, content and the communicative goal of a text but also and most importantly, to the purpose of reading". Moreover, other rule favours the increase of students' motivation and interest in the ESP class by using interactive items such as pictures, videos, diagrams and so forth. When making use of these materials to illustrate the content of the provided texts, students will be inspired and encouraged to acquire the knowledge required (Berardo, 2006). In addition to this, the use of the Internet as a provider may help as well the ESP teacher to improve the quality of texts by symbolizing their contents to meet the learners' needs. As reported by Bocanegra-Valle (2010) that the Internet offers diversity to the teacher as it is a source of present-day materials. On the whole, Harding (2007: 10) advocates the following principles to aid the ESP teacher along the way for selecting and implementing authentic materials:

- Think about what is needed;
- Understand the nature of your students' subject area or vocation;
- Spend time working out their language needs in relation to the subject;
- Use contexts, texts, and situations from the students' subject area;
- Exploit authentic materials that the students use in their specialism or vocation;
- Make the tasks authentic as wells as the texts;
- Motivate the students with variety, relevance, and fun;
- Try to take the classroom into the real world that the students inhabit, and bring their real world into the classroom.

1.5.2 Purpose-Related Orientation

Purpose-related orientation is linked to the students' awareness of the required skills, language items, tasks and activities in the target situation. As an explanation for this, ESP students as adult learners, they are fully attentive to their paths orientation to meet their target needs. In other words, ESP learning for them is more or less project-oriented learning. Therefore, purpose-related orientation is considered as “the stimulation of communicative tasks required for the target setting” (Graia Bouklikha, 2016: 38). As an instance of these tasks in regard to purpose-related orientation, Carter (1983) proposes that learners’ simulation of a conference includes preparation of papers, reading, note-taking, and writing.

1.5.3 Self-Direction

Self-direction refers to the learners’ personal touches taking decisions of what, when, and how they will approach and achieve the desired purposes in their ESP class. Accordingly, Carter (1983: 134) declares that “... point of including self-direction ... is that ESP is concerned with turning learners into users”. From his view, ESP students are considered as users more than learners. They are free to choose what best suits their communication needs using their learning styles and strategies to acquire new knowledge.

1.6 Syllabus Development

Once again elaborating an appropriate syllabus for a given group of ESP learners in a particular situation so as to come across their needs is not an easy task for ESP practitioners. For no other reason than there are several variables and parameters which ought to be taken into consideration by the syllabus designer. Consequently, it is evident to assert the definition of ‘syllabus’ so that to have a better understanding of what this concept is about in education.

According to Hutchinson and Waters (1987: 80), ‘syllabus’ refers to “... a document which says what will (or at least what should) be learnt”. Along the same lines, Robinson (1991: 34) claims that the syllabus is "a plan of work and is, thus, essential for the teacher, as a guideline and context of class content”. This definition

highlights the fact that the syllabus is connected at first with the ESP teacher, and then on how he/she plans the courses. Moreover, Nunan (1993: 3) defines the syllabus as a « series of accounts and records of what actually happens at the classroom level as teachers and students apply a curriculum to their situation ». However, syllabus and curriculum may be used interchangeably in the educational setting so that one should consider making a clear cut distinction between the two. In order to make this clear, while curriculum denotes the general statements about learning and content of a programme of instructions for a specific subject matter within an educational institution or system (Stern, 1983), syllabus is a « document which says what will be learnt » (Hutchinson and Waters, 1987:80 qtd in Brahim 2018: 26) - a list of content for a course during instruction.

For Basturkmen (2006:20), she adds that “in order to specify what language will be taught, items are typically listed and referred to as the syllabus”. She symbolizes the definition by providing syllabus characteristics as listed below in Table 1.1. On the other hand, Brown (1995) proposes seven types of syllabi or seven modes in which the teacher can elaborate his/her syllabus content: notional, situational, structural, functional, topical, skills, and task-based syllabus. From Harmer's (2001) current point of view, he adds in addition to these seven other approaches to develop the syllabus content like grammar syllabus, lexical syllabus, multi-syllabus syllabus, and content (topic) syllabus. In the present investigation, the researcher takes into account syllabus development as soon as she formulated the course goals and objectives. In addition to this, she opted for the suitable approaches (content and task-based approaches) to be adopted so that to instruct the written discourse for computing purposes, besides the proposed syllabus comprises of content and items that ought to be included in an ESP programme.

A syllabus:

- 1- Consists of a comprehensive list of
 - content items (words, structures, topics)
 - process items (tasks, methods)
- 2- Is ordered (easier, more essential items first)
- 3- Has explicit document
- 4- Is a public document
- 5- May indicate a time schedule
- 6- May indicate preferred methodology or approach
- 7- May recommend materials

Table 1.1: Characteristics of a Syllabus (Adopted from Basturkmen 2006:21 qtd in Lamri 2016: 14)

1.6.1 Content-Based Syllabus

Content-based approach to syllabus development is considered to be an instructional approach using content from other disciplines like biology, chemistry, and dentistry to teach language so that to offer context for language learning. (Mohan, 1986). In the same vein, Mohan's Language and Content examined the different ways wherein the subject matter and the learning of a language can be achieved (Brinton, 2003 qtd in Villalobos 2013: 72). The aim of this approach is to create a significant context for language learning.

Its origins can be traced back as early as St. Augustine. The genuine scheme of supporting language teaching through content is for sure not a brand new idea. Afterward, Mohan's work in the mid-1980s was the first publication of what is known today as Content-Based Instruction (CBI) (Villalobos, 2013). Brinton et al. (1989) have this to say concerning CBI backgrounds:

Once things are known knowledge of words follows... we cannot hope to learn words we do not know unless we have grasped their meaning. This is not achieved by listening to the words, but by getting to know the things signified. (Brinton et al. 1989: 4)

Content-based instruction is an approach in which learners get hold of the target language through content. As viewed by Richards and Rodgers (2001), they comment that “Content-Based Instruction refers to an approach to second language teaching in which teaching is organized around the content or information that students will acquire, rather than around a linguistic or other types of syllabus” (Richards & Rodgers, 2001: 204). Moreover, “the teaching of language through exposure to content that is interesting and relevant to learners” (Brinton, 2003: 201). That is to say, content denotes the subject matter that helps learners assimilate the language because it contains « topics or themes based interest or need in an adult EFL setting, or it may be very specific... » (Snow, 2001: 303).

The integration of both content and language seeks to provide learners with opportunities to better perform in the target situation. This implies that the approach targets attuning language activities to the subject matter being instructed. As for Muphy and Stoller (2001) CBA (Content-Based Approach) emphasizes twofold principles. These principles are, firstly, teaching content of the subject matter through the use of the English language. Secondly, the content-based approach must highlight content themes, topics and tasks in order to teach and learn the language. In sum, courses have two for one and are either content or language-focused, i.e, learners take the best of both worlds. Table 1.2 illustrates this incorporation within a CBI course. By the same token, Stoller and Grabe (1997) declare that this approach is about incorporation saying that it allows for different elements integration like grammar, skills, and functions, thus to meet learners’ linguistic and content requirements in the discipline.

CONTENT-BASED LANGUAGE TEACHING: A CONTINUUM OF CONTENT AND LANGUAGE INTEGRATION	
Content-Driven	Language-Driven
Content is taught in L2.	Content is used to learn L2.
Content learning is priority.	Language learning is priority.
Language learning is secondary.	Content learning is incidental.
Content objectives determined by course goals or curriculum.	Language objectives determined by L2 course goals or curriculum.
Teachers must select language objectives.	Students evaluated on content to be integrated.
Students evaluated on content mastery.	Students evaluated on language skills/proficiency.

Table 1.2: Continuum of Content and Language Incorporation²

1.6.2 Task-Based Syllabus

The essence of a task-based syllabus based on which ESP designers elaborate their teaching content is the set of adequate activities and tasks that specific learners are asked to execute using the target language. Its principles are drawn from a learning-centered approach that revolves around the importance of learners in an ESP context through using tasks as the gist of the courses of instructions rather than language elements. It highly supports the use of authentic tasks in real-life situations therein learners are more involved in purposeful, goal-oriented communication to meet their requirements.

Breen (1987: 161) defines a task-based syllabus bringing to light its content and methodology. He notes his definition in three standards: (a) its representation of communicative competence as the undertaking and achievement of a range of tasks; (b) its reliance on the contribution of learners in terms of the prior communicative

² Adopted from <http://carla.umn.edu/cobalt/modules/principles/decisions.html>

competence which learners bring to any task; and (c) its emphasis upon the learning process as appropriate content during language learning. It explores the learners' communicative competence in target, learning and present situations when performing a task. Moreover, in order to have a full understanding of the task-based approach to syllabus development, there must be a clarification of the innermost concept of the syllabus, which is 'task'.

Worth mentioning at this level of analysis that the term "task" has been used to cover various activities in language classes like grammar activities, homework, practice exercises...However, Nunan (2001) clarifies the types of tasks used in the task-based syllabus to avoid confusion. He distinguishes between task, exercise, and activity. First of all, exercise has a limited emphasis on a given language aspect. Nevertheless, a task is seen as a communicative act that does not usually have a limited emphasis on a specific grammatical structure and which has a non-linguistic outcome. Lastly, the activity usually has a limited emphasis on one or two language elements but also has a communicative outcome (Bouzid, 2012).

From Crookes' perspective (1986:1), a task is considered as what the learners do in the classroom as « a piece of work or activity, usually with a specified objective, undertaken as part of an educational course, or at work ». However, Nunan's (1989: 10) definition seems to be clearer as it provides an explanation to the communicative task which is:

A piece of classroom work which involves learners in comprehending, manipulating, producing or interacting in the target language while their attention is primarily focused on meaning rather than on the form. The task should also have a sense of completeness, being able to stand alone as a communicative act in its own right.

From his point of view, Nunan (1989) stated that communicative tasks refer to learning/pedagogical tasks which are classroom work in which learners are asked to use language. Within communicative tasks, students, also, are required to focus on meaning in order to accomplish objectives which are about grammar to facilitate

learners' expression of various communicative meanings. One can deduce that the task is directed toward goals to be achieved. Consequently, learners perform a task so as to reach the desired end through their speech or action. In the same line, these tasks are closely related to communication and negotiation as significant elements to learn the target language rather than just learning about language elements solely.

1.7 English for Science and Technology (EST)

English for Science and Technology (EST) is a subdivision of ESP. Its main focus is those learners who tend to be enrolled in scientific and technological majors. EST can be furthermore split into sub-disciplines, as Swales' (1988: 89) diagram illustrates (see Figure 1.8). It could be viewed from both perspectives: EOP and EAP. That is to say, it could be for academic purposes if it is included within an educational curriculum at university or college so as to help learners perform academic activities like reading, writing. However, it could fit professional purposes as well in case EST is designed for learners who attend occupational institutions and willing to pursue a vocational career in their discipline like English for technicians (Hutchinson and Waters 1987). Consequently, the EST program can be elaborated for academic purposes as well as occupational purposes. Thus, teaching English to members of a petroleum enterprise staff, for instance, they are not required to write academic articles, presenting research data to college lecturers but rather EST would help them accomplish their daily work requirements.

EST is a variation of discourse. Therefore, scientific texts are unlike literary texts. The main features that distinguish a scientific text from a literary one and make it unique regarding the other genres are called registers. Register means varieties of English language (Reid, 1956; Halliday et al 1964). It is a subcluster of a language that is used for specific purposes and in a certain social context. Language may show a discrepancy at the level of function/situation to be used in, vocabulary along with grammatical structures as well. Bhatia (1993:17) declares that for instance, « a scientific research article in an instance of scientific language as is an extract from chemistry lab report ». From his explanation, one can determine the specific social situations in which specialized registers are used for

various academic and vocational purposes such as chemistry lab reports, news reports and so forth. In addition to this, Halliday and Hasan (1976) insist that register is typical language elements linked to certain situational varieties in the discipline. Within the specific discipline, the particular set of texts are the entire events of the field in which these texts function altogether so as to fulfill certain purposes.

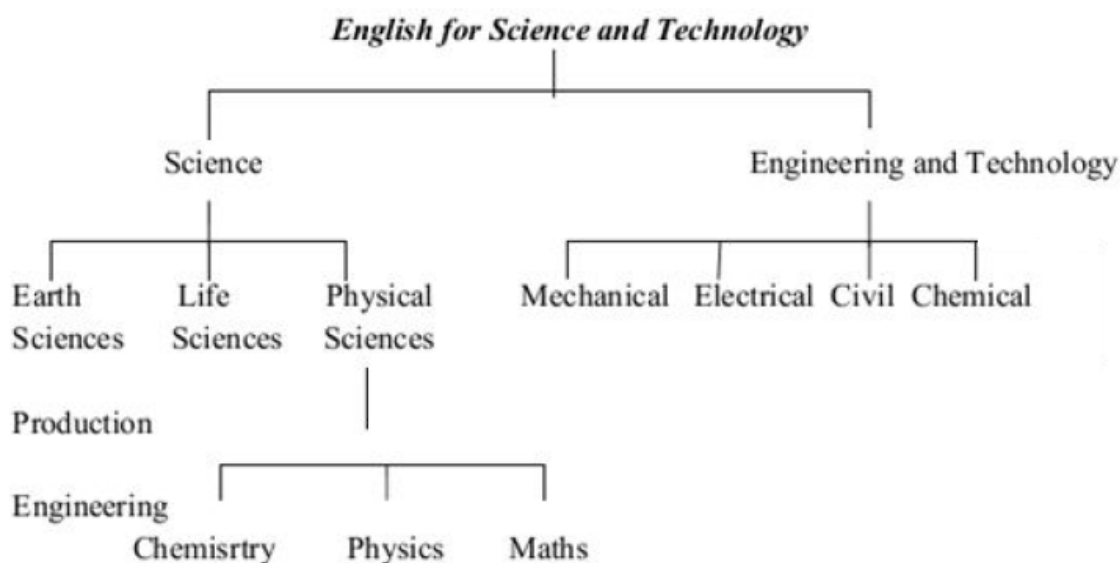


Figure 1.8: Sub-Branches of EST (Adopted from Swales, 1988: 89)

1.7.1 English For Computer Science

English has claimed its dominant position after World War II. It became the language of commerce as well as the language of science. In 1981, the English language secured its role mostly in scientific publications (by 80 %) incorporating books, journals ... (Crystal 1997:2). Scientific publications predominantly in exact sciences like mathematics, physics and computer sciences. On top of that, science ought to be pictured through the use of global language which is English. As a result, scientific English can be seen as an English variety. Its characteristics are closely related to specific register, i.e. specialized vocabulary, grammar in scientific texts. Scientists use scientific descriptions in their articles applying certain language

elements in order to avoid subjectivity and bias, for example, the use of passive voice.

Computing science English as one of the different disciplines has distinct textual patterns. Computer Science texts comprise of more nouns than verbs, especially compound nouns like bubble memory, index cards, programming languages... These texts have also the characteristics of using discourse markers to elucidate meaning or deny it such as although, therefore, however... Within these texts, scientists may use phrases like to analyze, to focus on, to process in ...according to these attributes of computer science texts, one can say that computing sciences English is about the form of sentences as well as semantic features of these statements. Computer science texts are regarded as stylistic, formal and some degree of modality. The former means that the style of science and technology is used to write computer sciences texts like technical reports, articles. This variety considers formality as well (formal, colloquial) along with modality which is about achieving objectives according to each type of texts: scientific articles, technical reports...besides, these texts are full of technical terms in English for instance, hub (the basic network that connects different computers³), reel (open reels refer to magnetic tape for data storage (Clements, 2013⁴), database, data processing...

1.7.1.1 Computer Science Discipline: Definition

Computer science discipline historical background traced back to the 1940s. Afterward, twenty years later, it emerged as a major which stands on its right (Bell et al 2006). It developed due to the advancement of data structure. According to Bell et al (2006:4), Computer Science (CS) is « a rich subject concerned with what computers can and cannot do, how to approach problems, and how to make computers more valuable to their users ». Moreover, computer scientists assume at that time that computers have an important role in our new modern lives all over the world, and throughout time every one of us will possess several computers for

³ <https://www.computerhope.com/jargon/h/hub.htm>

⁴ Clements, A. (2013). *Computer Organization & Architecture: Themes and Variations*. Cengage Learning. ISBN 1285415426. Archived from the original on 2017-11-20.

various aims. According to them, computers are more than just a technical device, it is rather a set of effective processes, algorithms, programs and so forth. It is about building computers based on writing programs.

For Denning et al. (1989: 12), “the discipline of computing is the systematic study of algorithmic processes that describe and transform information: their theory, analysis, design, efficiency, implementation, and application”. CS is about algorithmic solutions for problems, information processing, computer design, and computer programming (Brookshear, 2012). Computer Science as a field studies the algorithmic operations analytically by means of a whole description of the analysis, theory, design implementation and efficiency (Denning et al, 1989). He further states that “in 1989, we used the term ‘computing’ instead of ‘computer science’, mathematics, and engineering’. Today, computing sciences, engineering, mathematics, art, and all their combinations are grouped under the heading ‘computer science’” (Denning, 1989: 28). Computer science refers to the hidden process of design and information rather than computer users. Additionally, CS is defined by Spraul (2005 :3) as “a branch of science that studies computers”. It is connected to software design, use, and hardware use, as shown in the following diagram (Figure 1.9).

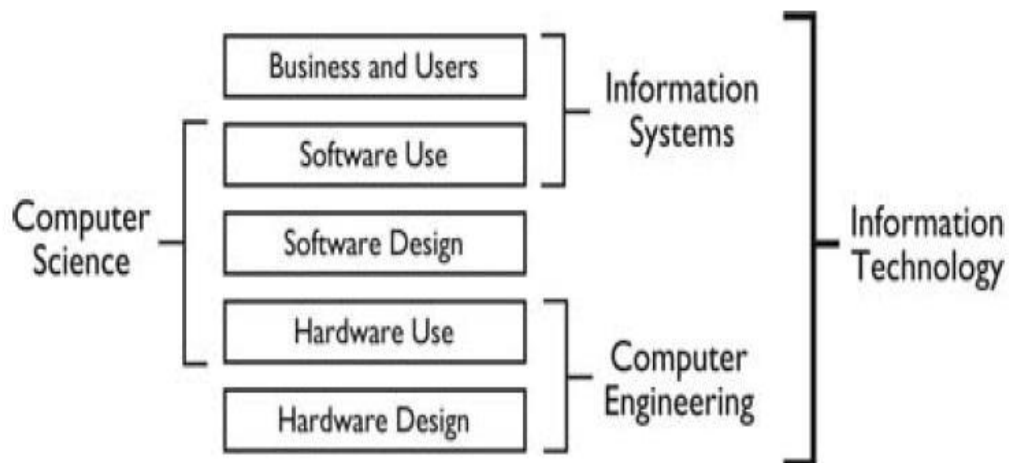


Figure 1.9: Computer Science Field (Adopted from Spraul 2005: 109)

1.7.1.2 Areas of Specialism in Computer Science

Computer science can be further subdivided into other fields of study. In line with Spraul (2005:5), who states eight different subject areas in computer science. Firstly, artificial intelligence refers to programming computers to make activities that necessitate intelligence when humans are doing them. The theory of computation is an area in which we make boundaries on what can be computed. Then, human-computer interaction is related to understanding how people and computers can work together. Next, information management is a study in which we understand how to access, store, create and share databases. Computer graphics refer to images creation through computers. Software engineering tackles processes of providing software. Myths, next, are linked to what people said in the field like CS is for geniuses, it suits men better than women, i.e. it is about the place of work and what relates this. Finally, computer security facilitates the protection of data which the computer stores them from being hacked. Spraul (Ibid) further adds that « Within the computer science field, scientists can work in many areas. Depending on the profession, some scientists may need to know a little about each area, while others may need deep knowledge of one or two areas ». As a result, computer scientists can be a system manager, network manager, software engineer, and a programmer as well.

1.7.2 Specialized Discourse in Computer Science

In English varieties, the focus is on both texts and discourse. Consequently, the term discourse means « the language above the sentence » (Stubbs, 1983: 1). However, and as reported by Widdowson (1983:26), a text « is what is said; from linguistic properties to communicative functioning ». Put it differently, discourse is identified as “a serious speech or piece of writing on a particular subject” (Summers, 2001:388). Hence, it has to do with both the spoken and written forms of language use. Moreover, Carter (1993) declares that the 'discourse/text' dichotomy is often related to the 'process/product' dichotomy correspondingly.

In this respect, ESP practitioners must be aware of the difference that lies between scientific discourse and literary discourse. Scientific discourse is

categorized by specific elements like the use of passive voice in technical texts, for instance, this sentence 'second-generation computers worked faster than their predecessors because of the use of transistors instead of vacuum tubes'. As we can notice, the terms used within this statement are highly technical; however, grammatically speaking, the sentence structure is not different from general English (Cherchab, 2012:32). As previously mentioned, the register is a language variation used in different situations according to several purposes. Halliday and Matthiessen (2004) proposed a register model for language systems in order to be classified regarding the lexico-grammar, semantics, and context of a text. Worth noting that the researcher in her investigation focuses on written discourse rather than spoken one. For the simple reason that in the case of CS, ESP learners have different types of texts. Moreover, they are asked to read and compose written academic texts using a computer science register.

Accordingly, this what the term 'specialized' implies, it means particular situations in which ESP learners are required to meet certain goals to acquire English. As affirmed by Harmer (1983:1) that ESP is concerned with « Situations where the student has some specific reasons for wanting to learn a language ». To sum up, the specialized discourse tends to build up the learners' competencies in their field of specialism and workplace using the English language suitably in particular situations.

1.8 Writing Skill: Definition

Writing is a type of communication that permits writers to express their feelings, ideas and facts through meaningful texts. Written discourse should be well formulated to be intelligible to receive. In this respect, Harmer (2001:246) has this to say « in order for communication to be successful we have to structure our discourse in such a way that it will be understood by our listeners or readers ». Writing, thus, is a way of expressing language in a visible form.

Writing is an essential productive language skill which is crucial for teaching/learning operation, ordered according to the way they are taught i.e.

Listening, Speaking, Reading and Writing. As a matter of fact, there exists no single definition of writing. For Daniels and Bright (1996:03) writing is « a system of more or less permanent marks used to present an utterance in such a way that it can be recovered more or less exactly without the intervention of the utterer ». In the same vein, Coulmas (2003:100) defines writing as « a set of visible or tactile signs used to represent units of language in a systematic way, with the purpose of recording messages which can be retrieved by everyone who knows the language in question and the rules by virtue of which its units are encoded in the writing system ». The previous definitions highlight that the writing system of a given language has a set of rules which govern the whole process of writing using observable letters. However, according to Fischer (2001), writing must accomplish specific criteria to be a 'complete writing system'. These standard criteria are conventional to formulate words, clauses, sentences, and texts, as expressed below:

- Communication is the purpose.
- It has to contain graphic marks.
- Those marks need to be conventionally linked to uttered speech so as to attain communication.

In addition to this, Badger and White (2000:157-158) state that « Writing involves knowledge about language, knowledge of the context in which writing happens and especially the purpose and skills in using language ». This means that from the above definitions, writing offers the writer or the learner with an ability to master an effective knowledge about the language. All in all, writing skill helps its learners to develop along with written discourse, planning, reflecting, drafting, summarizing and revising. Hence, the capacity to write accurately to transmit the exact message is a cornerstone skill for the learner.

1.8.1 Writing Skill Process

Linguists categorize five stages of the writing process. Writing is regarded as an important way of communication owing to these learners who wish to write accurately have to exercise these five steps of the process which are prewriting, drafting, revising, editing, and publication. Moreover, for Grabe and Kaplan

(1996:06) writing is «a set of skills which must be practiced and learned through practice ». From their explanation, we can say that written expression should be experienced many times over. Tribble (1996:39) illustrates the five stages of the writing process (Figure 1.10), as displayed below :

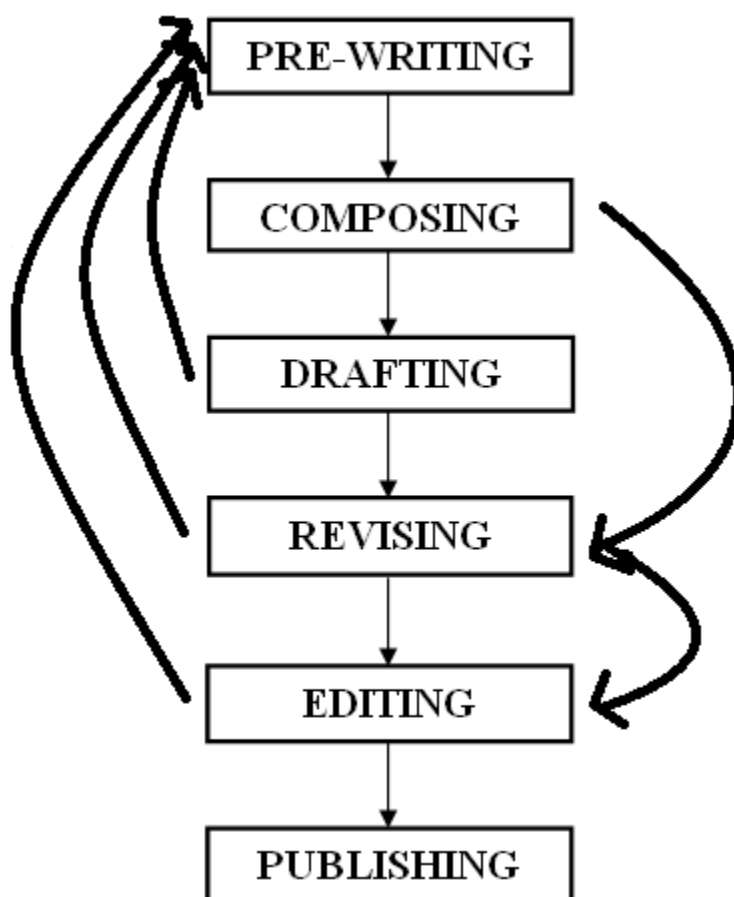


Figure 1.10: Writing Skill Process (Adopted from Tribble, 1996:39)

- **The Pre-Writing Stage** refers to brainstorming because the learners here are going to choose their theme of interest and plan their outline. (Bouyakoub, 2012).
- **The Drafting Stage:** the first rough copy made by learners is the draft that needs to be corrected by the instructor (Hamzaoui, 2006).
- **The Revising Stage:** In this stage, learners re-read their drafts and adjust them properly (Ibid).
- **The Editing Stage:** it includes editing at the level of grammatical patterns, lexis, sentence structures ... (Ibid)

- **The Publishing Stage:** learners come up with their final pieces of writing which were edited and modified (Bouyakoub, 2012).

1.8.2 Approaches to Teaching Writing Skill

ELT teachers provide several approaches to teach writing skill. For them writing skill is considered as a non-instinctive but rather an acquired skill that demands much practice to master. In the same vein, Walters (1983) considers writing as the final skill to be acquired and most likely the hardest skill students learn if they ever do. For this reason, educationalists tend to offer two main approaches to teach writing which are: product-oriented approach and process-oriented approach.

- **The Product-Oriented Approach** refers to the final production, as its name implies. The main focus is on the last piece of writing which a learner composes (White, 1988).
- **The Process-Oriented Approach:** It came as a reaction against the restrictions of the product approach. Writing act has been perceived as a process, rather than a 'product' that consists of several stages; pre-writing, composing/ drafting, revising, editing (Tribble, 1996)

1.8.3 Reading Skill to Enhance Written Expression

Reading and writing as distinctive skills are said to be closely related to each other. The relationship between the two seeks to enhance learners' outcomes of the overall foreign language learning. This has been affirmed by Hyland (2003:53), who insists on the interrelatedness between reading and writing, and he associates them with intellectually educated people. He claims that « writing, together with reading, is a central aspect of literacy ».

The students have a tendency to improve their writing capacity through reading. As an illustration, learners who start reading in the English language at the beginning of the academic year, have no problems when it comes to writing expression and they can perform any written task given by the teacher. Thus, through reading, they have developed what we called a 'good writing style'. In the

same line of thought, Harris (1993) proposes principles that express the interconnection between reading and writing reported as the following:

- a. The reading and the writing skills belong to the individual as well as to the social activities as a means of communication.
- b. These two skills; reading and writing are mutual and current. As a matter of fact, students get knowledge about their writing through reading, and they learn about their reading abilities through writing.
- c. Writing and reading are interrelated, i.e., if there is no writing, there are no readers at all.
- d. Writing and reading are used side by side since they share the same objective, and attached to learning and contextual meaning.
- e. Readers in their reading and writers with their products have the opportunity to detect the world.

In recent times, ELT teachers tend to give considerable value to reading and writing as they noticed learners' deficiencies in the language. Consequently, they insist that the two skills are the lack of knowledge in FL. Thus, they claim that those two academic skills complete each other. ELT teachers highly recommend reading as a strategy for writing enhancement. Building up strong reading habits immediately lead to an adequate written production. Accordingly, it falls to the ELT teachers to provide their learners with a variety of reading materials in order to help them practice writing. By the same token, Ourghi (2001-2002:242) comments that «by choosing a topic that involves learners, the teacher is providing a context within which effective learning on the target writing aspect can be undertaken ». As a result, the ELT teacher's role is to enhance his/her learners' English language learning by developing writing skill through reading.

1.8.4 Writing Skill in ESP

English for specific purposes is about knowing a specialized portion of the language along with the ability to perform this part using language skills. Accordingly, the emphasis of every ESP course should be on improving mainly language skills: listening, speaking, reading and writing. For this rationale, recently, ESP teachers have a tendency to incorporate writing skills in their programme

courses for the reason that they regard these skills as important bricks for their students' specific learning. ESP students need to develop their writing expressions to explore the specific related text in the field and to write formal papers. Since writing is linked with organizing ideas while explaining inner thoughts so as to transmit a message for the reader, therefore, learners are asked to improve writing skill as a major requirement for various professions. In this vein, Nunan (1991:37) puts forward standards for successful writing, which are as follows:

- Mastering mechanics.
- Mastering and obeying conventions of spelling and punctuation.
- Using the grammatical system to convey one's intended meaning.
- Organizing content at the level of paragraph and complete text to reflect given new information and topic.
- Polishing and revising one's initial efforts.
- Selecting an appropriate style for one's audient.

In the ESP context, learners need to hand over their research findings in a written form. Therefore, learners need to learn not only language forms but also how to specify goals, and to maintain strategies so as to achieve the goals set. Subsequently, ESP teachers must develop a writing programme in which they train their learners to write bearing in mind that the writing act is rather a process than a product.

1.8.4.1 Writing Difficulties in ESP

As being the most difficult skill to perform, writing in the English language is considered tough even by native speakers who do not possess a good command of English writing (Johnstone, Ashbaugh, & Warfield, 2002). The reason behind such difficulty is that learners are required to interpret their ideas into cohesive sentences in any given written task. This what makes it hard for a learner who needs both mental and physical efforts so as to write correctly in English. For Douglas (2000: 35), the difficulties faced by the learners are as follows:

- **Grammatical Knowledge :**
 - Knowledge of vocabulary
 - Knowledge of morphology and syntax

- Knowledge of phonology
- **Textual Knowledge**
 - Knowledge of cohesion
 - Knowledge of rhetorical or conversational organization
- **Functional Knowledge**
 - Knowledge of manipulative functions
 - Knowledge of heuristic functions
 - Knowledge of imaginative functions
- **Sociolinguistic Knowledge**
 - Knowledge of dialects/varieties
 - Knowledge of registers
 - Knowledge of idiomatic expressions
 - Knowledge of cultural expressions

Subsequently, these difficulties of writing consist of language knowledge such as grammar, vocabulary, and spelling (Celce-Mulcia, 2001; Martin, 1992). It involves also coherence and cohesion which link a piece of writing together, and conventions for structuring paragraphs like a thesis statement, supporting sentences (Celce-Murlia and Olshtain, 2000) ... On the other hand, aspects of specialized language knowledge affect the written composition of ESP learners. These specific elements are about knowing the register of the field of specialism including, specific lexis, verbal phrases, and collocations along with a technical objective style so as to write technically in the discipline.

1.8.5 Writing Skill in Computer Science

As writing in an ESP context is based on the communicative needs of the learners, for instance, in computer science major, students are required to write research lab reports, summarize instructions of computer manuals. It is very essential, thus, to develop learners' communicative and linguistic competences. Writing skill curriculum must focus on lexical, grammatical knowledge so as learners discover ways on how to edit their written compositions. In addition to this, students should learn to write taking into account the readers' expectations, using relevant discourse to the task topic.

Discourse modes are different according to each field of specialism such as to describe, to expose, to argument ...As a consequence, those modes ought to be incorporated in ESP programmes so as they could be performed by learners in several written tasks. Reid (2001:153) explains that « exposing ESL students to the functions and forms of the writing requirements and assignments they are almost certain to encounter in their future courses is essential to EAP instruction ».

ESP learners have to be involved in the creation of discourse rather than sentence creation. They should take grammatical, lexical together with rhetorical devices, cohesion, and coherence when writing different genres. That is to say, they need to fulfil each text type demands by using accurate style and addressing specific readers.

1.8.5.1 Types of Computer Science Writing

Different computer science majors around the world have viewed the content of the ESP courses delivered to their learners so as to prepare them for both educational and occupational purposes. McDonald and McDonald (1993) report a course for the computer science discipline at Northwest Missouri State University which aids students to acquire writing and performing oral presentations about computers to clients or academically at conferences (Ho, 2015). On Freiermuth (2002) side, he explores an ESP programme in technical writing at a university in Japan taking Computer Science students as a sample, who were asked to develop a research paper in group work then write a technical proposal individually. Xenodohidis (2002 qtd in Ho 2015: 10) designed a syllabus for computing English in an Institute of Vocational Training in Greece to make students learn computer sciences terminology and to enhance their writing skills in real-situation tasks. Most of the courses examined above have two common priority areas, explicitly writing and speaking, and the selected tasks and themes are relevant to computer science discipline with some incorporated even occupation-related situations (Blume et al. 2009 qtd in Ho, 2015: 10).

Consequently, Pholsward (1993) gives an account of his research on the English language needs of Thai computing occupations that the writing tasks most

commonly executed in the workplace are writing reports, short notes, and memorandums. However, in computing English for academic purposes, students mostly perform writing reports and articles, papers or extended abstracts in conference proceedings as well as writing theses. In addition to this, postgraduate learners are asked to write a journal article so as to publish their scientific findings (Zobel, 2014: 2). These types of writing in computer sciences are discussed below:

❖ **For Occupational Purposes :**

- ♦ **Lab-Research Reports:** reports are about providing the progress of a project. Computer sciences students write reports to describe a computer program for a client or the instructor as a training (Taffe, 1989).
- ♦ **Memorandum (Memo):** can be used for different communicative situations at the workplace. It can be a sentence or a couple of pages written for colleagues, employees in the computing fields (Flanagan, 2007).

❖ **For Educational Purposes :**

- ♦ **Journal Article:** is commonly a result of the research procedure. It is a presentation of new ideas that have been reviewed (sometimes over several rectifications) according to referees' propositions and criticisms in the computer sciences field (Zobel, 2014).
- ♦ **Theses:** A thesis is typically a multi-layered examination of a single issue done in a computer sciences field (Ibid).
- ♦ **Journals and Conference Proceedings:** comprise of contributions in computing journals or conferences that range from substantial papers to extended abstracts (Zobel, 2014:2).

1.8.6 Language Components in ESP Teaching

According to Dudley- Evans and St John, language aspects are of paramount importance in every language teaching/ learning process. Thus, these linguistic elements like grammar and vocabulary must be taken into consideration while teaching in an ESP situation. Moreover, and since the current investigation

addresses written discourse in ESP, achieving proficiency in writing skill demands grammar and vocabulary teaching. As stated by Celce-Mulcia (2001) and Martin (1992) that insufficient teaching of grammar and lexis decreases the ability of the learners to write appropriately.

1.8.6.1 Grammar in ESP Teaching

All educationalists agreed upon the significant importance of grammar in ESP teaching. Even though an ESP matter is not closely related to grammar, it is fundamental to deem grammar as an important aspect of ESP. Teachers tend to assess their ESP learners' performance in English in order to detect their grammatical deficiencies. Accordingly, they must provide a remedy work which is a designed course to address these grammatical deficiencies. The teaching of grammar in an ESP context focuses mostly on accuracy when using the English language, particularly in the discipline.

The ESP materials that are devised to instruct grammatical structures must consider two standards: effectiveness and appropriateness. First of all, as stated by Harmer (2002:25) that "when considering an activity for the presentation or practice of grammar the first question to ask is: how efficient is it?". That is to say, efficiency is a requirement in any grammatical tasks. On the other side, appropriateness is about taking the different variables of the teaching/learning situation into account. These variables are, for example, learners' age, level, interests, backgrounds, and attitudes ...

1.8.6.2 Vocabulary in ESP Teaching

Vocabulary is the cornerstone of ESP teaching. Ur (1991: 60) identifies vocabulary as « ... the words we teach in a foreign language ». Moreover, Thornbury (1997) declares that lexis and vocabulary in English are regularly used interchangeably. Besides, words are the core elements in any language. ESP learners cannot expand their knowledge of the speciality unless they acquire its lexical technical items.

Designing ESP materials for teaching vocabulary in the classroom needs to be executed according to the learners' needs since vocabulary is their main interest. In the same vein, Kennedy and Bolitho (1984:56) highlight the importance of vocabulary in any type of text commenting that « specialized texts of any sort, whatever written or spoken, exhibit various characteristic lexical features ». Subsequently, the content of the ESP courses devoted to instructing vocabulary must start with word formation (prefixes and suffixes and identification of word classes, Kennedy and Bolitho 1984). Afterward, it moves to word relationships (synonymy, antonymy, polysemy and collocations. Thornbury, 1997). Moreover, ESP texts have symbols, technical abbreviations, technical and subtechnical vocabularies. For this reason, the selection of ESP materials devoted to vocabulary content is restricted to the learners' needs, level, speciality along with authentic tasks depending on the target situation.

1.8.7 Integrating Skills in ESP Teaching

According to Dudley- Evans and St John in ESP situations, it is crucial that the four language skills: listening, reading, speaking, and writing are involved. Selecting incorporated materials to direct integrated skills are those materials devoted to two skills or more: listening, reading, writing and speaking on the same task. These activities help ESP learners develop the English language command. However, the ESP teacher must prepare his/her lessons by making sure the realia are available to facilitate the performance of his/her learners.

Besides, ESP teachers should assert that activities are simple and can provide instructions that are intended to do. Philips (1997: 3) insists that « the activities should be simple enough to understand what is expected of them ». As an illustration of the integrated skills tasks are information gap activities, projects, and games. For better assimilation of the foreign language in an ESP context, both receptive and productive skills must be incorporated in the proposed courses so as to both receive and produce ideas in English.

1.9 Communicative Competence

In an ESP context, the proposed course design for learners must fulfill both linguistic and communicative needs. In other words, the researcher in this investigation tends to determine the ESP learners' communicative needs and basically, linguistic demands as well in the Computer Sciences department so as to elaborate a syllabus accordingly. In what follows, we shall dig deeper to know the significance of both communicative and linguistic competences needed to be achieved by ESP learners in order to perform appropriately in the target situation.

Communicative competence refers to the ability to use language properly in any situation. In this respect, Chmosky (1965) explains that it is the refined knowledge of an ideal user of the language in the given speech community. This idea by the structural linguist Noam Chomsky (1965), was made firstly as a distinction between competence and performance. In his theory of Syntax and its aspects, he posits the recognition between the embedded knowledge placed in the speaker's mind, or what he calls 'linguistic competence' and what he expresses, or what he calls, 'linguistic performance'. That is to say, « we thus make a fundamental distinction between competence (the speaker-hearer's knowledge of his language), and performance (the actual use of language in concrete situations... » (Chomsky, 1965:4). Within the same line, this controversial differentiation between the two facets of any language focuses on linguistic competence through the process of idealization of the speaker-listener inner knowledge along with neglecting individual variations as being considered as unacceptable language behaviour.

Conversely, in the 1970s, an adverse reaction against the so-called 'linguistic competence' led by the American anthropologist Dell Hymes who uncovers that « Chomsky's notion of competence is too restrictive and does not take into account underlying rules of performance » (Alharby, 2005:28). He suggested a wider view of competence in order to encompass the rules of performance insisting that

There are rules of use without which the rules of grammar would be useless. Just as rules of syntax can control aspects of phonology, and just

as rules of semantics perhaps control aspects of syntax, so rules of speech acts enter as a controlling factor for linguistic form as a whole.

(Hymes, 1972:278)

Consequently, Hymes deems communicative competence as « that aspect of our competence that enables us to convey and interpret messages and to negotiate interpersonal meanings within specific contexts » (Brown, 2000:246). For the simple reason, Hymes discusses further saying that:

We should study the knowledge that people have when they communicate, what he calls communicative competence. Just like linguistic competence which tells you whether a sentence is grammatical or not, communicative competence tells you whether an utterance is appropriate or not within a situation » (Lin, 2011: 2).

In addition to this, Cunningsworth (1983) identifies that when a user/learner is acquainted with the language, he should know the many-sided process of learning this language. The learning process of any language according to Hymes must involve his communicative competence elements so as to improve the overall process of learning. As a result, in ELT classrooms, there is a tendency toward teaching 'language use' instead of 'language structure', i.e. ELT as both foreign and second language not least ESP, have adopted a communicative approach to English language teaching/learning.

After Hymes (1972), who claims that communicative competence is not only an inbuilt grammatical competence but also is the ability to use grammatical competence in a variety of communication situations. Revised versions of communicative competence and its crucial constituents were established by many researchers like Canale and Swain (1980), Canale (1983), Bachman (1990), and Bachman and Palmer (1996) as an endeavour to identify the concept. As a matter of fact, Canale and Swain (1980) were among the first applied linguists to build up a theoretical model of communicative competence which course designers and language instructors could use to teach and assess. Their model of communicative

competence involves three domains of knowledge which are grammatical competence, sociolinguistic competence, and strategic competence. After three years, Canale (1983) attached discourse competence (the ability to combine grammatical forms and meanings to achieve an integrated spoken and written texts). This can be shown in the following diagram (Figure 1.11) :

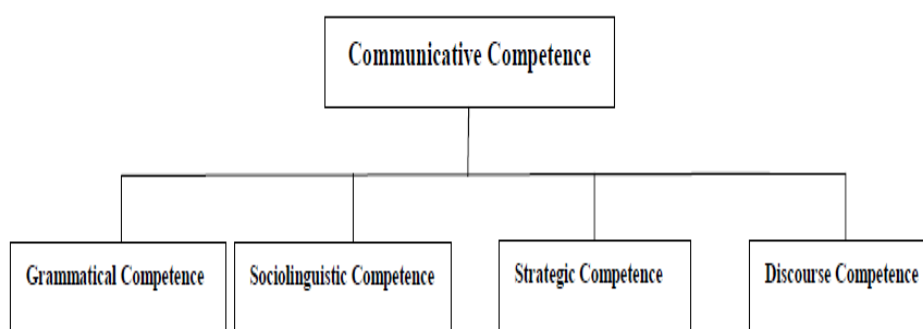


Figure 1.11: Canale and Swain's (1980) and Canale's (1983) Model of Communicative Competence (Adopted from Safont 2005:51).

The above diagram represents first of all the grammatical competence which is knowledge of vocabulary, spelling, pronunciation, word formation, sentence structure, and linguistic semantics. Next, Sociolinguistic competence refers to the ability to understand the social contexts, the participants and the shared information for the appropriate production of utterances to achieve certain functions. However, strategic competence is the mastery of the verbal and non-verbal strategies to compensate for the breakdowns in communication like gestures, body language and so forth. Finally, discourse competence means the capacity to combine grammatical forms and meanings to achieve cohesion and coherence of an incorporated spoken or written discourse.

In the current investigation, the researcher is analyzing computer sciences learners' needs to develop an appropriate course to meet their communicative needs.

Thus, the researcher tends to elaborate the course so as to improve the ESP learners writing skill to write technically in the discipline, taking into account their linguistic deficiencies and trying to remedy them. Consequently, she relies on one of the components developed by Canale and Swain (1980) which is the linguistic competence to improve the ESP learners' performance of the language to compose written discourse in the discipline. She does not reject the significance of the other competencies (strategic competence, discourse competence, and sociolinguistic competence) concerning language learning. However, her selection was based on the fact that developing writing skill is closely linked to enhancing the basic competence, i.e. linguistic competence as the primary requirement which facilitates the English language learning in an ESP context. In addition to this, and due to the limitations encountered by the researcher during her fieldwork, for instance, time constraint that is allocated to teaching ESP in the CS department along with the learners' deficiencies of the language, consequently, the researcher finds it very hard to focus her study and teach different elements in a restricted period devoted to ESP. In addition to this, even the linguistic competence highlighted by the researcher emphasizes only on morphology, syntax, and semantics in order to develop the writing abilities of ESP learners. The researcher puts aside the fourth element which is phonology since it has more to do with developing speaking than improving ESP learners' writing proficiency.

1.9.1 Linguistic Competence

Linguistic competence within Canale and Swain (1980) framework, is defined by Hedge (2000:47) as an ability involving different types of knowledge which are « linguistic competence involves knowledge of spelling, pronunciation, vocabulary, word formation, grammatical structure, sentence structure, and linguistic semantics ». That is to say, the proficient language user linguistically is one who has such abilities as grammar and lexis. Hymes, thus, calls it the grammatical competence to refer to those capacities. In the same vein, Safont (2005: 51) categorizes this constituent of the communicative competence which comprises of other significant subcomponents which are morphology, syntax, and semantics. As a result, the language user is required to get hold of these facets of linguistic

knowledge for accuracy purposes. That is to say, he/she is able to receive and produce accordingly correct grammatical sentences. Moreover, he (2005: 53) further adds these facets provide the language learners with different aspects like words, forms, and organizations in order to transmit the adequate message.

1.9.1.1 Morphology

Morphology as a field of study related to linguistics means investigation conducted in a given language so as to understand its forms and organizations of aspects relevant to this particular language. As stated by George Yule (2006: 62-63), morphology « ... has also been used to describe the type of investigation that analyzes all those basic ‘elements’ used in a language. What we have been describing as ‘elements’ in the form of a linguistic message are technically known as ‘morphemes’ ». In other words, for Aronoff and Fudeman (2011: 2) morphology is « in linguistics morphology refers to the mental system involved in word formation or to the branch of linguistics that deals with words, their internal structure, and how they are formed ». Worth noting at this level of analysis that both linguists (Yule, 2006; Aronoff and Fudeman, 2011) consider morphology as the study of the language forms and organizations.

For Yule (2006:63), who deems morphemes as the different parts of a word in any language, saying that a morpheme is « a minimal unit of meaning or grammatical function ». A morpheme is the smallest building block of a word-formation related to both word meaning or grammatical function of this word. As reported by Hedge (2000:47) « a learner who can add prefixes correctly to ‘perfect’, ‘legal’, ‘happy’, ‘pleasing’, and ‘audible’ to make the negative ‘equivalents’, is developing competence in using word-formation rules correctly ». In other words, word formation is about adding affixation (prefixes, infixes, and suffixes) to morphemes (roots) to form words in the language.

1.9.1.2 Syntax

The syntax is considered as the understanding of how the language is organized and used. According to Tallerman (2015: 1), the term syntax means the study of sentence construction. In other words, it focuses on the way words are organized in order to formulate phrases and sentences; it concerns the study of the syntactic properties of languages. Within the same line of thought, syntax distinguishes the various compositions which both sentences, phrases, and clauses can construct in a particular language. These distinct compositions of sentences have several syntactic components called “parts of speech”. As explained by Yule (2006: 74) those parts of speech are nouns, articles, adjectives, verbs, adverbs, prepositions, pronouns, and conjunctions.

1.9.1.3 Semantics

Yule (2006: 100) considers semantics as « the study of the meaning of words, phrases, and sentences ». This field emphasizes simply studying the exact literal meaning of words, phrases, and sentences. It attempts to look for the concept or object which a given word refers to. Thus, the chief task of semantics is to explore the central literal meaning of words as they are. Underneath the subject of semantics, there are several lexical components (semantic relationships) such as synonymy, antonymy, polysemy, and collocations.

- **Synonymy** means a situation in which two or more words are closely linked to each other. These two words share the same basic literal meaning. In this situation, these words are called synonyms (Yule, 2006: 104).
- **Antonymy** is linked to a situation when two or more words are opposite to each other. These words are called antonyms (Ibid).
- **Polysemy** refers to a word which has more than one meaning⁵. It is defined as the fact of a word which is associated with two or more related senses (Barnes, 1984).

⁵ <https://dictionary.cambridge.org/fr/dictionnaire/anglais/polysemy>

- **Collocation** is two lexical elements that go together. Palmer (1931: 4) explains it as units of words that are combinatory, for instance, pay attention, blond hair.

1.10 Evaluation

Evaluation is seen as the last stage in ESP course design. It has to do with the findings and results of the preceding phases. It is of great value for both ESP teachers and learners to clarify whether their goals and objectives were achieved or not. Moreover, this phase also detects the learners' improvement and to what degree the course was efficient. Besides, it unveils the shortcomings that were not effectively dealt with in the teaching/learning process. Hutchinson & Waters (1987) suggest mainly two levels of evaluation: "learners' assessment" and "course evaluation".

1.10.1 Course Evaluation

In this level of evaluation, the ESP teachers determine whether their set goals and objectives were met or not. Besides, the teacher makes use of it to check if the designed course was appropriate to the destined situation that was elaborated for. In the same token, Hutchinson and Waters (1987:156) assert that « course evaluation aims to find out whether the objectives of the course are being fulfilled in accordance with its design ». One can say that course evaluation examines its design along with every attribute the course contains. However, the evaluation procedures may take time for the ESP teachers to assess their learners' performance using different forms of assessment.

1.10.2 Learners' Assessment

Learners' assessment tends to measure both the present knowledge and feedback of the learners. Assessing learners investigates to what extent ESP learners have acquired what has been instructed. Dudley Evans & St John (1998) declared that ESP learners have to be assessed on their English language mastery in the target situation. In addition to this, the results of the evaluation procedures provide ESP teachers with learners' performance to evaluate the learners'

objectives. Also, it helps ESP teachers ascertaining the efficiency and quality of the delivered course (Brown, 1996). For the sake of assessing ESP learners' proficiency, teachers use several modes of assessment. That is to say, assessing learners' language knowledge is conducted during the course and when it is finished, so both formative and summative assessments are deep-rooted in the syllabus. Moreover, testing is an assessment tool to measure students' progress and provide feedback from the teaching practice and gauging the acquired skills of the language. To achieve this end, ESP teachers use tests as an assessment procedure to gather information about their learners' language proficiency in the target situation. As reported by Graves (2001), learners can be asked to use the acquired language to perform certain tasks, and they can recognize what they are not able to do.

1.10.2.1 Formative Assessment

Formative assessment, as one type of assessment, is an ongoing process that occurs during the teaching/learning situation (Angelo and Cross, 1993). It should be conducted in ways that support learners to make real progress in their learning. Consequently, the information collected from the formative assessment is applied by the teachers and the learners to set adjustment to their work and make it more efficient (Black, 1995). The teachers in formative assessment do not give a definite mark or grade to their learners' performance, but they provide them with feedback about progress in their learning (Irons, 2008:7).

1.10.2.2 Summative Assessment

Summative assessment, as another type of assessment, is linked to the assessment of learning. Moreover, it offers proof of what learners learnt at the end of a given period of learning. Thus, it is used by teachers to gauge the learners' achievement in learning at the end of a unit. It can be a test and/or examination in order to get a diploma or an occupation. Furthermore, summative assessments as reported by OECD (1968-2008:1) are «...used to measure what students have learnt at the end of a unit, to promote students, to ensure that they have met the required standards on the way to earning certification for school completion or to enter certain occupations». Also, it may take different forms like reading comprehension

questions in an ESP context. Vitally, regarding assessment and « its real meaning lies in understanding the reasons why it was given and what it tells the students about how they might improve their future work » (Hutchinson and Waters, 1987: 151). Put it briefly, ESP tutors can get strong proof of learners' progress only when teachers use both types of assessment so that to improve learners' performance and set up their objectives, goals, and evolution. Benjamin (2013 :04) summarizes the distinction between formative and summative assessments in ESP as listed below (Table 1.3):

Formative Assessment	Summative Assessment
Student is aware of the questions throughout the assessment process	Questions on a test are surprises to the student
Timing is flexible	Student must perform within time limits
Teacher's feedback is commentary and/or letter or number grade	Teacher's feedback is a letter or number grade
Evaluation is used to guide future learning	Evaluation is used to rank and sort students
Considers the students zone of proximal development	Does not consider the student as an individual learner
Test or task may be flexible	Test or task is not flexible
Student is involved in self-assessment	Assessment by teacher or outside agency only
Sets reachable targets for future learning	No direct follow-up ;when it's over,it's over
Results are not used as a report card grade	Results figure in to the report card grade

Table 1.3: The Comparison between Formative and Summative Assessments
(Adapted from Benjamin, 2013:04)

1.10.3 Assessment of Writing in ESP

Assessment of the writing skill is a basic element in an ESP context. It checks the assimilation of what has been taught. Subsequently, the most important goal of testing writing is to measure a student's ability to write in the target language. For this purpose, Fredericksen (1984:201) insists on the fact that:

Efficient tests tend to drive out less efficient tests, leaving many important abilities untested and untaught. An important task of educators and psychologists is to develop instruments to better reflect the whole domain of educational goals and find ways to use them in improving the educational process

Basically, the assessment of writing has twofold ways of testing the students' ability to write in the target situation. First of all, indirect assessment as stated by Coomber (2010:91) is « the indirect assessment of writing measures correct usage in sentence-level constructions and focuses on spelling, grammar, punctuation via objective formats such as multiple-choice questions ». Its main focus is to measure students' accuracy rather than fluency, i.e. the emphasis is on producing grammatically correct written compositions with neglecting the content and self-expression (Chelli and Khouni, 2013). On the other hand, the direct assessment as an approach to writing skill assessment gauges the learners' capacity to communicate using the written form of discourse and relying on the composition of written texts. That is to say, this mode of assessment focuses on the process of writing rather than the content (Harris et al. 1995).

1.11 Conclusion

Due to the fact that new technologies and mass media resulted from the globalization process, ESP teaching/learning has become widespread in our institutions. For this reason, many educational institutions act in accordance with the current changes to assure their learners' requirements. Therefore, this chapter is concerned with the literature review of the ESP field and its principles at first. It explains the utmost essential components in any ESP course design which is a

subsequent process to needs analysis of the ESP learners. After that, the collected data from needs identification and analysis serve as a basis for a better selection of teaching materials to elaborate a syllabus.

The second part of the chapter tends to shed light on the specific English used for mostly technology and computer science. Next, it moves to consider the writing skill in general and the written discourse in computer science in particular. Moreover, it reviews the several writing types in computer sciences and tackles the language teaching issues in ESP. Finally, it gives a brief account of the course evaluation process and learners' assessment procedures to examine the achievement of the set goals and objectives. The next chapter will look for the research methodology and design of the current investigation which is about uncovering computer science students' needs to write technically in the discipline.

Chapter Two

Situation Analysis and Research Methodology

2.1 Introduction

2.2 Situation Analysis

2.3 Sampling

2.3.1 Students' Profile

2.3.2. ESP Teachers' Profile

2.3.3. Subject Specialist Teachers' Profile

2.4 Research Methodology, Design, and Procedures

2.4.1 Research Process and Mixed-Research Method Approach

2.4.1.1 Case Study

2.4.1.2 Action Research

2.4.1.3 Stages of Action Research

2.4.2 Data Collection Tools

2.4.2.1 Students' Questionnaire

2.4.2.2 Interviews

2.4.2.2.1 ESP teachers' Interview

2.4.2.2.2 Computer Scientists' Interview

2.4.2.3 Classroom Observation

2.4.2.4 Testing

2.4.2.5 Focused Interview

2.4.3 Data Analysis

2.4.3.1 Quantitative Analysis

2.4.3.2 Qualitative Analysis

2.5 Conclusion

2.1 Introduction

The present study aims at evaluating the English written discourse in the computer sciences discipline. This chapter starts with shedding light on the situation analysis of the fieldwork. That is to say, the researcher describes the study setting to the readers, moving from what is general to what is the researcher's concern in this inquiry. Then, it gives methodological considerations that had been adopted in the fulfillment of the fieldwork. Moreover, it provides a detailed account of the sample population under investigation and the selected research tools. As a result, a case study is used to undertake a needs analysis process, followed by an action research to implement the proposed syllabus. Finally, it gives a brief account of the two data analysis approaches used in this investigation: quantitative and qualitative analyses as it will be shown in the coming sections.

2.2 Situation Analysis

Needless to recall that students in different majors like human sciences, politics, and sciences need to be provided with a specified syllabus that directs their potential needs and language skills required in both academic and professional careers. A typical example in our investigation is computer science students who are asked to compose technical pieces of writing in their discipline for their professional achievement. Hence, the current investigation calls for the researcher to conduct a study at the Department of Computer Science which comes under the faculty of Sciences at TLEMCEN University. Consequently, the researcher in this inquiry finds it very necessary, before any research investigation, to examine and portray the location in which the fieldwork will be undertaken. The main ground behind the situation analysis is to shed light on the main factors which affect the teaching and learning of the English language within the Department of Computer Science. Moreover, the aim of this is to depict the ESP teaching/learning situation in the site under investigation. For her to do so, the researcher seeks to give broad information about the faculty of Sciences of Tlemcen University in general and at the Department of Computer Science in particular.

The University of TLEMCEM is one of the Algerian universities that dispenses lectures for both graduate and postgraduate students in different options, researches, and other services. This university was first founded in the 1st of August 1989. Afterward, the University of Abou Bekr Belkaïd, Tlemcen results from of a long outgrowth moving from the 5th of August 1995 to the 2nd of December 1998⁶. At first, in the period between (1974-1980), it incorporated a university center of higher education which covered the only core curriculum of Exact Sciences and Biology. Latterly, teaching progressively increased in size to new sectors, besides a series of training courses that provided students with the opportunity to pursue their entire graduation courses in Tlemcen. In June 1984, the first promotions graduated in Social and Human Sciences and Language from the former University Centre. By the end of 1991 and the beginning of 1992, finally, it allowed the launch of the second post-graduation in almost all fields insured in Tlemcen. Lastly, after fifteen years of development came into sight the University of Abou Bekr Belkaïd, Tlemcen. Currently, the university has 8 faculties. It is situated on 5 university poles which are as follows: Imama pole, Chetouane pole, Kiffane pole, the New pole and the pole Miloud Barrack, in addition to Annex of Maghnia (University Center of Maghnia 2016/2017⁷, recently).

Abou Bekr Belkaïd University has eight faculties: Nature and Life Sciences, Earth and Universe Sciences, Economic and Management Sciences, Human and Social Sciences, Sciences, Technology, Medical Sciences, Languages and Literatures, and Law and Political Sciences in addition to the Institute of Applied Sciences and Techniques. The faculty of Sciences has more than sixteen (16) research laboratories⁸ accredited by the Ministry of Higher Education and Scientific Research. In this faculty, there are four main departments: Chemistry Department, Department of Physics, Mathematics and Computer Science Department.

⁶ <https://www.univ-tlemcen.dz/pages/87/presentation>

⁷ http://www.cu-maghnia.edu.dz/?page_id=10

⁸ <https://www.univ-tlemcen.dz/pages/95/laboratories>

After passing the Baccalaureate Exam, students can access the Computer Science Department with a good average (from 12 upwards). The studies program provided by this department is made up of five years; three years to get a License degree followed by another two years to hold a Master's degree in Computer Science studies. During their first year, students have a common computer science and mathematics program in the Mathematics Department. After passing their first year, students have to choose either Computer Science or Mathematics. Those who select computer science move to the Computer Science Department to pursue an academic and professional career in the field. This department incorporates students who are enrolled in the LMD (License-Master-Doctorat) system. As mentioned previously, it requires students to study for three years to get the License degree. Each year of those is formed of two semesters (three years equals 6 semesters). Next, students are asked to study another two years to have a Master's degree. In other words, they have to accomplish the other four semesters. In the last degree which is a Doctorate, students are asked to pass a contest to study for the other three years to have a Doctorate degree.

During the three years of License, undergraduate students have typical syllabi each year with different modules. In the common program of the first year, they have modules like Algebra, Mechanics, Analysis, Algorithm, Machine Structure and English course (ESP) grouped into two fundamental units and one methodological unit. After that, they have to choose Mathematics or Computer Science in their second year. As a result, during their second year in Computer Science Department, they study what follows: two fundamental units including 4 modules such as Data Base, Operating System, Software Engineering, Graph Theory, Communication Networks, and Web Application Development. Besides, the methodological unit which incorporates two modules: Legal and Economic Aspects of the Software and Foreign Language. Finally, to get their License degree in the third year, they have to succeed in two fundamental units involving four modules: Mobile Apps, IT security⁹, Logic Programming, Comic Book

⁹: Sécurité Informatique

Administration¹⁰ and Cryptography (the art of writing or solving codes¹¹). Moreover, they have to accomplish the additional units: a methodological unit with one module which is their mini-project, i.e, their mini-thesis and the transversal unit including scientific writing to compose their theses in the French language. The three years License syllabi are summarized in the following diagram (Figure 2.1).

Once again computer science branches get sub-branched at the level of Master so that students can choose one of the four offered specialties to study Masters. Those specialties in the Master's degree are Information System and Knowledge (SIC) specialty, Networks and Distributed Systems (RSD) option, Decision and Intelligent Model (MID) branch and Software Engineering (GL) specialty. Each specialty contains four units: two fundamental units, a methodological unit, a transversal unit, and a discovery unit. In addition to this, every specialty has different modules that fit within the context of the specialty.

To a certain extent, those are some of the Master's modules of each specialty included within the fundamental units in each one, for instance, MID specialty comprises Symbolic Learning, Image Processing, Computer Research, and Pattern Recognition. GL specialty encompasses the following: IT Project Management, Advanced Database, Middleware and Distributed Systems (middleware refers to any behind the scenes software that allows these two levels to communicate and interact with each other¹²) and Advanced Algorithmic. RSD branch has four modules in the fundamental units as follows: Algorithmic of Distributed Systems and Applications, Network Optimization Techniques, IT security and Client / Server administration. Finally, the SIC option contains what follows: Advanced Databases, Advanced Information Systems, Semantic Web and Advanced Networks. In the discovery unit or transversal unit, every specialty is composed of an English or Technical English module.

¹⁰ Comic Book Administration: Administration de BD (Bande Dessinée)

¹¹ <https://dictionary.cambridge.org/dictionary/english/cryptography>

¹² <https://www.cleverism.com/what-is-middleware-and-how-does-it-work/>

Computer Science Modules during the License degree		
Year	Units	Modules
1st Year: Common Computer Science and Mathematics Programme	- Fundamental units 1&2 (5 modules) - Methodological unit (2 modules) - Discovery unit and Transversal unit (2 modules)	Algebra, Mechanics, Analysis, Algorithm, Physics, Practical Office Work, Electronics, Systems Component, Coding, Machine Structure and English course (ESP)
2nd Year Computer Science Major	- Fundamental units 1&2 (4 modules) - Methodological unit (2 modules) - Transversal unit (2 modules)	- Data Base, Operating System, Software Engineering. - Graph Theory, Communication Networks and Web Application Development. - Legal and Economic Aspects of the Software and Foreign Language.
3rd Year Computer Science Major	- Fundamental units 1&2 (4 modules) - Methodological unit (Mini-Project) - Transversal unit (2 modules)	- Mobile Apps, IT security, Logic Programming. - Comic Book Administration and Cryptography. - Thesis - Scientific Writing in French language.

Table 2.1: License Syllabi

As a result of having English only during the first year of license with a time allowance of one session a week. Also, English is restored to their program once again during the first year of Master's. One can deduce that the English is held a low position comparing to the rest of the modules. Its coefficient is one whilst the other scientific modules go from 2 up to 6. English is classed as a complementary module that does not have significant importance when compared to the rest. Although, and as a matter of fact, the utmost significance of the English language in the computer science field, and the need to prepare students for academic and professional communication, induce the necessity to investigate the status of English in the technical computing context.

Actually, the English course delivered to computer science Master 1 students in the four specialties, is taught by two ESP teachers. The topics dealt with in the English language class are usually related to Computer Science in general. Continuously, and concerning the teaching of the English language, the Ministry of

Higher Education and Scientific Research provided the Computer Science Department with a broad outline of the course content for any foreign language taught: French or English. The syllabus outline includes broad concepts for the language teacher to explore and design lessons accordingly. The English syllabus elements focus on reading comprehension by going through technical texts that are tightly related to discipline, listening and speaking. As far as the teaching materials are concerned, the ESP teacher is not provided with any handbooks, lesson plans or guides. Subsequently, s/he designs the lesson content from web-based materials and uses sometimes the data show (projector) to deliver his/her course. Nevertheless, due to the lack of needs identification and analysis, still, the syllabus may be inadequate in terms of the most skill needed, the required language items for the Master 1 learners.

In a Computer Science career, students face situations where they are asked to communicate, mainly in English written expressions, through different forms like articles, research papers, reports, programming languages and planned speech (oral presentations). For this sake, the English language program needs to achieve certain communicative purposes. For this reason, the researcher conducted the present inquiry to explore fully the subjects' attitudes in both academic and professional contexts. Thus, it is of great importance, what was previously done, i.e. to depict the English teaching status in the Department of Computer Science, to give the final details about the situation under investigation and to help determining the learning needs as well as target situation needs.

2.3 Sampling

Selecting a suitable sample is a prerequisite for every educational research study, not least in an ESP (English for Specific Purposes) context. The demand of a sample of participants in order to reject or confirm the hypotheses proposed by the researcher is commonly what supplies information to the reader « where the data come from » (Fred and Perry, 2005:55). In the same line of thought, one can define a sample as « the source from which data are drawn to answer the research question(s) and/or to test any hypothesis that might be made » (Ibid). In other

words, pinpointing accurately the sampling frame from the target population which is the larger group of cases that the study assumes about ensures the feasibility of generalizing the results from the research sample to the whole population (Boyd, 2005).

Defining the target population is the cornerstone of the whole research work. However, the sampling objects which are drawn from the study population ought to be representative, that is to say, the sample framing has to represent pertinent attributes of the target population. The following diagram shows how the sample has to possess similar characteristics to the target population. Figure 2.1 pictures these characteristics (A, B, C, D, F) which could be level, age, gender, language proficiency. The symbolized attributes of the selected sample need to be similar to those of the predefined target population. Yet, the chosen sample below lacks only characteristic E which makes it very close to a representative for generalization purposes (Fred and Perry, 2005:60).

The ultimate aim of a representative sample is to directly generalize the research findings to the target population. Bracht and Glass (1968, qtd in Gall et al. 2003:164) pointed out that the main principle by which the whole research work is judged: population validity, or generalizability. According to Gall et al. (2003:164), population validity is « the extent to which the results of an experiment can be generalized from the sample that participated in it to a larger group of individuals, that is, a population ». Moreover, a representative sample is vital for the researcher to infer from the results of his/her study outside the confines of it. Simply put, the extent to which the sample framing represents decently the attributes of the target population is the extent to which the research findings can be generalized from the sample objects to the whole target population. Additionally, the more generalized the research findings are outside the study, the higher population validity.

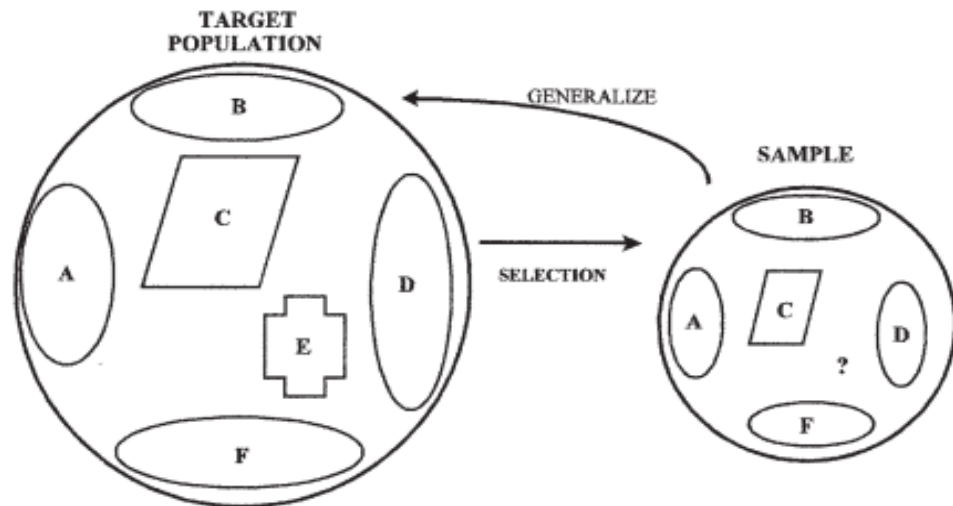


Figure 2.1: Representativeness of the Sample (adopted from Fred and Perry, 2005:60)

The researcher is set on selecting purposeful sampling for the reason that he/she is required to evolve ideas from the proposed hypotheses into thorough assimilation of the case being investigated (Gall et al. 1996). The purposeful sampling is « [...] to select cases that are likely to be ‘information-rich’ with respect to the purposes of the study » (Patton, 2004, qtd in Gall et al. 2003:165). In addition to the above, the discerning sample not only is intended to attain an in-depth understanding of the phenomenon being inquired but also to ensure population validity.

It is worth noting at this level of analysis, the use of selective samples in research is to form inductive inferences about the target population in order to make generalizations for the drawing conclusions. One way of a purposeful selection of samples is by essentially defining a sampling method to be used. According to Cohen, Holliday (1979; 1982; 1996) and Schofield (1996), sample frames are chosen based on two main sampling methods to attain a representative sample.

The investigator is the one who selects either a probability sampling (random sample) or a non-probability sampling (purposeful sample). The marked distinction between the two is as follows: in a probability sample, each individual of the target population has the chance of being selected for the sample. That is, the objects of

the whole population have an equivalent probability of being involved or kept out of the sampling frame, i.e. « inclusion or exclusion from the sample is a matter of chance and nothing else » (Cohen et al., 2007: 110). However, in a non-probability sample, some members of the target population have no chance of being chosen for the sampling frame. Thus, some individuals of the target population surely will be among the sample objects and others certainly being excluded from it, i.e. the researcher has intentionally preferred a certain proportion from among other sections of the target population to be gathered in the sample or be excluded from it (Ibid).

In case the researcher seeks generalizability, the probability sample method could prove useful. For the reason that it is drawn randomly from the target population, it will be worthwhile for the representativeness purposes of the whole population. Whereas a non-probability sample method attempts to represent a specific group from the population, i.e. the researcher deliberately targets a particular section which could not be generalized to the whole population; the chosen sample represents itself (Cohen et al, 2007). Figure 2.2 displays several types of probability sampling methods: simple random sampling, systematic sampling, stratified sampling, and cluster sampling. Besides, the different types of non-probability samples: convenience sample, quota sample, purposive sample, and snowball sample.

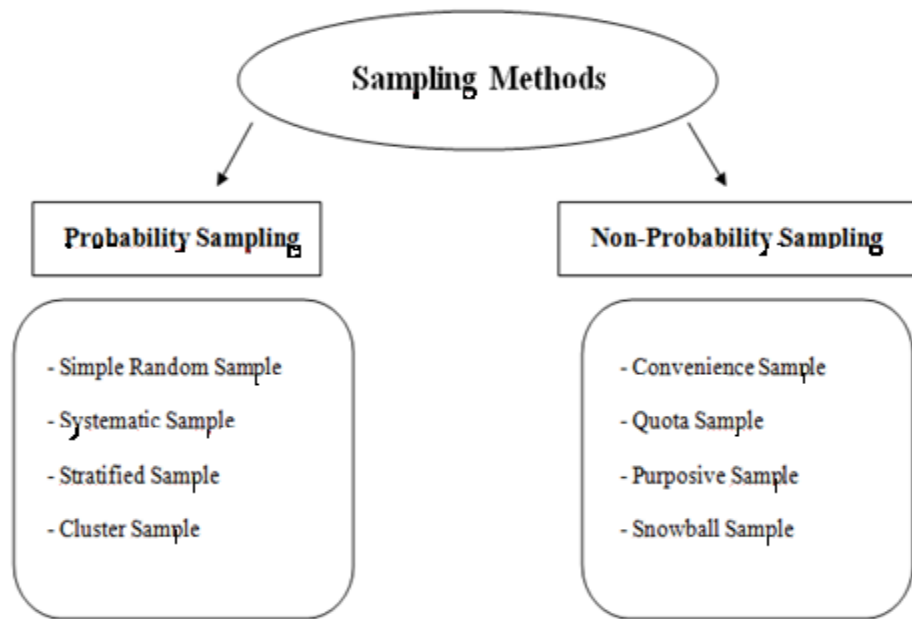


Figure 2.2: Sampling Methods (adapted from Taherdoost, 2016: 20)

To put it bluntly, a simple random sample is the utmost preferred method. Gall et al (2003:171) defined it as a « sample selected from a population by a process that provides *every sample of a given size* [has] an equal probability of being selected ». That is to say, when a researcher draws a simple random sample from the population, anybody of these subjects would have an equivalent chance of being included within the sample he/she selects for his/her investigation (Ibid). The selectivity that is built into a simple random sampling method derives from the researcher choosing the required number of informants at random from a list of the whole population for the sampling frame (Hopkins et al. 1996 qtd in Cohen et al. 2007:111). For this reason, the sample characteristics should be similar to the whole population, i.e. same age, same gender, same level, same background...Due to this, the simple random sample remains the preferable method of choice for sampling which stands the researcher in good stead when it comes to yielding research findings that can be generalized to the target population; it guarantees a representative sample.

With all this in mind, the current inquiry is an investigation into the Computer Science Master 1 students' needs to write technically in the field. Accordingly,

Robinson (1991 qtd in Dakhmouch, 2008: 33) stated the chief data sources for information in an ESP (English for Specific Purposes) study: «the students themselves, the language-teaching establishment, and the user-institution, for example, the students' place of work » (Robinson, 1991:11). In other words, ESP investigations need a selective sample frame alike the general English researches. Eventually, a needs analysis process was conducted in the current ESP fieldwork to highlight the students' requirements in the Computer Science discipline.

Concerning needs analysis operation, a diversity of data sources must be used to assure the validity and generalizability of the findings. Three sources mentioned by Robinson (1991), yet, are concerned in this investigation: target students, and both language instructors and subject specialists in the institutions where those students are enrolled. For this sake, the study objects were randomly selected by the investigator and fall into students and teachers at the Computer Science Department, Faculty of Science, TLEMCEN University. Therefore, the variety of sample subjects ensures a more thorough insight into student's needs and teaching/learning atmosphere (Creswell, 2011).

The students' proportion is represented by 40 Master 1 Computer Sciences students out of 133 (i.e. 30.07%) in the academic year of 2018/2019 (the end of semester-1 and the beginning of semester-2). Moreover, Roscoe (1975, qtd in Sekaran 2003: 295) claimed that sample size based on rules of thumb must be larger than 30 and less than 500 to represent the whole population. In a related move, the researcher was credited on picking through the entire population a manageable section that holds the same characteristics of the whole which would be a sufficient source of sound data (Swetnam, 2004 qtd in Brahimi, 2018:74).

The random sample also contains ESP teachers along with subject specialist teachers (Computer Scientists) at the Computer Science Department. For the apparent reason that instructors in the institution under investigation are fully aware of the learners' needs and the importance of the English language in the field of computer science more than the students do. In sum, the sample frame is a means

for estimating the population values as well as addressing research questions by testing hypotheses to achieve the designed objectives (Sekaran, 2003: 290).

2.3.1 Students' Profile

The subjects selected for the current investigation are a subcategory of the target population (Polit et al, 2001). Accordingly, the researcher opted for random sampling to pick out through the Master 1 specialties (See section 2.3) a representative sample from each. That is to say, 14 students from SIC¹³ specialty (Information System and Knowledge), 11 objects from RSD¹⁴ option (Networks and Distributed Systems), 8 informants from MID¹⁵ branch (Decision and Intelligent Model) and 7 subjects are from GL¹⁶ specialty (Software Engineering). In view of sample attrition factor « the loss of some cases over time or over sessions » (Goodrich and Pierre, 1979 qtd in Gall et al, 1996:177), this researcher's selection lies in the fact that few students only attend the English session (Technical English session for SIC option) per week because this session is a common one for each two specialties; as shown in the following time tables of both SIC and RSD specialties.

	11 :30- 1 :00		11 :30- 1 :00
Wednesday	SIC Common Course M1 (SIC/RSD) Technical English	Wednesday	RSD Common Course M1 (SIC/RSD) English

Table 2.2: Master 1 Computer Science Specialties' Timetable of English Sessions (SIC/RSD)

Additionally, the students' sample comprises 17 male and 23 female informants who are classed in the age group between 21 and 25 years old. All the objects have studied the English language for 8 years, i.e., four years in the middle

¹³ SIC: Système d'Information et de Connaissances

¹⁴ RSD: Réseaux et Systèmes Distribués

¹⁵ MID: Modèle Intelligent et Décision

¹⁶ GL: Génie Logiciel

school followed by three years in the secondary school and one semester only in their first undergraduate year at university (common stream) and then reintroduced in their Master 1. Moreover, a room sets aside for private schools as well; where some students take benefit from being signed up for extra-curricular communicative English courses. Yet, this refers to a two years English language gap. Similarly, the whole sample frame is enrolled in the LMD system.

Eventually, the valid motive behind this particular sample selection is that Master 1 students of Computer Science are required to receive and produce technical English, mainly in the written discourse. Thus, students are asked to write scientific reports, articles, and theses related to their domain. Hence, they highly recognize the importance of computing English since the most body of the literature about computers and Information Technology (IT) is in English. With the growing realization which they have about the English significance, however, most of the students ditch English classes as they are not motivated to receive English tuition as they are in other modules.

2.3.2. ESP Teachers' Profile

The other substantial portion of the selected sample from the target population is the ESP teachers at the Computer Science department, Tlemcen University. Three ESP teachers (English language teachers) were interviewed in this investigation to obtain information about the teaching of the written discourse in their ESP classes. Furthermore, there were only 2 teachers available at the Computer Science department in the academic year of 2018/2019, i.e., there were part-time and full-time language teachers in the beginning of the research (2017/2018), as they suppose it would be enough to have one permanent ESP teacher since only during the Master degree which students study English (they study it in their first semester of the first undergraduate year in Common Core at Mathematics Department). Then afterward in the following year, the administration recruited another permanent ESP teacher to join the ESP teaching staff when they realize the great significance of the English language in Computer Science major.

Moreover, the two permanent teachers hold a Magister degree one in Didactics and Assessment in English Language Education (DAELE) who has been working at both Mathematics and Computer Science Departments for two years so far. The second permanent teacher holds a Magister degree in Sociolinguistic Studies who was just taken on her new job and started to pursue her teaching career. On the other hand, the part-time language teacher holds a Licence degree in Applied Linguistics (Classical System). Regarding her teaching experience, she has been teaching English for two years.

The three agreed to participate in the present study by gathering data to answer the research questions. It is worth mentioning that the investigator converged them each one alone according to his /her timetable and encouraged them to respond to a semi-structured interview. For their ESP teaching practices in the classroom, they depend heavily on the Internet materials (Wikipedia reports, articles) to compose the lessons' content for the whole syllabus on the grounds that the administration does not supply teachers with any English language program for the lectures.

2.3.3. Subject Specialist Teachers' Profile

Another significant proportion of the target population is the subject specialist teachers. The subject specialist teachers' profile provides the researcher with a set of sound information about the ESP teaching\learning situation in general. Moreover, it offers the scientific inquiry a rational insight into the site and its participants to have a clear perspective towards achieving the researcher's objectives in particular.

In addition to language teachers, 10 subject specialists teachers who teach Computer Science modules in the department for Master's degree students agreed to take part in the study. Most computer scientists are specialized in Software Engineering, Networking, and Artificial Intelligence. Computer science teachers tutor several modules for postgraduate students to have their Master degree like Network Optimization Techniques¹⁷, IT Security¹⁸, Advanced Database¹⁹, Data

¹⁷ Techniques d'optimisation des réseaux

¹⁸ Sécurité Informatique

¹⁹ Base de données avancées

Analysis²⁰, Symbolic Learning²¹, Image Processing²², Semantic Web²³ and Web Application Development²⁴. The interviewed computer science professionals were randomly selected to participate in the fieldwork and answer a semi-structured interview. Eight subjects (8) hold a doctorate whilst only two computer scientists hold a Magister degree. Among the participants, there are two professors, two associate professors, two assistant professors and the rest are permanent teachers; one of them aside from being an associate professor he is the head of the Computer Science Department and some of them are the chiefs of the Master specialties. Besides, some subject specialists teachers are teaching Informatics Engineering in other academic institutions like the Preparatory School of Applied Sciences at TLEMCEN city. Regarding their teaching experience, it varies from 5 to 22 years.

The cooperation with computer scientists professionals is an attempt of collecting detailed data about the specialized content concerning the necessity of the English language in the field. This endeavour was drawn by the investigator for some reasons such as to get a representative sample. Furthermore, the subject specialists are a crucial element in both processes: needs analysis along with course design as they give the enquirer credible information about the site and field of study under investigation (Chen, 2000). The drawn conclusions help the researcher gain more subject knowledge and specialized content to conceptualize the significance of the English language individually from different standpoints according to each specific computer science specialty.

2.4 Research Methodology, Design, and Procedures

The following section is assigned to discuss the research design used for the current investigation and the data collection procedures adopted by the researcher. Furthermore, the methods of data analysis in which the inquirer opted for exploring the study. By the same token, the researcher introduces the nature of her research study, its plan, tools, and data analysis paradigms. The actual inquiry is based on a

²⁰ Analyse de données

²¹ Apprentissage symbolique

²² Traitement d'images

²³ Web sémantique

²⁴ Développement d'application web

mixed-methods research approach. Its paramount objective is to clarify and meet the Computer Science Master 1 students' needs to write technical discourse in the field.

First and foremost, the concept of « research design » needs to be explained in order to clear up the confusion of its definition that is usually connected to its use. Research design can be seen as the structure of research; it is the « cement » that attaches all the research constituents together. As stated below by Fred and Perry (2005:71) that the research design is the thorough scheme of things for conducting a research study; it is like...

The blueprint for building a house. Its purpose is to guide the researcher in constructing the strongest and most efficient structure to provide the most useful data to answer the research question(s). Just like a poorly designed blueprint, which results in a house full of problems and possible collapse, a poorly designed research study produces results containing many flaws and, consequently, little practical use.

Within the same line of thought, one may deduce that the technicality of the research design of a study relies on the practicality of an appropriate research design to be used (Fred and Perry, 2005). It is a pivotal prerequisite for a researcher to be a high-quality inquirer by critically assess the existing problematic issue for technical sound implications as well as developing a sense of discerning eye for an objective judgment (Igbokwe, 2009). As he\she is required to judge the design suitability by its functionality to answer the research questions alongside solving the present-day scientific problems.

To put it differently, the « systematic investigation undertaken in order to discover new facts, get additional information » is the process of research according to the Oxford Advanced Learners' Dictionary of Current English (1986:720). That is to say, research is a designed activity that is pointed towards constructing original facts and newfangled pieces of information about a definite phenomenon. Saunders et al. (2003) gave more support to the idea that research is « something that

people undertake in order to find out new things in a systematic way, thereby increasing their knowledge...”. The research operation covers the identification of a certain issue in a field of both interest and inquiry.

The researcher’s task is to put his\her shoulders to the wheel interpreting the current issues into research questions. Afterward, he uses tools of experience and reflection to collect data to quench his\her thirst for the quest for knowledge. The next stage, eventually, is testing the pre-answers to the research questions (Hypotheses) which were formulated based on common-sense solutions and accidental cases. Hence, and after analysing the collected data, the researcher can draw conclusions on the empirical phenomenon in addition to give an account of the research findings. In sum, research is the amalgamation of reasoning into the experience so as to unveil the desired truth. The previous explanation is better illustrated in the following diagram (Figure 2.3) drawn by Ugwuowo (2016:5) :

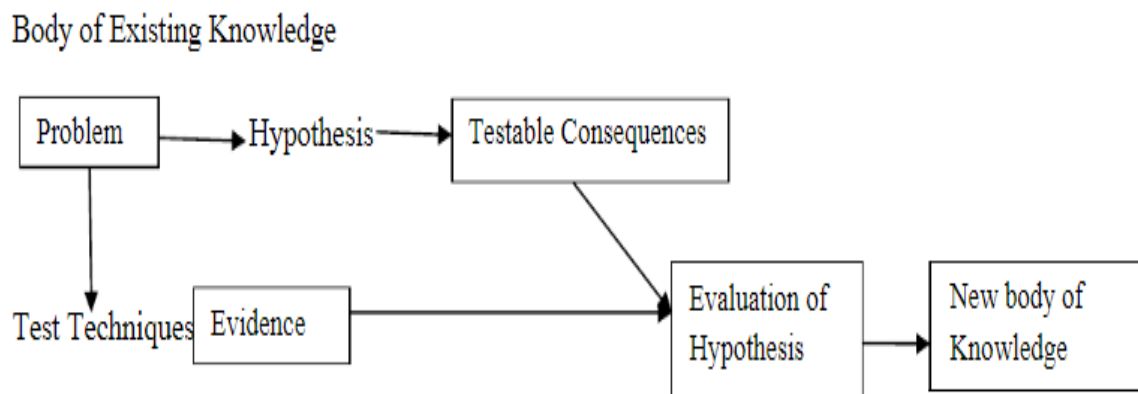


Figure 2.3: Research Flow Chart (Ugwuowo, 2016: 5)

Research design as a concept is presented in a compound word form that is the concept of design is linked to the noun research. As explained by Leedy (1997:195) it is a « plan for a study, providing the overall framework for collecting data ». To a certain extent, it is the mould within which the researcher pours his\her investigation into an empirical-shaped form. Furthermore, for MacMillan and Schumacher (2001: 166), the research design « is the outline for selecting subjects,

research sites, and data collection procedures to answer the research question(s) ». They further added that the ultimate objective of a firm ground for research design is to give consequences that can be measured so that to prove credibility.

For others like Trochim (2006), they stated that the core of the research design is to determine the strategies to incorporate several elements of the inquiry into one rational sequence. In a similar vein, Durrheim (2004: 29) admits that « research design is a strategic framework for action that serves as a bridge between research questions and the execution, or implementation of the research strategy ». In short, the research design is where the empirical research and the research questions meet to form a logical sequence which leads to conclusions from the data obtained so that to confirm or disapprove the proposed hypotheses (Yin, 1994).

The researcher finds it of great importance to make a clear-cut division between the two concepts of ‘research design’ and ‘research methodology’. The research methodology is, firstly, seen as « a theory of how an inquiry should proceed » according to Schwardt (2007: 195). It includes the standards, courses of actions and the analysis of suppositions in a defined method to the inquest. Apart from this, research methodologies make it explicit on how to locate the types of issues that are worthy of being investigated. Moreover, they are about what composes a researchable issue and exploring hypotheses through testable findings (Teddle and Tashakkori, 2006; Creswell and Tashakkori, 2007; Schwardt, 2007). Research methodology, all in all, is the track of placing an issue in a frame to such a degree that it can be inquired into employing specific designs, procedures and how to determine the convenient instruments for data collection.

In very down-to-earth terms, research methodology refers to the way of doing research. It means the steps the researcher follows when making an investigation. As mentioned by Cohen et al. (2005:44), research methodology is a « range of approaches used in educational research to gather data which are to be used as a basis for inference and interpretation, for explanation and prediction ». On the other hand, the research methodology includes the methods, tools, and activities of research. Sometimes, the terms methodology, design, strategy, and method are used

synonymously, however, the method is the process employed to conduct a research study. It is considered as a research strategy. Method refers to a set of techniques and research tools. A research tool is regarded as a procedure of data collection. It is a means used by the researcher to get information about the research topic from participants in the site under investigation.

Last but not least, research methodology reveals the arranged moves made by the researchers towards valid data and then reporting the results after analysing the findings. As raised by Singh and Nayak (2015:120) who have this to say « Research Methodology involves such general activities as identifying problems, review of literature, formulating hypotheses, procedures for testing hypotheses, measurement, data collection, analysis of data, interpreting results and drawing conclusions ». In this quotation, every phase of the process of investigation is mentioned. The following diagram (Figure 2.4) by Ahuja (2010:125), illustrates these steps precisely:

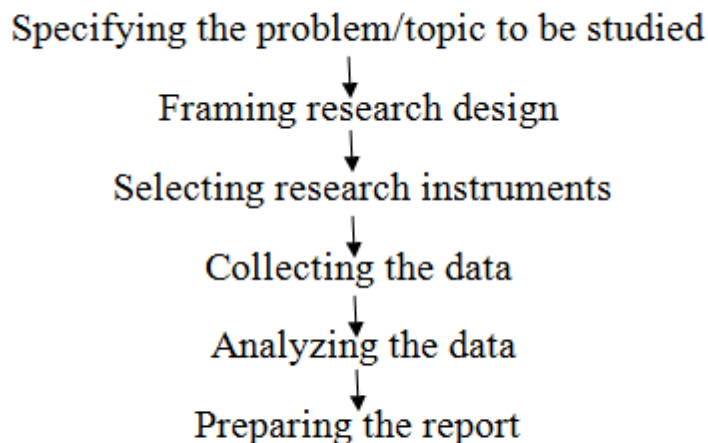


Figure 2.4: Research Methodology Sequences (Adapted from Ahuja 2010:125)

Worth bearing in mind its weight in gold that research is undertaken for different purposes. It may attempt to describe, explain or explore a phenomenon. Thus, it can be descriptive, explanatory, or exploratory...That is to say, the research types vary according to the research purpose. As confirmed by Van Myk (2012:7)

who put that « the research [*sic*] design also reflects the purpose of the inquiry, which can be characterized as one or more of the following: exploration, description, explanation, prediction, evaluation, history... ».

Moreover, much research scopes are on the ground of inquiry that can be grouped around two main sorts: 'Exploratory and Conclusive'. Conclusive research can be further classified into two other categories: 'descriptive and casual research' (Seth, 1994). The following diagram (Figure 2.5) of such types gives more details about their division :

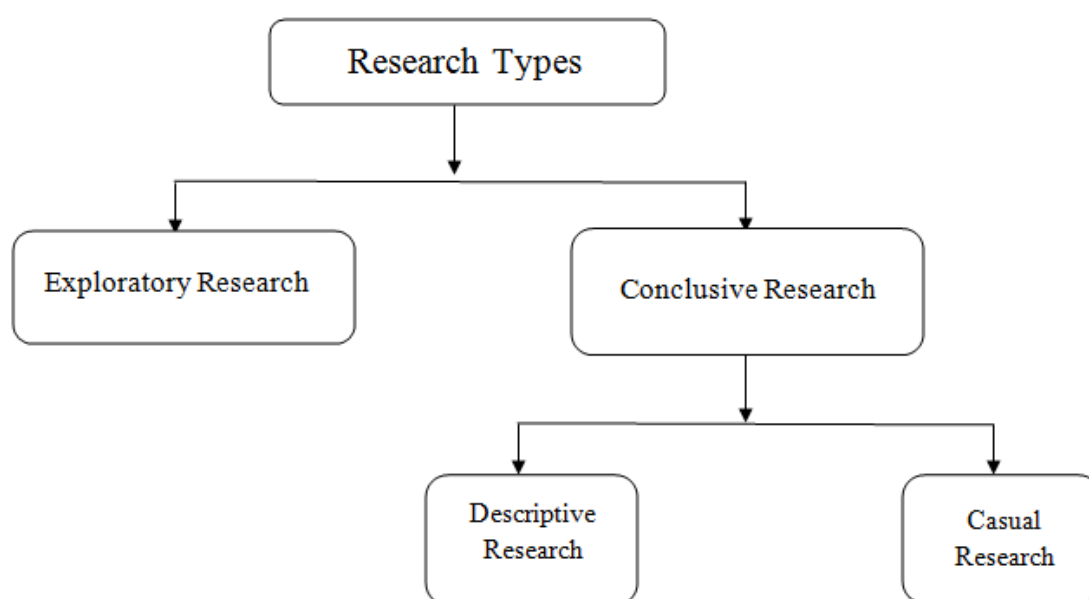


Figure 2.5: Types of Research (Adapted from Seth, 1994)

In the above diagram, exploratory research is about giving awareness and understanding of the inquiry setting. However, the conclusive research is in quest of having measurable data to analyze them using some sort of regular statistical analysis (Kumar, 2008). As Figure 2.5 displays the different types of research, the researcher in the present study may rely on both but more precisely, she came down in favor of the exploratory research. In view of the fact that she aimed at gathering valid data concerning the Computer Science Master 1 students' needs, exploring the teaching/learning situation in the site under investigation. She intended as well to investigate the ESP learners' difficulties to write technical discourse in the

discipline of Computer Science, and finally interpret the results to confirm or reject the proposed hypotheses.

Additionally, the research forms may diverge from one another based on the inquiry objectives and the settled down research questions. For this reason, the inquirer pours her study research into the convenient research type mould used to quest the study. Besides the pre-mentioned research types, there are other ranges of studies like a case study, cross-sectional, longitudinal researches and experiment, according to De Vaus (2001). Whereas, for Anderson (2006) research frames are classified into other sections, such as clinical inquiry, case study, action research, and grounded theory research. On top of that, each type of research pursues a different dependable arrangement of sequences. Also, each one is equipped with certain methods for gathering information as well as analysing them.

Subsequently, it is evident to assert that the researcher in this study opted as well for both case study research design and action research so as to answer the research questions and approve or flatly reject the proposed hypotheses. Such a selection was made on the basis that the researcher sought sound data that tackle several perspectives from the inquiry to provide a more in-depth understanding of the empirical phenomenon (Creswell, 2003). The mixed-method research assures the deep dive into the research problem. Owing to this, the researcher conducted a needs analysis as a first step in the journey of investigating the learners' needs in the ESP course along with exploring their difficulties to write technical discourse in the Computer Science field. As she carried on moving towards providing practical solutions for the issue by implementing a suitable course design that meets the students' needs based on the analysed data from the previous phase of research, that is, to undertake action research.

2.4.1 Research Process and Mixed-Research Method Approach

From the various definitions of research above, the research process of the current study was undergone through definite stages. After identifying the research problem which goes to investigate the English language course at the Computer Science Department whether or not it does meet the professional and

communicative needs of the ESP students, mainly concerning the technicality of written discourse. The researcher, afterward, put her finger on the pulse of the appropriate research method which was a mixed-method approach based on both a case study to explore the required students' needs and action research to react to the existing gap between theory and practice in the ESP context. Saunders et al. (2003:83) come nearest to establish 'research process onion' to guide any kind of investigation. This analogy represents (Figure 2.6) the scope of options, paradigms, procedures, and phases to be trailed by the researcher during his/her process of the quest.

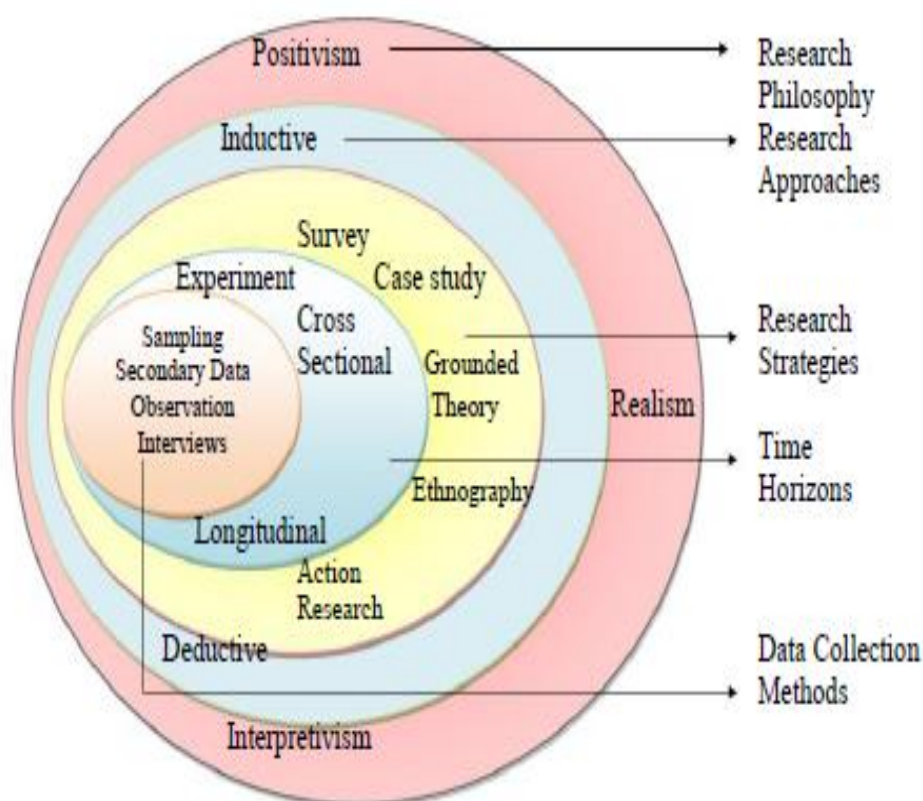


Figure 2.6: The Research Process Onion (Adopted from Saunders et al, 2003:83)

In order to give orientation to this study and as shown on 'the onion of research process' which depicts the needed summary of the significant points to be taken into account when making research (Saunders et al, 2003). The several onions layers serve as a basis for the research principles: the philosophical orientation of the researcher, i.e. research paradigm. In this phase, the researcher relied on a

Pragmatism (Realism Paradigm) which is a combination of Positivism and Interpretivism philosophies to achieve important results within social science more precisely educational studies, not least teaching\learning process in an ESP context.

The next layer is about selecting the research approach adopted. That is to say, the researcher took benefit from both research foundations which are the two types of logic reasoning such as deductive and inductive reasoning. Thereafter, the selection of appropriate research strategies, in this step, the researcher as previously mentioned opted for a case study along with action research to have a full sight on the ESP phenomenon under investigation. Besides, the research timelines that are under analysis; where and when the research took place as an empirical study during one semester at the Computer Science Department. Eventually, the data collection techniques employed by the researcher, gathering information from the sample participants (Master 1 students along with their teachers) through questionnaires, interviews and classroom observation (Saunders et al, 2003).

In very practical terms, a mixed methods research approach is falling in between the qualitative approach and the quantitative approach (See section 2.4.3 Data Analysis Approaches). Moreover, it intends to gather both types of data as well for instance, quantitative data and qualitative data in a sequential form through the use of different research instruments (Kemper et al. 2003). As for Bazely (2003) who claimed that this method is about using mixed data, for example, statistical and textual pieces of information for analysis by relying on different instruments in the same method. The researcher, thus, selects for one part of his\her quest a combination of both qualitative approach and a quantitative research approach for another part of his\her study.

Burke and Onwuegbuzie (2005:1) view mixed research method as a common ground where the researcher mixes qualitative and quantitative research approaches, techniques, methods, concepts of language in one inquiry. For some like Burke et al. (2005), the mixed method is a 'third wave' which means a third type that offers reasonable and feasible alternatives to research. Creswell et al. (2003:7) argue that « mixed methods research is more than simply collecting both qualitative and quantitative data; it implies that data are integrated, related, or mixed at some stage

of the research process ». Furthermore, they specify that the principal reasoning to integrating is that neither qualitative nor quantitative methods are satisfactory in themselves to get the trends and details of the situation...when used in a blend, both qualitative and quantitative data produce a more complete analysis, and they complete each other.

Within the same line of thought concerning the argument of mixed methods research approach logic, Johnson and Onwuegbuzi (2004:17) confirm that « mixed methods research includes the use of induction which refers to the discovery of patterns, deduction which involves testing theories and hypotheses, and abduction which refers to uncovering and relying on the best set of explanations for understanding one's results ». If so to speak, the mixed-methods approach joins the best of all possible worlds of research fundamental principles of logical reasoning. First of all, deduction which refers to the application of general rules to particular cases. Second, induction means to conclude the rule from the observation of a fact in a certain case. The third type of reasoning is abduction, is defined as a way of explaining the circumstances of a case to be identified later on.

Proponents of the mixed-methods approach to research advocate doing research studies by integrating the qualitative and quantitative approaches. Sale et al. (2002:46) are one of the proponents of this idea which highlights the reason behind combining the quantitative and the qualitative research approaches. Their point of view regarding the approaches combination is on the following comment, to sum up, all that has been said on the mixed-method approach:

Both approaches can be combined because they share the goal of understanding the world in which we live. They share a unified logic, and the same rules of inference apply to both. A combination of both approaches provides a variety of perspectives from which a particular phenomenon can be studied and they share a common commitment to understanding and improving the human condition, a common goal of disseminating knowledge for practical use. Both approaches provide for cross-validation or triangulation – combining two or more theories or sources of data to study the same phenomena in order to gain a more

complete understanding of that phenomenon (interdependence of research methods) and they also provide for the achievement of complementary results by using the strengths of one method to enhance the other (independence of research methods).

(Sale et al. 2002 :46)

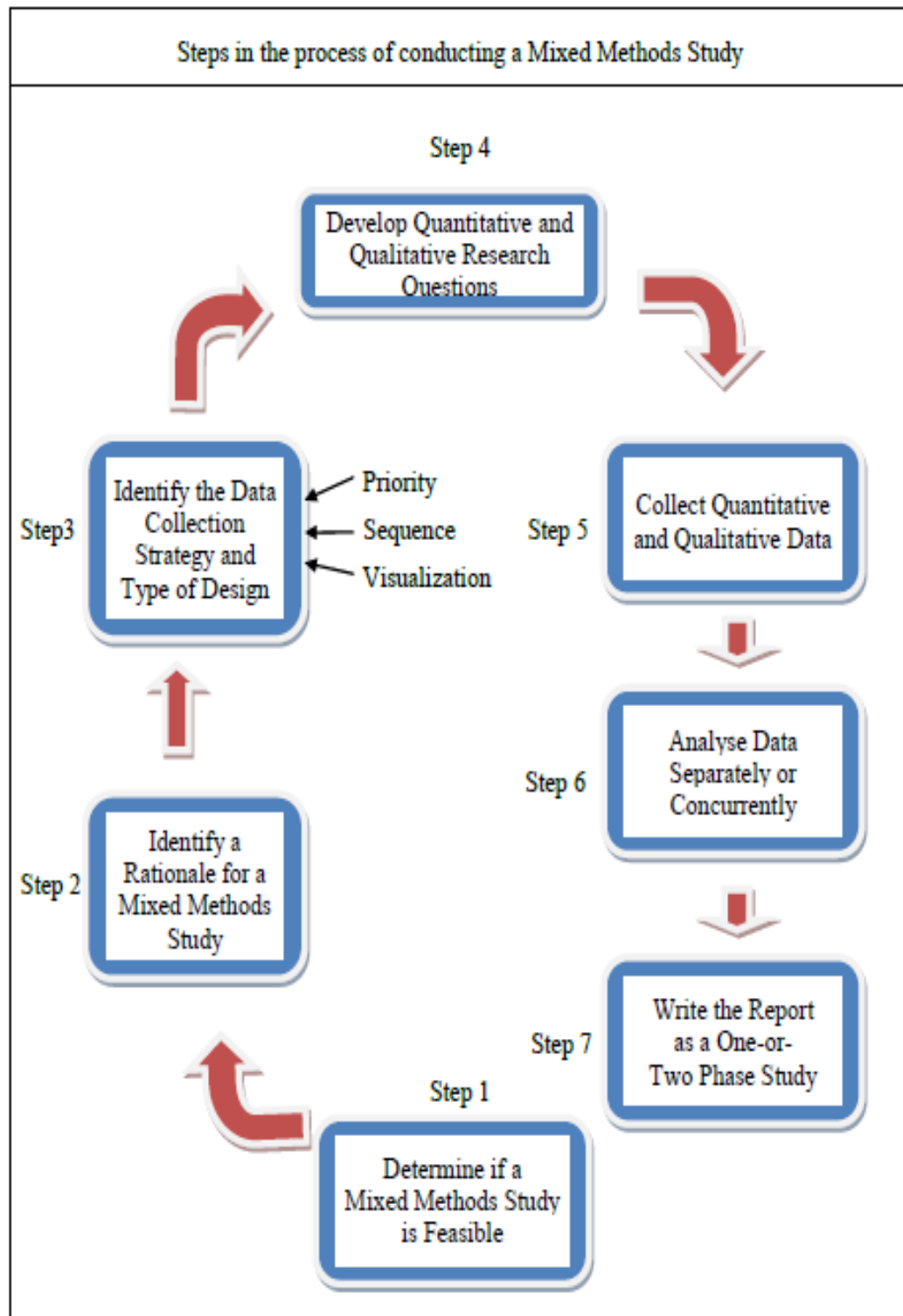


Figure 2.7: Steps in the Process of Conducting a Mixed-Methods Study
(Adapted from Cannon, 2004)

Last but not least, the above-drawn diagram (Figure 2.7) displays the different stages in the operation of undertaking a mixed-methods study. As we can observe, the seven phases in the figure denote the followed points in a study from the planning step to the analysis of the collected data. These parts focus on the fact that the research study should approach the research methods as a congruent mode of inquiry rather than regarding several research methods as a contradictory part in between the two dichotomies (quantitative and qualitative research approaches). That is to say, the goal of the researcher when applying the mixed-methods approach to research is to gain the strengths of integration and minimize the weaknesses of the quantitative and qualitative research approaches (Johnson & Onwuegbuzie, 2004). As a result, the researcher possibly gets profound awareness and understanding of the situation under investigation (Herman & Egri, 2003). The next section sheds light on the research types of design used in this study as well as the research instruments administered to collect data for the evaluation of hypotheses, and lastly the data analysis which relies on both quantitative and qualitative approaches.

2.4.1.1 Case Study

As the first step in a mixed-methods research approach, the researcher opted for a case study to be conducted at the level of the Computer Sciences Department at the Faculty of Sciences, ABOU BEKR BELKAID University- TLEMCEN. The research tools used for instrumentation so as to collect data are expressed thoroughly through this part besides the modes of analysis which are explained as well. The aim of such selection of a case study as a research method is to get hold of a multi-layered insight into the case under investigation represented in the teaching/learning situation in an ESP context in the Computer Science field. Moreover, the case study targets uncovering the learners' needs concerning written discourse at the discipline to write technical reports, articles, and theses to pursue professional and academic careers in their domain. Subsequently, an appropriate English language course is designed to address students' target needs and then to be

implemented later on in the stage of the second mixed-methods research approach which is action research.

In this vein, Creswell (2003) identifies a case study as a research design in which the « researcher explores in depth a program, an event, an activity, a process, or one or more individuals » (p. 15). That is to say, the researchers get a detailed understanding of the study and go on from general examples to more specific deductions. Furthermore, Gall et al. (1996) elucidated the previous definition by saying that a case study is as,

An in-depth study of instances of a phenomenon in its natural context and from the perspective of the participants involved in the phenomenon. A case study is done to shed light on a phenomenon, which is the processes, events, persons, or things of interest to the researcher. Examples of phenomena are programs, curricula, roles, and events. Once the phenomenon of interest is clarified, the researcher can select a case for intensive study. A case is a particular instance of the phenomena.

(p. 545)

Gall's definition puts forward the idea that one can recognize the focus of a case study is on a specific phenomenon. In other words, the ultimate objective of a case study is to reach the goals of the inquiry and prove or reject the research hypotheses. Leedy and Ormrod (2001) state, case studies attempt to learn “more about a little known or poorly understood situation” (p.149). Hence, it provides more thoroughly awareness and understanding of the phenomenon under investigation as it is a practical type of research when not much is known about an issue or phenomenon. As it was fully reinforced by Zainal (2007: 12) that « case studies, in their essence, explore and investigate contemporary real-life phenomenon through detail contextual analyses of a limited number of events or conditions and their relationships ». In the present research study, the use of the case study allows the researcher to look into the teaching\learning situation of the English language at the Computer Science field to discover the learners' difficulties

in order to write correctly by providing a remedial course which meets the learners' communicative needs.

The case study tries to identify an issue and provide a set of suggestions to solve the problem. It can be a sole case or a case bounded by time, place or number of cases (Creswell, 1998). Basically, it is a study of a social event, not least an educational phenomenon, within the unity and entirety of a case, which is temporally and spatially limited (Stake, 1995). The research framework of a case study contains the issue being analysed, the context within which it takes place, the surrounding problems, and the salutary lesson acquired (Creswell, 1998). Moreover, the process of data gathering in a case study is thorough and obtains from multiple sources such as questionnaires, interviews, observations, archival records or documents, physical artifacts, and audiovisual materials. In the setting of a case study, the researcher needs to pass more time on-site and having contact with the participants enquired. Consequently, the final account of a case study ought to consist of the acquired lessons, discovered models that get on well with theories (Creswell, 1998).

Although the case study can be included predominant within a qualitative study design, it is also widespread in quantitative research type. The instance within a case in a case study might be an individual, a population, a group of people, an example, an event, an episode of an event, a subgroup of a population, a town or a city. One of the case study characteristics to be called so is to consider the totality of a study population as one unit (Kumar, 2011). Due to this, the case that the researcher decides on is going to be the fundamental base for a systematic, holistic and extensive examination of the feature (s) which he/she would like to uncover, in the case study design. It is a type of research 'in which a particular instance or a few carefully selected cases are studied intensively' (Gilbert 2008: 36). As stated by Burns (1997: 364), 'to qualify as a case study, it must be a bounded system, an entity in itself. A case study should focus on a bounded subject/unit that is either very representative or extremely atypical.' A case study according to Grinnell (1981: 302), 'is characterized by a very flexible and open-ended technique of data

collection and analysis'. That is to say, it should rely on multiple sources for the data collection process as well as the data analysis phase.

Needless to recall, the case study model of research is built around the supposition that the case being investigated is rare in cases of a certain type. On that account, a particular case can afford awareness of the positions and episodes of events dominant in a group from where the case has been extracted. As reported by Burns (1997: 365), 'In a case study the focus of attention is the case in its idiosyncratic complexity, not on the whole population of cases'. One of the modes within a case study design is by selecting a case that frequently values purposeful, evaluative and information-oriented sampling techniques.

Eventually, the researcher when choosing a case study design, he/she tries not to sort out an arbitrary sample from the whole population but rather to select a convenient case which can come up with as much detailed information as he/she can collect to get a full awareness of the entirety of the case (Burns, 1997). In other words, the researcher will be aware of the totality of the case when he/she investigates an episode or an example to collect data from all accessible sources. As a strategy in a case study when you have the focus of your investigation is a group or a sample of the whole population you have to spend plenty of time with its members trying your best to build a truthful connection with them prior to collect any piece of information about them (Creswell, 1998). Although the researcher may use one method, the use of several data collection methods such as detailed interviews, collecting information through observations, gathering data via focus groups and group interviews, it is a significant characteristic of a case study. Yet when the researcher comes to the time of data analysis, he/she should carry on to view the instances of the case as a totality (Grinnell, 1981).

For Hitchcock and Hughes (1995: 322) who claimed that the case study research type is specifically worthwhile when the researcher knows a little bit of the events under investigation. They regarded (p. 317) that a case study has several features:

- It is concerned with a rich and vivid description of events relevant to the case.
- It provides a chronological narrative of events relevant to the case.
- It blends a description of events with an analysis of them.
- It focuses on individual actors or groups of actors and seeks to understand their perceptions of events.
- It highlights specific events that are relevant to the case.
- The researcher is integrally involved in the case.
- An attempt is made to portray the richness of the case in writing up the report.

Hitchcock and Hughes (1995) come nearest to recognize that a case study research provides the researcher with a chance to realize and examine the event under inquiry from various standpoints. Moreover, it gives the readers much information, an authentic view of the phenomenon to quench their thirst of curiosity towards the target topic. Case studies are set in temporal, geographical, organizational, institutional and other contexts that enable boundaries to be drawn around the case; they can be defined regarding characteristics defined by individuals and groups involved; and they can be defined by participants' roles and functions in the case (Hitchcock and Hughes 1995: 319).

According to Cohen et al. (2007: 273), case studies produce theoretical statements, however, like other sorts of research and human sciences, these must be supported by the existing proofs. This requires the nature of generalization in the case study to be clarified. Generalization can be in different formats, for example :

- From the single instance to the class of instances that it represents (for example, a single-sex selective school might act as a case study to catch significant features of other single-sex selective schools)
- From features of the single case to a multiplicity of classes with the same features
- From the single features of part of the case to the whole of that case.

Furthermore, Yin (1984 qtd in Cohen et al 2007:255) points out that there are different types of a case study. He clarifies that a case study has three types in relation to their consequences.

- Exploratory case study research (as a pilot to other studies or research questions)

Exploratory case studies that act as a pilot can be used to generate hypotheses that are tested in larger-scale surveys, experiments or other forms of research, e.g. observational. According to Botma et al. (2010:6-185), exploratory research « is more focused on grounded theory or theory development. An exploratory study begins with the phenomenon that is of interest to the researcher ». The particular phenomenon cannot simply be observed and described. In order to acquire a description, the phenomenon needs to be investigated in the way in which it manifests (Polit and Beck, 2012: 18).

Exploratory research focuses on the study of the problem to understand the issue and to bring ideas about the way of improving the existing situation. It answers the questions ‘what’, ‘how’ and ‘why’. Therefore, the researcher chose to apply an exploratory case study. As a consequence of what has previously stated, the reason behind the researcher's choice of an exploratory case study was for the sake of having an in-depth insight into the phenomenon; the Computer Science Master 1 students' needs so as to develop a professional career in the field. Besides, it explores the causes of the incapacity of these students to express themselves easily in a written form. The help, thus, provided by such a research type is found on the ground of making sound contact with the students since it facilitates the use of several research instruments for data collection like classroom observation, students' questionnaire and teachers' interviews. Within the same vein, this is what forms the steps of a needs analysis process of the Master 1 students along with providing a proposed English course to improve the existing teaching/learning situation at the Computer Science Department to meet their communicative and professional needs.

- Descriptive case study research (providing narrative accounts)

Its purpose is to describe the object of the phenomenon. It puts emphasis on the characteristics of a certain issue. It tries to answer the question 'what'. A descriptive case study tends to portray exactly the characteristics of the situation, people or groups or the frequency with which certain phenomena occur (Polit and Beck 2012). As stated by Gall et al. (2003:439) that a descriptive case study is:

In a case study whose purpose is the description, the researcher attempts to depict a phenomenon and conceptualize it. This depiction can focus on various phenomena, such as the meanings that the research participants ascribe to their life and environment, contextual factors that influence their life, a series of events and their possible outcomes, and the new or unusual in society. A good depiction will provide what is called a thick description of the phenomenon, that is, statements that re-create a situation and as much of its context as possible, accompanied by the meanings and intentions inherent in that situation.

- Explanatory (testing theories)

It studies the reasons of a problem and explains why something happens. It answers the questions 'what' and 'why'. As claimed by Gall et al. (2003: 440) that an explanatory case study research is about « some case study research aims to provide explanations for the phenomena that were studied. We refer to these explanations as patterns, meanings, that one type of variation observed in a case study is systematically related to another observed variation ».

There are supplementary types. According to Yin's (1984 qtd in Cohen et al 2007: 255) ranking of case study types which matches up with Merriam (1988) who classifies three other types such as: descriptive (narrative accounts); interpretative (developing conceptual categories inductively in order to examine initial assumptions); evaluative (explaining and judging). Merriam (1988 qtd in Cohen et al 2007: 255) also identifies other four prevalent fields or sorts of case study: ethnographic, historical, psychological and sociological. Sturman (1999: 107),

supporting Stenhouse (1985), distinguishes four other kinds of case study: an ethnographic case study – single in-depth study; action research case study; evaluative case study; and educational case study. Stake (1994 qtd in Cohen et al 2007: 255) differentiates three other main types of case study: intrinsic case studies (studies that are undertaken in order to understand the particular case in question); instrumental case studies (examining a particular case in order to gain insight into an issue or a theory); collective case studies (groups of individual studies that are undertaken to gain a fuller picture).

In order to design a case study, a model was put forward by Maxwell (1998 qtd in Gall et al. 2003: 442) which explicitly guides a researcher towards an efficient design along with vivid insight into the phenomenon under investigation. The full design model is displayed in Figure 2.8. Its five constituents are drawn in circles and connected with each other by lines to show the high link between them, that is, each element is linked to every single other element in both a linear or cyclic procedure. Moreover, the surrounding factors in the diagram influence the final outcomes of the case study design, i.e. an essential part in the process of designing a case study.

In Maxwell's model of design (1998 qtd in Gall et al. 2003: 442), the apparent five constituents are distinctive methods which could be turned out to a set of questionable issues. These five elements (research questions, purpose, conceptual context, validity and methods) are of great importance if the researcher intends to do a practical case study design. They can help in creating an order, form and importance to the form of the case study process. They represent sequential steps which may overlap and be traced in the course of doing and simplifying the process of the case study.

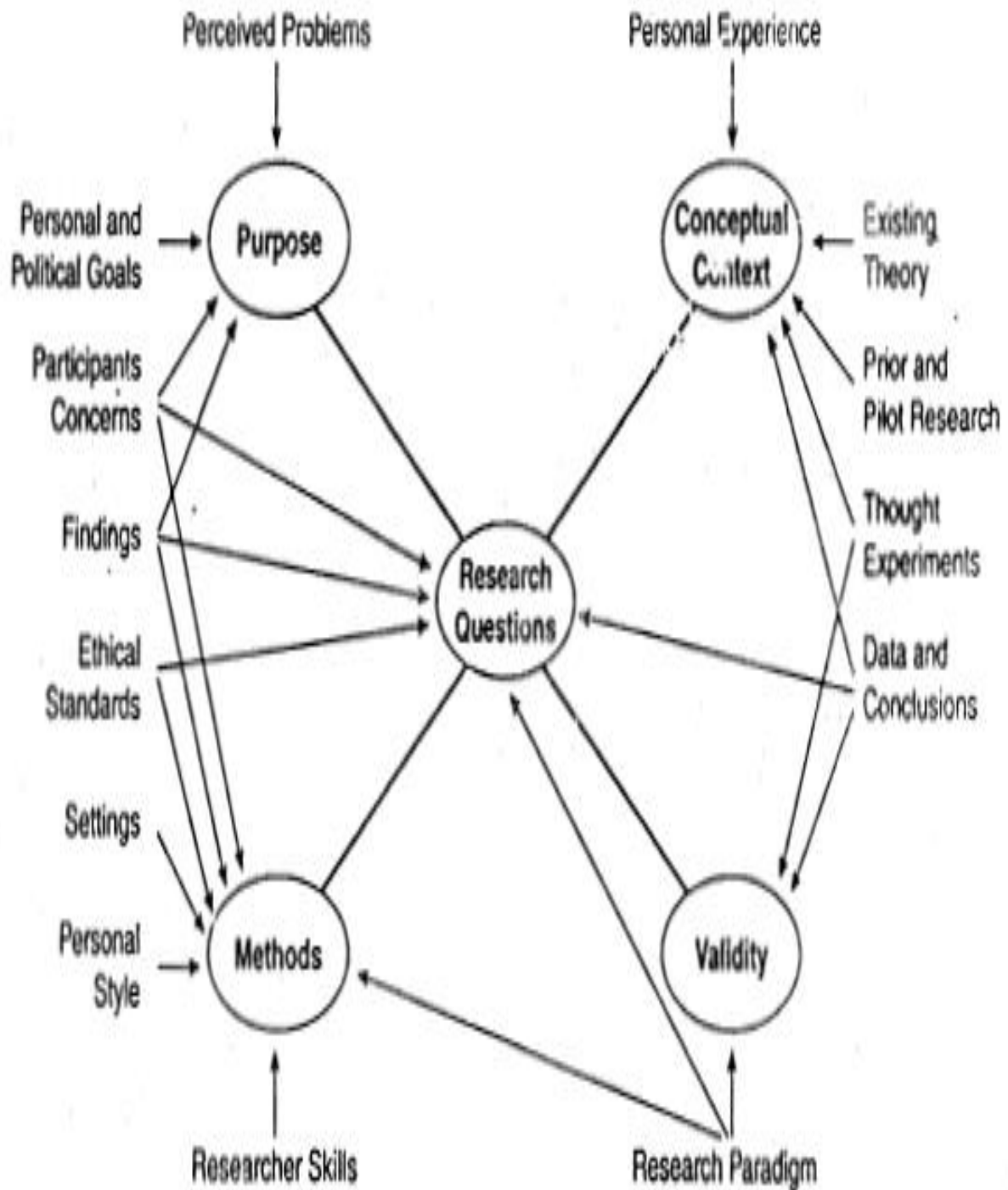


Figure 2.8 : Components of a Case Study Design (Adopted from Maxwell 1998 : 73)

In the same line of thoughts, according to Yin (1994 qtd Marczyk et al. 2005: 148), the case-study design must have the following five aspects in addition to what

has been elaborated by Maxwell (1998): its research question(s), its propositions, its unit(s) of analysis, a determination of how the data are linked to the propositions, and criteria to interpret the findings. As for Kazdin (1982), the major characteristics of case studies are the following:

- They involve the intensive study of an individual, family, group, institution, or another level that can be conceived of as a single unit.
- The information is highly detailed, comprehensive, and typically reported in narrative form as opposed to the quantified scores on a dependent measure.
- They attempt to convey the nuances of the case, including specific contexts, extraneous influences, and special idiosyncratic details.
- The information they examine may be retrospective or archival.

In conclusion, the previously mentioned elements are the crucial elements in a case study research. Besides, they are evident as well in Merriam's (2009) approach, Stake's (1995, 2006), and Yin's (2014). These aspects (Table 2.3) set out the case study form from other forms of research and tell the pivotal elements of the research design and its implementation (Harrison et al 2017:18). The researcher, in the current investigation, has adapted these essential elements in the case study design followed. She selected the required sample population 'case' based on the study purposes and conditions (Yin, 2014). Then, she opted for multiple sources of evidence so that to collect in-depth comprehension of the phenomenon under investigation such as questionnaire, interviews, and classroom observation. Moreover, the researcher relied on twofold methods of analysis which are qualitative and quantitative data analyses. The triangulation process was the chief target of the actual case study design which is exploratory in nature (Stake, 1995, 2006).

Selecting the case	Based on the purpose and conditions of the study Involves decisions about people, settings, events, phenomena, social processes Scope: single, within case and multiple case sampling Broad: capture ordinary, unique, varied and/or accessible aspects Methods: specified criteria, methodical and purposive; replication logic: theoretical or literal replication (YIN, 2014)
Multiple sources of evidence	Multiple sources of evidence for comprehensive depth and breadth of inquiry Methods of data collection: interviews, observations, focus groups, artifact and document review, questionnaires and/or surveys Methods of analysis: vary and depend on data collection methods and cases; need to be systematic and rigorous Triangulation highly valued and commonly employed
Case study design	Descriptive, exploratory, explanatory, illustrative, evaluative Single or multiple cases Embedded or holistic (YIN, 2014) Particularistic, heuristic, descriptive (MERRIAM, 1998, 2009) Intrinsic, instrumental, and collective (STAKE, 1995, 2006)

Table 2.3: Case Study Design (Adopted from Harrison et al 2017:19)

2.4.1.2 Action Research

As for the second step in the mixed-methods research approach, the researcher selected action research to carry on her investigation at the level of the Computer Science Department. From an educational standpoint, this type of research -action research- is mostly of a paramount importance in the field of applied linguistics research where it necessitates inserting proposed modifications to a process, not least in a teaching/learning situation, with the idea in mind of solving the existing problem by carrying through a research to identify the effective changes. Moreover, it aims at enhancing the teaching practices, for instance by taking action to handle the problem or issue. As a definition proposed by Kemmis and McTaggart (1988) which has tightened together various strands of action research in their all-embracing definition:

Action research is a form of collective self-reflective inquiry undertaken by participants in social situations in order to improve the rationality and justice of the own social or educational practices, as well as their understanding of these practices and the situations in which these practices are carried out. . . .

The approach is only action research when it is collaborative, though it is important to realize that the action research of the group is achieved through the critically examined action of individual group members.

(Kemmis and McTaggart 1988: 5)

In very practical terms, action research is undertaken when the practitioners want to make the first move towards change processes in organizations. On top of that, the starting point for a researcher is to identify the existing problem and then collects related information to come up with temporary problem solutions. Subsequently, then, the proposed solution is implemented bearing in mind that there may be unexpectedly by-products happening, as a result of such implementation. Afterward, the consequences are examined, specified, and determined, and the research process carries on a continuous basis up to the point when the issue is completely fixed (Sekaran, 2003: 36).

According to Kemmis and McTaggart (1988), and within the action research, the researcher may use different research instruments as well as it may inclose the collaboration with colleagues, customers, professional researchers, for instance, university professors...Although, as stated by Carr and Kemmis (1986: 162), who regard action research first of all « as a form of ‘self-reflective enquiry’ by participants, which is undertaken in order to improve their understanding of their practices in context with a view to maximizing social justice ». McNiff and Whitehead (2002:17) suggest that « action researchers support the view that people can ‘create their own identities’ and that they should allow others to do the same ». It is a self-reflection that becomes a disciplined inquiry with the intention of improving practices.

Action research is developed to bridge the gap between research and practice (Somekh 1995: 340), as a result of that endeavoring to cope with the perceived

enduring failure of research to react, or enhance, practice (Rapoport 1970: 499; McCormick and James 1988: 339). Elliott (1991: 54) suggests that « action research should contribute not only to practice but to a theory of education and teaching which is accessible to other teachers, making educational practice more reflective ». Therefore, action research is a combination of the identification of the nature of the existing problem, action, and reflection. Besides, the researcher focuses on the practical problems which have been analysed to be changed later on (Stenhouse, 1979).

It is noteworthy that researchers use the term action research to refer to what is sometimes named 'practitioner research' (Zeichner and Noffke, 2001:298-330), 'teacher research' (Cochran and Lytle, 1999), 'inside research' (Kemmis and McTaggart, 2000), and (when it is conducted by teachers educators on their teaching practice) 'self-study research' (Zeichner and Noffke, 2001:298-330). One can deduce that action research is used in education, basically, but it can be used in other fields of research as well.

The two coins of action research are action and reflection. Accordingly, Hobson (2001:7-27) suggested that teacher-researchers keep a journal, « a written record of practice, to help them evaluate their experiences ». Keeping an action research journal is the basic principle of reflection. The reflection process which happens through the use of journals helps the researchers specify the issues of their practices that could be changed systematically via action research. In addition to this, reflection through journals aids education teachers and teachers researchers to spotlight issues in their teaching/ learning beliefs and recommend suitable interpretations of the gathered information.

Concerning action research principles and characteristics, Winter's (1996: 13–14) work revealed the six key principles of action research:

- Reflexive critique, which is the process of becoming aware of our own perceptual biases.
- Dialectical critique, which is a way of understanding the relationships between the elements that make up various phenomena in our context.

- Collaboration, which is intended to mean that everyone's view is taken as a contribution to understanding the situation.
- Risking disturbance, which is an understanding of our taken-for-granted processes and willingness to submit them to critique.
- Creating plural structures, which involves developing various accounts and critiques, rather than a single authoritative interpretation.
- Theory and practice internalized, which is seeing theory and practice as two interdependent yet complementary phases of the change process.

The above definition highlights the fact that action research has key principles. That is, action research is an approach to enhance the existing situation, not least, in an educational setting by reflection and actions to change it. In the process of action research, all teaching staff, administration, students' parents are included to bring the desired change. It is based upon the idea of community development that looks up to the involvement of community members for change.

It is further noted that researchers must consider their purposes for conducting action research so as to put together convenient results for those purposes. Zeichner and Noffke (2001: 298-330) attempted in their work '*Practitioner Research*' as an endeavor to specify the diverse motives behind the selection of an action research design. Personal, professional, and political purposes are the reasons that underlie the action research process. The three dimensions may overlap with each other as described by the authors 'interwoven categories'. For most obvious reasons, action research is carried out for more professional purposes which require the teachers researchers to:

- Be engaged in action research as a form of staff development.
- Seeking to legitimize their roles as producers of knowledge and contributors to the literature on educational research and theory.
- Developing networks of practitioners engaged in action research to promote their collegueship and professionalism

Teachers researchers conducted action research to widen their research by action and bridge the existing gap between educational theories, beliefs, and educational practices. Explicitly, this what has been reaffirmed action research as

reflective research and distinguishes it from other forms of research. Put simply, the emphasis on reflection is the most crucial component of the cycle of the action research process. The starting point is the reflection from which the researchers gain new information, insights, and commitments to explore the strengths and weaknesses of their actual practices. For Hobson (2001:7-27), reflection is « a process of making sense of one's experience and telling the story of one's journey ».

This correlates with what Schon (1983) called 'reflection-on-action' which refers to action after the event, and 'reflection-in-action' which is tackled during the action. Table 2.4 displays the typical differences between action research and formal research which is designed to put together generalizable information for the sake of reporting them in academic journals. Although action research may be published as well, it is undertaken so that to improve the current situation and reflect upon to bring change.

Common Differences between Action Research and Formal Research

Topic	Formal Research	Action Research
Training needed by researcher	Extensive training	On own or with consultation
Goals of research	Knowledge that is generalizable	Knowledge to apply to the local situation
Method of identifying the problem to be studied	Review of previous research	Problems or goals currently faced
Procedure for literature review	Extensive, using primary sources	More cursory, using secondary sources
Sampling approach	Random or representative sampling	Students or clients with whom they work
Research design	Rigorous control, long time frame	Looser procedures, change during study; quick time frame; control through triangulation
Measurement procedures	Evaluate and pretest measures	Convenient measures or standardized tests
Data analysis	Statistical tests; qualitative techniques	Focus on practical, not statistical significance; present raw data, graphs
Application of results	Emphasis on theoretical significance; increased knowledge about teaching and learning in general	Emphasis on practical significance; improved teaching and learning in a particular classroom
Reporting outcome	Published report, journal article; professional conference	Informal sharing with colleagues; brief report; ERIC document; conferences

Table 2.4: Contrast between Action Research and Other Forms of Research
(Adopted from Mettetal, 2001 qtd in Gall et al, 2003: 580)

With all this in mind, the researcher of the current investigation settled down for action research as her second step in the mixed-methods research approach when planning this inquiry. In the first place, action research proves its point in EFL educational setting, not least ESP contexts. Consequently, the researcher used it for the aim of analysing the various teaching/learning perspectives in a typical Computer Science Master 1 class along with exploring the required teacher's instructions so that students' performance in the English language improves. In other words, the researcher looked for teaching aspects as a procedure towards enhancing teaching practices and expanding the acquired knowledge.

Moreover, as reflection is the paramount part of action research which sets it apart from other forms of research, the researcher reflected upon the current situation at the site under investigation relying on a self-reflective practice to gain more insights into the ESP context for the sake of designing the convenient syllabus. The collaborative aspect of action research empowers the quest by facilitating the process of gathering data and working together with both subject specialist teachers, ESP teachers, administration staff, for instance, head of the Computer Science department to come up with the needed language requirements in the field. Afterward, a typical course design from the syllabus is put into action for bringing change. Finally, the whole process of implementing the course is evaluated as in a cyclic-shaped mould of action research. In order to do so, an ESP practitioner needs to follow the steps of a suitable cycle model of action research.

The action research when it is conducted by practitioners, not least ESP teachers, as a part of their everyday practices, then, action research is considered to be more likely cyclical (Gall et al. 2003:585). For some reasons, according to Gall et al (Ibid) traced back the cyclicity of that research design: (a) do not always carry out the stages of action research in the same order, (b) may return to an earlier stage as their research progresses, and (c) may continue going through the stages rather than bringing the research to an end. By doing so, action researchers who collect data systematically to adjust their teaching practices according to their findings and reflect upon them, the process of action research becomes a crucial constituent of their practices.

In addition to this, Glanz (1998: 27) broke down « the process of action research into six steps: (1) selecting a focus, (2) collecting data, (3) analyzing and interpreting the data, (4) taking action, (5) reflecting, and (6) continuing or modifying one's actions, which in turn leads to a new focus for another round of action research ». These steps are shown in Figure 2.9 for more illustration.

Cyclical Nature of Action Research

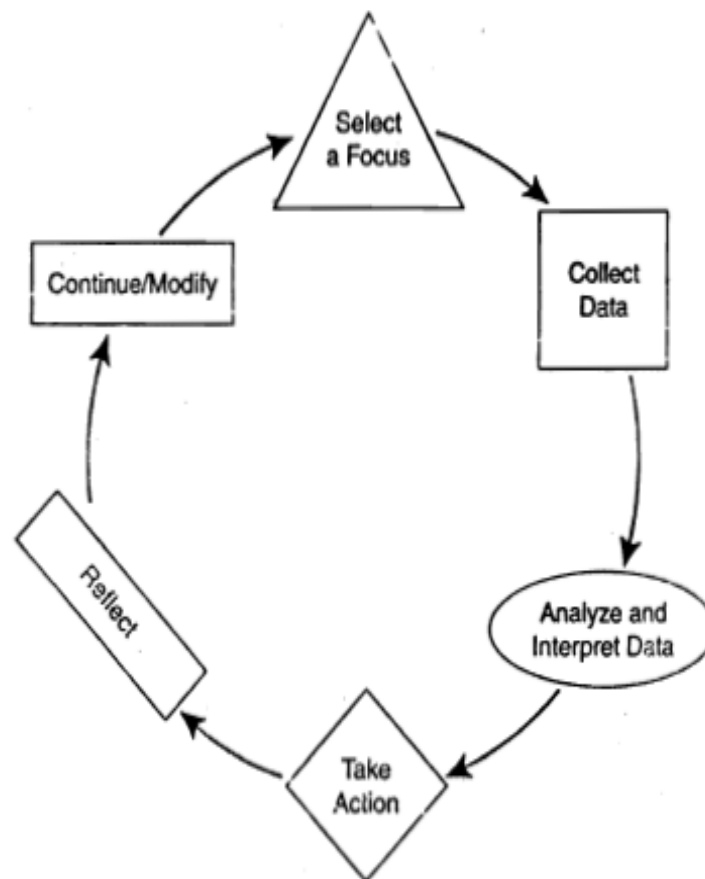


Figure 2.9: Cycle of Action Research Process (Adopted from Glanz 1998: 27)

Since the current action research in this investigation is carried out for a dissertation, it will have a definite beginning and an end similar to other forms of research. The reason behind this is that writing up the whole dissertation project tends to demand the fulfillment of the action and a summary report of the findings with evaluating them (Gall et al 2003: 585). These six-steps model can be used to illustrate the stages of a typical teacher's action research process.

2.4.1.3 Stages of Action Research

As soon as the researcher puts the action research cycle in motion as a vital part of their practices, he/she needs to think about the starting point. When the researcher selects a focus, typically he/she will collect data prior to taking action. Afterward, the researcher will analyse and interpret the data to take action accordingly to what has been found. Finally, adjustment and reflection take place to significantly modify the way in which the process of action research is carried out by the researchers so that to move back and forth between modification and continuation of their classrooms practices (Gall et al 2003: 586). The current investigation is undertaken under the same paths (See Figure 2.9) by Glanz et al. (1998: 27) in order to enhance the technical English in the Computer Science Department, mainly technical written expression of Master 1 students. Glanz's action research model helps the researcher in this study to meet the designed objectives. The investigation steps are as follows :

- Selecting a focus: the researcher in an ESP context starts with a diagnostic stage in which she specified the problems by asking research questions and developing hypotheses so that to determine the students' needs to develop a sound technical written English (Pre-intervention stage, see Section I: General Introduction).
- Collecting Data: for the sake of gathering data related to the problem being studied, in order to do so, the researcher relied on research instruments such as students' questionnaire, ESP and subject-specialists' interviews, and classroom observation to depict the ESP students' difficulties while composing in English (Pre-intervention Stage, see Section 2.4.2).
- Taking Action: After the researcher analysed and interpreted the gathered data, she put forward an intervention which points at improving the students' technical writing abilities, that is to say, Computer Science register along with grammatical structures by addressing their difficulties (linguistic competence problems: morphological, syntactic and semantic difficulties) that prohibit them

from writing correctly in the discipline (Intervention Stage, see Sections 4.9 and 5.2).

- Reflection and Adjustment: In this phase, the researcher keeps an eye on the impact of the intervention on students' writing capacities. On the other hand, the researcher tends to evaluate the proposed intervention whether it provides amelioration of the students' technical written English or not by assessing their pieces of writing (Post-intervention, see Section 5.2.2).

In sum, the researcher has followed the previous Glanz's paths of action research design rigorously. These stages in the conducted action research necessitate the researcher to use different research tools. For the sake of attaining the intended research objectives of each step, the researcher opted for the following data collection tools.

2.4.2 Data Collection Tools

Once the research design is selected, and a mixed-methods research approach was undertaken, the researcher needs to gather the needed data concerning the Master 1 Computer Science students' needs in order to obtain a clear sight of the situation under investigation. Several research instruments were used in this study to collect the required information. The researcher's choice of research tools was based on the determination of the study objectives. In other words, to design a corresponding course that meets students' needs. To reach this end, a needs analysis was first undertaken under the paths of a mixed-methods research approach, i.e. both case study and action research. In planning this design, the researcher opted for three research instruments to unveil the Master 1 students' needs as a first step before the intervention of the researcher.

A students' questionnaire, semi-structured interviews for English language teachers and subject specialists at the Computer Science Department and classroom observation. The intervention phase incorporates taking action (action research) by implementing the designed course accordingly after data analysis and interpretation. Finally, the evaluation and assessment phase in which the researcher reflected upon what has been done in the ESP situation by using evaluative procedures like tests,

and focus group discussion with the students. The researcher relied on the triangulation method in the procedure of data collection, i.e the use of several research tools so as to get a holistic picture of the data obtained and validate the results by cross-checking the findings from different sources (Altrichter et al. 2005). Worth noting that the students' questionnaire and the computer scientists' interview were translated into the French language to facilitate the process of data gathering when administering the two research tools (See Appendix D, E).

2.4.2.1 Students' Questionnaire

This section moves to a close-grained account of instruments for gathering useful and usable data. One of the used research instruments is the questionnaire which is « a widely used and useful instrument for collecting quantitative information, providing structured, often numerical data, being able to be administered without the presence of the researcher, and often being comparatively straightforward to analyse » (Wilson and McLean 1994 qtd in Cohen et al 2007: 317). A questionnaire is a tool of data gathering that is concerned with providing answers to pre-established questions. Moreover, it helps the researcher to obtain quantitative data about the topic of investigation.

Our questionnaire comprises of a set of written questions used to gather information about both facts and opinions. These questions are made up of 3 kinds of questions: closed-ended, multiple-choice and open-ended questions. Concerning the first type, closed-ended questions demand yes or no answers. Multiple-choice questions contain a set of alternative answers and require the respondents to select one response or more. Effectively, close-ended and multiple-choice questions give quantitative information. On the other hand, open-ended questions provide qualitative information. In fact, the latter requires a longer time to answer and analyse (Cohen et al 2007; Kothari 2004).

The questionnaire format is integrally essential. It must look simple, attractive and interesting rather than difficult, unclear. As claimed by Dillman et al. (1999 qtd in Cohen et al 2007: 338) explained that informants tend to prefer mostly a form-filling task than is actually required. They expect to read a question, pursue the response, give a mark, and pass on to the next question. However, in plenty of

questionnaires, it is more complex than this. So that the researcher needs to keep in mind the golden rule which says: keep it as uncomplicated as possible. Questionnaire instructions ought to be clear and guide the respondents through the whole questionnaire: 'Put a tick', for instance, requests participation. However, when relying on complicated instructions and complex procedures which intimidate respondents. For this sake, the researcher needs to show great attention when designing the items of his/her questionnaire items. Consequently, in order to get reliable and valid numerical information. The researcher has to take his/her time designing the items, piloting the questionnaire with a small number of informants to adjust the unclear elements after the piloting phase. The act of grouping together questions about a particular topic is a useful technique for sectionalizing questions (rubric 1: Q1, Q2...). It is a smart strategy which makes the questionnaire an easy instrument to answer and effortless tool to analyse. For this sake, the researcher needs to show great attention when designing the items of his/her questionnaire so as to get useful pieces of information. The researcher should design appropriate items, pilot the questionnaire with a small number of participants to rearrange the ambiguous elements afterwards.

In the current investigation, the reason behind questionnaire selection is made upon the fact of studying the language difficulties in an ESP context among a group of students in their classroom. Moreover, all the respondents will have standardized questions. The main aim of our questionnaire was to seek information about students' difficulties in writing expression. Besides, their linguistic competence in relation to their technical written production, that is, the ESP lexis and its meaning (Computer Science register), the grammar of the technical English language.

The present questionnaire (see Appendix A) was addressed to Master 1 students at the Computer Science Department, TLEMCEN University to obtain both qualitative and quantitative data. The questionnaire as a research tool helps the researcher to provide accurate answers to the formed research questions and defend or reject the proposed hypotheses. The students' Questionnaire was distributed to 40 Master 1 Computer Science students at Sciences Faculty to depict their language needs to write technical English in the discipline. Nevertheless, the researcher

depends on other research instruments in her investigation seeing that questionnaire as an important tool still has noticed shortcomings that constrain researchers to bring into play other tools to support their findings. As summarized by Beiske (2003 : 17) in the following points :

- Written questionnaires do not have features like gestures and other visual clues, and personal contact which can affect the respondents.
- Sometimes questionnaires are not completed by the person we want.
- Some respondents may not give the questionnaire back.

The questionnaire counts twenty-six (26) questions: three (3) close-ended questions [plus three (3) dichotomies questions: in which the respondents are asked to tick only one of the two categories of response], thirteen (13) multiple-choice questions [plus three (3) rating scale questions: in which the respondents tend to give intensity of their responses, for instance, how often do students read in English? (a) always, (b) sometimes, and (c) never (matrix questions in Cohen et al 2007: 331), four (4) rank-ordering questions: they ask respondents to identify their priorities by giving numbers,1,2...], and four (4) open-ended questions. Close-ended questions and scale rating or ordering questions have been used to gain thoroughgoing and numerical information which are easy to analyse (Johnson, 1992). Besides, open-ended questions help the researcher to get the informants' perceptions about a certain topic (Creswell, 2014: 40). Such questions are grouped into five sections. Then, under each section comes different parts. Each section and each part has its objectives, as explained below:

Section One: is concerned with collecting information about students' profiles. It starts with identifying learners' gender and age. Also, it is about (questions 1 and 2) determining students' English learning experience by evaluating their current level in the English language.

Part 1: is related to specifying students' English language learning needs. That is to say, (questions 3 and 4) their attitudes towards studying the language and their motives. Besides, (questions 5 and 6) their perception of the significant writing in their discipline and the reasons behind this significance. In addition to an integral

part of the writing skill which is reading and their reading habits frequency, i.e. to read in English.

Section Two: is about collecting data concerning the specific written discourse and where it is required in the Computer Science discipline. It (Question 7) tends to indicate the most needed written documents in their field of study.

Part 1: is designed to explore the different difficulties behind students' low writing proficiency. (Questions 8 and 9) These two questions ask problems like written expression difficulties faced by Master 1 students. However, it (Question 10) looks for the factors behind these obstacles whilst writing.

Section Three: is concerned with gathering data about learning the specific writing in the discipline. This section includes 6 questions which are on the lookout for the existence of writing sessions or at least writing assignments in an ESP context to develop the students' written abilities in the discipline (question 11), to know the frequency of these sessions if they have ever existed so that to meet the needed timing per week to improve writing skill in ESP context (question 12). (Questions 13 and 14) They are related to the identification of the selected teaching method by the ESP teacher to instruct the technical writing along with his/her focus during the writing lessons if they had any writing lectures. (Questions 15 and 16) They tend to give students suggestions when it comes to learning writing in their field of interest, that is, their preferences concerning the teaching/learning approaches to improve writing and the four language skills integration to learn writing in an ESP context.

Section Four: is related to the required language elements to develop writing in the Computer Science field. In other words, it is about linguistic competence in relation to technical writing in the discipline. It focuses on the three components of linguistic competence: morphology, syntax, and semantics captured in defining first of all the lexical problems such as spelling mistakes, word formation and using collocations (question 17). Second, the participants were required to classify the grammatical deficiencies related to writing rating them from the most commonly made mistake to the least done for instance the differentiation of the grammatical functions of words, tense use, sentence structure, passive/active voices,

prepositions, conditional sentences and so forth (question 18). Lastly, they were asked to clarify their semantic difficulties when using the Computer Science terminology by ordering their perceptions of the issue: recognition of the meaning, context, synonymy, antonymy, polysemy... (Question 19).

Section Five: the last section seeks to unveil the testing procedures used to assess the specific writing of the ESP students. It is about the writing assessment in the discipline. (Questions 20 and 21) They are linked to uncovering the number of tests taken and the frequency of writing evaluation in these tests per term. (Questions 22 and 23) They look for answers concerning the framing of the types of assessment and the activities that the ESP teacher uses in the writing evaluation process. Moreover, it (question 24) is designed to clarify the area that ESP teachers are more concerned with (content, form or both) while correcting their students' pieces of writing in a test. Last but not least, they (questions 25 and 26) ask for identifying the students' preferences when assessed in specific writing and their further suggestions to improve the writing production in the discipline.

2.4.2.2 Interviews

A second research tool in the needs identification process is the interview. It is evident to assert that interviews are conversations comprise of oral questions and answers between the inquirer and the informants. The researcher in his/her investigation uses the interviews as an instrument to collect data and viewpoints about the topic being studied. According to Richards (2001:61), « interviews allow for more in-depth exploration of issues than is possible with a questionnaire, though they take longer to administer and are only feasible for smaller groups ». As there were, the interviews are more useful when gathering information as each question is dealt with in isolation, and the researcher is sure that no question will be left without an answer (Cohen, et al 2007).

This is confirmed by Kitwood (1977 qtd in Cohen et al 2007: 369) claiming that « if the interviewer does his job well (establishes rapport, acceptably asks questions, etc.), and if the respondent is sincere and well-motivated, accurate data may be obtained ». So to speak, Kitwood explained that the interview is a possible tool of pure information transmit and a potential interchange of views between two

or more people on the topic of interest. As stated by Laing (1967: 66 qtd in Cohen et al 2007:369):

Interviews enable participants – be they, interviewers or interviewees – to discuss their interpretations of the world in which they live, and to express how they regard situations from their point of view. In these senses, the interview is not simply concerned with collecting data about life: it is part of life itself, its human embeddedness is inescapable.

One can deduce that the interview goal is not about the fact of collecting data related to life only, whereas, it is about human life itself. All in all, the interview in the life of the researcher as a distinctive tool serves the researcher to seek valid and credible answers to pre-formulated questions while maintaining the course of the interview in line with the inquiry objectives. Accordingly, Tuckman (1972 qtd in Cohen et al 2007: 351) asserted that interviews are addressed to collect data in order to have a direct bearing on the research objectives: « By providing access to what is ‘inside a person’s head’, [it] makes it possible to measure what a person knows (knowledge or information), what a person likes or dislikes (values and preferences), and what a person thinks (attitudes and beliefs) ».

As for interview types, interviews are categorized into three types: structured, semi-structured and unstructured interviews. The structured interview, to begin with, takes the form of an oral questionnaire. It requires all the respondents to answer the same questions which are prepared in advance and they have the same wording (Lincoln and Guba 1985 qtd in Cohen et al. 2007: 352). Whereas, the unstructured interview takes the form of a general discussion without any previous preparation of questions since the researcher just explains the topic to the informant who has to provide the researcher with his/her opinions and talks about the topic freely. As pointed by Sharp et al. (2002), the unstructured interview responses are different from one informant to another and it is more or less long-drawn-out when interviewing which makes it even harder to analyse the results. The semi-structured interview, thus, involves an outline of the topic that will be discussed, i.e., the interviewer orders a set of questions to ask them to the participants but he/she can

add more information or questions in order to have more information (Cohen et al. 2007).

The used interviews in the current inquiry are semi-structured interviews. The researcher designed pre-formulated general questions which are open-ended questions. So that to help the researcher gains in-depth insight into the ESP students' needs in the Computer Science Department by giving the participants (ESP teachers along with computer scientists teachers) the occasion to add or omit impertinent information. Within the same line of thought, the researcher in the chosen type of interviews may raise the informants' awareness towards other issues that were not discussed or planned before. The interviews design along with the questionnaire outline was developed based on Hutchinson and Waters's model of needs analysis (1987) to ensure the validity and reliability of the findings concerning computer science students' needs in the target situation and their learning needs in the ESP context as well.

2.4.2.2.1 ESP teachers' Interview

In this research work, the researcher selected the semi-structured interview to highlight students' needs following the framework of a needs analysis process. The first interview was addressed to three ESP teachers at the Computer Sciences department to educe their learners' lacks, necessities and wants in the domain. So as they are more aware of their students' language needs, writing difficulties, the factors behind such deficiencies and the assessment of the writing skill in the ESP situation. It covers besides the ESP teachers' profiles three other sections (see Appendix B) and eighteen (18) questions, as explained below:

Section One: contains three questions linked to their profile, their field of interest and teaching experience.

Section Two: is about teacher practices (ESP practices) in their ESP classrooms to teach Computer Science students. It is about unveiling the teaching method and the content of each lecture. Moreover, the type of English instructed be it general or technical as it supposed to be (question 1). They (Questions 2 and 3) are concerned with who is in charge of designing the English language syllabus along with students' command of English. The following questions (questions 4, 5

and 6) ask about the students' attitudes towards the English language module, the students' motivation to attend the lectures and which one of the four language skills is more emphasized in these sessions.

Section Three: concerns the teaching of writing in the discipline, precisely, to discover ESP students' language needs, lacks and preferences to write technically. This part asks teachers questions (questions from 7 to 10) about the importance of writing in the Computer Science field and students' attitudes towards writing in English (questions 7 and 8). They (Questions 9, 10 and 11) are linked to the ESP teachers' interest in writing, the timing s/he reserves for instructing writing and the teaching method of writing in these sessions. They (Questions 12, 13 and 14) are related to the students' difficulties when composing in English (linguistic competence: lexis, grammar, meaning) and the reasons behind such difficulties. The final question in this section probes the fact of teachers' preferences to teach writing skill in the computer science field.

Section Four: is related to the assessment procedures to test the students' written achievement in the ESP context. It includes the frequency of assessment, the types and activities of assessment in addition to the assessment criteria the evaluation process is built upon (questions 16 and 17). Finally, the English language teachers' suggestions to improve the students' achievement of technical writing in the discipline (question 18).

2.4.2.2.2 Computer Scientists' Interview

In the second semi-structured interview, a sample of 10 subject specialists was chosen for this interview. The reason behind this tool is to obtain a more in-depth awareness of students' needs in both the target situation and the learning process in the discipline. It involves the importance of English in the computer science field, not least writing skill. Moreover, it looks for answers concerning the convenient teaching method and techniques in addition to activities, from a subject specialist standpoint, to improve the technical writing ability of computer science students. Hence, the researcher got the informants' consent to put on record their responses. It contains two sections, seven (7) open-ended questions, and scale questions, as shown below (see Appendix C):

Section One: is linked with the subject specialists' profiles, the field of specialism and teaching experience. They (Questions 1 and 2) ask about the importance of English language in the field of Computer Science and in which form is the most needed (four language skills).

Section Two: concerns with the importance of writing in the discipline. This section asks about the significance of writing skill concerning the students' studies, their careers in the field and their lacks to write technically (Questions 3 and 4). It (Question 5) probes into the existence of language/subject specialist teachers collaboration for more students' benefit so as to design the syllabus, determining the content of each lesson and the most needed computer sciences terminology that is required to be learned in English. In addition to this, the following questions (6 and 7) are closely linked with the computer scientists' recommendations for both ESP students and English language teacher for better writing instructions and improvement in the overall teaching/learning outcomes.

2.4.2.3 Classroom Observation

The third research instrumentation in the Needs Identification and Analysis (NIA) process is the classroom observation. Classroom observation is a research tool that allows researchers to gain more insights into the situation under inquiry. In the same line of thought, it permits to examine the teaching procedure and students' behaviour in class. Accordingly, as pointed out by Robson (2002: 310), « what people do may differ from what they say they do, and observation provides a reality check; observation also enables a researcher to look afresh at everyday behaviour that otherwise might be taken for granted, expected or go unnoticed ». The most important feature about observation, not least classroom observation, is that it collects information from concrete daily situations. As for Patton, who (1990: 202) suggests that observational data should enable the researcher to enter and understand the situation that is being described. Consequently, the researcher will take more benefits from a highly structured observation, which will know what it is looking for in advance. To put it in a nutshell, a structured observation will already have its formulated hypotheses and will use the observational data to confirm or disprove these hypotheses (Cohen et al. 2007).

In the current investigation, the structured classroom observation (see Appendix F) looks for exploring the learners' behaviour, the teaching method of the four language skills, more precisely writing skill. In addition to the students' engagement in the learning context, including the ESP teacher practices, his/her lessons content, the techniques of instructions and his/her students' language use and their linguistic inadequacies. The whole observation process of Master 1 students at the Computer Science Department took 8 sessions in the academic year of 2018/2019. Session after session, learners felt more at ease as they got used to the observer's presence which led to the authenticity of learners' behavior in the learning environment. The researcher took notes according to the following items:

- Actions and Attitudes towards Writing: is about the different aspects of the typical ESP classroom. It targets the identification of ESP teacher's focus in his/her lectures, the four language skills including writing as the main observer's interest. Also, it highlights the factors (motivation, attitudes...) that affect the learners' achievement in the writing expression using computer science words.
- Climate for Learning: unlike the first part which looks for learner centredness, this part is more concerned with finding out if it is rather a teacher-centered classroom. Moreover, it observes the teaching/learning atmosphere, how ESP teacher creates a relaxed atmosphere that allows a smooth learning process (rapport, humor...) and how s/he handles to meet the required learners' needs besides carrying out different aspects of the lesson.
- Checking Understanding: It refers to the analysis of the teaching content and how it is presented to the learners. Also, it seeks to examine the students' understanding of the delivered content by asking questions about the used language components (lexis, grammar, and meaning), the learners' interest that the teacher plans for the ESP class. This part, thus, detects the ESP teacher's use of computer science words and whether s/he explains them using the blackboard or not in accordance with checking out the students' written expressions.

- **Assessment of Writing:** it involves the search for the evaluation procedures used by the teacher to assess his/her students' achievement in writing skill. So to speak, it explores the language activities, not least designed writing assignments by the teacher for assessment purposes.

2.4.2.4 Testing

The testing field is of great importance in the data collection process of any research work. Seeing that the researcher opted for testing procedures to continue carrying out her investigation so that to evaluate the intervention stage (post-intervention phase). Therefore, she chose testing as an evaluative procedure so as to measure students' achievement after taking action and implementing the designed course. The aim of testing is to quantify how students have coped with the content taught regarding the linguistic competence (morphology, syntax, and semantics) and, —to check whether course objectives have been met or not (Brown, 2004). As confirmed by Cohen et al. (2007: 414): « In tests, researchers have at their disposal a powerful method of data collection, an impressive array of tests for gathering data of a numerical rather than verbal kind ». Furthermore, considering testing as an instrument for collecting research data, several characteristics need to be taken into account in an ESP setting to have a better understanding of the students' language proficiency. Reliability jointly with authenticity and validity are essential testing parameters (Kothari, 2004).

The testing conducted in this quest was devised as a pretest and post-test (see Appendix G and H) to measure the syllabus efficiency in improving the students' writing ability. Moreover, it helps at evaluating the proposed course if it contributes to stimulating the students' readiness to compose technical written pieces in the discipline with boosting their linguistic competence (morphological, syntactic and semantic levels of language). Afterward, the data gathered from the pretest are compared to those obtained from the post-test. That is to say, the pretest was conducted at the beginning of the teaching period. Whereas, the post-test took place after the intervention phase. The two used tests were based upon authentic tasks related to the computer sciences domain (content-based approach). The selected tasks are about real-life situations and more specific technical language so as to

enhance the linguistic competence along with the content-knowledge of the ESP learners. All in all, tests were designed to help the researchers check whether students have assimilated the designed course content in accordance with the technical language used (if they have developed their linguistic competence) or not.

2.4.2.5 Focused Interview

For evaluative purposes, the researcher again relied on another evaluation procedure after taking her action to evaluate the whole achieved process. As a consequence of this, a focused interview was selected to discover students' attitudes towards the experience that they went through. As its name implies, focused interview or focus group discussion is about highlighting a specific experience of the participants who express their standpoints concerning what they had. As stated by Cohen et al (2007: 377): « It has been shown to be a particularly valuable technique because it gets at the deeper attitudes and perceptions of the person being interviewed in such a way as to leave them free from interviewer bias ». Furthermore, the informants' answers enable the interviewer both to test the validity of his/her hypotheses, and to reflect upon the unpredicted responses concerning their experience. Worth mentioning at this level of analysis, the researcher needs to put up an interview guide (see Appendix I) so that to identify the major areas of inquiry to facilitate the process of gathering relevant data (Merton and Kendall, 1946).

This focus group discussion aimed at discovering the ESP learners' perspectives and standpoints in regards to the implemented designed course, how it was delivered, and the assessment procedures which they sat for. Moreover, the researcher emphasized the students' perceptions of the teaching practices including the type of tasks, teaching strategies, and text variation. She also sharpened the focus of attention on learners' achievement using the language, i.e, to evaluate the spoken along with the written forms of students' language proficiency (linguistic competence). The obtained findings were cross-checked with pre and post tests results (see Section 5.2.6).

The following diagram (Figure 2.10) summarizes the research design adopted in the current investigation. The researcher starts with determining the type of research design followed in the research project which is a mixed-method approach and exploratory research in nature. Next, the two research designs used are an exploratory case study coupled with an action research design for comprehension depth and breadth of inquiry. Thereafter, she relies on multiple research tools to gather several pieces of evidence (questionnaire, interview, and classroom observation: Pre-intervention Phase). Afterwards, the researcher sets the target population's needs profile to design and implement a convenient syllabus to meet these students' demands in the discipline (Intervention Stage). Finally, it comes the last path in this journey which is the evaluation operation of the implemented courses to gauge their efficiency as well as the learners' language proficiency in general and specific writing skill particularly. The post-intervention phase is undertaken using different assessment and evaluation procedures (pre-test, post-test, and focus interview) so that to collect information about the students' perspectives relevant to the intervention phase.

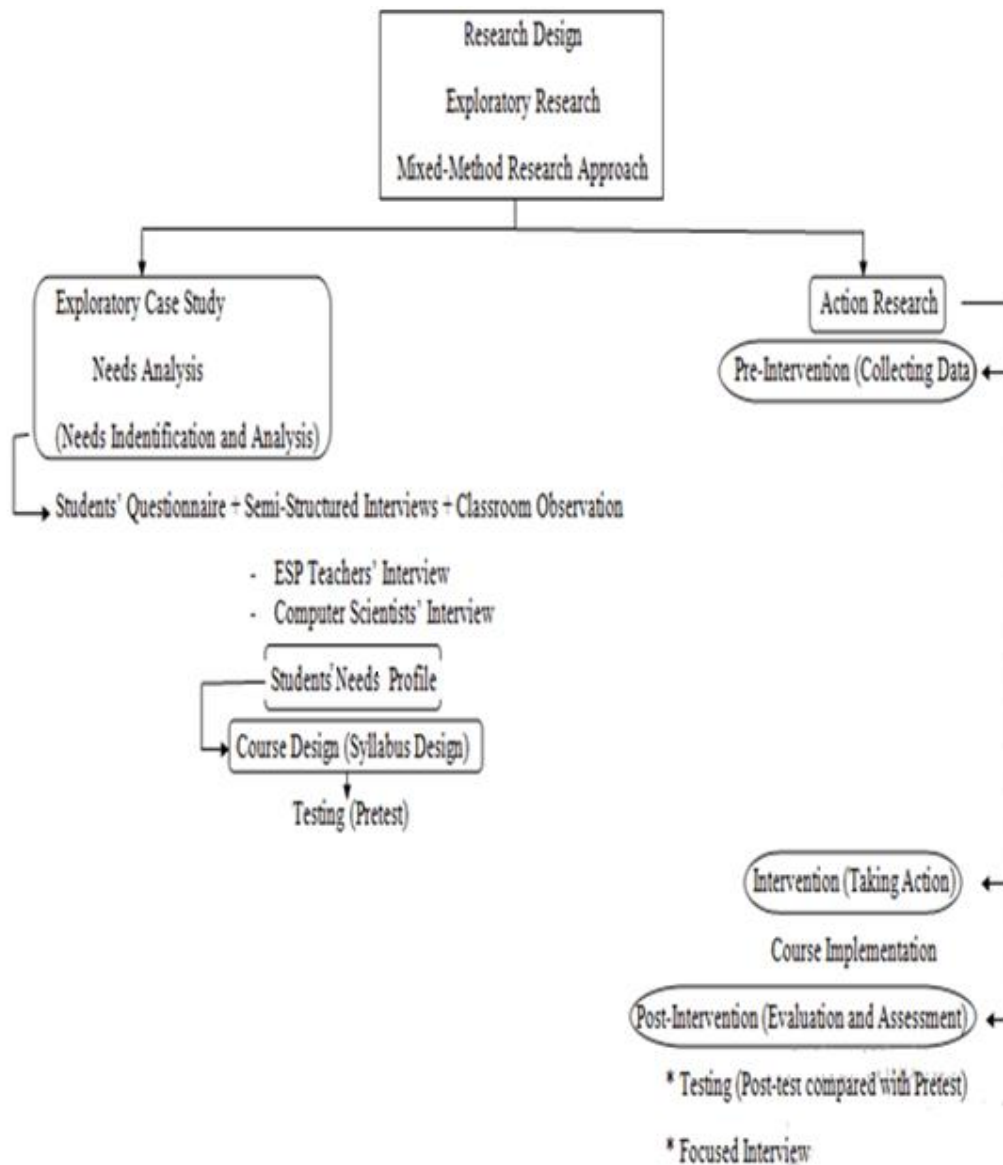


Figure2.10: Research Design

2.4.3 Data Analysis

After relying on a triangulation research method for gathering data from different sources to provide a comprehensive data analysis. Next, it should be the analysis of this collected information. In the current investigation, the researcher gathered several types of data considering that she used different research tools. Those types of data fall into two research modes which are qualitative and quantitative methods. Consequently, the researcher is required to use two different types of data analysis in order to analyse the different information that she got. By taking advantage of the two modes of research: quantitative and qualitative methods seeing that the mixed methods research approach was used for both collecting and

analysing data within two research projects: a case study and action research (Bryman and Burgess, 1999).

2.4.3.1 Quantitative Analysis

Quantitative data analysis relies on statistics. That is to say, the researcher used this type of analysis to quantify the numerical information. As a consequence, it enables the researcher to provide evidence and understand the results through numerical data, like the data obtained from the questionnaire (close-ended questions) and tests in this inquiry. The statistical results can be tabulated in numbers along with their analysis which involves the use of descriptive statistics, therefore, it includes the use of frequencies (the number of times in which similar items occur). Moreover, percentages which mean the proportions of answers in addition to this, the researcher employs measures of central tendency (mean, median, mode and standard deviation) (Kothari, 2004) for the analysis of data collected from tests.

In this investigation, the researcher relied on these measurements which enable her to demonstrate and interpret the statistical data gathered from tests (pretest and post-test) by comparing and cross-checking them. Hence, the quantitative analysis along with qualitative analysis are two facets of the same coin so that to bring the research of value (Cohen et al. 2007). Besides, the two data analysis types combined can take the advantages of quantifying data to be further generalized from the sample frame to the whole population.

2.4.3.2 Qualitative Analysis

Qualitative data analysis is based upon formulating textual information. In other words, it relies on the techniques of coding data gathered from the perspective of the research participants. Coding, thus, means using symbols to summarize the collected data. In addition to this, the researcher has to employ the method of classification in order to organize the answers together according to their content. The organization process is accomplished with the help of using description, explanation, and interpretation. Also, the researcher may use tables or diagrams to summarise and recapitulate the main points listed previously within texts.

The present inquiry uses interviews, questionnaire (open-ended questions) and classroom observation to collect qualitative data about the students' behaviour, attitudes, and perceptions along with their teachers' teaching procedure. Thus, the researcher opted for the qualitative data analysis so that to analyze the qualitative data obtained from these research instruments. As stated by Cohen (2007:461) in this type of analysis, the researcher classifies, explains, exemplifies and interprets the qualitative data that she gathered about the teaching content and the students' participation in the classroom. All in all, it allows the researcher to give her inferences and draw a conclusion by providing a detailed description (Fred and Perry, 2005).

2.5 Conclusion

The current chapter emphasized on giving information about the study setting and the situation analysis of the site under investigation. In addition to this, it shed light on the full account of the research methodology used. Firstly, the case study design, where needs identification and analysis process was undertaken, then, it provided details on how the findings were interpreted into action, that is, via action research. The sampling techniques and the selection of research tools used to gather information about the subjects are fully discussed. At last, it highlighted a short account of the approaches followed to analyse the data collected.

Chapter Three

Data Analysis and Discussion

Needs Identification and Analysis

3.1 Introduction

3.2 Students' Questionnaire Analysis

3.2.1 Reporting and Interpreting the Findings

3.3 ESP Teachers' Interview Analysis

3.3.1 Reporting and Interpreting the Findings

3.4 Computer Scientists' Interview Analysis

3.4.1 Reporting and Interpreting the Findings

3.5 Classroom Observation Analysis

3.5.1 Reporting and Interpreting the Findings

3.6 Discussion of the Findings

3.7 Summary of the Main Results

3.8 Conclusion

3.1 Introduction

The aim of this research work is to identify computer science students' needs for their academic and professional careers. Accordingly, it seeks to design a convenient syllabus that best counters the learners' needs to write in the field. Consequently, the researcher has undertaken a needs identification and analysis process to gather the relevant information about the teaching/learning situation in an ESP context, not least the teaching of writing in the site under investigation. This chapter dealt with a case study research design to report and interpret the research instruments results. Thereafter, the discussion of the main findings is represented in order to validate or disapprove the proposed hypotheses previously mentioned at the start of this study. Finally, a summary of the results is discussed so as to determine the learners' needs in the target situation using both collected data from the research instrumentation and Hutchinson and Waters' Model. Research tools aimed at consulting students' and teachers' perspectives to know the significance of the English language in the department. It looked also for students' writing difficulties and their factors to propose a suitable remedy work.

3.2 Students' Questionnaire Analysis

ESP students' questionnaire is quantitatively analysed in the following lines. Thus, its findings are reported and interpreted then right after discussed according to the proposed hypotheses. Once again, the questionnaire is designed to cross-check collected information through teachers' interviews and classroom observation. Besides, it promotes meeting the investigation objectives, and it facilitates getting an in-depth valid data (Anderson, 1990) about ESP students' needs to write technically in computer sciences major in addition to the difficulties they face while writing. Hence, it comprises of five sections: learners' profile, specific written discourse, learning writing in the discipline, linguistic competence and writing in the discipline, and assessing writing in the discipline. Under each section comes parts, as follows, learning needs, difficulties of written expression, and linguistic competence components which are lexis, grammar, and meaning (see Appendix A).

The questionnaire consists of twenty-six (26) questions. These questions are arranged in the five sections. Learners' profile is the first section which identifies learners' representation of age and gender. Next, specific written discourse as the second section looks for information related to where students need to write in their discipline and their written compositions difficulties along with their main causes. Then, learning writing in the discipline as the third section which is focused on collecting data about the writing sessions in the ESP context. Thereafter, the fourth section is about unveiling the linguistic competence deficiencies of the learners like lexis, grammar and meaning in relation to the students' ability to write in the discipline.

The researcher follows Hutchinson and Waters (1987) model of needs analysis to formulate the ESP students' questionnaire. That is to say, the present inquiry attempts to determine Master 1 computer sciences learners' linguistic and communicative needs to write technically in their field. These needs are split into target needs and learning demands. Firstly, target needs compose of necessities, lacks and wants. Necessities refer to the language components that are most needed by the learners to have a strong command of the written discourse in the discipline. Moreover, these necessities as important elements must be included in the English lectures. Lacks are related to the accordance between what the students already know and what they miss to perform effectively in the target situation (Benyelles, 2009). Learners' desires and suggestions are the third facets of the target needs which are wants. Finally, learning needs mean the road map used to reach the final destination which is the target situation (see Section 2.4.2.1)

3.2.1 Reporting and Interpreting the Findings

The data collected from 40 informants from Master 1 computer sciences learners are stated and clarified below. Brief descriptions along with tables, charts, and counts frequencies are used to report each questionnaire item. That is to say, the participants' number (Students' Absolute Frequency: AF) is identified in diagrams or the informants' percentage (Relative Frequency: RF).

Section 1: Learners' Profile

Students' Age and Gender

The findings of these questions imply that 42.5 % of the subjects enrolled in Master 1 computer sciences are males and 57.5 % of them are females. Moreover, their age varies from 21 to 25 years old.

Question 1: English Learning Years

This question uncovers the number of years in which learners have been studying English. The majority of the informants (29) stated that they learn English in formal education, i.e. they had English courses from the Middle School (9 years till now). However, only 11 students declared that they attended private schools to learn English. Thus, they have studied English lectures for more than 10 years, as described below:

	Number of Students		Number of Years
	AF	RF	
Middle School	29	72.5%	9 Years
Private Schools	11	27.5%	11 Years

Table 3.1: Number of English Learning Years

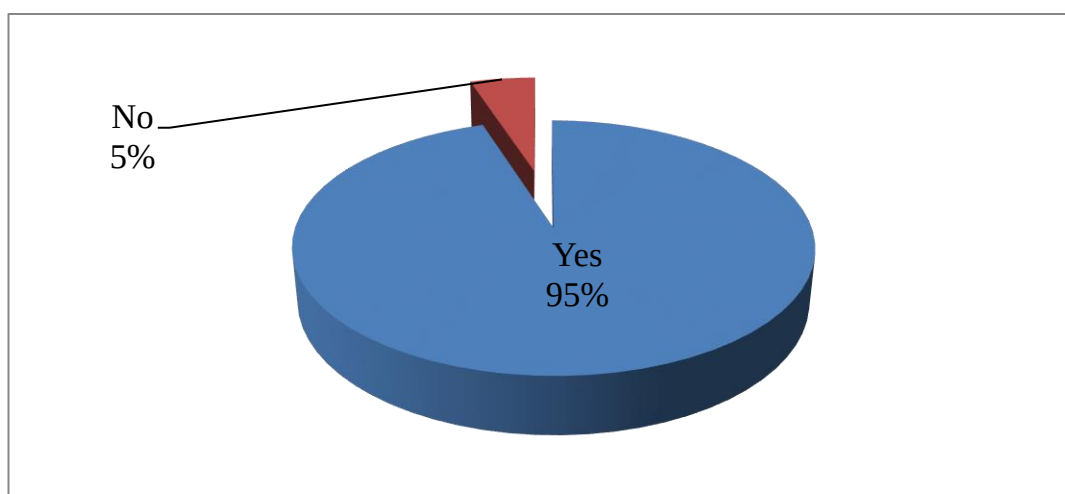
Question 2: English Language Command

The findings of this question depict the self-evaluation of the learners. The greatest number of participants (32) denounced that they are intermediate English learners. However, five informants (5) evaluated their level as advanced. Only three (3) subjects declared that their English level is considered as beginners. The following table displays the students' level of English language proficiency.

	Beginner	Intermediate	Advanced
Students' Absolute Frequency	3	32	5
Relative Frequency	7.5%	80%	12.5%

Table 3.2: Learners' English Language Proficiency**Part 1 : Learning Needs***Question 3: Students' Attitudes towards Studying English*

The gathered information divulge that almost all students (38) preferred learning English as illustrated below (see Figure 3.1). However, only two (2) informants showed negative attitudes towards English language learning. This is due to the fact that ESP students as adult learners are fully aware of the significance of English language in their field.

**Figure 3.1: Attitudes towards English***Question 4: Students' Motives for Learning English*

Having interrogated the students about their motives for learning the English language, they responded that the English language as to be an international language and more particularly the language of science is highly demanded in their both social lives, educational and professional careers. Also, they reported that English is required as a key element while reading English computer science

documentation, i.e. reading for research in the discipline. In addition to this, most of them proclaimed that English significance in a computer science discipline is of great value as it facilitates mutual international intelligibility when they apply for scholarships or international conferences. Besides what they have mentioned, the larger portion notified that they prefer and love the English language learning.

Question 5: Students' Perception of Writing Significance in Computer Science

The results of this question are linked to the reasons behind students' writing significance in their field. The majority of the informants attributed the importance of writing in their discipline to composing articles at the post-graduation level (Doctorate). Additionally, they highlighted the importance of reading documentation in the field like research papers, articles...as academic needs. They reported as both their educational and occupational demands concerning the programming languages which are designed and used in English language, students tend to use only keywords like class, final, continue, and new²⁵ which can be easily memorized by the learners. On the other hand, basically in the Technical English module, ESP teachers ask their students to prepare a speech to present orally (PPT Presentations), to write paragraphs, essays, summaries, and rarely writing reports.

Question 6: Reading Habits Frequency in Relation to Writing Skill

Reading as a complementary skill to enhance writing ability, in this question students were asked to identify their reading habits, i.e. the frequency of reading in English. The vast part of the informants (22) responded that they sometimes read in English. Fourteen subjects (14) stated that they often read English body of literature. Only 1 student said that he/she always read English materials. However, three students solely admitted that they never read in English. When interpreting these findings, one can say that ESP learners are aware of the transparent link between reading and writing as an integral skill to improve the overall English language mastery. The figure below demonstrates the students' reading habits:

²⁵ Keywords used particularly in Java Programming Language.
<https://docs.oracle.com/javase/tutorial/java/nutsandbolts/keywords.html>

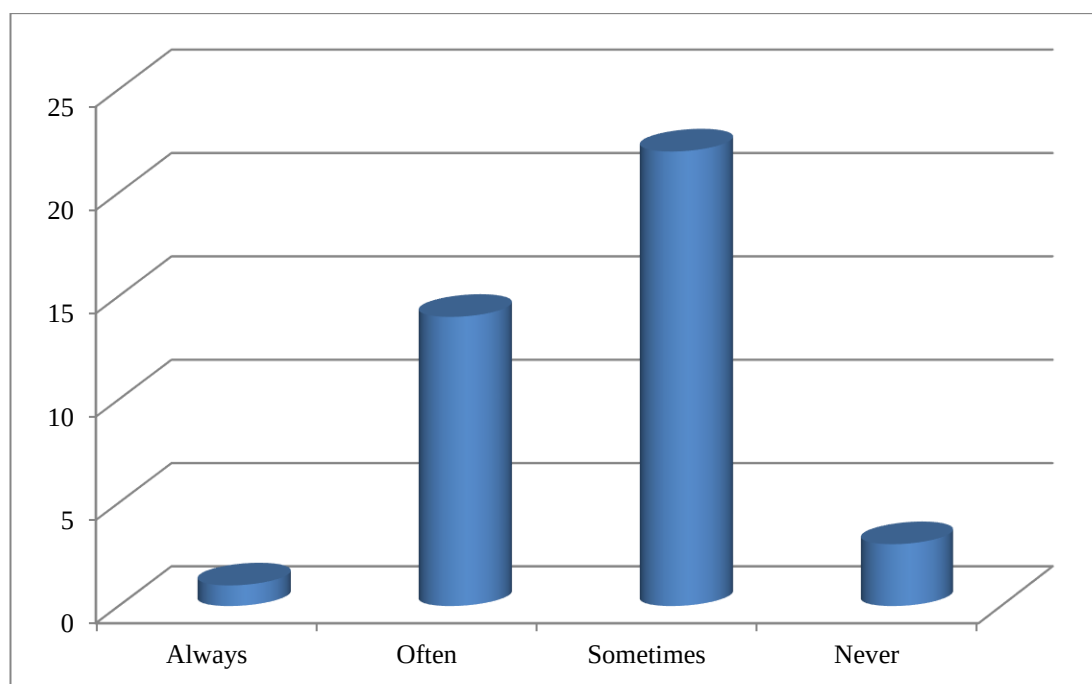


Figure 3.2: Students' Reading Habits

Section 2: Specific Written Discourse

Question 7: Written Discourse Demanded in Computer Sciences

As for the types of writing required in a computer sciences discipline, the great portion of students (22) answered that articles are most needed in computer sciences major, while 20 participants considered report writing as an important written type of discourse in their field. As far as research papers, 13 students declared that they are essential in computer sciences. Moreover, writing English theses in computer sciences is mentioned by 11 students. 10 students denoted (see Figure 3.3) that ESP teachers ask them to write essays. Additionally, 9 learners reported that they need English in preparing presentations to be performed orally. Last but not least, only three (3) participants stressed the importance of English written discourse in programming.

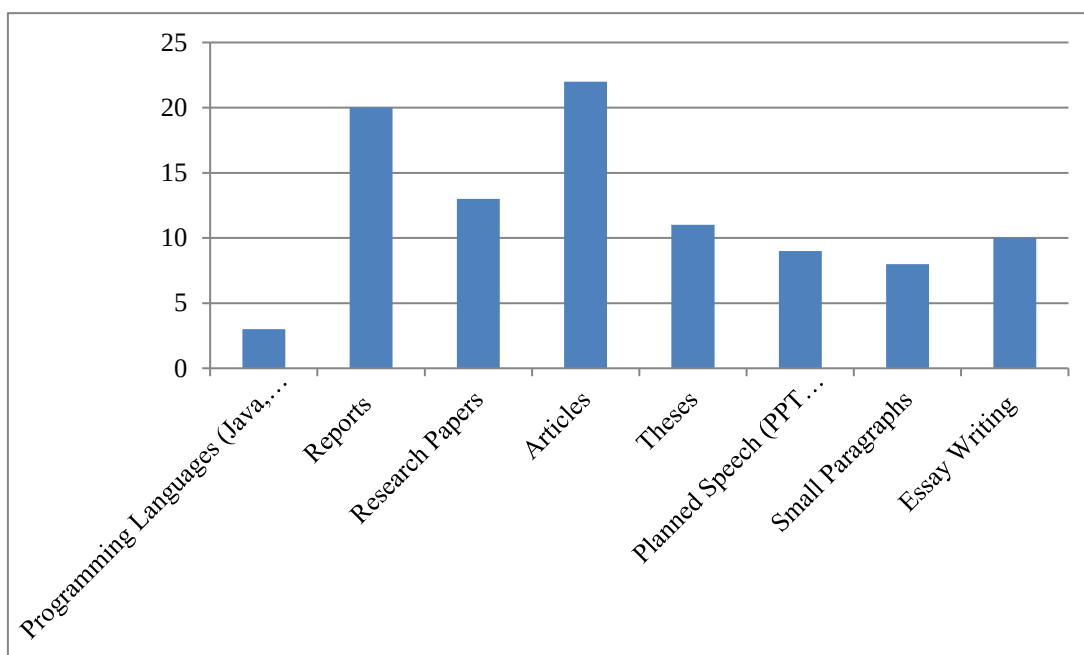


Figure 3.3: Writing Types Required in Computer Sciences

Part 1: Difficulties of Written Expression

Question 8: The Frequency of English Writing Accuracy

Figure 3.4 below depicts the findings gathered for the eighth question. The majority of participants (23) elucidated that they sometimes write correct English. Twelve learners (12) stated that they often compose written expressions accurately. Besides, three informants (3) claimed that they always write correctly in English. Nevertheless, just two (2) learners admitted that they never write correct English.

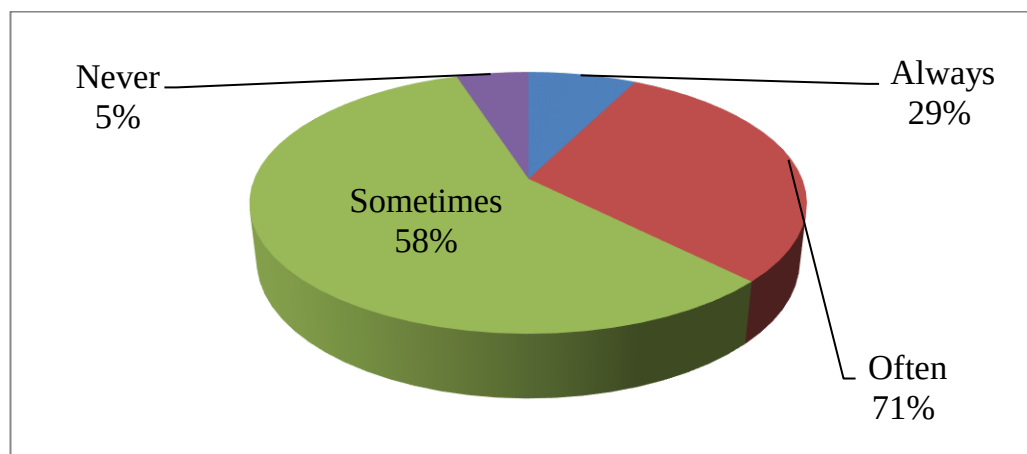


Figure 3.4: Frequency of Writing Correct English

Question 9: Students' Writing Difficulties in Computer Sciences

Most participants (20) stated that they have problems with vocabulary. Those who argued that they have no difficulties with vocabulary form a minority with 5 students. As for grammar deficiencies, a large portion of informants (15) said that they always, or at least sometimes, encounter such deficiency. The same could be noted about spelling which remains one of the tough writing tasks with 16 subjects who mentioned that they sometimes face this problem. As far as punctuation, coherence, and cohesion are concerned, only 10 learners admitted facing such difficulties when writing. Markedly, ESP learners encounter difficulties mainly in vocabulary, grammar, spelling, punctuation, coherence and cohesion. This interprets that the informants do not fully master the English language in the target situation. Figure 3.5 displays the ninth question results.

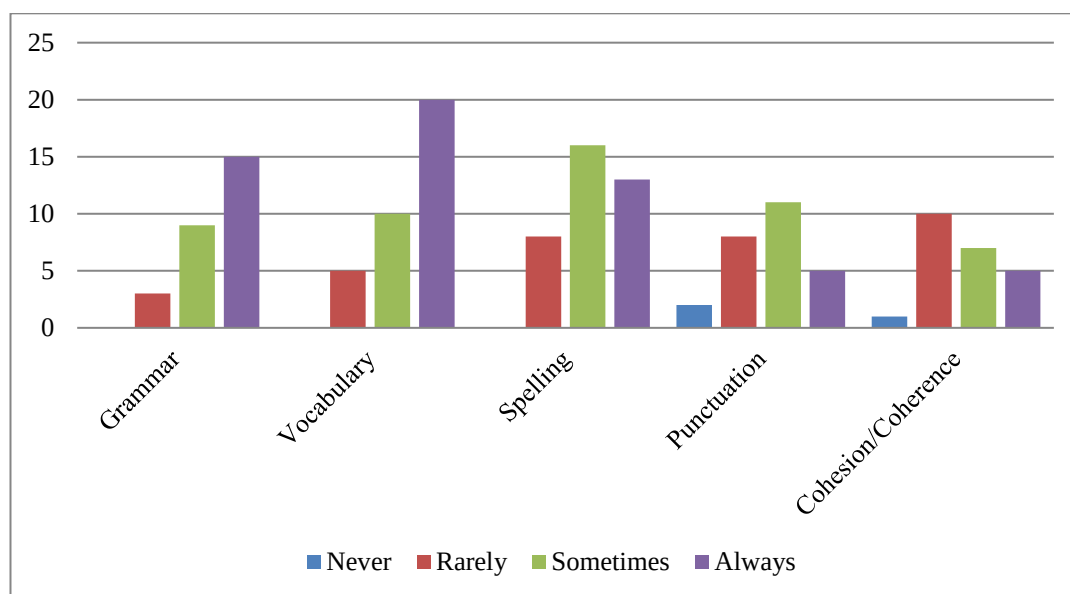


Figure 3.5: Students' Writing Difficulties in the Discipline

Question 10: Factors behind ESP Students' Writing Difficulties

The results revealed that most informants agreed with all the proposed causes of ESP students' low performance in writing composition. Many participants (28) ascribed inability of writing to lack of practice. 17 informants viewed that lack of reading is a chief factor that causes poor achievement in writing (see Figure 3.6). Also, 14 participants declared that the lack of time allocated to learning writing is

the main cause of writing incompetence. Other students (8) added reasons like inadequate teaching programs as the main factor.

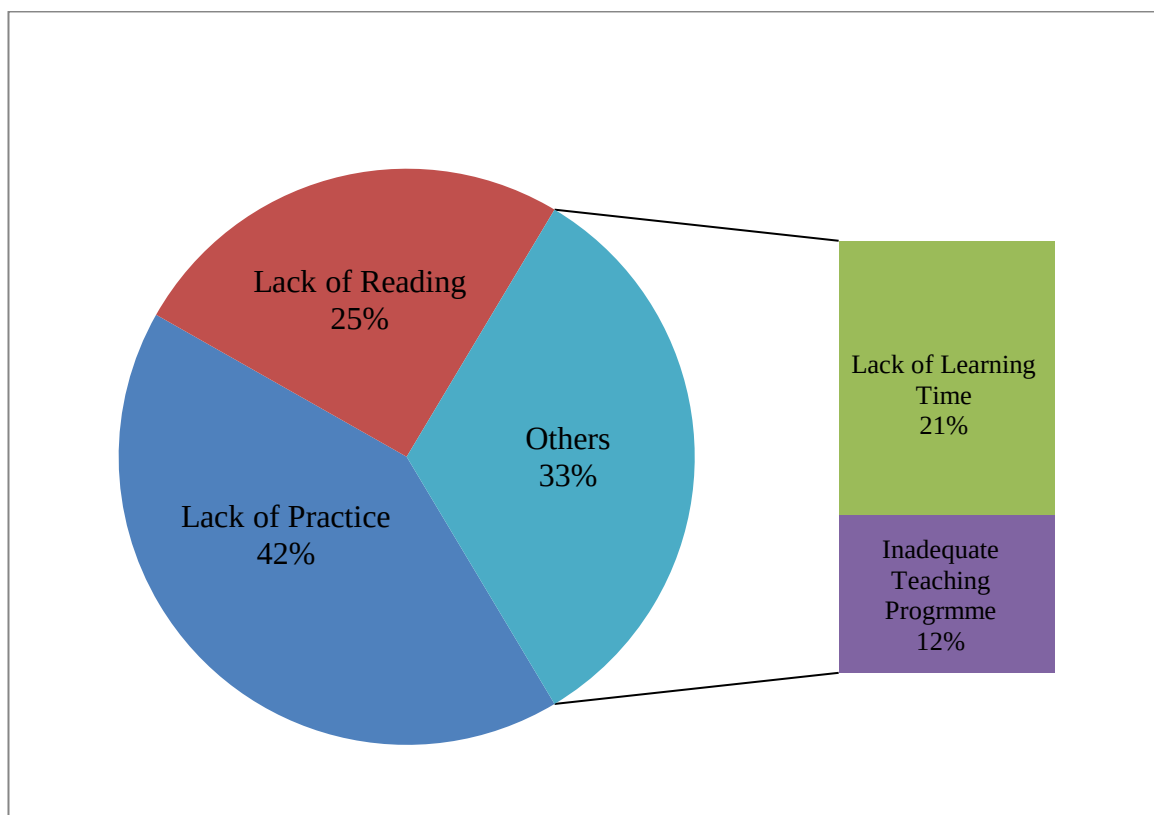


Figure 3.6: Reasons for ESP Students' Writing Difficulties

Section 3: Learning Writing in the Discipline

Question 11: The Existence of Writing Sessions in ESP Courses

This question inquires about whether ESP teachers devote sessions or at least assignments to instruct written discourse in the discipline or not. When students asked about that, the majority of students (23) admitted that they do not have specific sessions to learn writing ability. However, 17 informants (see Figure 3.7) denied this by saying that they did have ESP courses assigned to writing skill. The results revealed that ESP teachers maybe do not give much importance to writing skill in comparison with other language skills.

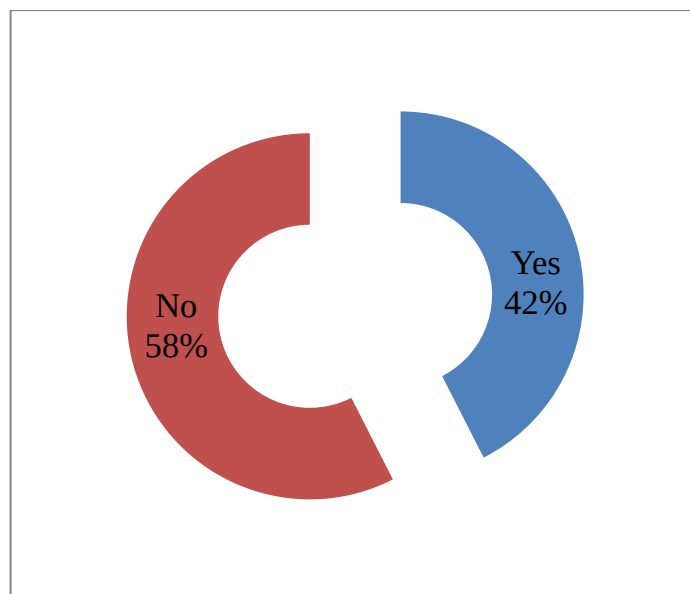


Figure 3.7: Writing Sessions in the ESP Program

Question 12: Number of Writing Sessions in an Academic Term

The findings exposed that most of the participants (17) agreed that they had from 1 to 4 sessions devoted to the writing skill to improve students' writing performance. Only five (5) informants said that they had 6 sessions and up dedicated to writing composition. However, three (3) students claimed that they studied writing for more than 12 sessions in a semester. Figure 3.8 below describes the results of question twelve.

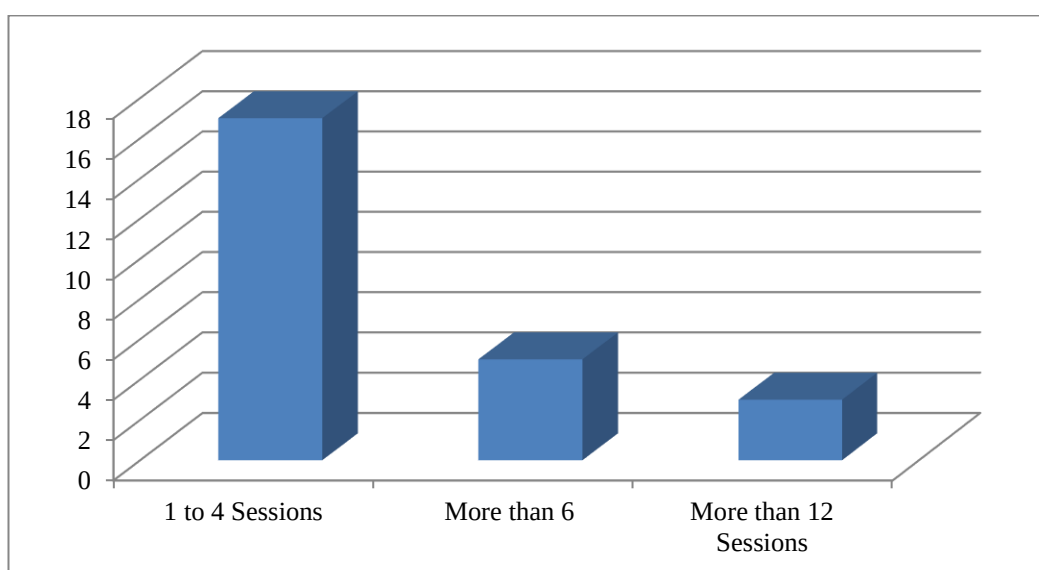


Figure 3.8: Number of Writing Sessions in a Semester

Question 13: Teaching Method of Technical Writing

In this question, students' answers were either teaching writing based on theoretical backgrounds or teaching writing via practice, i.e. tasks and activities. For the majority of informants (20), the writing was delivered in a form of definitions with no room for practice. However, the rest (14) reported that they did practice writing while learning. The following figure 3.9 displays the students' percentage.

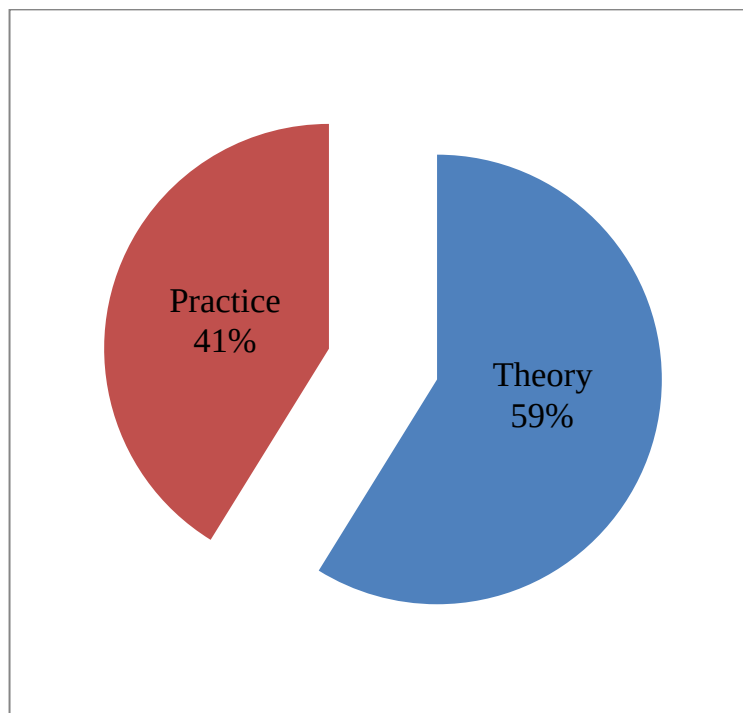


Figure 3.9: Teaching Method of Computer Sciences Writing

Question 14: ESP Teacher's Focus during Writing Sessions

The vast portion of informants (22) agreed that their ESP teacher focuses on their final draft to be handed over to him/her in the lesson or any given task. However, the remaining students (12) declared that their English teacher pays attention to the writing process they went through, i.e. the steps of writing to compose the last piece of writing. The percentage of the respondents is shown below in Figure 3.10.

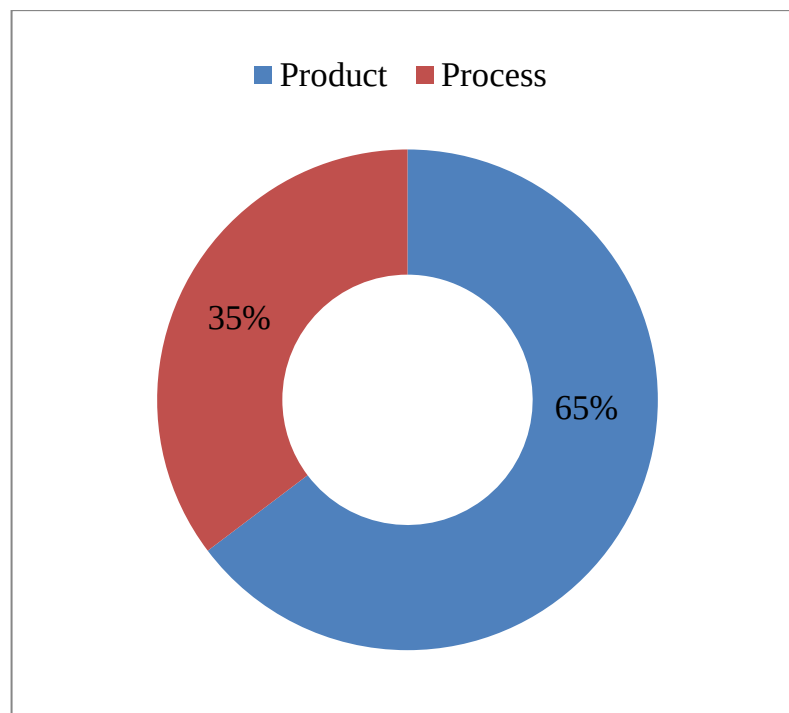


Figure 3.10: ESP Teacher's Focus during Writing Sessions or Assignments

Question 15: Students' Preferred Learning Approaches to Develop Technical Writing

Having asked the students about their preferences concerning approaches for writing development, the lion share (22) replied that they highly recommended the content-based approach as a teaching procedure. The task-based approach was suggested by 17 informants. Only 15 participants selected the language-based approach to develop their writing abilities. When interpreting these results, computer sciences students want a teaching approach which emphasizes the content of their discipline in order to meet the required needs to write technically. Figure 3.11 depicts the findings.

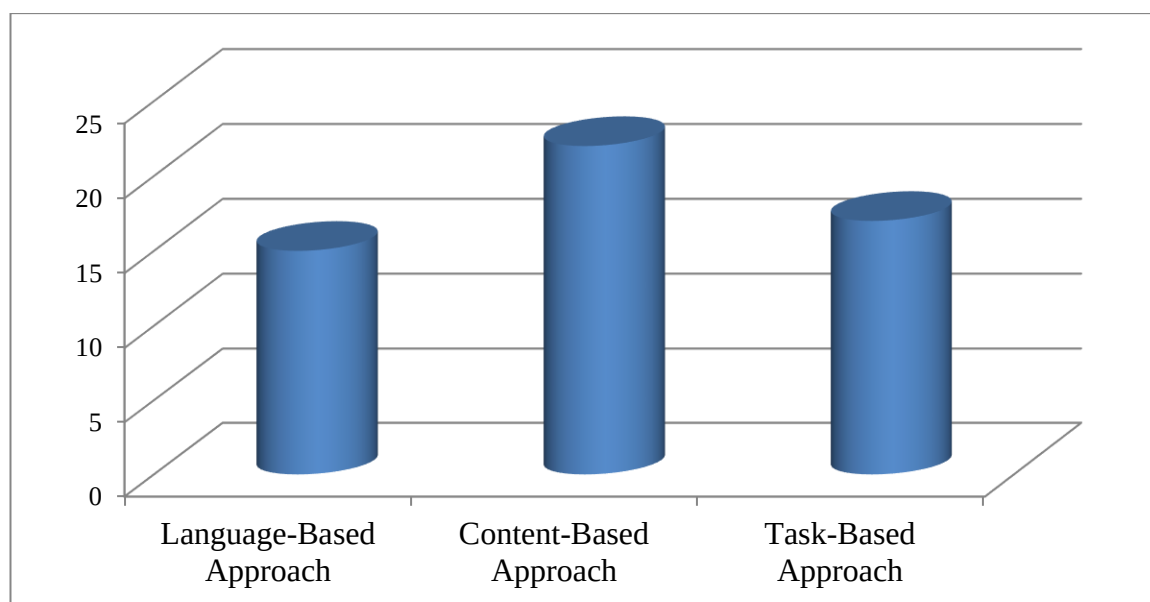


Figure 3.11: Students' Preferred Approach to Develop Writing Ability

Question 16: Four Language Skills Integration to Learn Writing

In this question, the larger part of the respondents (29) agreed that the integration of the four language skills may help them improve writing. However, only two students (2) commented 'not always' language skills integration is effective. Worth mentioning that nobody answered 'no' integration for writing learning. As an interpretation, ESP learners are fully conscious of the importance of the four language skills amalgamation to enhance the overall English language mastery (see Figure 3.12).

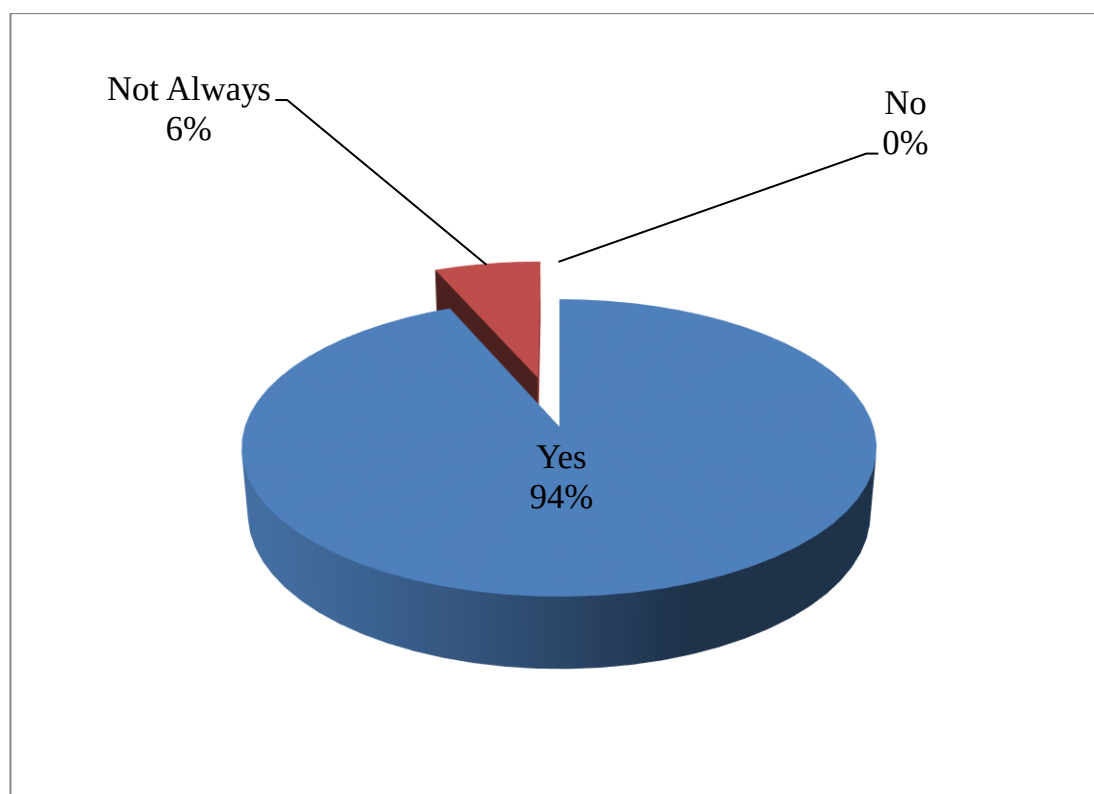


Figure 3.12: Four Language Skills Integration to Learn Writing

Section 4: Linguistic Competence and Writing in the Discipline

1-Lexis

Question 17: Vocabulary in Computer Sciences Discipline

Figure 3.13 below tells that the majority of ESP learners (17) found it difficult to write the correct form of a word, i.e. they face spelling mistakes mostly when it comes to using the specialized vocabulary in the field. As for word formation, eleven (11) informants declared encountering such lexical lacks. Eight informants (8) stated that they have problems using collocations while writing. Only three (3) students confessed that they do not know any of what has been mentioned.

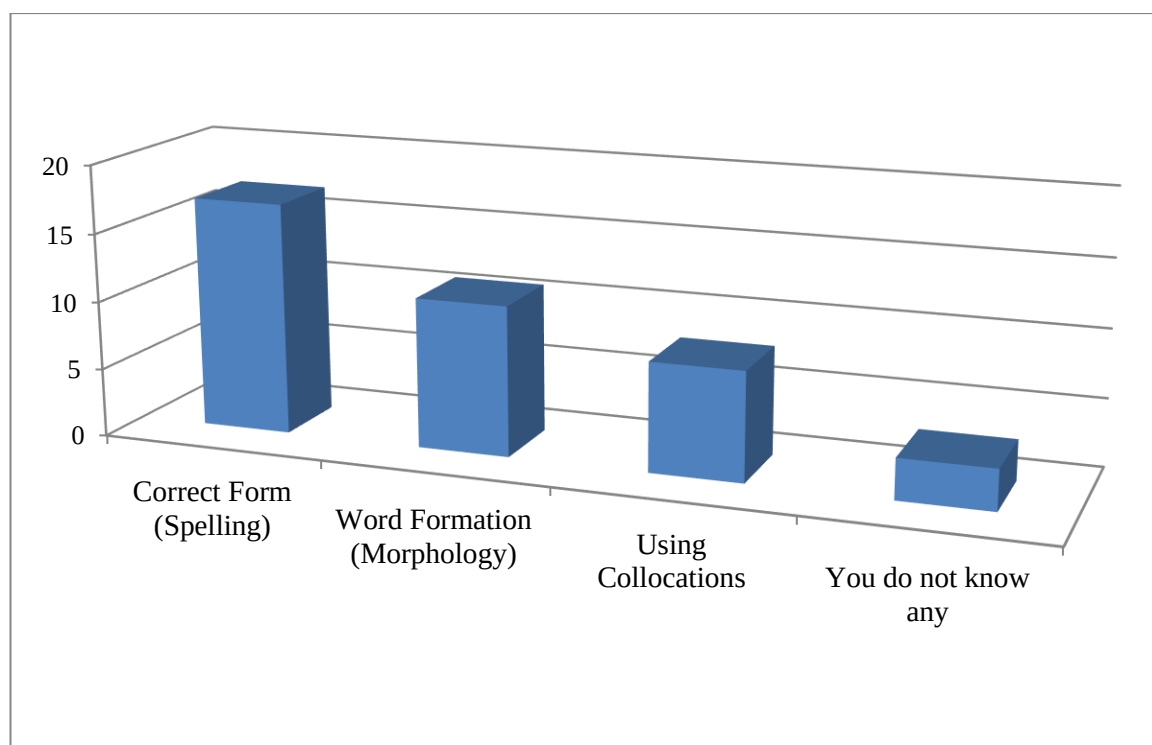


Figure 3.13: Students' Difficulties when Using Computer Sciences Vocabulary

2-Grammar

Question 18: Grammar in Computer Sciences

The results of this question revealed that the vast majority (18) replied that they face grammatical problems of using appropriate tense. Speaking about passive/active voice and conditional sentences, twenty-two (22) students ticked the two grammatical issues that they encounter. Eleven informants (11) answered that sentence formation causes an obstacle for them to compose correctly in English. Only two (2) informants claimed that they are not able to differentiate between nouns, verbs, adjectives while writing. Figure 3.14 below displays the findings of the eighteenth question.

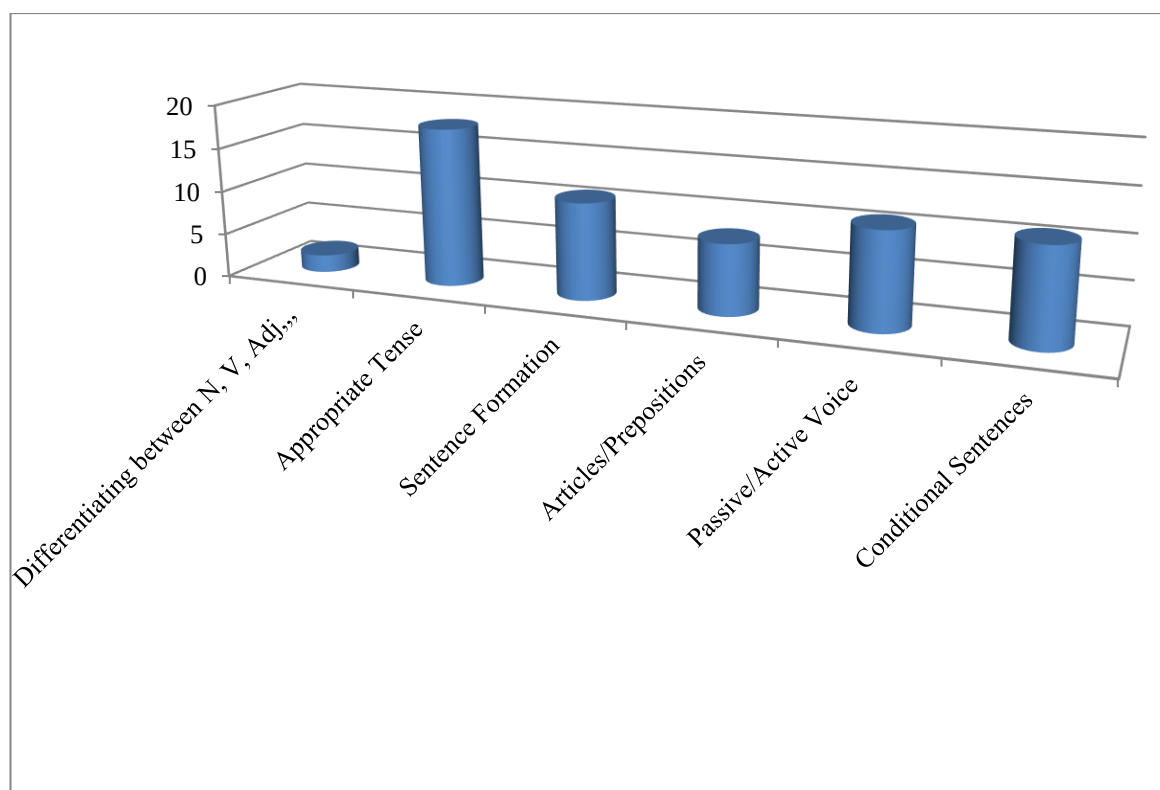


Figure 3.14: Students' Grammatical Difficulties in Computer Sciences Field

3-Meaning

Question 19: Computer Sciences Register and its Meaning

In this question, when asking students about their weaknesses while using computer sciences terminology, especially concerning words significance. The majority (12) viewed that they have problems of using antonymy which means to distinguish between words that have the opposite meaning. Moreover, 15 informants declared having difficulties of using synonymy whilst writing. 17 participants admitted that they encounter problems when using polysemy which refers to the inability to differentiate the several meanings of the same word. On the other hand, almost all students (28) proclaimed that they never faced problems of words meaning or using words in a context. The following figure 3.15 illustrates these results. As an interpretation, the major semantic difficulties of ESP learners are the use of synonymy, antonymy, and polysemy while writing.

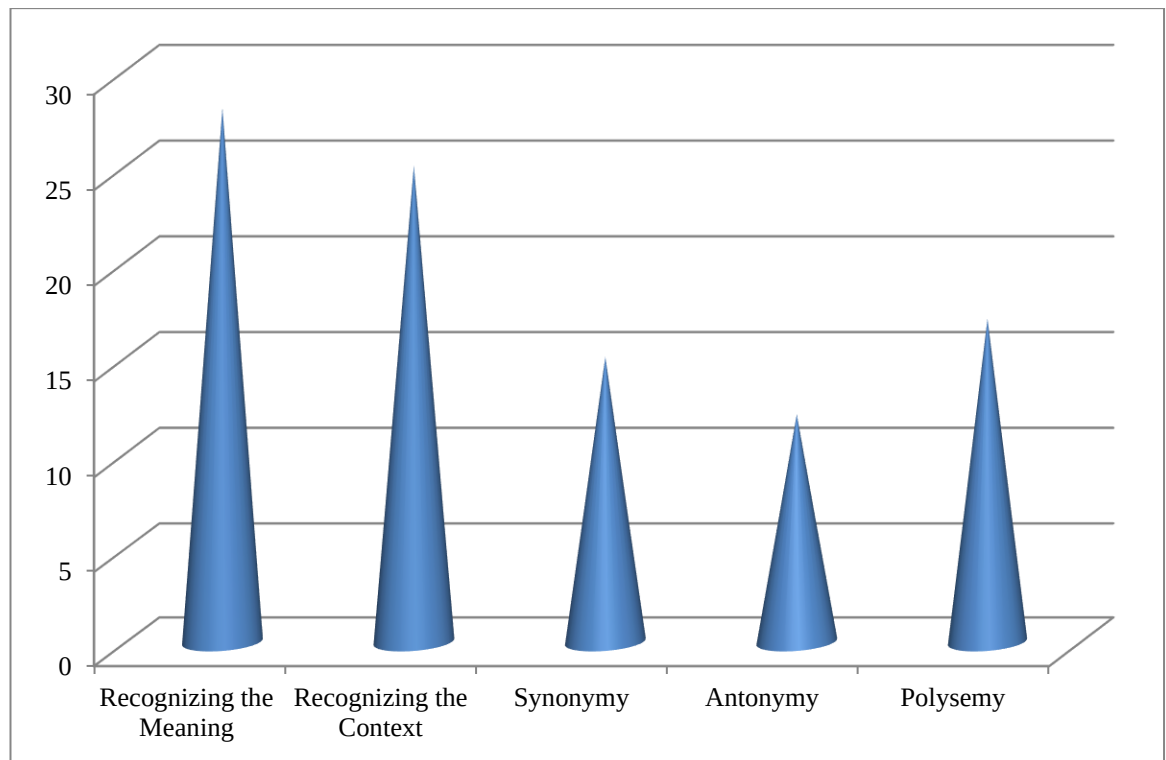


Figure 3.15: ESP Students' Semantic Difficulties

Section 5: Assessing Writing in the Discipline

Question 20: Number of Tests in a Semester

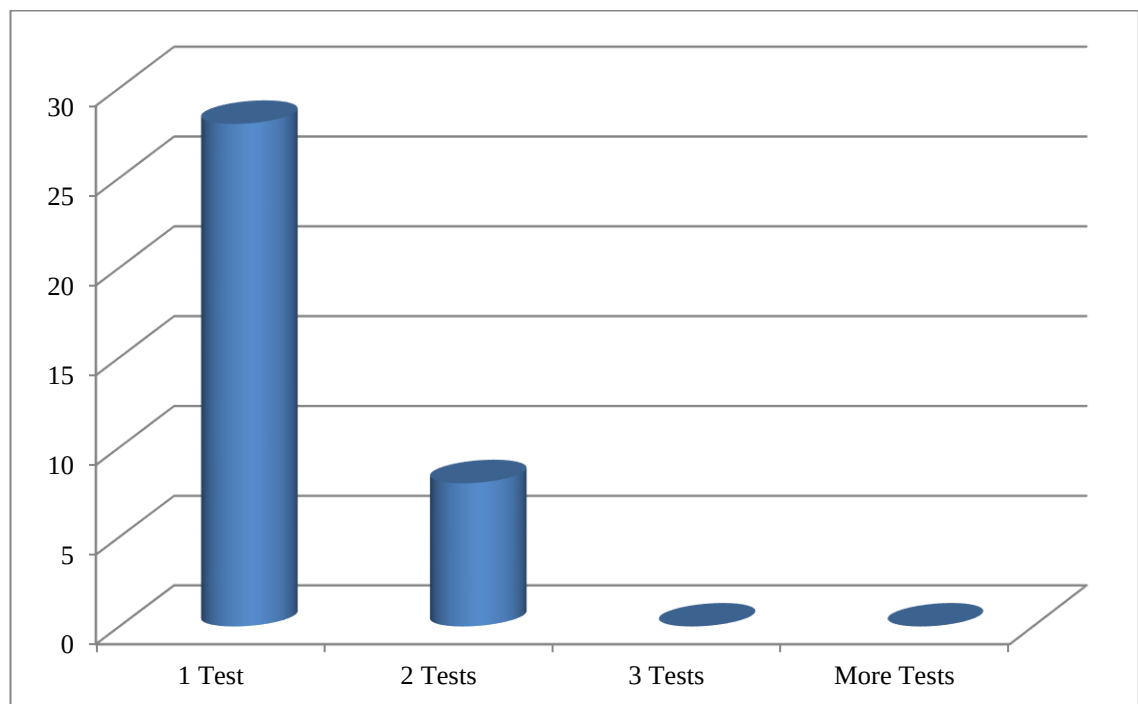


Figure 3.16: Number of Tests per Semester

From the above-mentioned diagram (Figure 3.16), we notice that the majority of students (28) agreed that they have one test in one academic term. However, 8 students disagreed saying that they had 2 tests in a semester. This is maybe due to the fact that each ESP teacher evidently follows a distinct assessment procedure.

Question 21: Evaluation of Writing in Tests

When asked whether the evaluation of writing exists in tests or exams, most students selected ‘often’. On the other hand, 15 participants declared that their ESP teachers ‘sometimes’ assess writing in tests and exams. 5 others chose the options ‘always’ and ‘never’ they had an evaluation of writing in their ESP courses. As an interpretation, ESP teachers maybe focus more on the reading comprehension questions to assess the students’ language proficiency when it comes to evaluation. The results are shown in Table 3.3.

	Always	Often	Sometimes	Never	Total
Students’ Absolute Frequency (AF)	2	20	15	3	40
Relative Frequency (RF)	5 %	50 %	37 %	8 %	100 %

Table 3.3: Evaluation of Writing in ESP Tests or Exams

Question 22: Types of Writing Assessment

The results of such question are graphically demonstrated in figure 3.17. Apparently, it is clear that the widely applied assessment procedure falls in favor of summative assessment (a test at the end of a semester) with a percentage of 50 %. Other participants (42.5 %) proclaimed that they have been assessed in writing as only an integral part of a test or exam. The rest (7.5 %) denied this fact by saying that they were assessed formatively (continuous testing during the semester). This implies that ESP teachers have different assessment techniques either with one test at the end of the semester or as only part of a test or continuous assessment during the whole academic term.

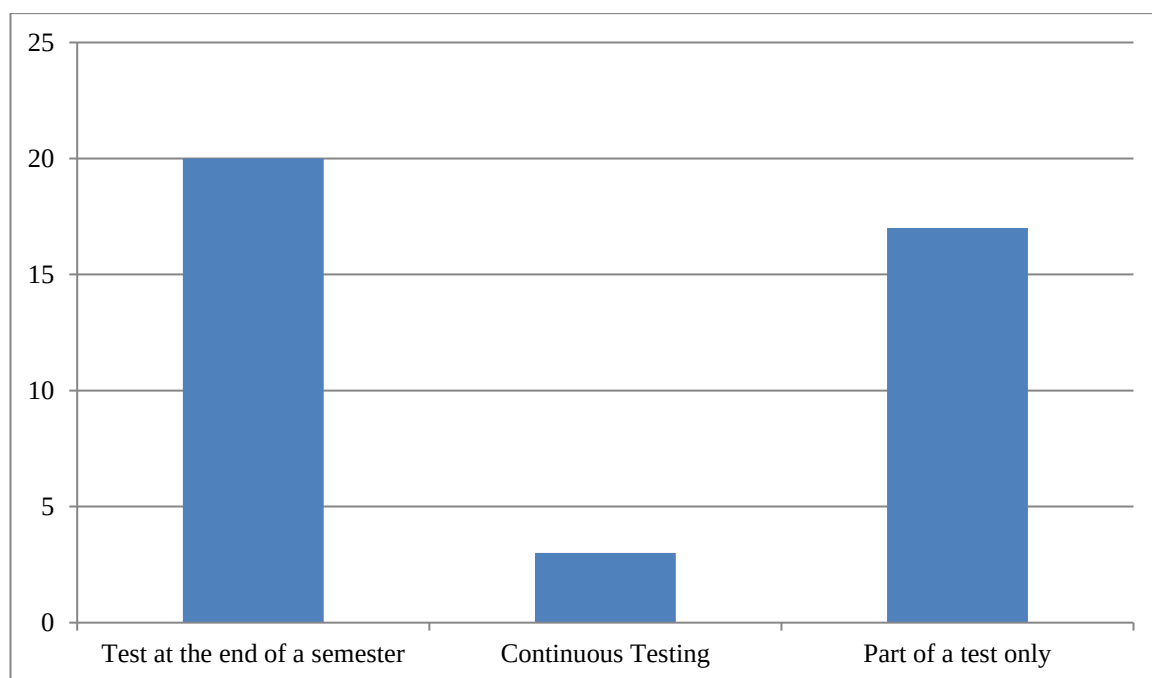


Figure 3.17: Types of Writing Assessment in ESP Courses

Question 23: The Form of Writing Assessment

Answers were varied. The vast majority (23) agreed that their ESP teachers assess their overall English mastery by using reading comprehension questions. Twenty (20) students opted for essay writing as a way of evaluation. Some other participants (14) commented that their ESP teacher uses activities and tasks as a method of classroom assessment. However, 17 informants selected both homework and synthesis questions (to write down summaries of what you have learnt). To put it bluntly, assessment procedures vary from one ESP teacher to another, from reading comprehension questions to activities and so forth. Figure 3.18 represents the results of this question.

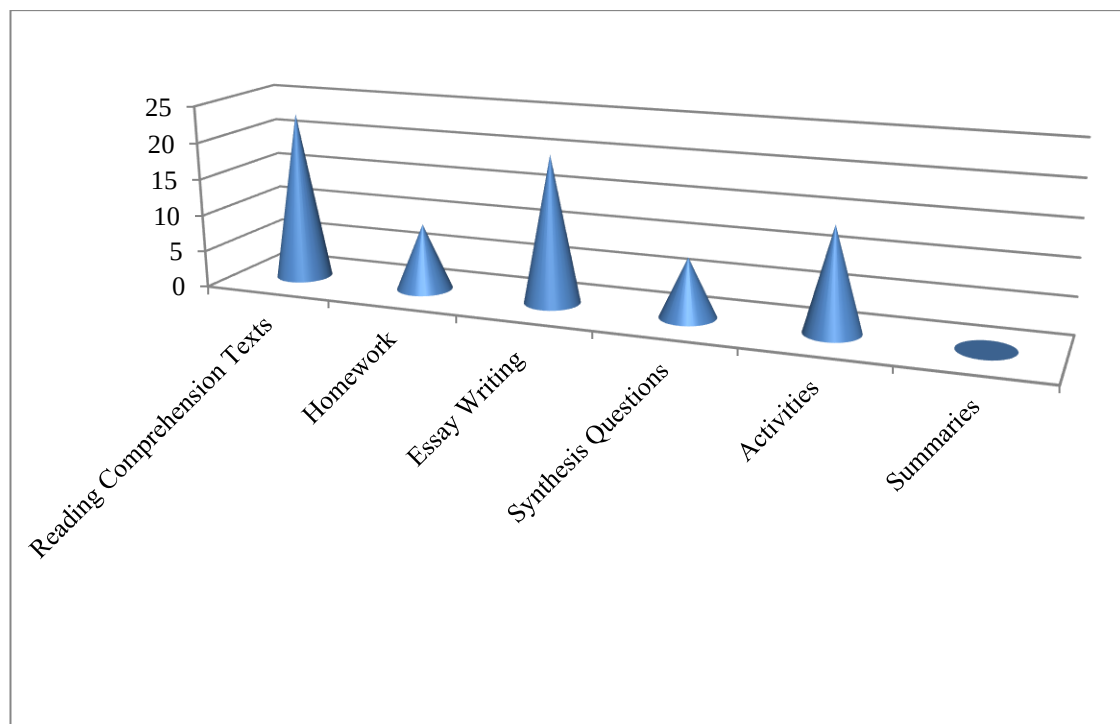


Figure 3.18: Forms of Writing Assessment

Question 24: ESP Teacher's Focus when Evaluating Writing (Content or Form)

The findings of this question uncovered that the larger part of students (31) replied that their ESP teachers give equal importance to both ‘form’ and ‘content’ when they correct their written compositions. The two facets are cautiously taking into account since they identify the learners’ strengths and weaknesses in writing. The following figure 3.19 depicts graphically the results.

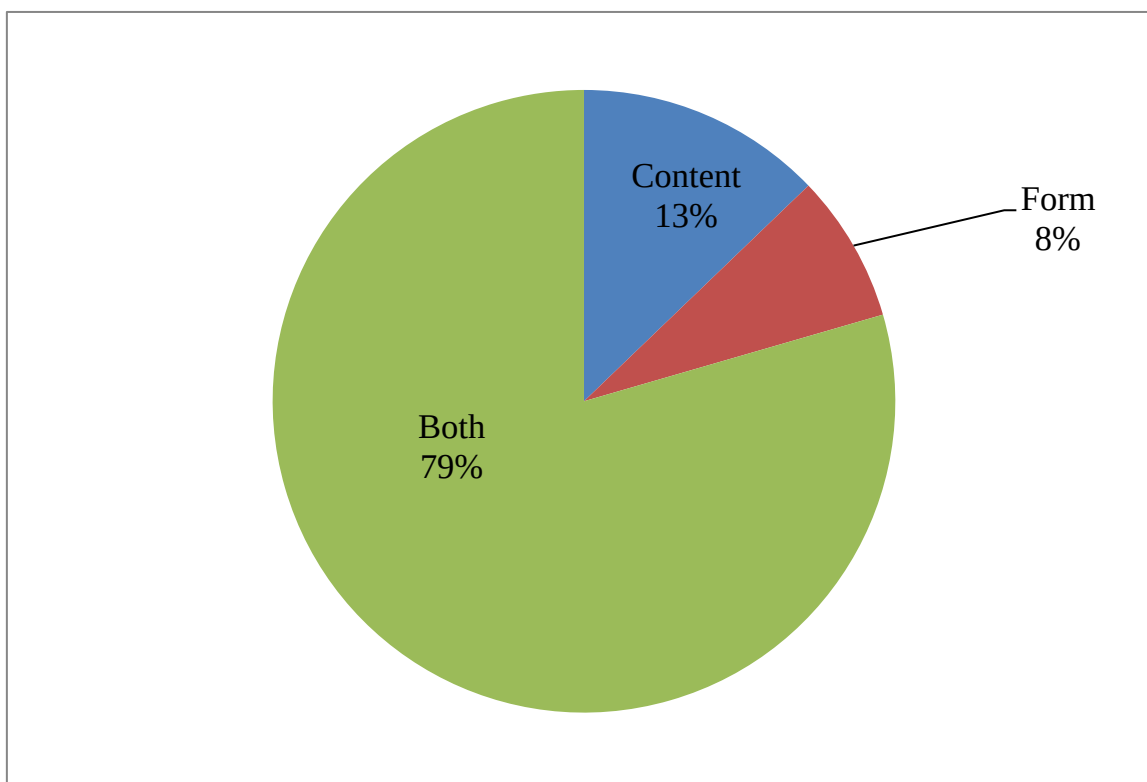


Figure 3.19: ESP Teacher's Area of Interest while Correcting Writing Production

Question 25: ESP Students' Wants to Assess Writing

It is clear that the question seeks to unveil what are the students' suggestions for the evaluation of writing in their ESP courses. The answers to this question were varied. The results revealed that twenty-two (22) participants reported that they want to have classroom activities as an assessment procedure of writing. Some others (20) favoured homework. Some informants (16) preferred projects, and still, some others (14) desired tests and exams. This implies that ESP learners are fully aware of their needs to improve technical writing in the computer sciences field. Classroom activities refer to formative assessment which helps guiding students whilst learning the English language. The findings are represented in Figure 3.20 below.

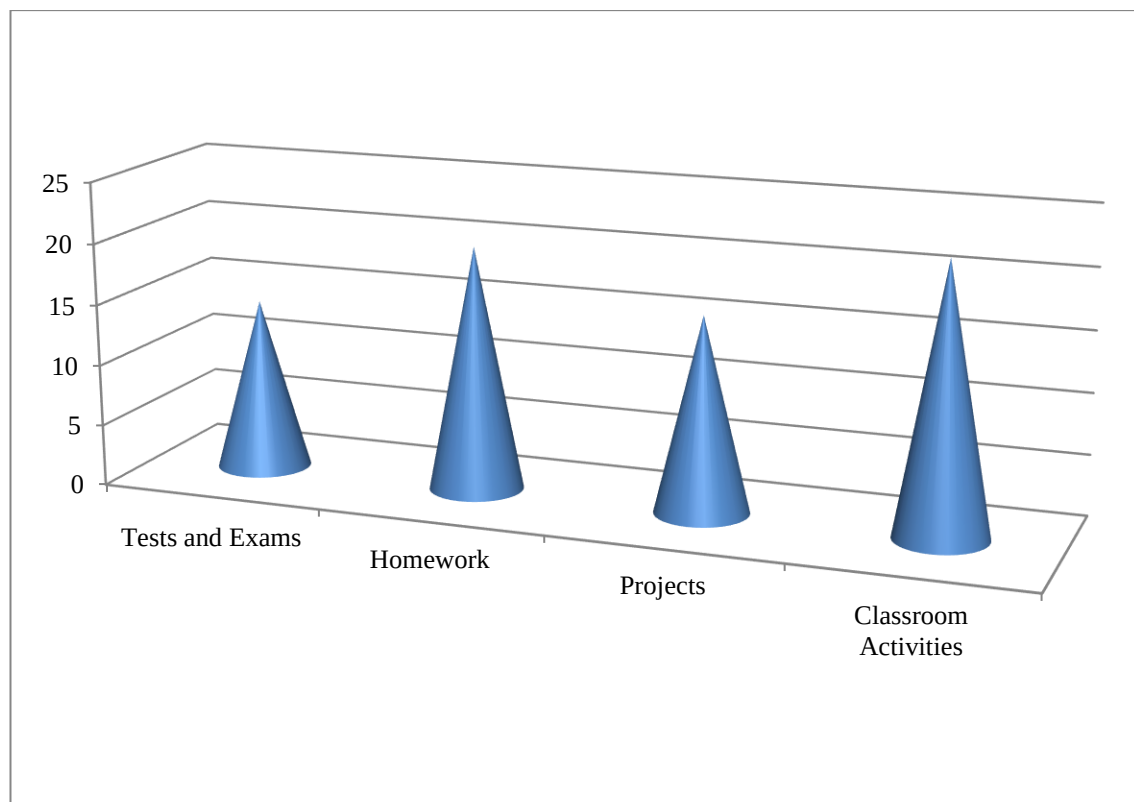


Figure 3.20: ESP Students' Preferences for Assessment

Question 26: Further Suggestions for Writing Development

It is worth mentioning that only 15 students answered this question. The recommendations varied from one student to another. The researcher summarizes their suggestions in the following points:

- ESP teachers should give more importance to writing than the other skills, for instance, writing research papers.
- More practice time should be devoted to enhancing their writing abilities either at home or in the classroom.
- Teachers are asked to use more interactive techniques which are more fun and innovative like games to make their learners like writing expression.
- Using technological-based devices to write directly on their computers such as applications, software to rehearse both the language and the technical aspect of their discipline.

- Integrating more often the speaking sessions to reinforce writing abilities in addition to listening materials, for example watching videos, audios, podcasts, and answering questions related to that.
- As for the assessment process, they highly recommended freestyle writing besides writing articles, short stories which will be proofread by the teacher, shared with the whole class, and to be published online.

3.3 ESP Teachers' Interview Analysis

The following lines deal with the ESP teachers' interview analysis qualitatively and quantitatively of the information collected from ESP teachers at the computer sciences department. First of all, it starts with outlining the semi-structured interview briefly. Thereafter, the researcher reports and interprets the ESP teachers' interview findings. The results report varies from qualitative data analysis which is about formulating textual information provided by the informants. On the other side, quantitative data analysis refers to statistics which enable the researcher to give numerical proofs and shreds of evidence to understand the inquiry findings.

In this investigation, the researcher interviewed three (3) ESP teachers who teach English at the Department of Computer Sciences. It comprises of eighteen (18) questions grouped besides teachers' profiles into three other parts (see Appendix B). The first part of the interview consists of questions linked to ESP teachers' profile: their status, field of interest, and teaching experience. Next, the second part seeks to find out answers concerning the ESP teachers' practices in their classrooms to instruct the English language to Master 1 Computer Sciences students. The third part deals with exploring writing skill in computer sciences discipline in order to discover the students' necessities and lacks to write technically in the field. Moreover, this part looks for students' writing difficulties related to linguistic competence (lexis, its meaning, and grammar) and the reasons behind such weaknesses. The final part covers assessment procedures to test students' writing performance in the ESP context. Last but not least, language teachers were

asked to give effective suggestions to develop their learners' writing proficiency in the computer sciences field (see Section 2.4.2.2.1).

3.3.1 Reporting and Interpreting the Findings

I) Teachers' Profile

ESP Teachers' Degree, Field of Interest, and Teaching Experience

In this part, ESP teachers were asked to give information about the degree and status they hold, their field of expertise, and their teaching experience. The three ESP teachers teach the English language at the Department of Computer Sciences. Two permanent recruited teachers, while the other ESP teacher was a part-time teacher. Hence, the two full-time teachers hold Magister degree and they are enrolled in the Doctorate degree. One of them holds his Magister degree in Didactics and Assessment in English language Education (DAELE) who has been working at both Mathematics and Computer Sciences Departments for two years so far. The second permanent ESP teacher has a Magister degree in Sociolinguistic Studies, and she was just taken on her new occupation and begun to pursue her teaching career. On the other hand, part-time ESP teacher has a Licence degree in Applied Linguistics (Classical System) who has been teaching English at the Computer Sciences Department for two years. It is worth noting that none of them has been trained or specialized in the ESP field of expertise. The results are demonstrated in table 3.4 below:

	Number of Teachers	Degree	Field of Specialism	Status	Teaching Experience
ESP Teachers	2	Magister	-Didactics and Assessment in English Language Education (DAELE) - Sociolinguistic Studies	Permanent/ Full-time Teachers	- Two (2) years - Starting her professional career
	1	Licence	-Applied Linguistics	Part-time	2 years

Table 3.4: ESP Teachers' Profile**II) ESP Teaching Practices**

Question 1: Type of English Language Instruction in Computer Sciences ESP Classes

As for this question, which revolves around the type of English the ESP teachers instruct in their classrooms, the responses were as different. Two teachers claimed that their English language instruction falls in favour of only Technical English which best suits their academic and professional learners' needs. On the other hand, only one teacher admitted that she used both General English (GE) and Technical English in her classes due to the fact that their students' language level sometimes differs from one group to another. The researcher can say that these results are interpreted differently from each ESP teacher. However, there was an agreement among them that the language taught to ESP students largely depends on various aspects like their level, age, group, kind of lecture performed and so forth.

Question 2: ESP Syllabus Design

As for the second question is concerned, all the interviewees agreed that the administration did not provide them with a specialized syllabus to follow. However, it gives them objectives of what to teach (see Appendix J) and it is up to them to elaborate and conceptualize their ESP teaching materials. The Ministry of Higher Education is in charge of the groundwork of teaching objectives (CANEVAS²⁶). Accordingly, each ESP teacher designs his/her English language syllabus to be instructed in the ESP classes. He/she is taking into account the general outlines given by the Canvas besides developing the teaching/learning materials to be used for each ESP course. The sources used for materials selection are basically the Internet as the first basis for knowledge in both English language and computer sciences field.

Question 3: ESP Students' Command of the English Language

Then the interviewees were asked to evaluate their students' command of English in general. ESP teachers viewed that their learners have an average level in English language mastery. Besides, they do have some advanced learners in their ESP classes. Additionally, beginners or low achiever learners did exist in most groups as they need more efficient and interactive techniques to teach them, i.e. they need special treatment so as to ameliorate their overall English language proficiency.

Question 4: Students' Motivation to Learn English

Having asked ESP teachers about their students' attitudes towards the English language module and their motivation to attend the lectures, two teachers proclaimed that their learners hold positive attitudes towards the module. Moreover, they are highly motivated to attend the ESP courses as they know the great significance of the English language in their field of interest. However, one teacher admitted that her learners have negative attitudes towards the 'Technical English'

²⁶ CANEVAS : Canvas in English which means preliminary or basic work, framework or structure.
<https://www.collinsdictionary.com/dictionary/french-english/canevas>

module. Besides, only a few learners attend her lectures, and even those who are present show a little interest to learn the language. She added that they justified this by saying that they study the content of their specialism in the French language so no need for the English language to be learnt.

Question 5: ESP Teachers' Techniques to Motivate their Learners

When required to precise the techniques used by the ESP teachers to motivate their learners, two teachers specified the teaching techniques arguing that they make use of varied teaching materials to teach the English language. That is to say, they select various topics for reading texts, listening materials, writing tasks and so forth. Moreover, they tend to establish a strong teacher-student rapport based on humour and eye contact. Lesson planning is an integral part as most ESP teachers reported. It helps them to organize the body of knowledge of each phase during the lesson, and ensure the smooth occurrence of teaching/learning operation. Moreover, some teachers take into account their students' desires and interests in addition to select teaching materials which do highly contain technical terms which are the main interest of students. The other teacher revealed that there are no specific techniques to motivate her learners; she argued that she uses an eclectic method of ESP teaching. This is due to the fact that each language teacher has his/her way of transmitting the desired message without losing his/her students' attention when doing so in order to help them better acquire the language.

Question 6: Language Skill Emphasized

The interviewees were required to identify which skill is the most focused during ESP classes. Teachers viewed that they in most cases follow the general outline which the administration provides them with. This objectives framework covers mainly three language aspects: reading comprehension, listening and speaking (see Appendix I). However, the three teachers said that they emphasize the teaching of the two productive skills instead which are speaking and writing capacities. Apart from this, one or two teachers also highlight the importance and the integration of both receptive skills: listening and reading as an input source to

produce the output presented in speaking and writing expressions. The findings are better shown in the following diagram below (Figure 3.21).

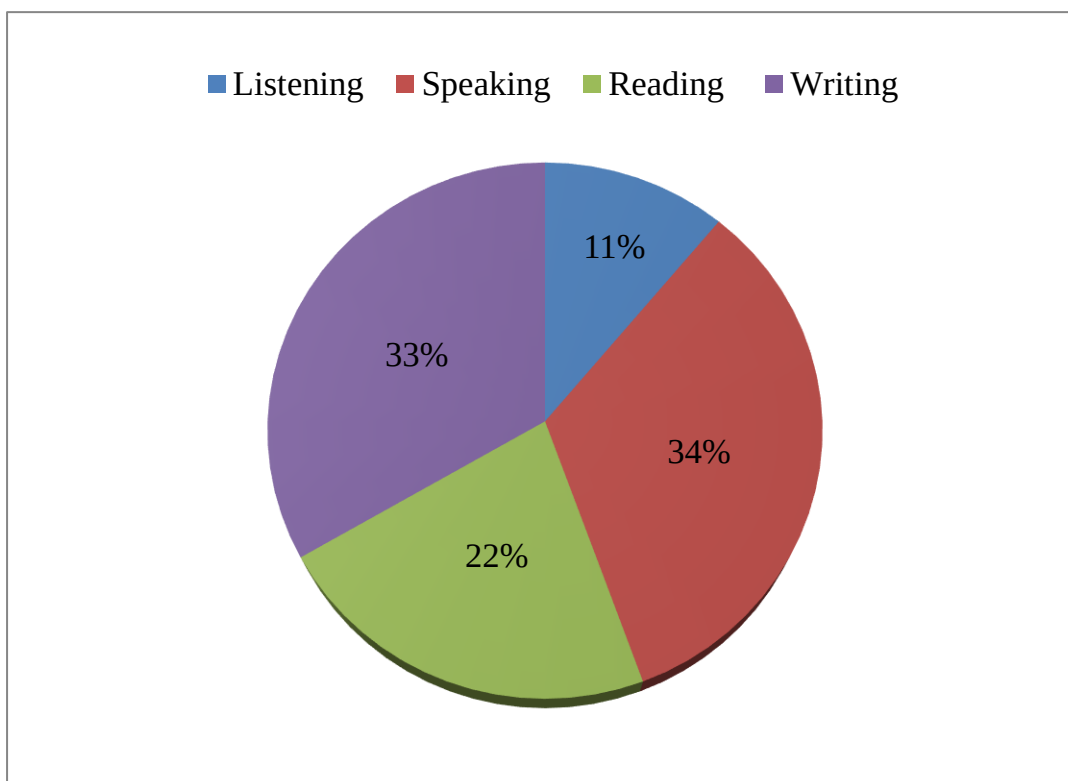


Figure 3.21: Language Skill Emphasized in ESP Classes in Computer Science

III) Writing in the Discipline

Question 7: The Importance of Writing in Computer Sciences

As for the seven (7) question, which turns around the significance of writing skill in the students' discipline, the responses were different. All the interviewees agreed that their ESP learners in computer sciences discipline need to write indeed. They further added that their students are required to write accurately in the discipline like reports, research papers, and articles at the level of post-graduation (PhD students) as their main academic needs. Speaking about professional needs, they need a few writing abilities as they are asked to program or to chat with international partners when having international exhibitions for instance. Concerning programming, ESP teachers reported that their students when coding

(Using programming language to write instructions in order to develop a computer program. These instructions are called ‘codes’ in programming), they make use of only chunks of words or group of words. The following picture (Figure 3.22) demonstrates the instructions written by a programmer with the keywords he/she used. They further added that their learners are required to memorize these keywords which depend on the programming language used (each programming language has its keywords).

```
function myFunc(a, b) {  
    return a * b;  
}  
  
document.getElementById('demo').innerHTML = myFunc(4, 3);
```

Figure 3.22: Chunks of Codes Written in JavaScript Programming Language

Question 8: ESP Students’ Attitudes towards Writing

The findings of this question are varied. Some teachers confirmed that their learners enjoy learning English, as it is the global language of communication. In addition to this, they have positive attitudes towards expressing themselves in a written form or learning writing. On the other hand, one teacher admitted that her learners show little motivation to learn English in general and writing in particular. As an interpretation, different ESP groups may have several interests with mixed-ability classes which required the ESP teacher to react distinctively.

Question 9: ESP Teachers’ Interest for Writing

In this question, all the interviewees came to the conclusion that they all have a deep interest in writing. They agreed that they highlight writing instructions in their ESP classrooms along with reading comprehension. Moreover, they claimed that they give writing the lion share of their teaching time by preparing writing tasks and activities to develop their students’ achievement in the writing skill. Only one

teacher admitted that she does not emphasize writing teaching in her classes yet she knows its significant importance though. However, in reality, they tend to have a superficial interest as they focus on other skills than writing as noticed in classroom observation and based on students' questionnaire answers.

Question 10: the Existence of Writing Sessions in ESP Classes

When asking ESP teachers whether they reserve sessions for writing tasks or not, most interviewees reported that they have scheduled writing sessions or at least writing assignments every two sessions per month. That is to say, they claimed that they reserve 6 sessions or more per semester. This was done to help ESP learners improve their writing abilities in the computer sciences field, as they reported. On the other hand, one teacher again admitted that she does not reserve any session or maybe just one session for instructing writing. She only gives her students from time to time some writing assignments to be performed like essay writing. This is due to the fact that each ESP teacher has dealt with this requirement teaching and assessing in ESP context differently according to his/her students' level, group, and background knowledge. By doing so, ESP teachers raise the awareness of their learners to achieve a good proficiency level in writing skill. The results are represented in the following diagram (Figure 3.23).

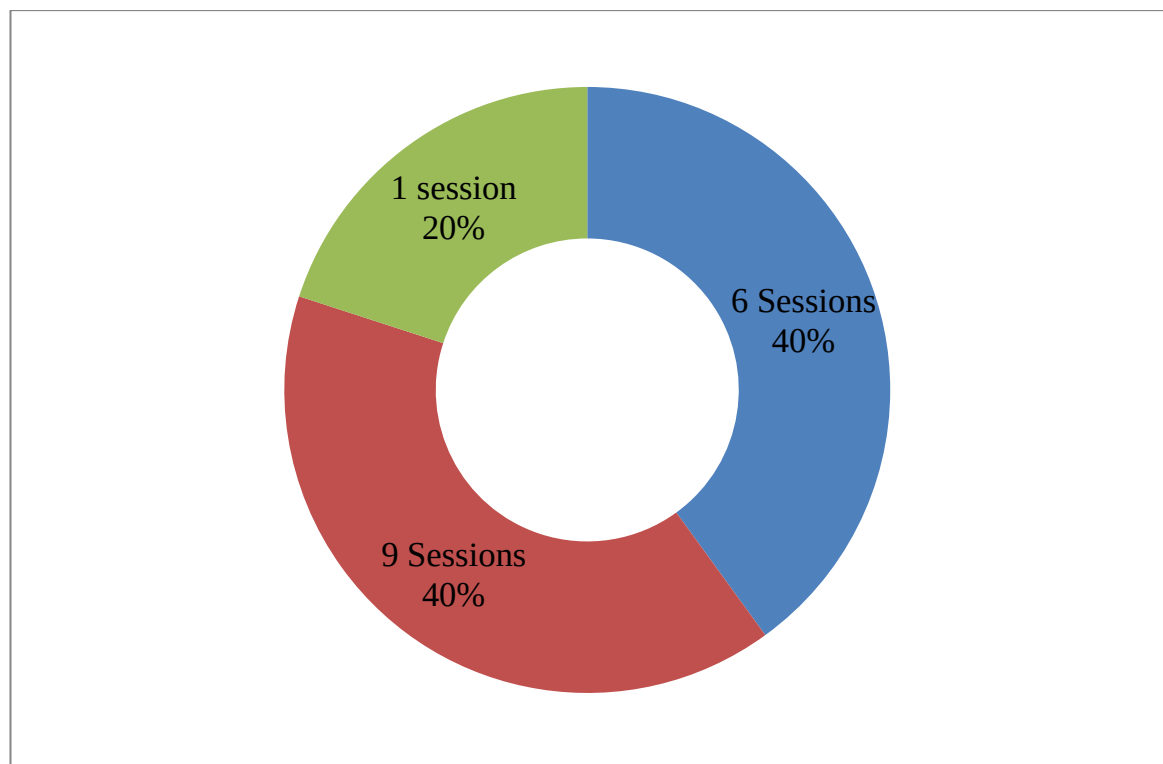


Figure 3.23: Sessions Devoted to Writing in ESP Classes

Question 11: Teaching Method of Writing

As far as this question is concerned, all the informants agreed that they focus on language and theoretical guidelines to instruct writing. They also said that sometimes they value the writing process and consider its stages whether their students follow these stages or not. Besides, they commented that they devote some practice time so as their learners write more often what has been learnt. One teacher pointed out that she uses content-based language in her classes in addition to the integration of the four language skills to improve not only writing but the overall English proficiency. Moreover, she argued that learners do not follow the writing process steps complaining that even some teachers do not follow such steps. This can be explained by saying that even ESP teachers lack the training of the writing process teaching in an ESP context. Consequently, learners do not follow these stages because are not aware of them. They need to be trained on how to brainstorm, organize their ideas, and draft their thoughts. One way for doing so, it is by checking students' drafts one-by-one and group-by-group. However, due to the

time constraint and the over-crowded groups, ESP teachers face obstacles correcting and editing all the students' pieces of writing.

Questions 12, 13 and 14: ESP Students' Difficulties of Writing and the Reasons behind

Then the participants were asked whether their students encounter difficulties while writing or not. All the interviewees agreed that their learners do face difficulties when it comes to the written expression. In the thirteen (13) question, ESP teachers continued saying that their learners encounter mainly lexical difficulties when producing written discourse. That is to say, they face spelling difficulties along with words formation and words meaning. They write incorrect language which means they have grammatical lacks as well. They further added that their learners often confuse between the French and the English items, i.e. they fall in negative transfer when writing. In addition to this, most students have a poor writing style due to some psychological variables (fear, anxiety, stress) when they begin writing. Figure 3.24 summarizes the findings of this question.

Next, in the following question (14), ESP teachers attributed such lacks to the time allocated to teach writing ability. Some teachers also highlighted the importance of reading skill and practice to develop writing. Moreover, one teacher said that his learners sometimes show a demotivation to learn writing. They even added that their ESP syllabi reserved for teaching writing are unsatisfactory. Some teachers went beyond and explained that among the reasons is that language policy adopted by the government is inadequate in our ESP teaching/learning environments. That is to say, any ESP learner tends to study his/her fundamental subject matter in the French language and then studies the English language as not be it important but just complements the curriculum. The Algerian educational system and its language policy adopted are in charge of raising students' awareness by accrediting the English language as a means of instruction in the content of their specialism.

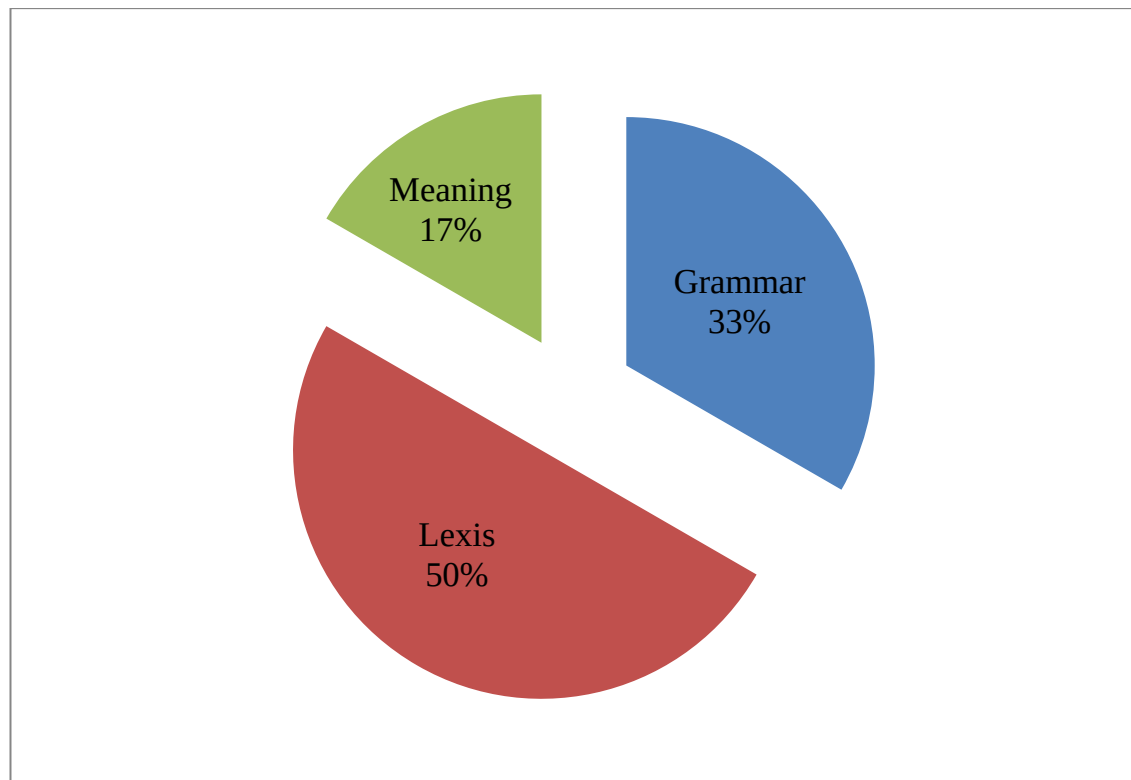


Figure 3.24: Students' Difficulties when Writing

Question 15: ESP Teachers' Preferences to Teach Writing

All the informants highly recommended the teaching of writing based on content-based approach. That is to say, they explained that the content-based approach would help their learners overcome their writing difficulties in particular, and language deficiencies in general. Some other teachers claimed that even task-based approach and eclectic approach-as they called it- could be of great benefit in an ESP context to foster the linguistic competence of the learners which could be tackled in language-based approach as well.

IV) Assessing Writing in the Discipline

Question 16: ESP Teachers' Assessment of Writing

In this question, ESP teachers were asked about the frequency of their assessment, its type and the activities used to test their students' achievement in writing. One of the informants stated that he assesses his learners very often using formative assessment like PPT presentations, essays writing, and reports

Whereas, the two other teachers said that they assess their learners only in tests or exams in the whole term, i.e., using summative assessment. ESP teachers use formative assessment activities which are controlled or free-writing activities, oral questions in the classroom, and PPT presentations to test students' performance. Other interviewees reported that they use tasks in their exams or tests (summative assessment) which are mainly reading comprehension questions, and sometimes exercises of writing. The following diagram (Figure 3.25) represents the findings.

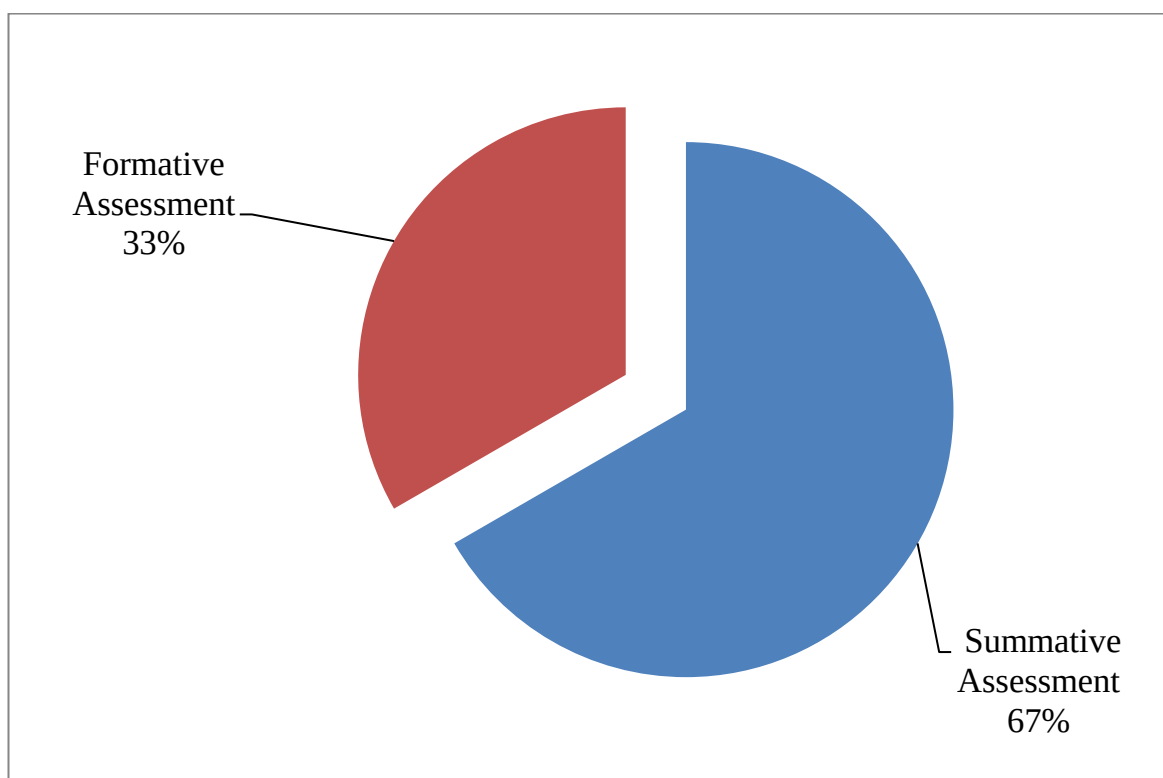


Figure 3.25: Types of Assessment

Question 17: Criteria of Writing Assessment

In terms of ESP teachers' criteria of assessment, all the informants but one argued that they give both aspects (content and form) equal importance while correcting written compositions. Yet, the other teacher commented that for ESP learners, content is for sure a backbone element but we should not neglect the form, i.e. ESP teachers are more concerned with the form since ESP students are intermediate or beginner learners, yet content is essential for more advanced learners and it is up to the subject specialists to evaluate it. This teacher continued

saying that she gives sometimes 'holistic' and 'analytic' scoring to mark her students' pieces of writing. This means that an analytic scoring provides a detailed mark for each element in the written production (introduction, grammar, vocabulary, indent...). However, holistic scoring is about giving a general mark to the whole writing composition with written feedback. Both scorings help to guide learners through the writing expression process and make them understand what kind of mistakes they have made. Findings are demonstrated in Figure 3.26.

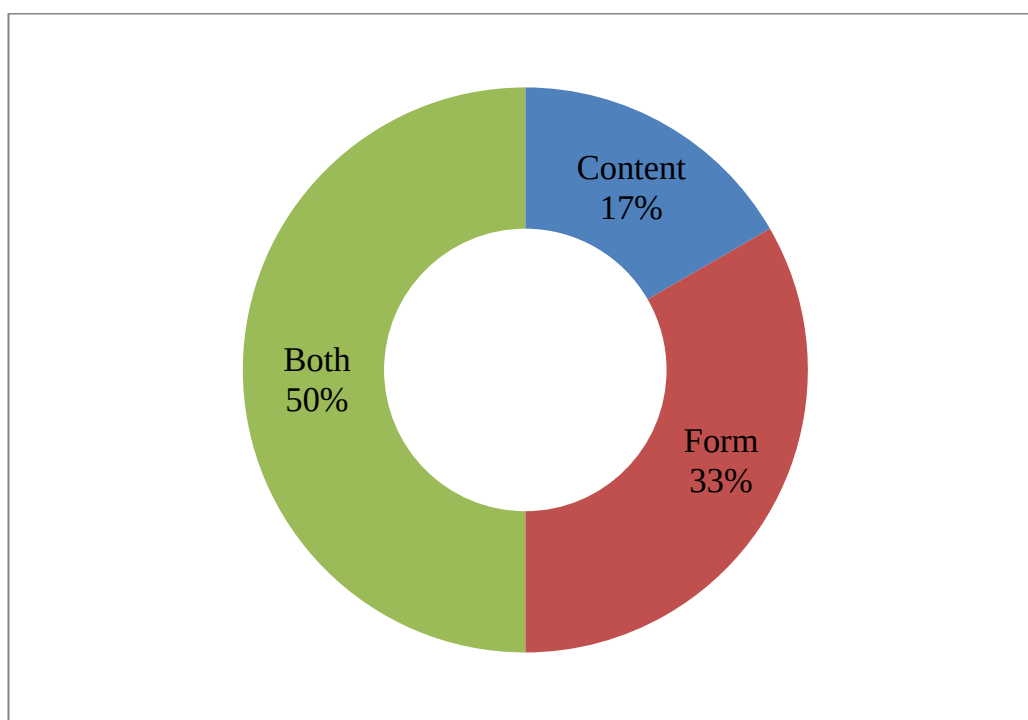


Figure 3.26: ESP Teachers' Criteria for Writing Assessment

Question 18: ESP Teachers' Suggestions to Improve Technical Writing

Last but not least, the teachers demonstrated how they help their students to cope with their deficiencies in the English language in general and writing ability in particular. All the interviewees suggested devoting more time to the writing skill with more tasks and activities as practice time to enhance their students' writing production. Moreover, the content of any ESP course should focus more on content related to the students' field of interest highlighting technical words that are most used in the discipline. Collaborating with subject specialists was highly recommended by all the ESP teachers so as to stay updated with what is new in the

discipline and what should be included in the lectures. The four language skills, on the other hand, must all be performed in the ESP lectures. Additionally, not only ESP teachers but language policy adopted by the educational system should raise students' awareness of the importance of English language by implementing top-down reforms like a predesigned syllabus to be followed. As far as assessment and evaluation are concerned, teachers need to rely more often on formative assessment than summative assessment by using assessment grids and effective assessment procedures. Equally important, ESP teachers must conduct a needs analysis process at the beginning of each year to define their students' difficulties, necessities, and wants. Finally, writing mistakes need to be explained and identified to avoid making them in the future.

3.4 Computer Scientists' Interview Analysis

In this section, the researcher analyzes both qualitatively and quantitatively the information gathered from the computer scientists' interview at the computer sciences department. Firstly, it begins by giving a brief overview of the semi-structured interview outline. Afterwards, the findings of the computer scientists' interview are reported and interpreted. The findings report varies from qualitative data analysis which refers to providing textual information given by the informants. Whereas, quantitative data analysis means statistics which are numerical pieces of evidence so as to explore in-depth the investigation results.

The researcher interviewed ten (10) subject specialists who teach different modules at the Department of Computer Sciences. It consists of seven (7) questions arranged into two main sections: teachers' profiles and writing in a computer sciences discipline (see Appendix C). It was formulated to draw attention to the significance of English, unveil learners' necessities in order to write technically in the discipline from a specialist standpoint. That is to say, it investigates the learners' target needs and the learning process to meet the communicative requirement especially in the written discourse.

The first part of the interview involves questions related to subject specialists' profile: their status, degree, the field of interest, and teaching experience. Next, the second section tries to find out answers concerning the writing skill in computer sciences and its importance in the field. Furthermore, it searches for the suitable teaching method and techniques in addition to activities, from a subject specialist perspective, to enhance the technical writing ability of computer sciences students. Finally, specialists were required to provide efficient recommendations to improve not only writing achievement of their students but the overall English language teaching/learning outcomes in the computer sciences domain (see Section 2.4.2.2.2)

3.4.1 Reporting and Interpreting the Findings

I) Teachers' Profile

Subject Specialists' Degree, Field of Interest, and Teaching Experience

The informants in this interview are subject-specialists, instructing undergraduate and post-graduate computer science students at the Department of Computer Science, TLEMEN University. The computer scientists teach different modules related to their field of interest like Network Optimization Techniques, IT Security, and Advanced Database... Eight participants (8) hold a doctorate whereas the other two subject specialists hold a Magister degree. Among the informants, there are two professors, two associate professors, two assistant professors and the rest are permanent teachers; one of them aside from being an associate professor he is the head of the Computer Science department and some of them are the chiefs of the Master specialities. Most computer scientists are specialized in Software Engineering, Networking, and Artificial Intelligence. Their teaching experience varies from 5 years to 27 years. The interviewees are fully aware of their students' linguistic and communicative needs in relation to English language learning. Table 3.5 summarizes the computer scientists' profile.

	Number of Teachers	Degree	Field of Specialism	Status	Teaching Experience
Subject Specialist Teachers	8	Doctorate	Intelligent Model and Decisions/Artificial Intelligence	Permanent Teachers: -Two Professors -Two Associate Professors	5 to 27 years
	2	Magister	Information System Software engineering (Programming Languages) Networking and Distributed Systems	-Two Assistant Professors -Head of the Department -Chiefs of the Master Specialities	

Table 3.5: Subject-Specialist Teachers' Profile

Question 1: English Language Significance

With respect to English language importance, all the participants drew attention to the significance of English in relation to computer sciences studies generally, and particularly in the technical modules. The ten teachers viewed that it is of great importance to learn English in every ESP context. They further added that their students need to write articles at post-graduation level as all scientific articles relevant to the discipline are available in English. Equally important, they need English to read computer sciences documentation since all the recent body of literature on computer sciences studies is in English. Consequently, it is compulsory to know English so as to be prepared for even subject lectures. Furthermore, the informants highlighted that academic writing for international publication necessitates a proficient command of the English language.

Some teachers went beyond and commented that their personal English language level is respectively considered as intermediate and upper-intermediate. They justified their English level to the fact that they did not have English courses in their curriculum but they were enrolled in private schools. For instance, they studied extra courses of English language in private language centres or at the Department of Intensive Foreign languages learning at Tlemcen University. Subsequently, they highly recommended the language teachers to emphasize computer sciences terminology teaching in addition to foster even the speaking abilities to communicate in international conferences. On account to what has been mentioned, some teachers insisted on the fact that English courses ought to be expanded to Master 2 students at the department, even first and second-year Licence degree so as to improve English language skills to attain an advanced level in their post-graduation.

Question 2: The Needed Language Skills

When required to precise the most needed language skill in the field, most teachers immensely favoured first of all the writing skill as it is the utmost required skill at doctorate level so as to compose scientific articles to be published in international computer sciences journals. Next, they highlighted the importance of reading since it is the backbone of writing. Reading computer sciences articles, theses, and programmation reports help learners to memorize technical words with their spelling. Equally important, some of them advocated the improvement of speaking abilities along with listening skills to communicate in international scientific events like meetings and conferences. All in all, they highly suggested the integration of the four language skills as they are complementary to each other in every language teaching/learning situation.

III) Writing in the Discipline

Question 3: The Required Writing in Computer Sciences

The subject specialist teachers were asked about their learners' academic and professional needs in relation to the required level of writing ability. Speaking about whether computer sciences learners need basics of communication or developed writing in their educational needs, majority of the interviewees declared that indeed they need qualified writing abilities at post-graduation level which should be fostered at the beginning of their studies (first, the second year of licence). Computer sciences students are asked to write an article and read the literature of the discipline. Moreover, they should develop speaking abilities so as to attend international conferences or if they wish to apply for scholarships to study abroad. On the other hand, ESP learners are required to execute programming in their workplace in which they need specific terminology to be memorized according to the programming language used.

Question 4: Students' Lacks to Write Technically

Then the computer scientists were asked to provide the major weaknesses characterizing their students. All the respondents agreed that ESP learners do lack language mastery in general. They said that these difficulties that students encounter when writing are vocabulary, its meaning difficulties along with spelling mistakes. Furthermore, they reported that their learners face grammatical deficiencies, punctuation, cohesion and coherence while composing in English. They further added that it is up to the language teachers to address these writing difficulties for better achievement in their language proficiency.

Question 5: Collaboration with ESP Teachers

The researcher used this question to look for the subject specialists' standpoint on collaborating with ESP teacher in the interest of enhancing students' English language proficiency. All of the participants answered positively to this question without identifying any information on the way of applying this collaboration.

However, when it comes to reality, no cooperation is done. Each teacher elaborates his/her ESP syllabus and the lessons content without subject specialists' guidance to enhance the teaching/ learning outcomes. We can say that the collaboration of both teachers is conducted, at least informally, to stress the required computer sciences vocabulary in conjunction with the scientific language used.

Question 6: Subject Specialists' Recommendations to Teach Writing in the Discipline

As far as the subject specialists' suggestions are concerned, five (5) subject specialist teachers agreed that the convenient approach to teaching technical writing in a computer sciences discipline is content-based. Some other teachers (3) highlighted the use of task-based approach as a method of choice to instruct writing production effectively in any ESP context. However, two other subject specialist teachers emphasized the language-based approach as the better approach to teach the overall English items, not least writing skill. Figure 3.27 depicts the findings of question six.

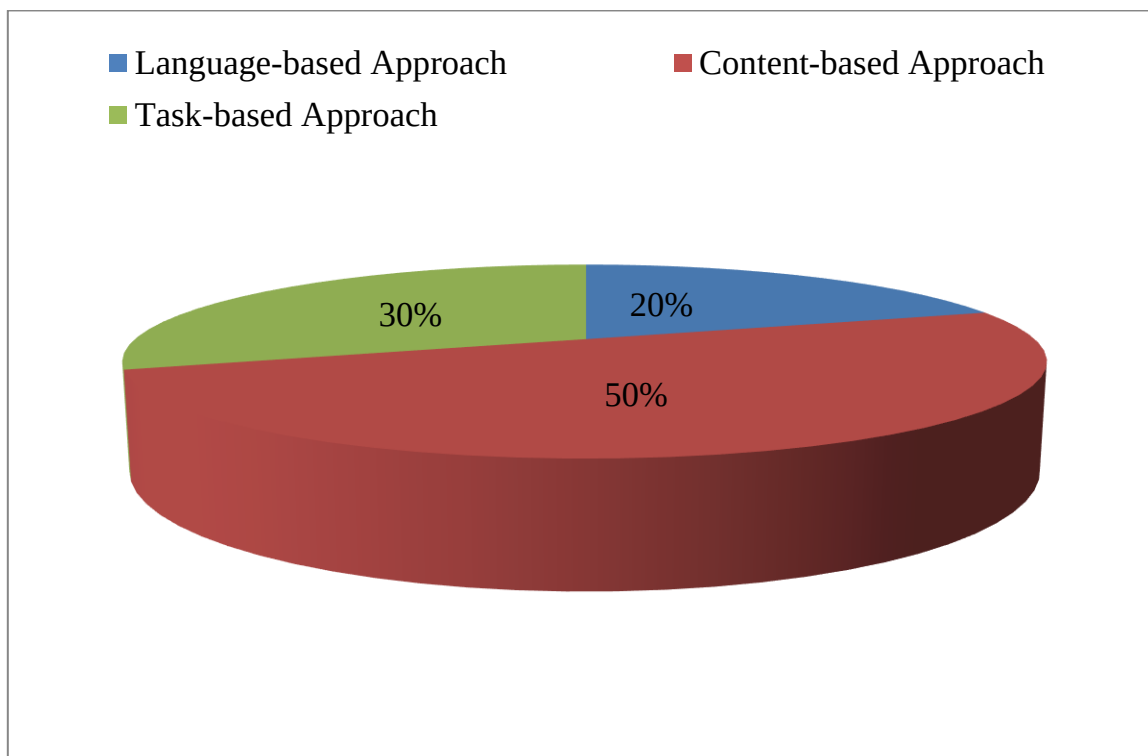


Figure 3.27: Subject Specialist Teachers' Recommendations for Teaching Technical Writing

Question 7: Further Suggestions for Better English Language Teaching/Learning Outcomes

As a concluding question, subject specialist teachers provided several suggestions for enhancing the overall English language mastery. First of all, concerning the teaching of writing, they proposed that ESP teachers are in charge of this must as they need to give room for classroom written tasks using workshops, discussions, and U shape settings so as to guide their learners throughout the language learning. Moreover, ESP teachers are asked to use interactive teaching techniques to boost their students' motivation to attend their language courses more often. Furthermore, creating online platforms in which students can write and share with their classmates might also be a key proposal. From an administration perspective, the educational system should give more importance to the English language. Owing to the fact that computer sciences major is fully instructed in the French language so that as an effective recommendation, one teacher asserted that it is high time the English language becomes the instructional language instead of French/Arabic in the Algerian universities. Consequently, ESP teachers would have a precise syllabus to follow, in addition to integrating both the international tests in the ESP curricular in the Master degree like IELTS and TOEFL to encourage the learners to attain international English language proficiency.

3.5 Classroom Observation Analysis

Besides the use of the pre-mentioned research tools, the researcher opted for a controlled classroom observation which helped her to gain insights about the sample population and their behaviours. It made it easier for the researcher to learn more about the teaching/learning situation and lessons content. Moreover, it sought information relevant to the computer sciences language requirements along with Master 1 learners' communicative needs in the natural setting of language learning. Classroom observation aims at collecting reliable information linked to the teaching procedure and student-teacher interaction. It provided the researcher in her investigation with a vivid portrait of students' linguistic background in the present situation and their lacks to achieve the required target situation needs. Furthermore,

it facilitated making the differences between the students' responses and their real attitudes towards the English language inside the classroom on display.

The inquirer observed Master 1 computer sciences classes a total number of eight sessions. These sessions were split into two categories; firstly, four sessions in which the researcher attended and took notes with the help of a grid (see Appendix F). Thereafter, four other sessions to put her research into action and both implementing the design course with pre- and post-testing procedures. In Master 1 classrooms, the number of students remained the same during the whole observation period (10 to 15 students per session). The researcher did not observe on a regular basis but rather the observed sessions were far apart owing to some impediment (mass demonstrations against the political system)²⁷ out of the inquirer's reach. It observed students' actions and attitudes towards writing, climate for learning, checking students' understanding, and assessment of writing (see Section 2.4.2.3). The results of classroom observation are demonstrated in the following lines.

3.5.1 Reporting and Interpreting the Findings

Actions and Attitudes towards Writing

Computer sciences Master 1 students have comfortable well-organised rooms to guarantee a convenient ESP learning environment. According to what has been observed, the investigator found out that the ESP teacher is the centre of the learning process. He gave his/her students the content of the lesson be it reading comprehension texts with questions or a video to watch. After that, they were asked to answer the questions related to the text, grammatical tasks and at the end there were some writing activities sometimes. Most of the time ESP teacher wrote grammatical rules on the blackboard and explained them to his/her students. Right after, they were required to apply them and give answers orally to these grammar tasks. The researcher can deduce that their lectures were rather concerned with GE (General English) than with specific language used for computer sciences purposes.

²⁷ **Hirak Movement** or also called **Revolution of Smiles** is the 2019–20 Algerian protests which began on 16 February 2019 against the fifth presidential term of ex-president Abdelaziz Bouteflika. https://en.wikipedia.org/wiki/2019%E2%80%9320_Algerian_protests

Concerning the language skill emphasized, as it has been mentioned, the ESP teacher dealt apparently with all of them. However, he/she paid more attention to reading and speaking along with listening skills as he/she mostly used handouts for reading comprehension because students maybe are more interested in those skills. On the other hand, writing skill was addressed by the ESP teacher sometimes not often. It was not given room for much practice, especially in the classroom. It was seen as a complex activity by the students so the ESP teachers almost neglected this skill as it causes hindrances for their students. Owing to the fact that students face writing difficulties, the focus on this skill is rare. Although students hold neutral attitudes towards writing, they still cannot express themselves easily in the English language.

As far as students' motivation is concerned, some of the students seemed hesitant when they entered the English class. While the rest showed a little bit of motivation to attend the lectures as they know its importance to their studies and future career. Whereas, some other students ditched their ESP classes completely. Some students who attended their lectures sat in the front seats and they were the ones to respond to their teacher's questions. However, the majority of the students did not participate because the teacher did not offer them the opportunity to do so. As a result, students were not highly encouraged to get involved in the classroom environment.

Climate for Learning

The ESP teacher was very active and strict. He was trying to motivate his students in every session through his apparent self-confidence that he has. He encouraged them to express themselves using the language while practising language skills. He showed a remarkable sense of humour with eye contact. He was self-confident and tried to stimulate his students to practice language skills. He searched for a few interactive techniques to enhance his students' motivation and performances. He had a good command of the English language, in addition to his fluency and accuracy. Evidently, ESP teacher did not mention either the lessons objectives which reflect the learners' needs after the course of instruction or the

skill covered at the beginning of his lecture. Subsequently, students were not prepared for the content to be learned.

The ESP teacher was considered as the main source of knowledge in the classroom. Sometimes, he asked questions and responded to them by himself while the students were silent and kept staring at him. At the beginning of each session, the ESP teacher asked his students to recall what they had seen together last time as a brainstorming phase. Some of the learners voluntarily restored the previous lesson. It was clear though that there was less interaction between the students and their teacher as he is the only one to speak sometimes in the classroom.

Checking of Understanding

During the observation process, the delivered courses were teacher-centred. Students rarely asked questions whether they understood the instructions or not. They spoke only when spoken to and rarely replied to the teacher's questions or ask for clarifications. Consequently, the teacher did not ask many questions in his lectures or when he asked only those sitting in the front seats who responded. Teacher/learner interaction and learner/learner interaction were not frequent in the classroom. The ESP teacher used simple words in English not even specific words of the discipline and sometimes used French to clarify some technical terms. Besides, ESP teacher had recourse to translation from into both Arabic and French to assure that the students assimilated the meaning of words.

Some of the delivered lectures were basically grammar lessons. He used the blackboard to explain grammatical rules to his students while asking questions about it as well. In the classroom, the ESP teacher did not give room for practising the writing skill unless his students had an assignment or homework to do. Since the administration did not provide the ESP teachers with any syllabus or teaching materials, it fell to the teachers to elaborate their instructional matters. Therefore, ESP teacher selected teaching materials based on Wikipedia articles without taking students' interest into account. Some of the topics dealt with are ethics and

moralties while watching a video based on the audio-visual materials and discussed it afterwards.

Assessment of Writing

Considering writing skill as the most difficult skill students dealt with. ESP teacher gave his students homework and writing assignments in the form of essay writing. Some of them just copied and pasted from the internet to hand over their assignments. Due to the fact that this skill demotivates the students since they faced problems in editing their pieces of writing. The students also felt that they did not have enough vocabulary to compose writing production in English. Although the ESP teacher did his best to encourage his students to respond to their writing tasks, still some of them showed little interest in writing assignments.

When ESP teacher gave his students writing assignments to assess their writing performance, students felt bored as he created an uncomfortable atmosphere for both his students and himself as well. Writing assignments were quite challenging for the students since they were not instructed or trained to write technically in the discipline. The writing skill was the bane of the students since they found themselves struggling to accomplish written assignments. Sometimes, ESP teacher gave his students a task at the end of a reading comprehension test which asks for a text summary or filling the gaps. He seldom asked his students to write reports of computer programs that they developed.

3.6 Discussion of the Findings

In this section, the researcher provides a discussion of the main results. The information gathered from the different research tools used: students' questionnaire, both ESP teachers and subject specialist teachers along with classroom observation help the investigator to cross-check the findings. Therefore, she explores the pre-mentioned hypotheses in relation to the main results of this research work. In addition to this, this investigation addressed the significance of English in the computer sciences discipline, especially the written discourse. It attempted to identify the ESP students' academic and professional needs. The objectives of this

study were to help students improve their linguistic competence (vocabulary, grammar and semantics) so as to write technically in the field. Besides, the inquiry process provided further suggestions and recommendations to strengthen their overall communicative competence to attain a good command of the English language. Evidently, the researcher, in this section, can prove or refute her proposed hypotheses for the problem of her research work which highlighted the evaluation of written discourse in a computer sciences discipline.

In the very beginning of the investigation, it was hypothesized that students may receive general English instructions which did not serve their discipline-specific language needs. In fact, the data obtained from the three research instruments used (questionnaire, interviews, and classroom observation) revealed that students showed an average level in the English language mastery which is considered as the general type of language not the specialized language for their major. This verity was particularly reinforced by attending ESP sessions delivered to computer sciences Master 1 students which depicted the vivid image of the thorough teaching/learning situation in the classroom. On the contrary, ESP teachers' responses were not harmonious with what they actually did in their classrooms. They claimed that they gave room to instructing and practising writing skill. However, when it comes to reality, they just gave some writing assignments and homework without any practice in the classroom. They fully instructed what is considered as being more general English than computing English, which was tackled sometimes though. This type of language neither assure the students' academic nor occupational needs as they did not have the required language to deal with the target situation. As a matter of fact, the findings validate the first hypothesis.

Concerning the second hypothesis, the investigator suggested that ESP teachers evaluate their students' writing expression in the discipline using specific types of tests (formative and summative assessments in the form of reading comprehension tests). The findings showed that ESP students are assessed building on different types of assessment. Moreover, as displayed in classroom observation,

ESP teachers gave their students writing assignments and homework without classroom practice. The collected data from ESP teachers' interview also revealed that teachers sometimes used classroom activities to instruct and practice writing like free-writing activities and guided-writing activities in order to compose paragraphs, fill in the gaps thereby students rehearsed language aspects like vocabulary and spelling. In addition to this, ESP students were not only evaluated in the classroom (formative assessment) but also at the end of the semester. This fact was reinforced by ESP teachers' responses to the interview in which they declared that they varied their assessment tools (formative and summative assessments) for better results so that to assess the students' overall language proficiency.

However, once in the classroom, the researcher observed that these responses (assessment techniques) are not fully executed in the classroom. The ESP teacher neglected the writing practice in the classroom as be it a complex skill which causes difficulties to the students to compose in the language since they were not trained to perform such skill. Consequently, they relied on writing assignments and homework as a formative assessment without classroom rehearse, and when it comes to summative assessment, they assessed them through the use of reading comprehension tests which sometimes have writing task at the end (summary of the text or filling the gaps) and most of the time do not consist of any writing tasks. Worth noting that in fact, assessment techniques vary from one teacher to the other. Thus, they all share the same goal which is linked to measure and guide students' language performance, not least the writing skill in ESP context. These findings confirm the second hypothesis.

Regarding the third hypothesis which identified the main difficulties faced by ESP learners while composing in the English language. These difficulties were linked to lack of computer sciences terminology (register) along with the grammatical structures to write technically in the discipline. That is to say, students lack what is called linguistic competence (lexis, grammar, and meaning) in order to express themselves in the written discourse. The questionnaire addressed to Master 1 computer sciences students showed that students do suffer from writing

difficulties which are related to firstly, the vocabulary of the discipline, secondly, the grammar, and then spelling. They continued saying that lexical difficulties are about spelling mistakes and word formation (morphology). Grammatical lacks mainly related to tenses, conditional sentences, and passive/active voice. On the other hand, semantic problems are linked to the meaning of the word used and its context in addition to the semantic relationships²⁸ (Zapata, 2008:1) (synonymy, antonymy, and polysemy). The questionnaire findings also revealed that the factors which result in deficiencies of vocabulary, grammar, and spelling mainly due to the lack of classroom practice and reading in the discipline.

This verity was reinforced by the teachers' responses to different interview questions. ESP teachers confirmed that the time allocated to teach writing ability along with the writing syllabi is not really enough to instruct and practice simultaneously in the classroom. They also said that reading computer sciences documentations helps learners memorize the specific terminology in addition to enhancing their writing ability. Moreover, ESP teachers added that their learners have a low motivation to attend ESP lectures in general and practice writing in the classroom particularly. These findings were proved by subject specialist teachers who highlighted the urgent need to develop the linguistic aspects (morphology, syntax, and semantics) in order to meet the learners' target needs to write technical compositions. A similar view was pictured during the whole classroom observation in which the researcher noticed the learners' language difficulties. In fact, the results validate the third hypothesis.

With respect to the fourth hypothesis which stipulates that designing an appropriate course (content, task-based approach) to meet the specific learners' needs in addition to a collaborative atmosphere with subject specialist teachers may have positive impact on the students' motivation to develop their linguistic competence and to be more engaged in specific writing of the discipline. The data

²⁸ **Semantic Relationships** refer to associations that there exist between the meanings of words. (Semantic relationships at word level like synonymy, antonymy, and polysemy).

http://webdelprofesor.ula.ve/humanidades/azapata/materias/english_4/unit_1_semantic_relationships.pdf

gathered from the students' questionnaire divulged that the ESP learners suggested innovative techniques of teaching to attract them in the ESP lectures, especially writing courses to increase both their attention and attendance. In this stimulating atmosphere, ESP students will be interested in writing skill since they will know the importance of writing production in their field of interest. Furthermore, this environment will facilitate building a good rapport with their teachers for better learning outcomes. Besides this, when asking students about their preferred approach to learning writing in computer sciences, the majority favoured a content-based approach to foster their linguistic competence in the target situation.

While interviewing them, both ESP teachers and subject specialist teachers, they insisted on creating a motivating teaching/learning atmosphere in which the two teachers work hand-in-hand to increase the language learning outcomes, not least the students' writing performance. Once again, both ESP teachers and subject specialist teachers were in favour of the content-based approach to instruct and train ESP learners to write in a computer science major. Equally important, ESP teachers must define students' problems by making needs analysis at the beginning of the year to provide remedial work. ESP teachers added that they should raise their students' awareness of their writing mistakes and encourage them to revise their pieces of writing. On the other hand, subject specialist teachers highly recommended the creation of online platforms and workshops at the level of computer sciences department to help the learners produce written compositions and share them with their classmates and ESP teachers. According to them, this proposal could raise the students' awareness of the significance of writing in their field. The same picture was portrayed during the classroom observation where ESP learners seemed to be bored during their language courses. They would be more stimulated during the sessions, especially writing assignments if there was a use of more innovative techniques to teach writing in particular and the English language in general. Again, these results approve the fourth hypothesis.

3.7 Summary of the Main Results

In the following lines, a summary of the crucial findings is represented. A brief account of the students' questionnaire results, ESP teachers' interview, computer scientists' interview, and classroom observation findings are discussed in relation to the learners' needs identification and analysis. The needs analysis process is conducted with regards to the linguistic competence of the ESP learners to write discourse in the discipline. The learners' needs identification and analysis follow Hutchinson and Waters (1987) model, i.e. it seeks to find out the target needs of the learners to perform effectively in the target situation in addition to the learning needs which pave the learning paths to achieve the target situation requirements for both academic and occupational purposes. Once again, the students' target needs are divided into three main categories: necessities, lacks, and wants.

First of all, the questionnaire addressed to master 1 computer science students allows the researcher to have valid information about the learning situation of the target population. The researcher gained insights into the ESP learners' necessities, lacks and wants as far as the writing skill is concerned. She explored the students' difficulties in writing (vocabulary and grammar) and the factors behind such deficiencies (teaching time and practice). Furthermore, the researcher got data related to ESP teaching in general and writing instruction particularly. Last but not least, the researcher tackled the assessment techniques used by the ESP teachers to test their students' writing expression in the discipline. Finally, there was room for students to provide some teaching and assessment techniques to better the ESP teaching/learning situation.

As for ESP teachers' interview, it yielded reliable data. As a matter of fact, it explained the ESP teaching practices at the Computer Science Department, Tlemcen University. What is more, its findings highlighted the most emphasized language skill while teaching. The participants admitted that they focus on writing and speaking. However, once in the classrooms they teach basically reading comprehension and sometimes grammar. Furthermore, ESP teachers declared that

their students face writing difficulties due to their average level in English. They attributed such deficiencies to the insufficient time allocated to teaching writing per semester without classroom practice. Concerning the assessment of writing skill, ESP teachers proclaimed that they often assess their students' writing proficiency using both formative assessment techniques (writing activities in the classroom) and summative assessment (a task at the end of a reading comprehension test). At last, they recommended some useful proposals to enhance the teaching of English language in an ESP context and teaching/assessing of writing in particular.

Subject specialist teachers, on their turn, stated that the computer science students in Master 1 need to develop their writing abilities so as to write scientific articles at the post-graduation phase as the main academic needs. In addition to this, they emphasized the importance of reading literature related to the discipline since reading is the backbone of writing. Reading computer sciences documents like Programmation reports and scientific articles helps ESP learners develop the lexis of the field with memorizing their meanings and spelling. Concerning occupational requirements, students may use writing to report their programming of computer programs or chatting with international partners in exhibitions. Moreover, they insisted that their students need to improve the language aspects since they have writing deficiencies. They suggested content-based as an approach of choice to instruct writing at the computer science department. Finally, they further added some fruitful and innovative proposals (online teaching/learning platforms) to enhance English language teaching/learning outcomes.

Classroom observation depicted the vivid image of the teaching/learning process in an ESP context. The noticed approach adopted in the classroom was teacher centredness. The ESP teacher neither clearly stated the learners' needs nor the students' interest when he designed the content of his lessons. Furthermore, the researcher portrayed the students' actions and attitudes toward writing. ESP teacher based his teaching on general English, video watching, and reading comprehension. As far as writing skill is concerned, he just gave homework and writing assignments to his students without classroom instructions or practice. This atmosphere created

negative attitudes towards writing since learners encounter difficulties to compose written discourse due to the fact that they were not trained to do so. There was little interaction with the teacher, they answered only when being asked. In terms of assessment of writing, he relied heavily on summative assessment (writing task at the end of an exam) whereas formative assessment is done in the classroom through homework with no room for practice or giving feedback which helps learners to know more about their writing mistakes.

The information gathered from these different research instruments: students' questionnaire, the ESP teachers' interview, computer scientists' interview, and classroom observation helped cross-checking data and allowed the researcher to identify the learners' needs so as to develop writing production in their field. Needs identification and analysis along with the content-based syllabus (students' and teachers' suggestion at the computer science department) can prove better learning outcomes in the ESP context. The researcher through analyzing the data collected determined the learners' target needs and learning needs.

The target needs of the learners in computer science domain are grouped into necessities, lacks, and wants to meet both the educational and occupational requirements of their careers. First of all, the students need to write research articles in the target situation as shown in the research instruments findings along with developing computer science terminology. Concerning necessities, students are asked to promote two cornerstone skills in order to enhance specific written discourse, for instance, these skills are basically writing and reading. Teaching and practising writing in the classroom would be of great help to the learners. Also, reading computer sciences articles, reports, and research papers can add value to the writing instruction and students writing performance as students will learn specialized vocabulary with its meaning, context, and spelling.

As to the lacks, it was clear that students were deficient in all language aspects, especially, linguistic competence, i.e. lexis, grammar, and semantic problems related to computer science register. With respect to their wants, ESP learners' preferences were divided into two facets. The first facet, which is about

teaching writing, they highly recommended the content-based syllabus to boost their English language written expression. In addition to this, they favoured the integration of the four language skills for more language learning benefits. The second facet is concerned with the assessment of writing, in which they proposed more classroom writing practice through using activities, homework, and projects to foster the overall English language mastery, not least the writing skill.

As far as the learning needs are concerned, they paved the way on how to reach effective written communication in the computer sciences domain. ESP students supported the fact of taking their interest when selecting and conceptualizing the content of language courses. Besides, the read texts in the classroom which are relevant to computer sciences literature need to reflect the students' concern and attract their attention. ESP teachers are required to use more interactive teaching techniques to motivate students and increase their attendance. Furthermore, he/she is asked to elaborate the content of ESP lessons based on the relevant content taking into account the performance of the four language skills.

All in all, the needs analysis process revealed the significance of the English language for computer science students and identified the learners' needs in academic and workplace situations. The needs identification and analysis followed Hutchinson and Waters' model. This model identifies both the target needs and learning needs of the students. The main results were to write computer sciences articles and develop relevant terminology to achieve better communicative end products. As a result, the fieldwork findings urge the researcher to elaborate a content-based syllabus. The next chapter will be about the course design following a content-based syllabus which will permit a wide range of teaching techniques therein the language elements and the needed skills will be incorporated. Thereafter, the syllabus will be implemented using the action research in the fifth chapter so as to evaluate the proposed course design (to prove or refute the fourth hypothesis in practical terms).

3.8 Conclusion

In the current chapter, the researcher aimed at reporting and interpreting the information collected from the students' questionnaire, ESP teachers' interview, computer scientists' interview, and classroom observation. The data gathered were analyzed both quantitatively and qualitatively. Afterwards, the discussion of the results was stated in relation to the pre-mentioned hypotheses. The main results were about the significant importance of English language in computer sciences, equally important the writing skill which is the most needed skill for students' academic demands. The development of linguistic competence was the chief proposal to improve writing production and overcome the writing difficulties. In order to do so, the needs analysis process was the key element upon which any ESP course should be based on. Consequently, the next chapter will tackle the course design elaborated following a content-based syllabus as the recommended solution for writing skill improvement. Thereafter, in the fifth chapter, this course design will be implemented and evaluated to validate or refute the proposed hypothesis (fourth hypothesis).

Chapter Four Computer Science Syllabus Design

4.1 Introduction

4.2 ESP Syllabus Design

4.2.1 ESP Syllabus Design Principles

4.2.2 ESP Syllabus Design Process

4.3 Elaborating an ESP Course for Computer Sciences Students

4.4 Computer Science Students' Needs Profile

4.5 Formulating Goals and Objectives of the Course

4.5.1 Setting Goals, Aims, and Objectives for the Proposed Syllabus

4.6 Content-Based Syllabus

4.6.1 Principles and Characteristics of CBI

4.6.2 CBI Models

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4.7 Content Conceptualization

4.8 Developing Teaching Materials and Learning Activities

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4.8.2 Teaching Techniques/Activities Organization to Develop Communicative Skills (Based on CBI Tenets)

4.8.3 Time on Task

4.9 The Suggested Syllabus for Computer Science Master 1 Students

4.10 Sample Unit: Sample Lesson

4.11 Conclusion

4.1 Introduction

Instructing English to computing learners is an essential academic demand. Owing to the fact that English is the dominant language worldwide, students and professionals in computer sciences studies are asked to improve their language proficiency, especially writing, and their communicative abilities. It is of great value to develop the students' writing skill to write articles and reports in the discipline since all the computer sciences body of literature are produced in English. The majority of Information Technology information is published in international computing journals using the English language. For this reason, it is of utmost importance to enhance the students' writing composition through reading comprehension activities, vocabulary building, and communicative tasks.

The needs analysis operation revealed the required students' needs in their studies and the workplace. As a consequence, the researcher acts accordingly to elaborate a suitable content-based syllabus for computer sciences students. This chapter is about the ESP syllabus design process and its principles. It starts with defining the computer sciences needs profile and setting goals and objectives of the proposed syllabus. Then, the researcher highlights the content conceptualization through developing teaching and learning materials. At last, this chapter aims at identifying the outline of the suggested syllabus sequencing into units, particularly the sample unit with the implemented sample lesson. The sample unit alike the rest of the courses of instruction in the syllabus incorporated the four language skills, language work (lexis, grammar, and meaning), study skills tasks. Additionally, it evaluates the students' language proficiency through progress tests, homework, projects at the end of each unit to gauge the instructional process. Finally, this chapter gives a brief description of the proposed syllabus and one instance of the lessons which is the implemented sample lesson.

4.2 ESP Syllabus Design

Syllabus design is a key element in any ESP situation. Syllabus refers to the crucial units of second/foreign language programmes (ESL/EFL). Moreover, it is

seen as academic curricular which can have various forms denoting several learning theories. It can be elaborated in different ways. Worth mentioning at this level of analysis and before speaking about the proposed syllabus design of this study, the clear cut division between the terms 'curriculum' and 'syllabus' which are used sometimes interchangeably in terms of the context to be used in (Nunan, 1988: 3).

First of all, the term curriculum in both ESL/EFL settings has been considered paramount throughout ELT history. The curriculum as a sub-branch of educational studies is recently viewed as a new discipline which stands alone (Stern, 1983: 434). Curriculum means the included items within an academic programme of institutional regulation. As for Stenhouse (1975: 17), he posits that curriculum is «an attempt to communicate the essential properties and features of an educational proposal in such a form that it is open to critical scrutiny and capable of effective translation into practice". In the same line of thought, Allen (1984) comments that « ... [a] clear distinction, similar to that which has been prevalent in Europe, the curriculum being concerned with planning, implementation, evaluation, management, and administration of education programmes, and the syllabus focusing more narrowly on the selection and grading of content ». (p. 61). According to Allen, the curriculum tackles the whole teaching/learning operation. Furthermore, it consists of materials, gadgets, assessment procedures and teachers' training. All in all, the curriculum is referred to what needs to be instructed, to whom, when, where, and how.

Additionally, as stated by Nunan (1988: 14) some elements like methodology and evaluation are involved withing the identified syllabus. Correspondingly, the curriculum is related to learning objectives, teaching methods, and syllabus content (White, 1988: 19). This kind of explanation covers respect of theoretical, social and governmental features of a study-programme. On the other hand, the definition of syllabus goes up and down between common simplifications of curriculum and specific definitions. Breen's definition of syllabus is about « the meeting point of a perspective upon language itself, upon using language, and upon teaching and learning which is a contemporary and commonly accepted interpretation of the

harmonious links between theory, research, and classroom practice » (Breen, 1987: 83).

According to Prabhu (1987: 89), syllabus definition relies on the process of identifying what to teach in order to be learnt. One can say that syllabus is the subsection of a curriculum which is concerned with the designation of teaching units (Allen, 1984: 61). For Yalden (1987: 26), the syllabus is a teacher's job to determine his/her teaching objectives and lessons content. It is about the teaching scaffolding of activities to be executed so as to facilitate learning. Syllabus carries out the instruction tasks in the classroom and convenient teaching materials (Nunan, 1988; Prabhu, 1987). Kumaravadivelu (1994: 72) defines syllabus as « a pre-planned, pre-ordained, pre-sequenced inventory of linguistic specifications imposed in most cases on teachers and learners,.....it is a widely recognized view ».

A common ground definition of syllabus refers to syllabi interest in representations of a certain body of knowledge and skills. Additionally, it is linked to the designers' thoughts of language learning. That is to say, the syllabus representations are modelled by the developer's standpoints of language nature, how language is best instructed to the learners, and how learners can produce language in the learning situation (Breen, 1987a: 83). In the current study, the two concepts under consideration are used as synonymous. As a matter of fact, when one speaks about curriculum in any educational context, not least ESP environment, he also might discuss the syllabus issues (Richards et al, 1992: 94).

There exists an agreement upon the attributes of the curriculum, as explained below by Brumfit (1984 qtd in White, 1988). They are the determination of institutional programme, defining learning goals, and the relevant theory of language learning. Moreover, there are other characteristics like learners' needs, teaching materials, and an administrative document of what to teach in the ESP classroom.

1. The curriculum specifies the work of a particular department in a college or school, organized in subsections, defining the work of a particular group or class.
2. It is linked to time, specifying a starting point and an ultimate goal.
3. It specifies some kind of sequencing either in accordance with a theory of language learning or with the structure of specifiable material relatable to language acquisition.
4. The mode of sequencing above is constrained by administrative needs such as materials.
5. As a document of administrative convenience, it is both negotiable and adjustable.
6. It can only specify what is taught, rather than organizing what is learnt.
7. As a public document, it is an expression of accountability.

(Brumfit, 1984 qtd in White, 1988: 3)

It is evident to assert that Breen regarded syllabus as being a subject to particular conditions which necessitate the syllabus designers to emphasize, determine, separate, and arrange the suitable end products of language learning in a specific order (Breen, 1987: 83). He demonstrated the significant importance of defining teaching purposes so as to conveniently implement the syllabus through the use of assessment procedures. Moreover, he added that the evaluation process refers to the characterization of the study-programme liability in the academic setting including learners, colleagues, administration, and the macro societal level.

- a) Provision of an accessible framework of required knowledge and skills;
- b) Provision of continuity for its users;
- c) Ability to give a retrospective account of what has been achieved;
- d) Evaluation - provision of accountability to colleagues, to learners, and the wider institution and society;
- e) The precision of purpose, so that it may be assessed for appropriateness through implementation;
- f) Sensitivity to the environment for which the plan is intended.

(Breen, 1987: 82)

Consequently, regarding ESP syllabus design, the designated process should accomplish three main factors which are language description, learning theories, and needs analysis (Hutchinson and Waters 1987:23). In other quarters, language description is the mode wherein the language mechanism is subdivided to the purposes of learning. As an illustration, notions like 'structural', 'situational', and 'functional' are part of this category (Ibid). One can say that language description is another facet of the same coin which is the type of syllabi. They are associated with the ways of analysing and describing language.

In this chapter, the researcher considers the language system as a content-specific approach related to the computer science discipline so that to improve the learners' writing production. Subsequently, the designated type of syllabus is the content-based syllabus relevant to the computer sciences subject matter. It stresses the use of content to learn the language rather than only using the language itself. ESP learners tend to learn the subject matter, in our case computer sciences, especially scientific writing, through the English language.

Next factor is the theories of learning which mean how language items are portrayed and in what way they must be taught (Ibid). Those theories are concerned with approaches and methods of teaching drawn from a learning perspective, not from language view. It helps the course designers to identify the theoretical assumptions of learning methodology. Learning could be general related to any kind of knowledge that people learn not only languages, for instance, it used concepts in the area like 'behaviourism', 'cognitive', and 'affective'. In the present investigation, the researcher opted for an eclectic approach taking what is valuable from each learning theory. The teaching methodology will be exclusively tackled in chapter five. The three theories of learning can be of great help to the ESP practitioners. As an explanation, the ESP teacher may use behaviourism to teach pronunciation, cognitive approach to instruct grammar, and affective paradigm to select read texts.

The involvement of both language description and learning theories must be selected in terms of certain standards of Sweet (qtd in Corder 1973 cited in Hutchinson and Waters 1987:52). These principles are based on the vital consensus of « whether or not the learning of the language will be facilitated thereby ». After discussing the two theoretical bases of course design, the final factor is more practical which is the distinctive feature of ESP courses- needs analysis. As reported by Richards (2001: 2), the curriculum development consists of the operation of determining students' needs in the teaching/learning situation. Needs analysis and identification help course designers to enhance the learning outcomes in ESP contexts. Hence, ESP practitioners must collect information about learners' demands in the target situation through the use of needs analysis procedures like questionnaires, interviews and so forth (Lekatompessy, 2002). The researcher practically gathered data about Master 1 computer sciences students to elaborate an appropriate syllabus which meets their academic and professional needs. The required demands are to write scientific articles at the post-graduation level in a computer sciences discipline. All in all, ESP syllabus design refers to the determination of skills, knowledge, and learners' needs in order to have improvements in the learning outcomes. Figure 4.1 summarizes the three main factors viewed by Hutchinson and Waters (1987:22) so as to develop a suitable ESP syllabus.

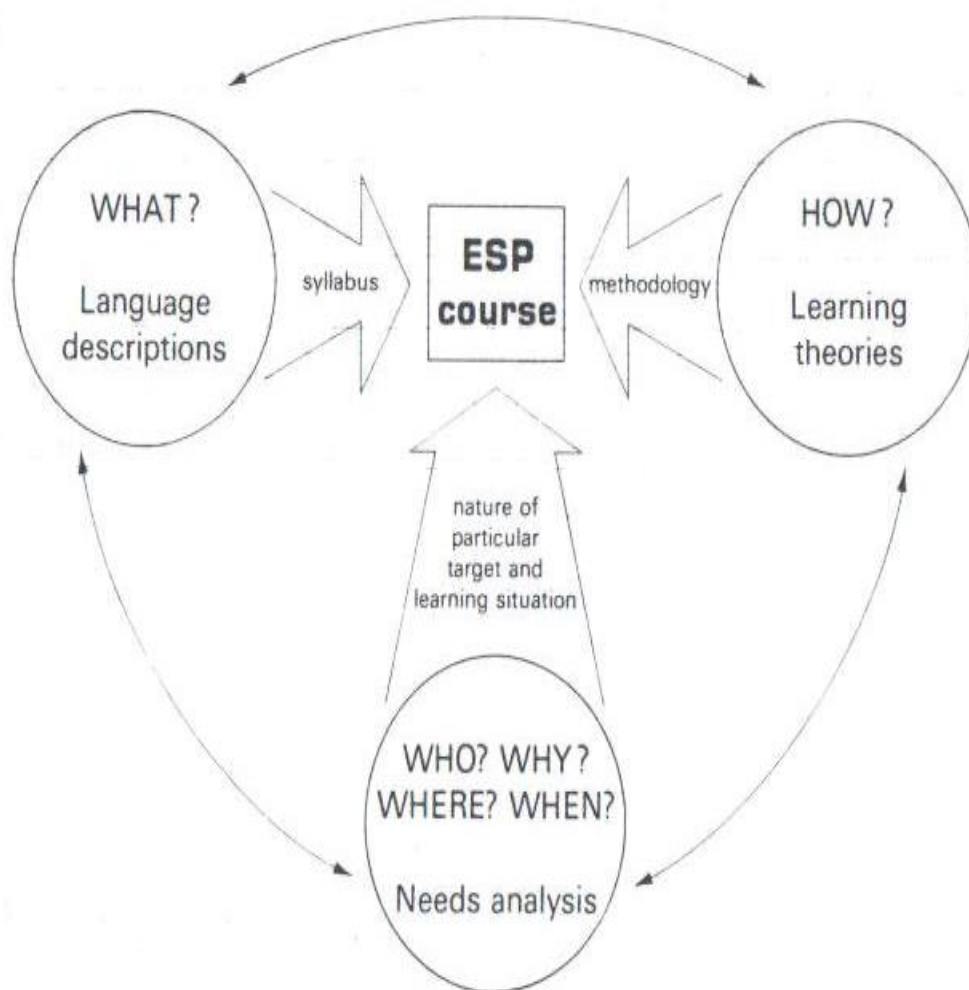


Figure 4.1: Factors Affecting ESP Course Design (Adopted from Hutchinson and Waters 1987: 22)

4.2.1 ESP Syllabus Design Principles

As viewed by Harmer (2001:295), ESP practitioners are asked to elaborate syllabi taking into account particular principles. He stated that « whatever type it is, every syllabus needs to be developed on the basis of certain criteria ». These criteria are related to making decisions about selecting teaching materials, arranging lessons content, and sequencing learning activities of the syllabus or the curriculum. Harmer (2001) proclaims that these four principles need to be deemed so as to design an appropriate syllabus in an ESP context, which are :

- Learner ability: the content of the syllabus or curriculum must be attuned to the students' level of competence.

- Validity: the chosen linguistic items of the syllabus need to be real and authentic in the teaching/learning situation.
- Significance: the syllabus or curriculum tenor should reflect the determined set of objectives and aims.
- Interest: the syllabus content has to stimulate ESP learners, attract their attention, and keep their interest.

4.2.2 ESP Syllabus Design Process

After analysing the computer sciences Master 1 students' needs taking into account the needs identification and analysis process findings along with the ESP course objectives, a content-based syllabus was selected to best fit the target situation requirements of the sample under investigation. The content-based instruction was the students' and both ESP teachers' and computer scientists' suggestions claiming that it is the best syllabus that fits their academic and professional demands. According to the study participants, the content-based approach focuses on the integration of the four language skills, highlights the subject matter (computer sciences discipline) to the language elements. This approach also allows learners to perform authentic tasks in the learning situation which they can face in their educational and occupational careers along with real-life teaching materials used for instructing the necessary content and language forms.

The results of the needs analysis operation uncovered that Master 1 computer sciences students need to develop their writing skill in the discipline. Moreover, they lack computer sciences terminology which could be promoted by reading computer sciences documentations. They need enhancing the linguistic competence which entails the improvement of lexis and its meaning, and grammatical structures so as to write scientifically in computer sciences. Their main academic requirement is to write research articles at post-graduation level and even scientific programming reports at the Master's degree. Furthermore, the researcher gathered data about the two facets of the teaching/learning situation in an ESP setting which are related to instruction and assessment. ESP learners highlighted the significance

of integrating the four language skills to develop the overall language mastery. In addition to this, they stressed the use of assessment procedures in the classroom as activities and tasks to practice the needed written discourse in the form of formative assessment. Besides this, they emphasized the importance of listening and speaking skills which permit them to interact with foreign partners in international exhibitions. Subsequently, the researcher is asked to design a suitable content-based syllabus to meet the computer sciences Master 1 demands. The careful design denotes the need to know more about the basis of the content-based syllabus and its techniques, activities and so forth.

Additionally, the ESP syllabus design process includes the identification of learner's needs, the localization of the appropriate syllabus type. It involves course framework, teaching approach and method, instruction materials, and finally the assessment procedures to evaluate the language study-programme. Figure 4.2 below displays the ESP syllabus development :

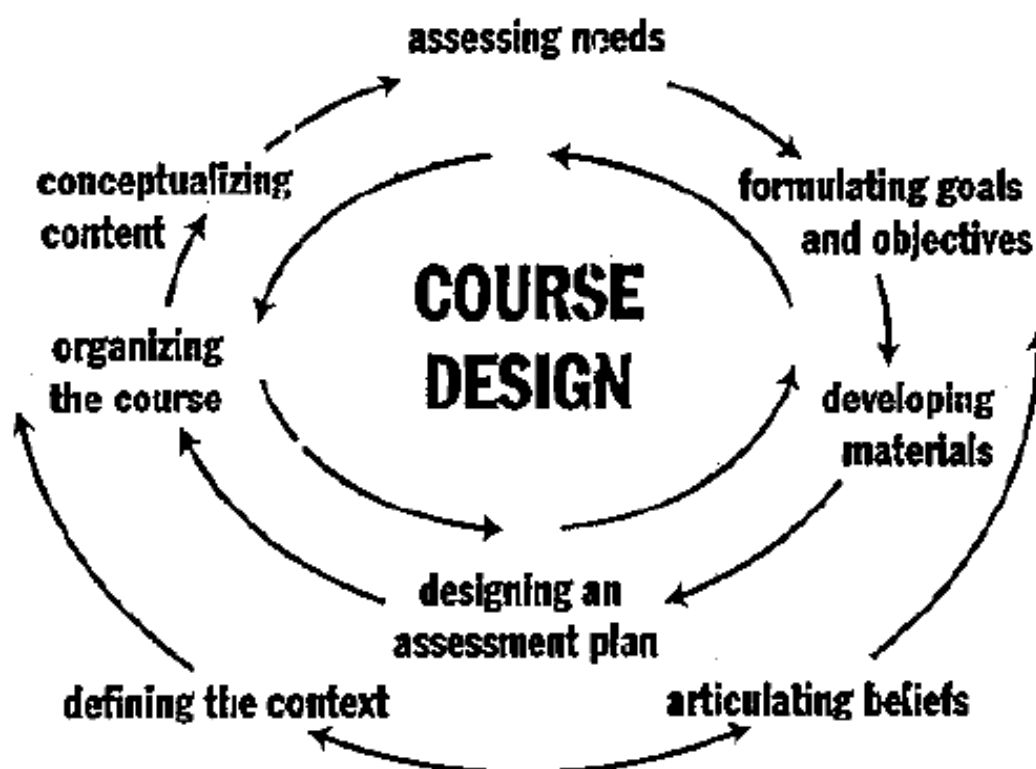


Figure 4.2: ESP Syllabus Design (Adopted from Graves' Model 2000)

The above-mentioned diagram focuses on the needs assessment as the first step in ESP syllabus design. The next step is to devise the intended goals and objectives for organizing a language study-programme (Richards, 2001:145). Besides, Graves' model for ESP syllabus design specifies the content of course instruction and how it is sequenced, listed, and tested. In the present research work, the researcher tends to develop a syllabus based on the learner's demands in the target situation (Saragih, 2014). She created a syllabus for computer science students at Master 1 level in order to improve their linguistic competence to write technical discourse in the discipline. The researcher based her syllabus implementation on the eclectic approach of teaching (Chapter five). In sum, the ESP syllabus design is linked to analysing and assessing needs, formulating goals and objectives. Moreover, conceptualizing suitable content for course instruction, selecting and sequencing teaching materials and learning activities. The final step is evaluation and how to assess the learner's performance and the language programme along with the previous steps (Taba, 1962).

4.3 Elaborating an ESP Course for Computer Sciences Students

For the sake of elaborating a suitable ESP course for Master 1 computer sciences students, the researcher followed the pre-mentioned steps in ESP syllabus design process. Furthermore, as mentioned before, the two concepts curriculum and syllabus are used interchangeably in this work although they have distinctive meanings. This section tackles the syllabus design as a subpart of curriculum development. That is to say, the designed syllabus searched for the specification of the lessons content to be instructed, teaching objectives and materials along with their lists as a subset of the overall curriculum.

A successful ESP syllabus design must close or at least narrow the gap between the language curricula at primary levels, for instance, Middle and Secondary schools and the language study-programmes at the university level (Benyelles, 1999). The designed course of instruction needs to cater for the computer sciences learners' needs whom they demand a different type of English than the one taught in the primary general language curricula. This type of English

is for computing purposes to compose written discourse in the ESP situation. Apart from this, the ESP syllabus should boost the students' communicative abilities of the English language. In order to do so, an eclectic approach of teaching is required along with the process of designing a convenient syllabus therein instructions of grammar, vocabulary, functions, and tasks are decided by the teacher whether to be taught inductively or deductively.

In the current study, the researcher conducted the identification and analysis of the needs (NIA) as the first step in the ESP course development for computer sciences students. For this purpose, the researcher used certain research tools to uncover the ESP learners' demands in both academic and workplace situations. The research instrumentations allowed the researcher to depict two kinds of information. The first data collected were about the students' necessities and lacks in order to have an idea about their current situation. The second information was about their suggestions and wants to obtain insightful ground on how to ameliorate the current ESP situation to achieve the requirements of the target situation.

The next step in the ESP course development is to formulate goals and objectives for the teaching/learning process. In this phase, the researcher had a vision in mind of what to instruct, how, and when. According to Graves (1996 qtd in Bouabdalla 2008:115), goals are the general statement of the journey end which the students are required to reach. On the other hand, objectives are the paths of this journey to reach the final destination (goals). The following expressions are established by Nunan (1988) in order to devise goals and objectives of a course : (a) students will learn that ... (b) learners will be aware of ... (c) students will enhance... Thereafter, the ESP practitioner conceptualized the content of her lessons to be taught to computer sciences students in the site under study. The designed courses emphasized the technical areas along with linguistic items so that the learners develop their communicative competence, especially writing skill to produce scientific papers in the target situation.

After conceptualization of the content, the researcher selected her teaching materials that best fit the learners' demands. This step helps the accomplishment of

the intended objectives and goals of the ESP course. Teaching materials go hand-in-hand with the learning activities which ensure the smooth occurrence of the teaching/learning operation. Learning activities were ordered in a given sequence to facilitate the students' assimilation of the different course aspects. The final phase is the evaluation process so as to assess the learners' English proficiency, not least writing skill, at the end of the course. By doing so, the researcher could know whether ESP students reach intentional objectives or not. If the destination was achieved, the researcher ended the process and framed the whole process. If the students did not reach the intended level, the assessment operation needs to start over again from the formulation of objectives and goals. The following diagram by White (1988:26) illustrates the followed steps to develop an ESP course for computer sciences students.

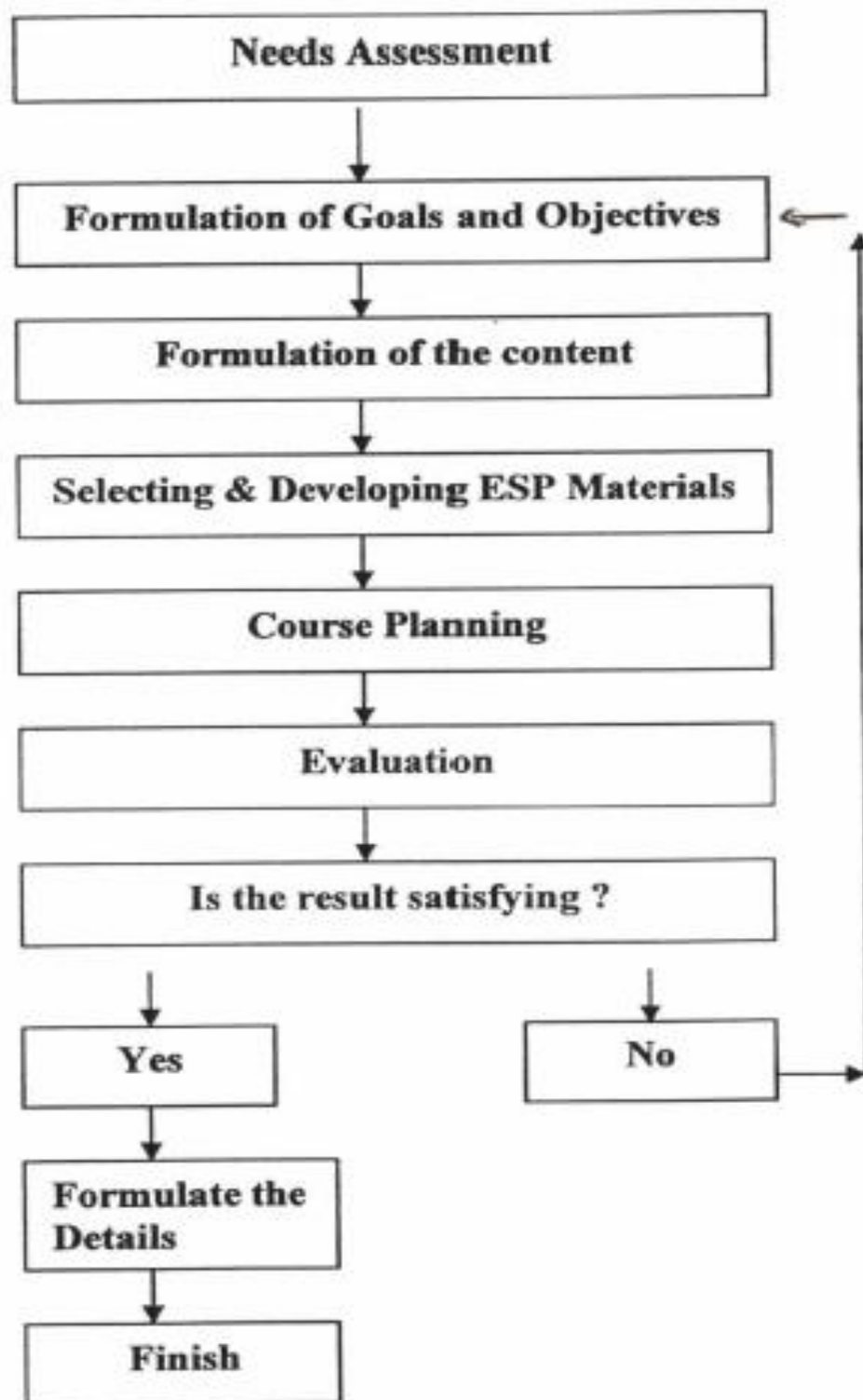


Figure 4.3: Phases of Elaborating an ESP Course (Adopted from White 1988:26)

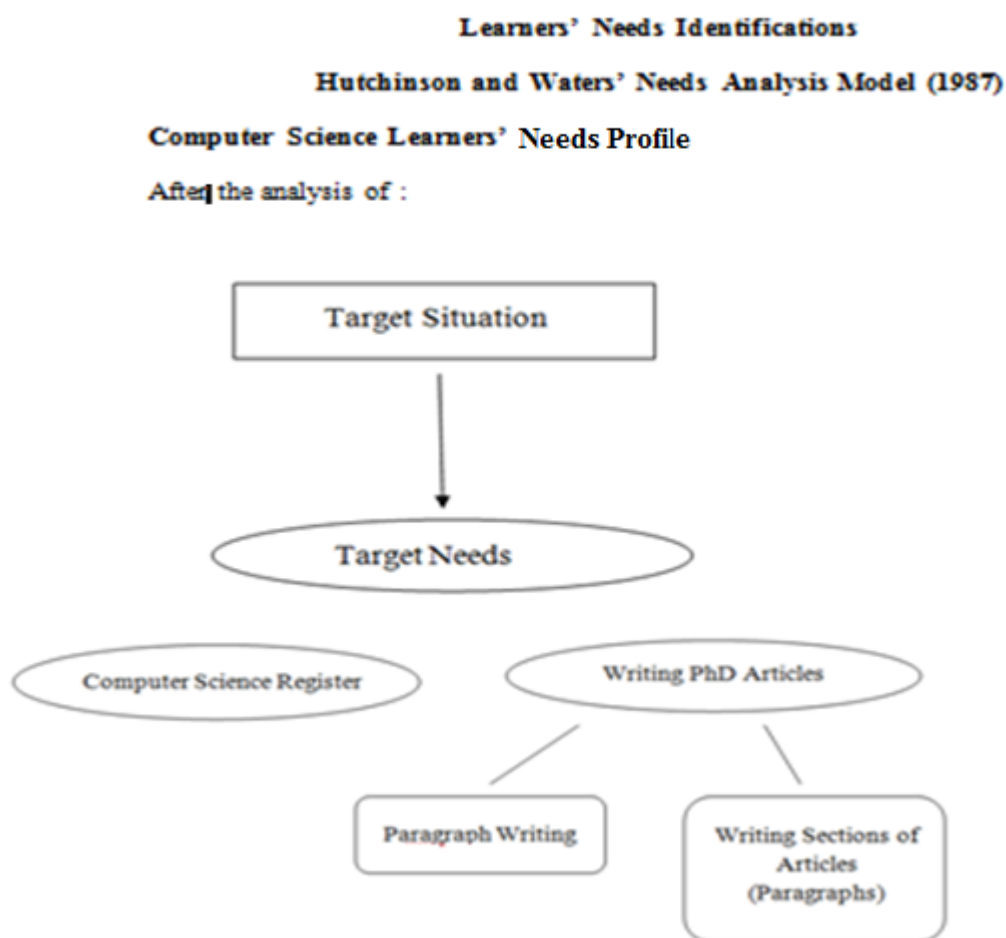
4.4 Computer Science Students' Needs Profile

The researcher after gathering data from the process of needs identification and analysis, she gained insights from the students, ESP teachers, and computer scientists concerning the computer sciences students' language needs. The final results stressed the students' needs to develop communication in educational and occupational situations. The students most needed skill is to write scientific articles in the discipline. Moreover, after analysing the needs of the target situation which is called TSA as defined by Robinson (1991:8) "a needs analysis, which focuses on students' needs at the end of a language course, can be called a TSA (Target Situation Analysis)". Their target needs are represented in the writing of research articles at the doctorate level along with developing the computer sciences terminology.

The next analysis was of Present Situation (PSA) which refers to "PSA (Present Situation Analysis) seeks to establish what the students are like at the start of their language course, investigating their strengths and weaknesses" (Ibid). The researcher highlighted the students' weaknesses and necessities in order to reach the target situation needs. The students' necessities are to develop the writing expression along with the reading skill. Writing skill improvement is the key demand in the target situation so that to meet the educational post-graduated requirements represented in the technical writing of reports and scientific papers. On the other hand, developing the reading skill through studying computer sciences documentations will promote the students' assimilation of computing terminology, its meaning, and spelling. The students' expressed weaknesses in the different aspects of linguistic competence which are lexis, its meaning (computer science terminology), and grammatical structures.

The final analysis was of Learning Situation (LSA) which is "Learning Situation Analysis (LSA) includes subjective, felt and process-oriented needs" (Dudley-Evans & St. John 1998:124). LSA means what do learners want to learn. Furthermore, Dudley-Evans and St. John (1998) view that LSA means effective ways of learning the skills and language. Subsequently, the researcher identified the

learners' wants and the learning paths to achieve the target needs. The learners showed a tendency towards learning the English language, not least the writing skill, with the integration of the four language skills (listening, speaking, reading, and writing). They recommended the use of the content-based syllabus to foster their writing abilities. As far as the assessment is concerned, they suggested classroom activities and homework as formative assessment procedures to practice writing in the classroom. Moreover, they added that their ESP teacher should pay more attention to their interest while selecting the teaching materials, especially read texts. They continued saying that ESP teachers, also, should motivate their students using more relevant content-based activities. Figure 4.4 illustrates the computer science learners' needs profile according to Hutchinson and Waters' (1987) model of needs identification and analysis, taking into account the three types of needs analysis which are: TSA, PSA, and LSA.



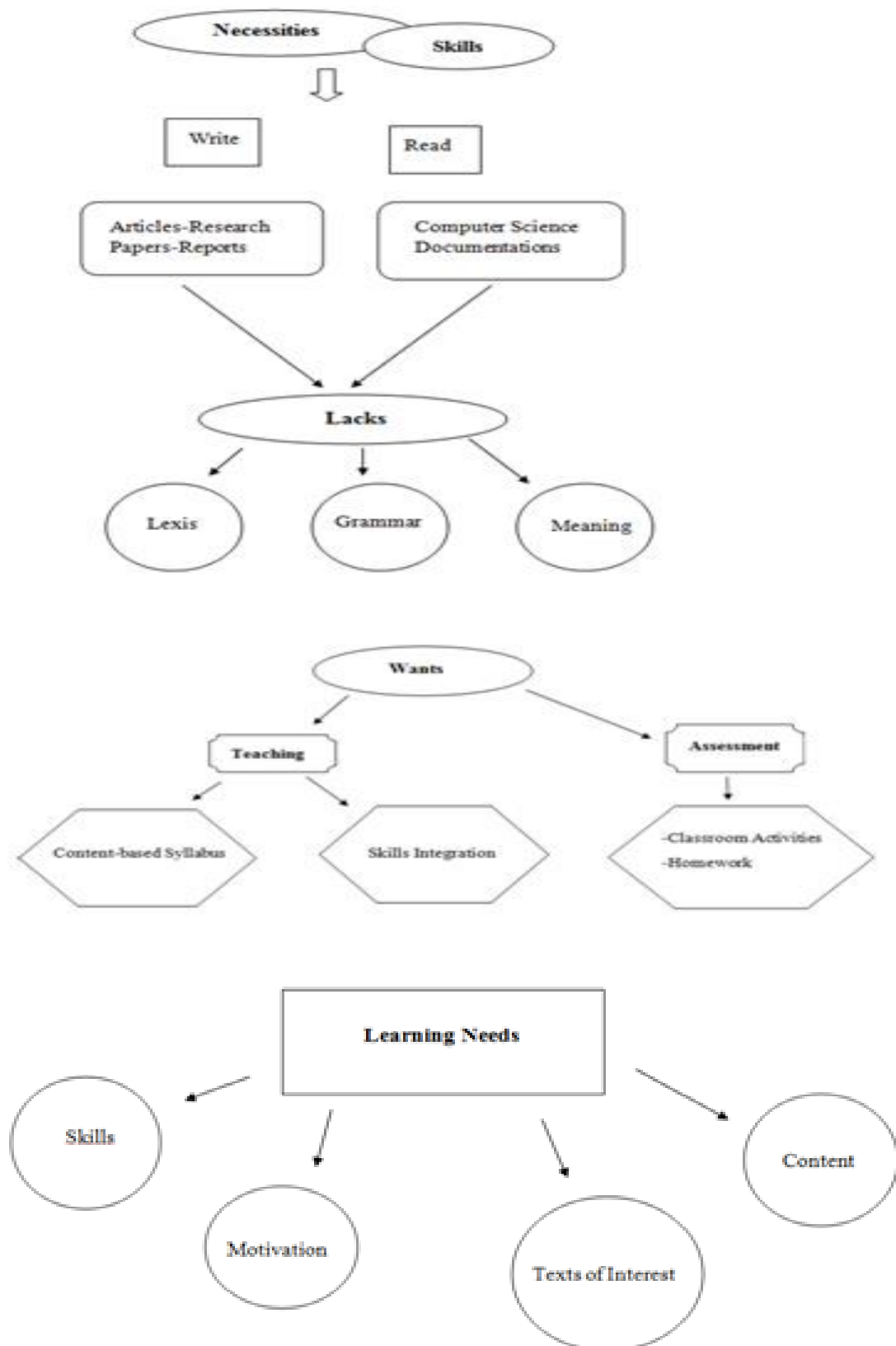


Figure 4.4: Computer Science Students' Needs Profile (Adapted from Hutchinson and Waters' (1987:55-63) Model of Needs Analysis)

As another part of a needs analysis process and evaluation, the operation is the situational analysis. The situational analysis refers to the examination of various factors (for recent study-programme) which consists of social factors, project factors, institutional factors, teachers factors, learners factors, and adoption factors (Richards, 2001:91). This analysis attempts to assess the feasibility and the influence of these factors on the curriculum. As reported by Clark (1987:xii qtd in Richards 2001:90) the situational analysis helps the ELT teachers to understand the foreign language study-programme in any given context. He stated that teachers should study the several factors which have an impact on the curriculum specific shape and the related teaching approaches. The following table (Table 4.1) displays the situational analysis profile. There exist 13 positive situations and 9 negative situations on the findings of the situational profile. The researcher gained such information indirectly from the research instrumentations (students' questionnaire, ESP teachers' interview, computer scientists' interview, and classroom observation) used to gather data about both the students' needs and the teaching/learning situation in the site under investigation.

Social Factors	Positive	a) The Government considers positively English as an international language (The educational national system). b) English is required in the future of all the Algerian students
	Negative	The English language teaching/ learning is a must, however, it is not planned adequately, especially in ESP contexts where students' needs are more specific according to both the educational and professional careers.
Project Factors	Positive	a) The head of the computer sciences department assembled the teaching staff including ESP teachers to address the teaching of English that targets the improvement of the language skills based on the context of computer sciences. b) It is very essential to form a team to redesign the present syllabus.
	Negative	a) There is no teachers' team to elaborate on the syllabus for the courses of instruction. The head of the department gives the ESP teachers the general teaching objectives which are

		established by the Higher Ministry of Education (CANEVAS). Subsequently, each teacher develops his/her study-programme. b) Although the general teaching objectives are common and each teacher based his/her teaching on them, they carry out different syllabi and work individually.
Institutional Factors	Positive	a) The Computer Science Department provides meetings for the English subject for the First Semester of the core common year (Mathematics and Computer Sciences). One hour and a half are served for each meeting. b) The subject specialists are sometimes likely to cooperate with the English language teachers in an informal way for more students' benefits to incorporate updated discipline content within language learning materials.
	Negative	a) Only a few collaborations between the computer scientists and ESP teachers are found. This fact leads to less authentic materials of computer sciences integrated into the target situation of language learning. b) Computer Sciences Master 1 students did not have opportunities to practice English, especially writing, inside the classroom or even outside the English classroom. It is suggested to use some English in subject matter (computer sciences modules) classes.
Teachers Factors	Positive	a) The English language teachers in Computer Sciences Department have good proficiency in the language. b) The two recruited teachers were selected based on their English mastery along with their teaching experience.
	Negative	a) The two teachers work individually to instruct the English language to computer sciences students. b) Although they have good proficiency in the English language, yet they do not apply a suitable teaching method to attract their students' attention. Due to this fact, students seem bored and they do not feel progress in terms of their computing English.
Students Factors	Positive	a) Students are aware of the significant importance of English in their educational and workplace careers.

		b) Some students show a high level of enthusiasm to learn English inside and outside the learning settings. c) Besides, they are more concerned and motivated to learn English which is related to their needs.
	Negative	The computer sciences students are bored to enter ESP classes due to the fact that language teachers use different syllabi, teaching methods, and they do not consider their students' needs when planning the courses of instruction.
Adoption Factors	Positive	a) The curriculum developers in Algeria have a great experience in teaching higher education students. b) They provide an English language programme for first-year common core curriculum (first semester) and during the first year of Master degree (two semesters).
	Negative	The computer sciences Master 1 students feel that the teaching materials in the classroom do not cater to their academic and occupational needs since it is most of the time GE (General English) based lectures.

Table 4.1: Situational Analysis Profile (Adopted from Hermawan 2017:88-89)

Besides, the next table (Table 4.2) summarises the findings of the needs analysis process and the computer sciences students' needs that the proposed syllabus will be based on. It consists of the target situation needs in the computer science department along with the learning needs to reach the required demands. Furthermore, it stresses the language knowledge and skills intended to be developed for educational purposes. This table lays the ground to formulate the objectives and goals of the suggested syllabus. Additionally, it helps to conceptualize the suitable teaching content to the proposed syllabus. The learning activities, also, are sequenced to achieve better learning outcomes.

Target Situation Needs	Language Knowledge and Required Skills (Learning Needs)	Recommended In-Class Activities
Writing Articles, Research Papers, and Reports	- Writing instructions - Linguistic competence improvement: - Grammar instructions - Vocabulary building - Meaning and Context Recognition - Content-based Instructions - Skills Integration - Interactive teaching techniques - Communication Development - Formative Assessment	- Writing tasks - Paragraph writing activities - Writing sections of Articles (Paragraphs, introduction, body paragraph ...) - Grammar exercises - Vocabulary activities (spelling and recognition of computer science context) - Lexis and meaning tasks (word formation, collocations, semantic relationships) - Audio-visual activities (using visual aids) - Listening and speaking tasks - Reading and writing activities - Study skill tasks (problem-solving situations) - Information gap activities - Jigsaw activities - Classroom controlled activities
Reading Computer Science Documentations	- Reading comprehension - Selection of related reading materials (students' interest and needs) - Linguistic competence improvement: - Vocabulary acquisition (meaning, context, and spelling) - Accuracy (grammar practice) - Deducing meaning from	- Reading computer sciences texts (articles, reports, research papers) - Authentic reading comprehension questions - Grammar activities within the reading task (inductive grammar learning) - Vocabulary building activities (semantic relationships, collocations, and word

	text - Guessing specialized words meaning in computer sciences literature - Content-based Reading - Interactive teaching techniques - Communication Development	formation) - Lexis recognition tasks (define a word in the text) - Writing exercises at the end of a reading task (summarize the read texts) - Videos watching and audios hearing to develop listening abilities - Speaking activities - Information gap activities - Jigsaw activities

Table 4.2: Computer Science Students' Needs and Suggested In-Class Activities (Adopted from Benyelles, 2009 qtd in Brahim 2018:151)

4.5 Formulating Goals and Objectives of the Course

As a first step, one needs to make a distinction between the three concepts 'goals', 'objectives' and 'aims'. As the three terms mean the purpose of a curriculum or a course (Richards 2001:120). According to Taba (1962), who considers goals as general and broad statements. However, the aims are more specific and long-termed. Within the same line of thought, Bell (1981: 50) claims that aims are « key objectives ». Equally important, objectives are short-termed or medium-termed related to a given goal which is specific and has relevant objectives. The two concepts goals and objectives including aims are of great value to the overall ESP context. Due to the fact that with no settled aims at the beginning of the ESP journey, ESP practitioners may lose destination directions and they become lost attempting to meet the short term objectives. An analogy established by Hooper (1971: 202) cleverly describes the difference between 'aims' and 'objectives' which states that « The satisfaction of hunger may be an aim. A plate of steak might be the correlated objective ». By the same token, Widdowson (1983: 7) draws a clear cut distinction between EGP (English for General Purposes) and ESP (English for Specific Purposes) with respect to the place of aims in the particular course (Figure 4.5).

ESP	specification of objectives: Equivalent to aims	training: development of restricted competence
EGP	specification of objectives: Leads to aims	education: development of general capacity

Figure 4.5: Widdowson's Distinction between EGP and ESP Concerning Aims (Adopted from Widdowson, 1983: 7)

As reported by Widdowson (1983:6-7), objectives refer to « the pedagogic intentions of a particular course of study to be achieved within the period of that course, which is measurable by some assessment device at the end of the course ». He added that aims mean « the purposes to which learning will be put after the end of the course » (Ibid). On the other hand, goals are a set of guidelines described in the form of targets that ESP practitioners determine to achieve. According to Giesen et al. (2010:1), course goals refer to « a broad statement of intent or desired accomplishment.... Which should be written from the instructor's point of view ». They viewed objectives as «measurable and observable... and should be written from the student's point of view » (Ibid). Moreover, one can say that all goals should be yielded the same significance to make sure the accomplishment of the process succeeds. Reasoning from this fact, objectives join the determined goals and complement them by establishing specific expression of facts. These assertions are trails that paved the way for the ESP practitioner to reach the intended line (Giesen et al. 2010).

In reference to the research problem of the current study, the designed courses emphasize the improvement of the students' linguistic competence to write scientific research papers in a computer science discipline. Moreover, it addresses their writing difficulties so as to ameliorate the overall language mastery, and the writing production particularly. This course of instruction aims at providing computer science Master 1 students with the needed skills and language knowledge in order to communicate efficiently in the educational and occupational situations.

As a result, the process of needs identification and analysis stipulates that computer sciences Master 1 students need to develop their writing skill for post-graduation level, reading computer science documentations, and promoting vocabulary learning. Furthermore, communication in the target language was highly stressed, especially in the written discourse. However, even the remaining language skills are strongly recommended to be integrated into the language course to reach language proficiency. These objectives will facilitate the language knowledge paths and they will enable the learners to use the language in the target situation effectively. The determined course objectives figure out the students' learning outcomes in accordance with the language content. The ESP course for computer sciences students was developed accordingly, to attain the following purposes:

- ♦ To increase students' language skills and communication capacities.
- ♦ To develop mainly writing and reading skills along with vocabulary acquisition.
- ♦ To increase the classroom writing instructions along with writing controlled activities to practice writing in the classroom.
- ♦ To improve students' reading comprehension through the use of relevant reading materials (computer sciences documentation) along with reading tasks (summary tasks, writing tasks) to infer meaning from the read texts and compose pieces of writing.
- ♦ To promote the students' linguistic competence to write technically in the discipline (lexis, its meaning, and grammar)
- ♦ To familiarize the students with basic terminology and specialized computer sciences vocabulary (vocabulary activities: synonyms and antonyms tasks, word formation activities...)
- ♦ To build a strong command of computer sciences English lexis with the convenient context (words tasks: spelling and meaning recognition exercises, collocations tasks...)
- ♦ To strengthen what the learners have already learnt as computing English.

- ♦ To enhance the students' grammatical knowledge in the computer sciences context.
- ♦ To enable the learners to study several language aspects through the integration of the four language skill together with a variation of topics to attract the students' attention and interest.

4.5.1 Setting Goals, Aims, and Objectives for the Proposed Syllabus

Goal: By the end of the courses, students will develop writing skill (correct written discourse in English)

Objective 1 general: By the end of the units, students will recognize the structure of research articles.

Objective 2 specific: By the end of the class, students will be able to compose the structure of paragraphs (specific writing).

Objective 3 more specific: Students will have practiced writing production of research articles sections (introduction, conclusion, references...).

Objective 4 more specific: By the end of the course, the students will have developed a greater understanding of computer science documentations through reading comprehension materials and tasks which are adjusted to their interest and needs to ensure the learning outcomes.

Objective 5 more specific: By the end of the course, students will have become more aware of their computer science terminology in general and be able to identify the specific areas of lexis in which improvement is needed.

Objective 6 more specific: By the end of the course, students will improve their grammatical structures for scientific writing production.

Aims: The aim of the ESP syllabus designed for computer science Master 1 students is to provide learners with real-life situations in which scientific knowledge can be transmitted into the target language. It also aims at equipping the learners with the set of skills they need i.e., writing and reading skills so that they will be

able to read and compose scientific documents related to their discipline particularly and develop their communicative abilities in the English language in general.

By the end of the proposed course, students will be able to communicate, especially in the written form, for academic and occupational purposes. The ESP practitioners can notice students' behaviours of what they have learnt as a result of the learning process. That is to say, the different competencies that the students are supposed to learn at the end of the syllabus or a course. Thus, the syllabus design was based on the learners' lacks to design a remedial course. The course is represented in units made up of several kinds of activities elaborated within diverse themes. Consequently, a content-based syllabus for computer science students was designed to meet their needs. This proposed syllabus implies an understanding of the principles and the basis of the content-based syllabus.

4.6 Content-Based Syllabus

From Krahne's (1987) viewpoint, the content-based syllabus is the teaching of content in the language which is being acquired in. That is to say, the ultimate aim of the course of instruction is to teach some content using the language that the students are also learning. Put differently, the learners use the foreign language to learn other subjects such as Biology, Maths, Science, etc. With the implementation of content-based instruction in ELT teaching, not least the ESP situations, students learn not only the subject matter of their field of specialism but rather they enhance their language use and skills in parallel.

Along the same lines, Richards (2001) claims that content-based instruction is a suitable approach to go along within academic or occupational institutions. Besides, the merits of content-based instructions are that they permit the school learners to learn the subject matter and the language at the same time. Thus, the language is acquired in the context of its use (Krahne, 1987:70). Content-based language teaching/learning courses occur in the ESL/EFL curriculum, especially the ESP study-programmes. It exists in countries where the English language is taught

as a second or foreign language. One typical example is Canada²⁹ where they apply the principle of 'immersion teaching'. The English-speaking parents sent their kids to French-language schools for their primary education (Snow and Brinton, 1988). As defined by Nunan (1989:125) that content-based syllabus refers to what follows :

Many of the courses and textbooks for English for Specific Purposes take as their point of departure content or topics from other subject areas. Another example of content-based courses are the foreign language 'immersion' programmes in which school students learn maths, science, history etc. through the target language. (In a sense, as language is used as a vehicle to talk about other things, all language classes have a content dimension.)

In a similar vein, in the content-based syllabus, students learn what they need and based on their demands. As reported by Richards (2001), who proclaims that one of the content-based instructions principles is to implement CBI (henceforth Content-Based Instruction) perfectly when the ESP practitioners take into account their students' needs for better language learning outcomes. The ESP practitioners are asked to provide teaching materials along with the learning activities in the classroom which better reflect the students' demands of the target situation. That is to say, the learning activities need to enable the language learners to perform what type of discourse they will encounter in real-life use of the language. This view is insisted by Grabe and Stoller (1997:19-20), who assert the content-based instruction rationales:

- a) In content-based classrooms, students are exposed to a considerable amount of language while learning content. This incidental language

²⁹ **Immersion education** experience developed in Montreal, Canada from 1965 onwards, in which the French language was used as the medium for the instruction of monolingual English-speaking children. These programs expanded successfully throughout the rest of Canada and the US in the subsequent decades. The immersion paradigm is one of the most carefully researched language teaching /learning models in primary, secondary, and ESP programs (Cummins, 1978; Genesee, 1987; Johnson and Swain, 1997 qtd in Dueñas, 2004:81)

should be comprehensible, linked to their immediate prior learning and relevant to their needs. (...) In content-based classrooms, teachers and students explore interesting content while students are engaged in appropriate language-dependent activities (...) The resultant language learning activities, therefore, are not artificial or meaningless exercises.

- b) CBI supports contextualized learning; students are taught a useful language that is embedded within relevant discourse contexts rather than as isolated language fragments (...)
- c) CBI allows greater flexibility, adaptability and variation of topics and tasks to be built into the curriculum and activity sequences.
- d) CBI is a student-centered classroom (activities, tasks)

4.6.1 Principles and Characteristics of CBI

As far as the content-based instruction principles are concerned, they traced back to the tenets of communicative language teaching considering the fact that students are interactively engaged when exchanging content. For Richards and Rodgers (2001), CBI depends on two pertinent principles: (a) students learn a second language or a foreign language better when they use the language as a means of learning information, rather than as an end in itself. (b) CBI best reflects students' demands for learning a second language or a foreign language. When a student faces an everyday requirement in a real-life situation in which he/she is asked to use the learnt language, it seems easy for the student to learn the target language as a tool with genuine purpose like applying for a job, ordering food, studying for a degree in a given specialism, and so forth.

In addition to the principles developed by Richards and Rodgers (2001), Brinton (2003) added some supplementary standards for content-based instructions. These additional principles help the language teachers to implement the CBI essence in their classrooms. As a matter of fact, they facilitate the process of putting the content-based syllabus into action. In fact, they are represented as follows:

A- Base instructional decisions on content rather than language criteria:

It is the language teachers responsibility to select and adjust the teaching/learning materials to be used in the classroom. In the CBI implementation, the tenets of content-based syllabus allow the language instructors to choose the content. The pedagogical decisions are determined by the content selection and sequence. In this sense, Brinton (2003:206) declares that CBI « allows the choice of content to dictate or influence the selection and sequencing of language items ».

B- Integrate skills: CBI advises the four language skills integration for the teaching/learning of the English language. For instance, the lesson may start with the listening skill (watching video...) and later on, the lesson will incorporate more language skills in the course performance. This is due to the fact that this approach advocates the teaching of several language skills concurrently just like real-life situations.

C- Involve students actively in all phases of the learning process: In CBI classroom, students control the learning operation. That is to say, the CBI classroom is learner-centred, not teacher-centred. Hence, students are actively engaged in CBI lectures. They construct knowledge while participating in the course of instruction. The peer assessment and peer input are essential in this approach.

D- Choose content for its relevance to students' lives, interests, and/or academic goals: the basis in the CBI is the content. However, the selection of content needs to be relevant to the students' needs, interest, and pedagogical settings. For example, at university most of the time, both EFL study-programmes and ESP curricula match the different subject matters that learners study. Nevertheless, the only discrepancy is that the university students are instructed from several standpoints and with numerous pedagogical objectives.

E- Select authentic texts and tasks: Authenticity is very important in CBI implementation. The teaching/learning materials used in CBI classrooms like texts and tasks come from real-life situations. For Brinton (2003), the use of authentic materials in CBI language classes boost the effective learning of the target

language. Moreover, the use of authentic materials might be more valuable for specific groups of learners with a particular set of needs.

As far as the distinctive characteristics of CBI are concerned, Brinton (2003) develops a set of the general techniques and activities performed in the CBI classroom. As a matter of fact, these activities and techniques are in common with the CLT (Communicative Language Teaching) activities. With regard to this, the activities used in both approaches tend to involve actively the students' participation in the learning experience. These classroom activities and techniques are: Pair and group work, information gap, jigsaw, graphic organizers³⁰, discussion and debate, role-plays³¹, and others. It is evident to assert that these activities and techniques are traced back to the CLT principles. Stryker and Leaver (1997: 3) comment that CBI characteristics « aim at empowering students to become independent learners and continue the learning process beyond the classroom ». These kinds of activities enable learners to carry out their own learning experience in the classroom. The researcher in her study implemented some of the CBI tasks and techniques in the ESP classroom to ensure better learning outcomes concerning the writing skill of computer science students. Moreover, the use of authentic materials in the CBI classrooms allows the ESP students to hold positive attitudes in order to continue their learning operation outside the classroom. The CBI emphasis is to make the students learn what interests them the most using the target language. As a result, students can improve their linguistic competence and broaden their world-knowledge horizons.

³⁰ **Graphic organizers** are « means for organizing and presenting information so that it can be understood, remembered, and applied ». Graphs, realia, tables, maps, flow charts, timelines, and Venn diagrams are used to help students place information in a comprehensible context. They help the students to organize information obtained from written or oral texts, develop reading strategies, increase retention, activate schema as a pre-reading or pre-listening activity and organize ideas during the prewriting stage (Crandall, 1993, as cited in Crandall, 1994).

³¹ **Role play** is an efficient technique to develop interaction in any language class. It increases the students' self-esteem, and improves their collaborative abilities (Richard-Amato, 1996). As for Brown (2001: 183), « Roleplay minimally involves a) giving a role to one or more members of a group, and b) assigning a purpose or objective that participants must accomplish ». The intended task objectives to be accomplished are communicatively driven.

Additionally, while studying authentic reading comprehension materials in CBI classroom, the students are required not only to understand the text information but rather to infer meaning from it and interpret it into writing compositions (summary tasks, writing tasks). As reported by Brinton et al. (1989:2), CBI « provides a forum in which students can respond orally to reading and lecture materials. It recognizes that academic writing follows from listening and reading, and thus requires students to synthesize facts and ideas from multiple sources as preparation for writing. ». For them, the incorporation of four language skills in the CBI classroom promotes the overall learning process of the target language. According to Stoller (2002:2), « in this approach, students are exposed to study skills³² and learn a variety of language skills which prepare them for the range of academic tasks they will encounter ». That is to say, in the CBI approach, ESP students have the opportunity to learn study skills therein they acquire a different set of skills needed for their academic and professional careers.

As for the CBI assessment, it stresses the assessment of both language and content (McKay, 2006). Johnstone (2000) suggests that embeddedness of language and content ensures testing purposes since assessment procedures like tests need to be valid, i.e. the test must represent a kind of task which students have learnt in the classroom. Besides, the language and content assessments assure that both the teaching process and the testing operation go hand-in-hand (Coyle et al. 2010). In the current investigation, the language and the content were incorporated into both in-class activities and the evaluation tests (pretest and posttest) items. The content taught in the proposed syllabus was computer science-based purport as well as in the evaluative tests. The assessment procedures vary from tests, task-based assessment³³ (activities), to homework and projects.

³² **Study Skills:** Study skills are a set of skills which tackle the process of organizing and taking in new information, retaining information, or dealing with assessments. For instance, effective reading; concentration techniques, and efficient note-taking. <http://weblearn.ox.ac.uk/site/colleges/seh/freshinfo/vs/StudySkills2008b.pdf> Archived

³³ **Task-Based Assessment:** Students learn by carrying out specific tasks or projects (Homework) (Rosebery et al. 1992, as cited in Crandall, 1994).

Since CBI promotes language skills improvement through integration, the vocabulary building, the communicative interaction, grammatical structures along with discourse organization so that the teacher role in the CBI classroom is to guide his/her students' learning of the target language. He /she is the one to select and adjust authentic teaching/learning materials for in-class use while creating learner-centred classrooms. In their turn, students in CBI classrooms are asked to become more autonomous in their learning environment not relying much on their teacher. However, they may help each other through the learning experience by using collaborative learning strategies (peer assessment, peer input). This is due to the fact that students in CBI are the source of content and jointly with their teacher to participate in the topics selection and sequencing tasks. Hence, CBI practitioners are asked to use realia in their classrooms to facilitate the teaching/learning process and ensure materials comprehensibility.

4.6.2 CBI Models

After the researcher highlights the CBI definition, principles, and characteristics. In the following lines, a general description of the different models of CBI is represented. The three models of CBI are theme-based language instruction, sheltered content instruction, and adjunct language instruction.

4.6.2.1 Theme-Based Language Instruction

Theme-based language instruction model refers to the teacher's organization of his/her curriculum based on selected topics and themes (Brinton et al, 1989; Brown, 2001). It aims at improving the learners' language proficiency along with content knowledge. With regard to this, Brinton et al (1989 qtd in Richards 2001:158) view what follows:

In the theme-based course, a high level of interest (...) should serve as the organizing principle (...) with the linguistic focus of instruction determined by the students' needs, their proficiency level, and (last but not least) the degree to which the content 'maps' onto the course objectives.

Moreover, within one of these general topics may be divided into more specific topics and teaching possibilities for about one or two weeks. In the introduction of the lesson, there exist different techniques to present the theme of a lecture. For instance, listening to audio, reading, and vocabulary tasks. Within the lesson, language skills are integrated into the teaching/learning operation. (Richards & Rodgers, 2001). These topics and sub-topics taught in the classroom take several weeks of instruction. Hence, these varieties of topics dealt with in the lessons come up with a valuable language and content input (Brinton, 2003). Furthermore, Brinton (2003) admits that the learning atmosphere in theme-based language instruction develops the students' language proficiency. The themes in CBI are a cornerstone element in the syllabus design (Stryker & Leaver, 1997).

4.6.2.2 Sheltered Content Instruction

The next model is called sheltered content instruction. In this model, the main teaching objective is to make the learners understand the content. Indeed, students are still learning the target language which makes the language teachers modify their teaching/learning materials so that to assure maximum comprehensibility (language knowledge, pace, grammar...). Thus, language teachers allocate some time to clarify the language aspects attached to the content of the course (Brinton, 2003). On the other hand, some scholars like Richards and Rodgers (2001) claimed that this model of CBI tends to fully instruct the students in their subject area. That is to say, the teachers are often content specialists. All in all, the classrooms techniques used by language teachers in sheltered content instruction guarantee the students assimilation of the content knowledge (Stryker & Leaver, 1997).

4.6.2.3 Adjunct Language Instruction

The third model is the adjunct language instruction. In this course of instruction, in fact, students receive two adjunct courses. The paired courses are connected. Worth noting at this level of analysis that one of the courses is based on a specific content. However, the other course depends on specific linguistic items of the target language (Richards & Rodgers, 2001). The two provided courses are compatible (Ibid). In this language instruction model, a collaboration between a

language teacher and content-specialist is required. The language teacher's objective is to develop the students' language skills to function effectively in the target situation. In its turn, the content course aims at making the students understand the subject matter. As reported by Stryker and Leaver (1997:4) that « adjunct courses can enhance students' self-confidence with a feeling of using the new language to accomplish real tasks ».

These above-mentioned CBI models have several degrees of focus on content and language. The following figure (Figure 4.6) explains the extent to which each model emphasizes either language instruction or content knowledge. It depends on the instructional setting where decisions are made in terms of the model selection. In recent studies, blended implementation of the different features of each CBI models exists so as to assure the learning outcomes (Snow, 2001). In the present research work, the researcher tends to combine both theme-based language instruction with adjunct language instruction. For the simple reason, that theme-based language instruction develops the students' language proficiency along with content knowledge based on the syllabus organization. The ESP teacher organizes his/her curriculum following a selected topics sequence. The proposed syllabus is divided into several topics and themes to enhance the students' content knowledge. As for the second CBI model selected, the researcher's concern is an attempt to emphasize the topics tackled in content courses by computer scientists. However, the researcher's main goal is to promote the linguistic competence of computer science Master 1 students in order to write scientific research papers in the Doctorate. Yet, it is not the researcher's responsibility to instruct the computer science content knowledge since she is not a content specialist but rather to teach language items and skills.

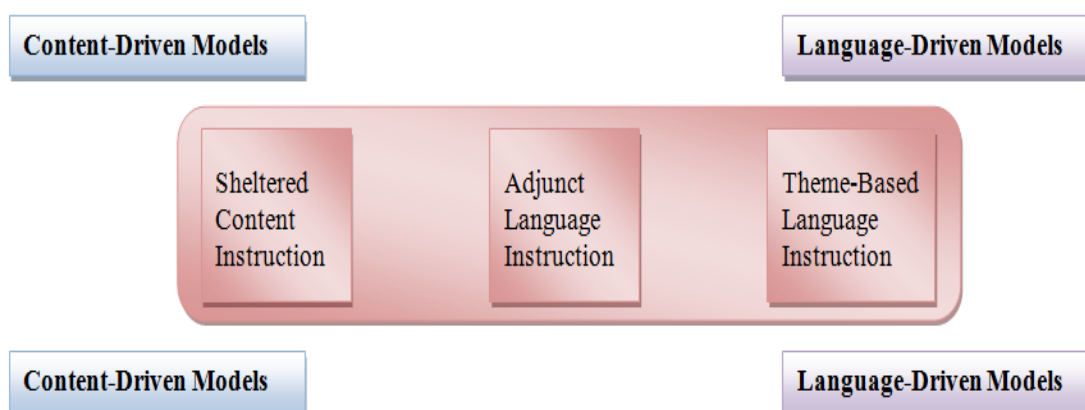


Figure 4.6: CBI Models: Content and Language Integration (Adapted from Snow, 2001 qtd in Villalobos 2013: 75)

4.7 Content Conceptualization

After completing the needs analysis process, setting goals and objectives, the next step is choosing the content of the courses of instruction and determining the teaching materials and learning activities. Consequently, the needs identification and analysis as well as the goals and objectives impart awareness of the course content and address the accurate components which worth being included in the syllabus. As a matter of fact, ESP practitioners are asked to select themes and topics which are most relevant to the students' major and interest. As a result, a careful selection of the syllabus content may have a positive impact on the students' language proficiency, their attitudes, and motivation. Hence, the results of the needs analysis process allow the ESP practitioner to identify the suitable content for the proposed syllabus in order to remedy the situation. After gathering information from the target sample, the findings suggest the design of a content-based syllabus in the site under investigation. As one of the CBI principles, language teachers are required to use a variety of topics so as to make their learners encounter as much vocabulary as possible to foster their specialized knowledge of lexis. Since it is a challenging task for ESP teachers to select a convenient content for their syllabi, Reilly et al. (2014, cited in Xenodohidis, 2006:20) posit some tips on how to conceptualize the course content:

- ♦ Define what the students should be able to do as exactly and realistically as possible, as the result of the instruction;
- ♦ Rank the syllabi in order of importance according to desired outcomes;
- ♦ Evaluate available resources and match them with the syllabi;
- ♦ Designate one or two syllabi as dominant;
- ♦ Review how the combination and integration of syllabi types can be achieved and in what proportion;
- ♦ And translate decisions into actual teaching units.

The content-based syllabus stresses the improvement of language skills, vocabulary building, and communicative interaction through the use of a variety of topics. As far as computer science Master 1 students are concerned, their target needs along with learning needs after the collected data urge the researcher to elaborate a course which reinforces their linguistic competence to write technical research papers. Lexis, its meaning, and grammar were highly emphasized by ESP learners to be developed as the basic components of linguistic competence. The proposed syllabus tried to take all the students' necessities, lacks, and wants into account so that to attain the set objectives of the designed course.

The content tackled in the syllabus was computer science-based purport. The computer science-based content elements were introduced to the computer science learners respecting the simplicity of information, i.e, from simple to more complex pieces of knowledge. Hence, this content organization is an essential part of the ESP course design and performance to achieve better learnability. Subsequently, the researcher used a variety of tasks for the sake of integrating the four language skills, grammar, lexis, meaning which are required for computer science discipline. Moreover, she focused on assessing what had been learnt in the course by using study skills tasks and language activities.

These in-class activities were authentic as this step is one of the CBI tenets with a view to mimic the real-life situations which students encounter in their academic and professional careers. The CBI syllabus consists of a variety of techniques and activities related to language aspects, skills, and a variety of topics.

The researcher tried to adapt these elements in her designed syllabus to meet the computer science students' needs. Thus, these elements are incorporated into units of the suggested syllabus of Master 1 students.

4.8 Developing Teaching Materials and Learning Activities

The next step, after selecting the syllabus content, is materials and activities development for teaching/learning operation. Once again, the instructional materials and learning tasks must match computer science demands. The researcher tried to take into consideration the students' level since every learner has a distinct English level in general and a different writing proficiency in particular. Consequently, the developed teaching/learning materials are expected to meet the current students' level and to remedy their necessities, lacks, and wants for the target situation. Reaching the goals and objectives is another element taking into account while developing the teaching materials and learning activities. However, materials development is also a challenging task for ESP practitioners. The restrictions faced by materials developers as reported by Hutchinson and Waters (1987:106-127) are as follows:

- The teacher may tend to provide suitable materials to fit specific needs of the learners that may not be available.
- Even if those materials are available, they may cost for the teacher.
- The materials may not be written for educational purposes.

For this reason, ESP teachers should make it as easy as possible to reach learnability. That is to say, materials should teach learners how to learn (Allwright, 1982). According to Dudley-Evan and St John (1998), teaching/learning materials need to match the set objectives. Using real-life situations tasks as one of the CBI tenets in the present syllabus increases the learners' motivation to learn. Authentic materials are the specific materials to be used with a particular group of learners in an ESP setting. With regard to this, Anthony (1997 :3) viewed that « one of the main controversies in the field of ESP is how specific materials should be ». Real-world activities are the specificity needed in any ESP context. Besides, the

researcher followed Hutchinson and Waters' model of materials design (1987:109) which comprises of four important components. As the first element, the input that can be any piece of information (video, audio, text...) related to the learners' needs. Content is the second component in which language is considered as a means to transmit the tenor of courses. The next element is language as being the most studied part in the lectures and the one put into practice in meaningful communicative tasks in the classrooms. The final element is about language use in a given task therein students construct knowledge based on the language and content delivered in the input. Figure 4.7 illustrates Hutchinson and Waters' model of material design.

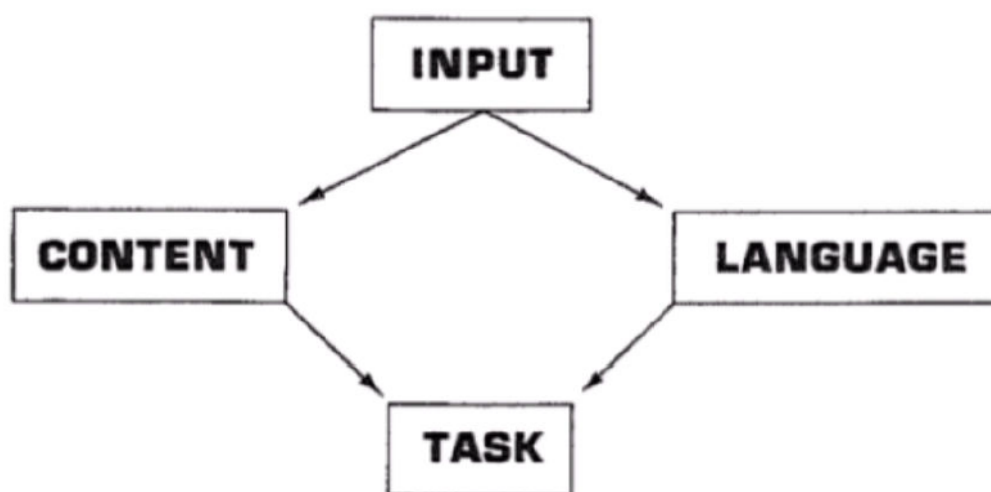


Figure 4.7: Hutchinson and Waters' Materials Design Model (Adopted from Hutchinson and Waters, 1987:109)

The selected materials are a combination of language aspects (lexis, its meaning, and grammar), language skills (listening, reading, speaking, and especially writing), technical writing items, study skills and assessment procedures (projects). The researcher used eighteen (18) content-based textbooks intended for ESP students of computer science in technical colleges and universities all over the world as sources for materials design in the current syllabus courses. The selection of these materials takes into consideration essential factors like students learning

styles, preferences, and motivation in order to maximize learning. In addition to computer science textbooks, articles retrieved from relevant international journals and websites like English 4 IT³⁴ which played a major role when devising learning activities and teaching materials. These sources are as follows:

- ❖ *Oxford for Computer Science* by P. Charles Brown & Norma D. Mullen (1989)
- ❖ *Infotech English for Computer Users: Students' Book* by Santiago Remacha Esteras (2008)
- ❖ *Infotech English for Computer Users: Teacher's Book* by Santiago Remacha Esteras (2008)
- ❖ English 4 IT
- ❖ *Oxford English for Computing Students* by P. Charles Brown & Keith Boeckner (2002)
- ❖ *Oxford English for Computing: Teacher's Guide* by P. Charles Brown & Keith Boeckner (1993)
- ❖ *Oxford English for Information Technology Students* by Eric H. Glendinning & John McEwan (2003, 2nd 2006)
- ❖ *Oxford English for Information Technology Teacher's Guide* by Eric H. Glendinning & John McEwan (2003)
- ❖ *Understanding Information Technology* by Vijay Kumar Pandey & Dilip Kumar Dey (2016)
- ❖ *Basic English for Computing Students* by Eric H. Glendinning & John McEwan (1999)
- ❖ *Basic English for Computing: Teacher's Book* by Eric H. Glendinning & John McEwan (1999)
- ❖ *English for Information Technology 1: Student's book* by Maja, Olejniczak. (2011)

³⁴ **English 4 IT (ENGLISH FOR INFORMATION TECHNOLOGY):** is a self-paced course in technical English for IT students. Think of it as an interactive « online textbook ». The subject matter is suitable for students, professionals, and government career training programs. Topics include software engineering, tech support, technical sales, and most other IT careers. The focus is on real English as it is spoken in an international job environment.
<https://www.english4it.com/>

- ❖ *English for Information Technology 1: Teachers Notes* by Maja, Olejniczak. (2011)
- ❖ *Oxford English for Careers: Technology 2 Teacher's Resources Book* by Alison Pohl (2009)
- ❖ *Oxford English for Careers: Technology 2 Student's Book* by Eric H. Glendinning & Alison Pohl (2009)
- ❖ *Oxford English for Careers: Technology 1 Student's Book* by Eric H. Glendinning (2009)
- ❖ *Oxford English for Careers: Technology 1 Teacher's Resources Book* by David Bonamy (2009)
- ❖ *English for Information Technology 2: Course Book* by David Hill (2012)
- ❖ *English for Information Technology 2: Teachers Notes* by David Hill (2012)

4.8.1 Language Activities

The suggested syllabus stressed language improvement in general and specific writing skill in particular. The target situation needs urging the researcher to develop a syllabus which has a much focus on linguistic aspects along with language skills. Computer science students at the Master 1 degree need to read and write as the necessities for their mainly academic careers and workplace situations. Besides this, they need to listen and speak to develop their communicative language abilities. These skills have to be developed throughout language activities. The elaborated language activities emphasize, in addition to the language four skills integration which again is one of the CBI tenets, the grammar tasks together with lexis exercises to foster the language mastery of ESP learners in the computer science department. The language activities themes varied for more students' engagement in the courses of instructions and their level of difficulty was graded from simple to more complex. The researcher developed the following language activities in her suggested syllabus:

A. Listening Activities

Most of the time in the designed syllabus, listening activities are the introduction of the lesson. It is preceded by a warm-up activity therein the teacher tries to make the learners familiar with the main theme of the course. Students in these kinds of activities may listen to audios, watch videos, or just listen to their teacher reading a text for them so that to extract meaning from. They went through pre-listening activities, while listening, and post-listening tasks to improve their listening abilities. The English teacher tries to introduce more technical English terms in her listening materials to ensure the authenticity of the learning situation. Students may have to discuss the topic they have just listened to or they may have some listening comprehension questions. Listening is part of those real-life situations in which students are asked to act according to their academic or professional purposes.

B. Reading Tasks

With reading relevant texts, students develop their reading abilities throughout being exposed to the specialized language in the computer science documents. Moreover, they retain information from the read text to perform the following tasks. They went through pre-reading activities and post-reading tasks to fooster their reading comprehension skill. In the latter activities, students are asked sometimes to summarize the read texts by note-taking the main ideas from the text after reading in order to compose a piece of writing. The used texts were authentic as the researcher chose her reading materials from the textbooks sources which are content-based and had articles from journals, manuals, and reports that students are likely to encounter in real-life academic or occupational situations. The teacher encouraged her students to read once she introduced the text. Afterwards, the teacher read the texts as the learners listened to the target language, especially words pronunciation. If needed, the teacher may have recourse to use Arabic or French languages for translation purposes of those technical words which are hard to assimilate even with English illustration. Thereafter, the reading comprehension tasks came, for instance, answering the related questions, filling the gaps (tables),

choice of correct statements (True/False activities). Students while the reading phase may take notes, skimming, and scanning the text at hand. The selected texts were based on learners' interest and level.

C. Speaking Activities

It is evident to assert that the speaking skill was integrated with other skills for example while reading, or when students were asked to give their opinions on course parts. The teacher also used some debate tasks in which students were required to discuss a relevant issue in the computer science field defending their views. Students in these kinds of activities may use strategies (or the teacher could instruct some strategies) of how to agree with proponents' point of views and how to argue politely with the opposing standpoints. They, also, were required to use the target language with more specialized vocabularies if possible. Sometimes, they were only asked to express themselves easily to boost their communicative English abilities.

D. Writing Exercises

The overall designed syllabus is reserved for developing writing skill. The writing skill has a section in its own (in the designed syllabus) in which the teacher gave instructions on the writing process in general and the technical writing in particular in each course of instruction. Moreover, a more specialized section was given in the last intended courses to fully develop the scientific article/reports writing. The teacher based her assessment at the end of a course of instruction on writing assessment therein students were asked to practice their writing abilities in class with the teacher's help to put into practice what had been just learnt in addition to some technical vocabularies and grammatical structures.

E. Lexis and Meaning Tasks

Lexis as being the most important part of the target language studied, the researcher addressed some lexis related tasks to improve the students' vocabulary building. Those activities cover basic components of linguistic competence which

are morphology, spelling, and collocations. In addition to this, there exist other vocabulary exercises like identify the meaning of the word, its context, and the semantic relationships linked to this word (synonyms, antonyms, and polysemy). For instance, word formation activities (suffixes, prefixes), and sort words into particular defined sets. Consequently, lexis activities range from simple vocabulary (common English words) to basic computer science terminology. As a result, computer science students can improve their communication at the social and professional levels through using basic and more technical vocabulary comprehension and acquisition. Moreover, students will be familiarized with computing English terminology, developing their ability to infer meaning from context, and spelling words.

F. Grammar Tasks

Grammar is an important language element in any ELT or ESP language syllabus. Subsequently, the proposed syllabus for computer science students provides a room for grammatical practice through reviewing nouns, verbs, adjectives differentiation and formation, important verbs like 'to be' and 'to have' in a scientific context. The courses of instruction also tackled revising tenses, articles, and prepositions. Moreover, it emphasized active and passive voice considering that passive voice is a common feature in scientific writing and a benchmark of technically written discourse (Riley, 1991). The conditional sentences, type 0 and 1 were called upon due to their importance when expressing equations in reporting programming software. Sentence construction was another grammatical aspect taught in the suggested courses of instruction. Grammatical structures were instructed sometimes inductively, and other times deductively depending on the students' readiness and motivation in the lesson.

4.8.2 Teaching Techniques/Activities Organization to Develop Communicative Skills (Based on CBI Tenets)

Those teaching techniques are the basic principles of the CBI in an ELT classroom, not least an ESP situation. They help the teacher organises her teaching/learning environment to ensure the smooth occurrence of the implemented

syllabus. Moreover, they enable computer science students to improve the communicative abilities of the target language in both instructional and workplace settings. The adaptation of activities is not the only requirement in the CS classroom, the teacher is also responsible for grouping his/her students when making activities. By doing so, the language teacher increases the achievement of the tasks. As a matter of fact, different groupings and teaching techniques can be used for the sake of learning improvement in the classroom. For instance, the grouping ways are: pair work and group work. Teaching techniques and activities within the CBI framework are information gap activities, and jigsaw tasks. The choice of the convenient technique or activity depends heavily on the teacher-learners rapport, type of task at hand, teacher's personality (Ur, 1981).

A. Pair Work

According to Ur (1981), pair work, in any ELT class, is the most frequently used as a type of grouping. It is about making two learners (sitting beside each other) perform the same task together. It helps them to learn from each other collaboratively. The ESP teacher may use this grouping when intending to make his/her learners cooperate, sharing knowledge, and reaching the designed goals.

B. Group Work

Another grouping technique is group work. Usually, a group consists of three learners or more. The number is not limited but Philips (1993) insists that if the number of one group is higher than 5 learners, the group will not be productive. The principle behind using group work whether learning inside the classroom or outside the classroom is to make those shy students in the class atmosphere more confident with their peers in the task at hand. As viewed by Ur (1981: 7), who claims that « the chance for students who are shy of saying something in front of the whole class, or to the teacher so that they can be more confident about themselves and their capacities ». The ESP teacher may select a leader for each group of learners to control the groups and facilitate the communication purposes (talk to the leader instead of all group). As stated by Wright et al (1997:5) that « the leader's role is to ensure that the game or activity is properly organized and to act as an intermediary

between learners and the teacher ». In the current syllabus, the researcher used group work for in-class activities as well as for outside classroom activities like homework and projects.

C. Information Gap Activities

According to Hedge (2000:58), information gap activities « involve a transfer of given information from one person to another or from one form to another, or from one place to another generally calling for the decoding or encoding of information from or into language ». That is to say, it negotiates the meaning of the tasks for genuine communication. Moreover, information gap tasks take place between students, generally in pair work. In the pair work, each student is asked to select a connected piece of information, and then to facilitate the finding gap for his/her pair worker. The researcher used information gap activities together with pair work (sometimes group work) to increase the language learning experience. With regard to this, Johnson and Morrow (1981: 62) declare the effectiveness of the information gap activities by saying that it is « one of the most fundamental in the whole area of communicative teaching ». To put it differently, with information gap tasks, students move from structured learning to more communicative atmosphere in which they use the target language as in real-life situations tasks.

D. Jigsaw Tasks

They refer to the needed piece of information so as to be completed by a pair or a group of learners in the tasks at hand (Longman Dictionary of Language Teaching and Applied Linguistics, 2010). Jigsaw is a teaching technique and a learning strategy in which cooperative learning is encouraged to meet the intended goals. Each student in a jigsaw task has an important role that supports the overall assimilation of the end product of the performed task. Jigsaw increases the positive language outcomes as it focuses on the language learners in particular and the language learning in general. That is to say, the educational environment becomes more « interdependent than independent » (Benson, 2003:292). Once again, it is used by the researcher as an important activity inside the language class and outside like projects and homework.

E. Study Skills Activities

In any ESP context, educational and occupational achievements are generally linked to the learners' mastery of certain study skills (researching, note-taking, problem-solving, etc). These skills can help ESP learners perform tasks in both their study or workplace. They may have these skills like note-taking while reading inside the classrooms (in-class activities). On the other hand, they may have problem-solving situations (e.g. to draw programming flowcharts) to deal with outside the classroom setting as in homework individually or in project work as group work. In addition to that, the practice of study skills in the classroom may help the students to exercise the phases of the writing process (planning, drafting, editing, revising, and final version). Furthermore, these activities motivate ESP learners to write in their discipline and receive immediate feedback from peers and the tutor.

The researcher used project works in some of the proposed units so as to increase the use of the study skills and collaborative work among ESP learners. As defined by Haines (1989: 1 qtd in Stoller, 2002), project work is « an approach to learning which complements mainstream methods and which can be used with almost all levels, ages and abilities of students ». That is to say, it is the outside extension of what occurs in the classroom. It focuses on content-learning, real-world situations, and learner centeredness. Students work in groups in a collaborative way not competitively. They share knowledge while integrating the language and the study skills to solve the authentic task within reach. The ultimate goal of project work is the process of working together towards the end product not only the outcome. Hence, project work emphasizes both process and product orientation. Through mirroring real-life situations, students develop cognitive abilities, content building, and autonomy by relying on themselves rather than the teacher. All in all, project work encourages overall language output. That is to say, the personal production of learners in a group way to accomplish a task.

4.8.3 Time on Task

Another aspect which course designers need to take into account when elaborating their teaching/learning materials in the classroom is time. To put it differently, language tutors in their classes are deemed to instruct their course in line with the determined time for each task or course of instruction. In the ESP syllabus implementation, each unit or activity requires a specific period. For the simple reason, that time management is one of the key elements in the teaching/learning process as it helps the learners hold a sense of punctuality in order to accomplish the tasks. The timeline urges the learners to perform the task on the grounds of a deadline. Immediately, the teacher provides his/her students with feedback after correcting the task on the blackboard so as to reinforce students' comprehension of the task within reach. On the other hand, as reported by Richards and Rodgers (2001), the ESP course is sometimes not time-based but rather it is based on the student improvement at the end of the course. Since students in CBI execute real-life tasks, teachers are not limited by time but rather on how well the students can perform the given task. That is to say, learning in CBI is a lifelong situation wherein students must learn with a low pace for long term purposes.

4.9 The Suggested Syllabus for Computer Science Master 1 Students

After analyzing the students' needs, setting goals and objectives, conceptualizing the content, selecting language teaching/learning activities, now the syllabus sections are ready to elaborate the overall framework of courses of instruction. However, another important part of course design as a final phase in the syllabus development process is syllabus organization. The goal of organizing a course of instruction is to boost learning and not only to instruct the foreign language. For this reason, the syllabus content should be sequenced to facilitate the teaching/learning process. Additionally, the syllabus should focus on the graduation degree. That is to say, the content needs to be graduated from what is general in the domain to what is more particular in the field of study. Yet, it could be done sometimes in the other way round which means in the inductive process therein the learning materials are organized from particular to general (Wilkins, 1981). All in

all, learners' needs and pedagogical factors are extrinsic reasons in the teaching/learning operation which determine the syllabus organization.

By taking into consideration all that has been said before, the researcher tries to put forward a syllabus that fits the computer science students' communicative needs in both their academic setting and workplace. The students' basic requirement is to communicate efficiently in the target situation using the specific written discourse. Writing in the discipline is the ultimate aim of the proposed syllabus by improving linguistic competence as a basis for the students' educational and professional demands. This could be accomplished through mainly emphasizing on the computing vocabulary building and grammar acquisition. Consequently, the proposed syllabus stresses language activities that aim at improving the writing skill in the discipline. Lexis and grammar-related tasks therein the computer science students show their language mastery as in the real-life academic and occupational situations.

The proposed syllabus is designed according to the content-based instruction approach and communicative teaching approach. As a matter of fact, the content-based instruction along with the communicative approach can be good servants for the present investigation where the English language of computing is required, time for learning is reinforced, recent content knowledge is needed, effective communication mainly in writing is the crucial students' demands in the target situation. Furthermore, the two approaches give enough room for practice inside the classroom and outside through the wide range of language tasks (Brown, 1995). The researcher emphasized tasks and activities that enable the learners to use the language communicatively. ESP learners may reach communication goals by performing actively in pairs and groups; interact freely with each other without any fear of making errors (Ibid). As a result, the content and communicative approaches help designing an appropriate syllabus which focuses on language teaching communicatively not only the mastery of the grammatical system of the language (Richards, 2001).

According to Yalden (1987), any ESP syllabus should contain what follows: communication requirements, motivation, personal needs, learning features, classroom needs, learners' wants. For the sake of enabling the students to use the language communicatively in the target situation. ESP learners are supposed to acquire the language communicatively using interactive activities like conversations, dialogues with pair or group work (Brumfit and Johnson, 1979). This syllabus delivers recent themes and topics in the Information Technology (IT) and computing domains. Apart from this, the selected themes have a close relationship with the course goals and objectives (Nunan, 1988).

Speaking about the needed vocabulary, it is incorporated within the suggested topics. Learners in the lexis and meaning tasks are supposed to learn new words and infer their meanings from their real contexts. According to Candlin (1987 qtd in Nunan, 1988), the used language tasks should be motivating and stimulating. These tasks should promote the attention to meaning, negotiations, objectives, and goals drawn from communicative needs. Moreover, these tasks provide an opportunity for ESP learners to use appropriately the language by practicing problem-solving tasks, exchange information and ensure the efficiency of useful communication in pairs and groups. Activities, in this case, may include every computing-related interest of the computer science students such as describing graphs, images, diagrams, providing conversations or explanations on a given technical situation, providing missing part of the information in dialogues (specialized vocabulary use), problem-solving solutions, finding the main ideas, summarizing texts, describing tables, discovering specific information about certain problems in real-life situations, computing writing, etc.

Computer science syllabus is a program that tends to satisfy students' needs and improve their language level. Lapidot and Hazzan (2003) say that the main elements that computer science students should learn are: software engineering, database and web programming, computer network and security, distributed systems, machine intelligence, bioinformatics, and computer graphics and multimedia. These themes and topics are integrated into the suggested courses of

instruction. Additionally, the researcher paid a great amount of attention to the instruction time along with the assessment procedures. The preparation intended from this syllabus for future computer science teachers and workers imposed the supply of useful ways of assessment like homework, projects, computing writing tasks, and progress tests at the end of some units. As stated by Denning et al (1989:13) that « the curriculum should be designed to develop an appreciation for learning with graduates will carry with them throughout their careers ».

The computer science students are required to have adequate knowledge of English to prove a big challenge in their future studies and workplaces mainly writing in the discipline. To achieve the emphasized prospects, a sample syllabus has been suggested trying to focus on the most common technical situations that the students may face in their studies and workplaces focusing on special computing vocabulary and grammar practice to write technically. As for Munby (1987), syllabus design is determined as a matter of identifying the content that needs to be instructed and then arranging it into teaching syllabus with adequate learning units. The current syllabus is composed of computer science topics presented in the form of units. It comprises of 5 units (only 3 units are included in this research work) of the up-to-date themes in the IT and computing domains.

The syllabus aim is to improve the writing skills of computer science students through the development of their linguistic competence. The trainer focuses on incorporating much more specialized vocabulary to be acquired through different skills presented in the course. For instance, word formation, collocations, spelling and recognition, meaning, context, and semantic relationships (synonyms, antonyms, and polysemy) are emphasized in a wide range of lexis and meaning activities. Grammar teaching is reinforced as well, as reported by Dudley Evans & St John (1998). The syllabus pays more attention to instruct the several patterns within the grammar section and apply them in specific tasks. For instance, learners are asked to practice grammar forms related to their real-life practice in academic and occupational situations. The Master 1 computer science students' grammar needs have been summarized under some patterns such as the use of appropriate

scientific tenses (present, past, and future), auxiliaries (to be), adjectives, adverbs, prepositions of places, articles, the passive voice, and conditionals as the major attributes of scientific writing. ESP students are trained throughout the whole syllabus to write scientifically in their field of specialism for academic and professional purposes in their careers.

The type of writing required to be achieved by the end of this course of instruction is the articles and reports writing. This syllabus is seen as a preamble to the postgraduation level (Doctorate) in which learners are required to compose scientific papers for international publications in computing journals and magazines. As one instance of the required articles at the Doctorate see Appendix K. The specific writing instructions in the proposed syllabus begin with what is general to more specific and domain-related. That is to say, it starts with defining the writing process and its stages to facilitate the students' composition later on (Unit1). Then, it moves to paragraph writing by highlighting the paragraph structure, organizing information, and contextual reference within a paragraph (Unit2). Next, specific writing content is more distinct; it goes to specialized scientific writing in computing which is concerned with research papers writing like giving examples, explanations, definitions, listing, making the comparison (Unit3), cause and effect writing, and time sequence (Unit4). The last focus in the syllabus is more particular. It addresses the report writing in computing specialism. It concentrates on how to give and follow instructions for technological devices, describing graphs, making predictions for customers, etc (Unit5).

The designer emphasized study skills tasks in the suggested course as the important tenets of CBI characteristics. Students when executing problem-solving situations, they will be prepared for their future real-life contexts. As far as assessment procedures are concerned, the trainer developed a series of writing tasks, problem-solving activities, homework, projects, and progress tests to measure the students' progression in the learning experience of the computing English, especially writing. Worth noting at this level of analysis that obviously, all the topics dealt with, lexis, meaning, grammar, and specific writing instructions are

shaped within the four language skills integration framework. Sometimes within one task two language skills or study skills are combined. That is to say, listening while taking notes, reading and summarizing, grammar tasks inductively through listening, reading, pronunciation activities, and reading to infer meaning from context. Moreover, translation exercises from and into both the target language and the French language (it is the language of computing instructions in all modules) are incorporated within the proposed courses. Collocations tasks sections draw attention to new words, groups of words set, family words, semantic groups...On the other hand, the receptive skills like listening and reading in which there is room for pre, while, and post activities to prepare the learners for the new knowledge accumulation. Writing tasks as evaluation procedures also tend to integrate skills in within like speaking, reading, labelling image, group work, filling the gaps, and problem-solving situations.

With regard to vocabulary building exercises, its scale ranges from General English (synonyms and antonyms tasks) to more technical computer specialist terms. The two ends of the computing terms continuum are required to be acquired in the domain and the computer specialists need to pay attention to both (especially, non-technical specialist language) for the best interest of their customers. In these types of tasks, they are often asked to check up their dictionaries and the Internet to ease the learning process. Tests and projects are the final evaluative tools at the end of each unit to assess the students' overall language progress, especially writing. The trainer may use also in-class activities which are more controlled or group work homework (problem-solving tasks) that are more free and collaborative task to achieve.

As it has been mentioned before, the proposed syllabus is composed of five units (only 3 units are included in this research work). Each unit provides around 6 sessions of work as it contains two lessons (1 to 3 sessions for each, a total of 9 hours). Its topics vary from computer science, information technology, software engineering, networks.... Each of these units contains authentic teaching/learning materials. The five units are as follows: Introduction to Computer Science,

Computer Programming, Distributed Systems, Artificial Intelligence, and IT Security and Safety. Each unit has different themes and topics like a programming language, operating systems, robotics, and data security to be tackled within its language work (linguistic competence), language skills, study skills, specific writing rubric, and evaluations. These sections are the basic components of each lesson in this syllabus. Therefore, table 4.3 shows an in-depth description of the broad essential syllabus content objectives. The details of the syllabus content are provided in the whole document 'English for Computing Purposes' (see Appendix L), which contains only Unit1, Unit2, and Unit 3. Afterwards, an overview of each unit (description, topics and objectives) is provided. Each unit involves sections with a special focus on language skills, language aspects (lexis, grammar, and meaning), and study skills.

Language Skills	Language Work			Study Skills	Specific Writing Rubric	Evaluation
	Lexis	Grammar	Semantics			
Listening	Morphology - Suffixes 1,2 - Prefixes 1,2 - Compound nouns 1,2 - Word building 1,2 - Plurals - Superlatives & Comparatives	-The verb 'To Be' - The Present Simple - Present Simple vs Present Continuous - The Past form - Past Simple and Present Perfect - The Future Forms - Adjectives and Adverbs - Articles and Prepositions - The Passive Voice	Meaning - Definitions - Labelling images tasks - Translation tasks - Reading a text to infer meaning	-Note Taking (listening, reading...) -Summarizing Texts -Problem-Solving Situations	Writing Process 1,2 -Writing process: Stages of Writing - Contextual Reference	Writing Tasks -Homework -Projects -Progress tests
Reading	Collocations -Words Groups -Recording new words - Using Non-Specialist Language: Customer Care	-The Conditional Sentences	Context - Semantic Groups 1, 2 - Choosing Graphics Software		Paragraph Writing 1,2 - Organizing Information - The Structure of a Paragraph	
Speaking	Spelling and Recognition -Spelling activities		Semantic Relationships (Synonyms, Antonyms and Polysemy) - Matching tasks - Determine a word and its synonym or antonym in a text -Using dictionaries and the Internet		Technical Computing Writing (research papers) - Giving Examples, Explanations, and Definitions - Making Comparisons and Listing - Cause and Effect - Time Sequence	
Writing					Report Writing 1, 2 - Making Predictions - Instructions and Graphics	

Table 4.3: The Content Objectives of the Suggested Syllabus for Computer Science Master 1 Students

The proposed syllabus is described in the following way: the first unit is called 'Introduction to Computer Science'. It is designed as an introductory phase so that to get the learners to be familiar with the computing world, Information Technology, and the informational era. It deals with a variety of topics in these broad domains like living in a digital age, Computer Users, Computer Essentials, Technology and Society, Studying Technology, and Branches of Technology. It covers the four language skills in integration. It includes, also, the related lexis and vocabularies of the informational era that we are living in. Moreover, it focuses on the present simple and the verb 'to be' from a grammatical standpoint. Writing process is addressed in the introductory unit to get the learners to know details about the writing operation. Finally, it has a project as an evaluative tool in order to assess the students' proficiency in the taught unit (see Table 4.4). These are the Unit 1 objectives:

Unit 1: Introduction to Computer Science

Lesson 1: Computers in the New Era

Lesson 2: Information Technology

Learning Objectives

In this unit, students will:

- Talk and write about computer applications in everyday life
- Study the basic structures of a computer
- Study Technology in relation to society
- Learn about the present tense, precisely the verb 'To Be'
- Learn to understand and formulate technical words in computing.
- Study the specific writing process
- Deal with problem-solving situations in the digital era

Language Skills	Language Work			Study Skills	Specific Writing Rubric	Evaluation	
	Lexis	Grammar	Semantics				
Listening: -Computer Use -Technology and Work	-Morphology Suffixes 1,2 -Collocations Words Groups Recording New Words -Spelling and Recognition	Present Tense of ‘To Be’	-Meaning -Context -Polysemy -Synonyms -Antonyms	Problem Solving Tasks	Writing Process: Stages of Writing	-Homework Computer System Upgrades and Options	
Reading: - What is a Computer? - Studying Technology							
Speaking: - Computer Use - Future Use of Computers		The Present Simple			Contextual Reference		-Homework Computer Applications for Cars Safety
Writing: - Computer Users - Benefits of Laptops and Tablets PCs: Email Writing							
A project at the End of Unit 1: Problem-Solving Task							

Table 4.4: Unit 1 Content

Secondly, Unit Two is about 'Computer Programming'. It emphasizes a wide range of topics within the programming scope as being the most required theme in the computer science major. The topics dealt with are: Programming, Steps in Programming, Computer Languages, Java Computer Language, C Language. Once again, it uncovers the four language skills incorporated with the programming related lexis and the grammatical structures needed like tenses present simple, present continuous and past form. The computing writing is tackled as well as it focuses on paragraph writing (organizing information and paragraph structure). At last, a project is given to learners to test the students' progress in this unit (see Table 4.5). The learning objectives of Unit 2 are presented below:

Unit 2: Computer Programming

Lesson 1: Programming/Data Programming

Lesson 2: Programming Languages

Learning Objectives

In this unit, students will:

- Listen and read about computer languages

- Ask and answer questions about programming
- Learn more about Java and C computer languages
- Differentiate between present simple, present continuous, and the past
- Study basic concepts in programming
- Learn how to write a correct paragraph in the discipline
- Deal with problem-solving situations in programming

Language Skills	Language Work			Study Skills	Specific Writing Rubric	Evaluation
	Lexis	Grammar	Semantics			
Listening: - Steps in Programming - C Language Reading: - Computer Language - The Java Language Speaking: - Programming Languages - Software Development Writing: - Flowchart Description - Converting to a New System	-Morphology Prefixes 1,2 -Collocations -Spelling and Recognition	Present Simple vs Present Continuous	-Meaning -Context Semantic groups 1,2 -Polysemy -Synonyms -Antonyms	Problem Solving Tasks	Paragraph Writing 1: Organizing Information	-Homework Flowchart
		The -ed form: The Past			Paragraph Writing 2: The Structure of a Paragraph	-Homework Flowchart and Language work: Do <i>until</i> do <i>while</i>

A project at the End of Unit 2: Problem-Solving Task

Table 4.5: Unit 2 Content

Next, the third Unit addresses the 'Distributed Systems'. It is elaborated so as to get the learners to recognize the several topics and lexis related to the operating systems and networks. The themes conveyed in this unit are: Computers Software, Computer Hardware, Working with Computer, Word Processing, The Internet, Websites, and The World Wide Web. The four language skills are integrated into both lessons of the unit. Tenses related to scientific writing are emphasized in this unit; Past Simple, Present Perfect, and Future Forms. Research papers writing is stressed starting from this unit with a focus on 'Giving Examples, Explanations, Definitions' and 'Making Comparisons, Listing' to prepare the students for scientific computing writing at the Doctorate. Last but not least, the evaluation

process is achieved through a progress test at the end of this unit (see Table 4.6).

Unit 3 has the following learning objectives:

Unit 3: Distributed Systems

Lesson 1: Operating System

Lesson 2: Networks

Learning Objectives

In this unit, students will:

- Talk and write about computer distributed systems
- Learn about the function of the operating system
- Learn more about networks particularly the Internet
- Differentiate between past simple, present perfect, and the future
- Study vocabulary related to operating systems and networks
- Learn about the specific writing in the discipline (giving examples, explanations...)
- Deal with problem-solving tasks related to the Internet and operating systems

Language Skills	Language Work			Study Skills	Specific Writing Rubric	Evaluation	
	Lexis	Grammar	Semantics				
Listening: - Windows Vista - Buying a PC	-Morphology Compound nouns 1,2 -Collocations Using Non-Specialist Language: Customer Care -Spelling and Recognition	Past Simple and Present Perfect	-Meaning -Context -Polysemy -Synonyms -Antonyms	Problem Solving Tasks	Giving Examples, Explanations, and Definitions	-Homework GUI: Graphical User Interface	
Reading: - Operating Systems: Hidden Software - Wireless Networking							
Speaking: - Operating Systems - Transmission Modes		The Future Forms			Making Comparisons and Listing		-Homework Choosing ISP: Internet Service Provider
Writing: - Describing an Operating System: Linux - Advantages and Disadvantages of Networks							
Progress Test at the End of Unit 3: Linux							

Table 4.6: Unit 3 Content

Then, the fourth Unit deals with the most recent area in the computing field which is 'Artificial Intelligence'. It directs the most up-to-date topics and vocabulary related to this fast-moving sector in Information Technology. These topics are Graphical User Interfaces, Applications Programs, Machine Translation, Multimedia, Web design, and Virtual Reality. The integration of the four language skills exists in this unit hand-in-hand with the grammatical structures used in technical writing like adverbs, the order of adjectives, articles, and prepositions. Cause and Effect relationship while writing scientifically together with 'Time Sequence' are emphasized in the fourth unit. Finally, it evaluates the unit instructions and students' language mastery through a progress test at the end of this unit (see Table 4.7). The following learning objectives are highlighted in Unit 4:

Unit 3: Artificial Intelligence

Lesson 1: Creative Software

Lesson 2: Robotics

Learning Objectives

In this unit, students will:

- Listen and read about creative software
- Learn about Web design
- Study the features of a graphical user interface, or GUI in particular
- Learn about the main components and applications of multimedia systems
- Differentiate and use adjectives, adverbs, articles, and prepositions
- Be familiar with vocabulary related to artificial intelligence
- Study specific writing in the discipline (cause, effect, and time)
- Write a letter to a newspaper and a blog about multimedia use
- Study problem-solving tasks in multimedia

Language Skills	Language Work			Study Skills	Specific Writing Rubric	Evaluation
	Lexis	Grammar	Semantics			
Listening: - Artificial Intelligence - Multimedia System: Components and system Requirements	-Morphology Word building 1,2 -Collocations -Spelling and Recognition	Order of Adjectives and Adverbs	-Meaning -Context Choosing Graphics Software -Polysemy -Synonyms -Antonyms	Problem Solving Tasks	Cause and Effect	-Homework Writing a Letter
Reading: - Computer Graphics - Virtual Reality						
Speaking: - Computer Graphics Applications - Virtual Reality		Articles and Prepositions of Place				
Writing: - Applications Programs - A Blog Entry about the Use of Multimedia						
Progress Test at the End of Unit 4: User Interfaces						

Table 4.7: Unit 4 Content

Finally, the last unit (5) is devoted to computer users safety and Internet security. Its title is 'Information Technology (IT) Security and Safety'. Unit 5 handles interesting topics concerning security solutions in the IT and computing fields like Communication Systems, Computer Graphics, Databases and Spreadsheets, Transaction Security, Security Solutions, and Internet Security. Language skills are all covered in this unit integratively coupled with related lexis in the Internet safety domain. From a grammatical standpoint, it instructs the remaining features of scientific sentences in a piece of writing which are passive voice and conditional sentences. Speaking of writing composition in computing, the last unit addresses the last stage of the writing training provided in computer science major at Master 1 level, Tlemcen University which is report writing. The two final specific writing lectures are about 'Making Predictions', 'Giving and Following Instructions', and 'Describing Graphics'. As an evaluative procedure, the fifth unit has a project at the end of instructions to measure the students' performance in this unit (see Table 4.8). Finally, students after the implementation of the whole syllabus with its evaluation procedures (formative assessment), they

may have a summative assessment (test, exam, or both) to assess the overall students' language proficiency and the teaching/learning materials along with the teaching approach at the end of the syllabus, not least the improvement of the specific writing skill together with the linguistic competence (lexis, grammar, and meaning) in computer science studies. The fifth Unit has these learning objectives:

Unit 3: IT Security and Safety

Lesson 1: Computing Support

Lesson 2: Data Security

Learning Objectives

In this unit, students will:

- Talk and read about computer security
- Study about computer graphics software
- Study the basic features and applications of spreadsheets and databases
- Learn about the main components of communication systems
- Study how to use conditional sentences in addition to the passive voice
- Recognize and use vocabulary linked to computer security
- Study specific report writing in the discipline (give and follow instructions)
- Write a report about security scanning
- Learn problem-solving situations in computer security solutions

Language Skills	Language Work			Study Skills	Specific Writing Rubric	Evaluation
	Lexis	Grammar	Semantics			
Listening: - Computing Support - Safety Online for Children	-Morphology Plurals Superlatives/Comparatives -Collocations -Spelling and Recognition	The Passive	-Meaning -Context -Polysemy -Synonyms -Antonyms	Problem Solving Tasks	Report Writing 1 : Making Predictions	-Homework Writing Report
Reading: - Computer Graphics - History of Hacking						
Speaking: - Databases - History of Hackers, Computer Crimes, and Superlatives		Conditional Sentences				
Writing: - The Global Positioning System: GPS - Computer Crime						
A project at the End of Unit 5: Problem-Solving Task						

Table 4.8: Unit 5 Content

4.10 Sample Unit : Sample Lesson

In the intervention phase, when the researcher took action (Gall et al. 2003) in the Computer Science Department, TLEMCEN University, she chose the second Unit to be implemented in the Master 1 classroom. Due to the time constraints, she only applied the first lesson of the unit with a combination of some elements of the second lesson. For the simple reason that she could not teach more than 1 to 2 sessions in the Department in addition to the pre-test and post-test sessions. The researcher had 4 sessions as total (authorized³⁵ from the head of the Computer Science Department). She selected the Second Unit entitled ‘Computer Programming’ considering that this area in computing field is of utmost importance in both the academic and professional sides of the major. She combined ‘Programming/Data Programming’ with ‘Programming Languages’ in the lecture

³⁵ The researcher got this authorization due to the fact that the ESP teacher (newly recruited one) had a scientific leave for one month. For this reason, the researcher replaced her in order to carry out her third stage in the intended action research (taking action) for the students’ improvement in writing skill in computing.

delivered from Unit 2 for the students' improvement of their linguistic competence to write in the computer science domain.

In the proposed syllabus, each lesson in each unit was prepared in advance in a 'lesson plan' form to facilitate the teaching/learning process in the classroom. Putting into practice a plan in the classroom, it is the operation undertaken to perform a lesson. A lesson plan is the teacher's guide in his/her classroom to present the lectures. In an ELT or ESP setting, planning a lesson is an essential task to be done before performing the lecture for the success of the teaching/ learning process. According to Lapidot and Hazzan (2003:30), lectures are used to «emphasize curriculum issues, address topics such as learning theory and instructional strategies of science curricula, special aspects of laboratory instruction and other investigative methods, professional ethics in science instruction, and the place of science and education ».

When defining lesson planning, is a written work done by a teacher to provide a general description about the course ways which he/she tends to use during his/her class sessions in order to attain certain objectives. As stated by Farrell (2002:31), lesson plans « are systematic records of a teacher's thoughts about what will be covered during a lesson ». Furthermore, it is about the interactions that may occur during class. The successful lesson preparation takes into consideration the time division, the expected teaching techniques, and the different learning styles. This step (planning a lesson) once achieved in any ELT classroom, not least an ESP class, first of all, it makes sure the teacher is more confident by having the efficient pieces of information needed for his/her class. It provides more organization for the teaching/learning process. Moreover, it activates the students' motivation and satisfaction during the implementation of a lesson plan as it ensures the readiness of the teacher to perform his/her lesson.

Each lesson in this syllabus starts with a brief overview of the topics dealt with, course description, objectives, realia, a glossary of computing terms and abbreviations, and references. As pointed by Bell et al (1998) that the lesson plan introductory outline should contain an essence of the required materials, time limit,

background knowledge, students' age, etc. Additionally, they categorize eight elements in the lesson plan outline. The first section is devoted to the skills developed in the lesson (focus part). Second, it covers the description and outline of the plan (summary element). Afterwards, the section dedicated to the specific lexis used in the lesson (specialized terminology part), and the 'useful aid section' in which the teaching tools are presented to help the instruction operation. Next, the alternatives and extensions to the intended teaching techniques (variation part). The final section is allocated to the course description (lecture part), and an additional section addressed to the further readings for more research (references section).

The researcher when designing her syllabus, she tried to implement some of the introductory components in the lesson plan outline. Moreover, each lesson has three phases in its organization. An introduction phase, firstly, which comprises of warming-up tasks. Body of the lesson, then, that consists of listening, reading, language work (grammar, lexis, semantics), and speaking skill activities. The concluding phase is composed of study skills tasks, specific writing rubric, and the evaluation operation through writing tasks, homework, projects or tests at the end of each unit. As reported by Esteras (1999), a lesson plan includes five phases. First of all, the initial stage is 'the opening' which is the starting point of the lecture. In this stage, the researcher stresses warming –up tasks to review the background knowledge of her students. Thereafter, the 'stimulation' phase in which the teacher is asked to help his/her learners in their learning experience by using useful aids. That is to say, the trainer in her course implementation made her students receive the new piece of knowledge in the computing domain through using audios and videos in the listening tasks, organizational skills (note-taking), discipline-related texts in the reading activities, language work tasks (lexis, grammar, and semantics).

Next, the 'participation' stage therein the teacher used pair work or group work to attain his/her lesson objectives. In other words, in the implemented lesson in action research, the researcher used speaking tasks and study skills tasks to make her learners work in groups for the more collaborative and beneficial learning experience. Then, the 'closure' phase in which the teacher evaluated his/her course

of instruction at the end of the session. In the course implementation performed by the researcher, she tended to evaluate the whole teaching/learning process using a specific writing task at the end of her session. This writing task is to be executed in the classroom for more teacher's control and guidance to ensure learning from the evaluation. The final phase is called 'follow up' phase which is considered as the last activities. They are given to the students in order to make them learn outside the classroom. The researcher gave her students homework and projects to activate both the autonomous and collaborative learning style outside the classroom to improve her students' language proficiency level.

The sample lesson performed focuses on the improvement of the linguistic competence to write technically in the discipline. That is to say, the researcher emphasized the major language aspects needed in computer science studies. It highlights the linguistic outcomes related to morphology, syntax, and semantics. These objectives tackle the content knowledge to be taught, the skills needed to be developed, and the students' attitudes in each lesson. The 'Programming/Data Programming' lesson stresses the following linguistic objectives (Table 4.9):

Linguistic Objectives	
Morphology (Vocabulary)	- Be aware of different prefixes such as - Negative and positive prefixes (un, re-, dis-, ...) - Size prefixes (semi-, mini-, micro-, ...) - Location prefixes (inter-, super-, ex-, ...) - Time and order prefixes (pre-, ante-, fore-, ...) - Number prefixes (mono-, bi-, oct-, multi-, ...) - Be able to form the different nouns, adjectives, and adverbs in English. - Be able to divide a word into its morphemes (prefix, stem, suffix) - Be able to recognize different nouns, adjectives, and adverbs with prefixes

	while reading texts (tasks) - Encourage students to be familiar with the word morphemes³⁶ (components) and play with them (prefixes, stems...) to better their understanding of new words as they read texts (to infer and guess meaning based on prefixes types). - Study collocations and their use in a sentence - Learn how to spell words related to programming (spelling and words recognition)
Syntax (Grammar)	- To learn the 'present simple' and its use - To study the 'present continuous' and its use - To make a distinction between the two present tenses and their uses - Be able to use both tenses 'present simple' and present continuous' properly.
Semantics (Meaning)	- Study computing lexis and its meaning related to data programming in computers. - Be aware of several programming steps and their components using the English - Learn programming terminology meaning when using it in a context (semantic groups). - Be aware of some related synonyms, antonyms, and polysemy of certain computing words (or general English terms as well). - Recognize programming lexis in its context - Recognize the semantic relationships (synonymy, antonymy, and polysemy). - Motivate the students to learn lexis in computing ranging from non-technical to more technical specialist vocabulary.

Table 4.9: Linguistic Objectives of Lesson 1 'Programming/Data Programming', Unit 2

³⁶ A **morpheme** is a meaningful linguistic unit consisting of a word such as dog, or a word element, such as the -s at the end of dogs. Morphemes are the smallest units of meaning in a language.
<https://www.thoughtco.com/what-is-a-morpheme-1691406>

The Sample Lesson

Unit 2: Computer Programming

Programming/Data Programming

Lesson Plan 1

Lesson 1: Programming/Data Programming	1-3 Sessions (90mnts-270 mnts)
Topics/Themes :	
- Programming	
- Steps in Programming	
- Computer Languages	
Course Description: The programming/data programming course focuses on the process of Programming, and the demonstration of steps of programming. Moreover, it emphasizes computer languages in addition to a different set of language communicative skills.	
Course Objectives: By the end of this lesson, students should be able to:	
- Listen to audios	
- Take notes and reply	
- Know and use related words (compilation, error, system,...)	
- Choose correctly between Present Simple and Present Continuous	
- Write a short paragraph	
Realia:	
- Programming related texts	
- Audios and recordings	
- Listening Script	
- Pictures and images	
- Flowcharts ³⁷	
- Data projector	
Glossary of Computing Terms and Abbreviations	
C /si:/ noun U [21,22] a general purpose computer programming language that was originally designed for writing Unix systems programs	cache /kæʃ/ verb [2] to temporarily store frequently-used data in fast memory so that it can be accessed more quickly
C drive /'si: draɪv/ noun C [10] the first hard disk in a personal computer	cache /kæʃ/ noun C [2,13] fast memory used to temporarily store frequently-used data to allow it to be accessed more quickly
C++ /si: plʌs 'plʌs/ noun U [5,21,22] an object-oriented superset of the C programming language commonly used for writing applications programs for the Microsoft Windows operating system	cache coherency /kæʃ kəʊ'hɪərənsi/ noun U [2] a system that ensures that any changes written to main memory are reflected within the cache and vice versa
	cache controller /'kæʃ kən'trɒlə(r)/ noun C [2] the set of electronic logic circuits that control the operation of cache memory

³⁷ **Flowchart** is a graphical representation of a computer program in relation to its sequence of functions. <https://www.edrawsoft.com/flowchart-definition.html>

boot /bu:t/ verb [5] to copy a part of the operating system into memory to allow a computer to start up

bridge /brɪdʒ/ noun C [11,15] a hardware and software combination used to connect the same type of networks or to partition a large network into two smaller ones

class /kla:s/ noun C [21] the term used for a collection of objects in object oriented programming

bot /'bɒt/ noun C [23] from the word robot. A computer program that runs automatically. Bots are often used for searching for information on the Internet

browse /braʊz/ verb [14,16] to move from webpage to webpage using a Web browser program

cleanse /klenz/ verb [3] a term used in data mining meaning to remove duplicate information and erroneous data

References

- Boeckner, K. & Brown, C. (2002). *Oxford English for Computing: Student's Book*. Oxford: Oxford University Press.
- (1993). *Oxford English for Computing: Answer Book*. Oxford: Oxford University Press.
- Esteras, S. R. (2008). *Infotech English for computer users: Student's Book*. Cambridge: Cambridge University Press.
- (2008). *Infotech English for Computer Users: Teacher's Book* (4th ed). Cambridge: Cambridge University Press.
- Glendinning, E.H & McEwan, J. (2003). *Oxford English for information technology: Student's book*. Oxford: Oxford University Press.
- (2006). *Oxford English for Information Technology: Student's Book* (2nd ed). Oxford: Oxford University Press.
- (2003). *Oxford English for Information Technology: Teacher's Book*. Oxford: Oxford University Press.
- (1999). *Basic English for Computing: Student's Book*. Oxford: Oxford University Press.
- (1999). *Basic English for Computing: Teacher's Book*. Oxford: Oxford University Press.
- Maja, O. (2011). *English for Information Technology 1: Student's Book*. England: Pearson Education Limited.
- David, H. (2012). *English for Information Technology 2: Coursebook*. England: Pearson Education Limited.
- Glendinning, E.H. (2009). *Oxford English for Careers: Technology 1 Student's Book*. Oxford: Oxford University Press.
- Glendinning, E.H. & Pohl, A. (2009). *Oxford English for Careers: Technology 2 Student's Book*. Oxford: Oxford University Press.
- Bonamy, D. (2009). *Oxford English for Careers: Technology 1 Teacher's Resources Book*. Oxford : Oxford University Press.

Lesson Plan

Introduction

Warming-Up

Task 1: Work in pairs. The stages in programming (1-7) are listed below. Fill in the gaps with the missing stages (a-d)

1	Analysing and defining the problem to be solved	
2	_____	a Training the users
3	Coding	b Testing
4	_____	c Designing the program
5	_____	d Documenting
6	_____	
7	Obtaining feedback from users	

Task 2: In pairs, discuss what programming is.

Body of the Lesson

Listening (Steps in Programming)

Section 1

Audio script

I'd like to begin the course by giving you a very basic overview of the programming process. We'll then move on to the details. So, to write a program, we normally follow these steps:

A program usually provides a solution to a given problem – for example, how to calculate wages and income tax in a big company. First of all, you have to understand exactly what the problem is and define it clearly. This means you have to decide, in a general way, how to solve the problem. The next step is to design a step-by-step plan of instructions. This usually takes the form of a flowchart, a diagram that uses special symbols to show how the computer works through the program – where it makes decisions, where it starts and ends, where data is input, things like that.

Next, you write the instructions in a programming language, like BASIC, Pascal or C. These computer

instructions are called source code. Then you have to use a compiler, a special program that converts the source code into machine code – the only language understood by the processor, which consists of 1s and 0s.

Once you've written the program, you have to test it with sample data to see if there are any bugs or errors. The process of correcting these errors is called debugging. Computer programmers have to find the origin of each error, write the correct instruction, compile the program again, and test it until it works correctly.

Finally, you have to write program documentation, a detailed description of how to use the program. A great program is not much good unless people know how to use it.

Photocopiable © Cambridge University Press 2008

Task 1: Listen to Andrea Finch, a software developer, talking to a group of students on a training course about how a program is written and check your answers to the previous task (warming-up).

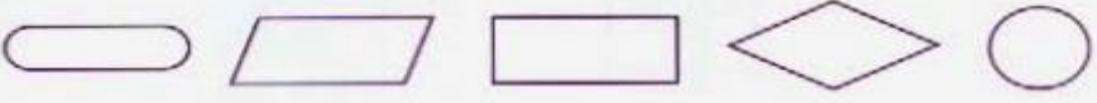
Task 2: Listen again and put these steps into the correct order.

- ☐ Write instructions in a programming language
- ☐ Prepare documentation
- ☒ Understand the problem and plan a solution
- ☐ Make a flowchart of the program
- ☐ Compile the program (to turn it into machine code)
- ☐ Test and debug the program

Section 2 : Flowcharts

Task 1 :

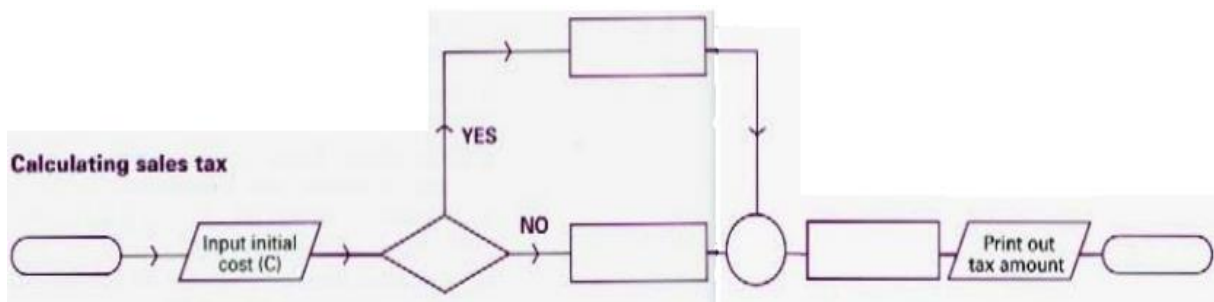
Programmers sometimes use flowcharts when planning a program.
Listen to Part 1 of the recording to identify these symbols used in flowcharts.



a _____ b _____ c _____ d _____ e _____

Task 2 :

Listen to Part 2 of the recording which describes this flowchart for calculating sales tax. As you listen, fill in the gaps where necessary.

**Reading (Computer Language)****Task 1 (Before reading)**

Before reading the text, try to fill in the gaps in these sentences.

- 1 A _____ is a program written in one of the high-level languages.
- 2 A program written in a high-level language must be interpreted into _____ before the computer will read and process it.
- 3 A program designed to perform a specific task is called an _____.
- 4 The _____ or _____ is the program produced when the original program has been converted into machine code.
- 5 A _____ is a program that converts a high-level language into machine code.
- 6 The systems program which fetches required systems routines and links them to the object module is known as the _____.
- 7 The _____ is the program directly executable by the computer.

Now read the text to check your answers.

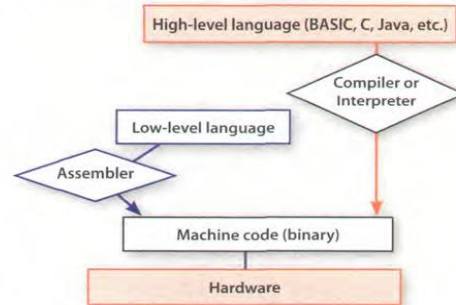
Computer languages

Unfortunately for us, computers can't understand spoken English or any other natural language. The only language they can understand directly is **machine code**, which consists of 1s and 0s (binary code).

Machine code is too difficult to write. For this reason, we use symbolic languages to communicate instructions to the computer. For example, **assembly languages** use abbreviations such as ADD, SUB, MPY to represent instructions. The program is then translated into machine code by a piece of software called an **assembler**. Machine code and assembly languages are called **low-level languages** because they are closer to the hardware. They are quite complex and restricted to particular machines. To make the programs easier to write, and to overcome the problem of intercommunication between different types of computer, software developers designed **high-level languages**, which are closer to the English language. Here are some examples:

- **FORTRAN** was developed by IBM in 1954 and is still used for scientific and engineering applications.
- **COBOL (Common Business Oriented Language)** was developed in 1959 and is mainly used for business applications.
- **BASIC** was developed in the 1960s and was widely used in microcomputer programming because it was easy to learn. **Visual BASIC** is a modern version of the old BASIC language, used to build graphical elements such as buttons and windows in Windows programs.
- **PASCAL** was created in 1971. It is used in universities to teach the fundamentals of programming.
- **C** was developed in the 1980s at AT&T. It is used to write system software, graphics and commercial applications. **C++** is a version of C which incorporates object-oriented programming: the programmer concentrates on particular things (a piece of text, a graphic or a table, etc.) and gives each object functions which can be altered without changing the entire program. For example, to add a new graphics format, the programmer needs to rework just the graphics object. This makes programs easier to modify.
- **Java** was designed by Sun in 1995 to run on the Web. Java applets provide animation and interactive features on web pages. (See Unit 25)

Programs written in high-level languages must be translated into machine code by a **compiler** or an **interpreter**. A compiler translates the source code into **object code** – that is, it converts the entire program into machine code in one go. On the other hand, an interpreter translates the source code line by line as the program is running.



It is important not to confuse **programming languages** with **markup languages**, used to create web documents. Markup languages use instructions, known as **markup tags**, to format and link text files. Some examples include:

- **HTML**, which allows us to describe how information will be displayed on web pages.
- **XML**, which stands for **EXtensible Markup Language**. While HTML uses pre-defined tags, XML enables us to define our own tags; it is not limited by a fixed set of tags.
- **VoiceXML**, which makes Web content accessible via voice and phone. VoiceXML is used to create voice applications that run on the phone, whereas HTML is used to create visual applications (for example, web pages).

```

<xml>
< name> Andrea Finch </name>
< homework> Write a paragraph describing
the C language </homework>
</xml>
  
```

In this XML example we have created two new tags: <name> and <homework>

Task 2 (After reading)

Read the text again and answer these questions

- 1 Do computers understand human languages? Why? / Why not?
- 2 What is the function of an *assembler*?
- 3 Why did software developers design high-level languages?
- 4 Which language is used to teach programming techniques?
- 5 What is the difference between a *compiler* and an *interpreter*?
- 6 Why are HTML and VoiceXML called *markup languages*?

Task 3: Summarize the information of the text on different high-level computer language by completing the table below.

Language	Developed	Function	Characteristic
FORTRAN			
	1959		
		mathematical and scientific purposes	
			combines features of COBOL and ALGOL
BASIC			
		to support Unix operating system	
	1962		

Language Work

Grammar (Present Simple vs Present Continuous)

Language work:

Present simple vs Present continuous

Study these examples of the **Present simple** and the **Present continuous** from the interview with Colin. Which tense does Colin use for:

- 1 routines and procedures?
- 2 things happening now?
- 3 likes and dislikes which are always true?

Present continuous

an example of what we're working on at the moment

there are three main areas we're working in

I'm, at the moment, trying to learn how to use Active Server pages

we're now using a system called Visual Failsafe

Present simple

we speak to the users

we offer solutions

we don't spend a full day programming

we go to the canteen and work it out

I enjoy my work

We use the **Present simple** to describe routines, standard procedures, and things which are always true, such as likes and dislikes.

We use the **Present continuous** for actions going on at the moment.

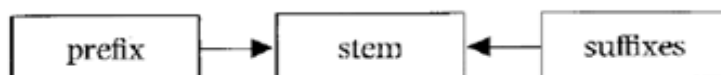
Task 1: Complete these sentences by putting the verb in brackets into the Present Simple or Present Continuous.

- 1 At the moment I _____ (work) on a program for schools.
- 2 We always _____ (ask) the users, not the managers, what they need from the system.
- 3 Paul is a database expert so usually he _____ (do) anything on databases and I _____ (get) the interfaces.
- 4 We _____ (use) Active Server for this project because it's Web-based.
- 5 Commonly we _____ (use) C++ and JavaScript.
- 6 Whenever we _____ (finish) part of a project, we put a copy of the software in a sub-folder as a record.
- 7 I _____ (subscribe) to two magazines.
- 8 Right now I _____ (try) to learn how to use Active Server properly.
- 9 At the moment we _____ (develop) a Web-based project.
- 10 It's a magazine for people who know what they _____ (do).

Lexis

Morphology (Prefixes 1)

When you are reading, you will come across unfamiliar words. It is often possible to guess the meanings of these words if you understand the way words in English are generally formed.



An English word can be divided into three parts: a prefix, a stem, and a suffix. *Pre-* means 'before'. A prefix, therefore, is what comes before the stem. Consider, as an example, the prefix *de-* (meaning 'reduce' or 'reverse') in a word like **demagnetize** (meaning 'to deprive of magnetism'). A suffix is what is attached to the end of the stem. Consider, as an example, the suffix *-er* (meaning 'someone who') in **programmer** ('a person who programs').

Suffixes change the word from one part of speech to another. For example, *-ly* added to the adjective *quick* gives the adverb *quickly*. Prefixes, on the other hand, usually change the meaning of the word. For example, *un-* changes a word to the negative. **Unmagnetizable** means 'not capable of being magnetized'.

Let us now consider some prefixes, their usual meanings, and how they change the meanings of English words.

Prefixes				
Negative and positive	Size	Location	Time and order	Number
un-	semi-	inter-	pre-	mono-
non-	mini-	super-	ante-	bi-
in-	micro-	trans-	fore-	hex-
dis-		ex-	post-	oct-
re-		extra-		multi-
		peri-		

Task 1: Read the following sentences and circles the prefixes. For each word that has a prefix, try to decide what the prefix means. Refer back to the table if you need help.

- 1 Floppy disks are inexpensive and reuseable.
- 2 If a printer malfunctions, you should check the interface cable.
- 3 The multiplexor was not working because someone had disconnected it by mistake.
- 4 Improper installation of the antiglare shield will make it impossible to read what is on the screen.
- 5 After you transfer text using the 'cut and paste' feature, you may have to reformat the text you have inserted.
- 6 You can maximize your chances of finding a job if you are bilingual or even trilingual.
- 7 Peripheral devices can be either input devices (such as keyboards) or output devices (such as printers).
- 8 Your pay rise is retroactive to the beginning of June and you will receive a bi-annual bonus.
- 9 The octal and hexadecimal systems are number systems used as a form of shorthand in reading groups of four binary digits.
- 10 As the results are irregular, the program will have to be rewritten.

Collocations

Verbs and nouns often go together in English to make set phrases, for example **access the Internet**. These word combinations are called **collocations**, and they are very common. Learning collocations instead of individual words can help you remember which verb to use with which noun. Here are some examples from the text on pages 2–3: **perform operations, do research, make calls, send texts, display data, write letters, store information, complete exercises, carry out transactions.**

Task 1: Match the verbs (1-5) with the nouns (a-e) to make collocations.

1 give	a money
2 keep	b a PIN
3 access	c databases
4 enter	d presentations
5 transfer	e records

Task 2: Use the previous collocations to complete these sentences

- 1 Thanks to Wi-Fi, it's now easy to _____ from cafés, hotels, parks and many other public places.
- 2 Online banking lets you _____ between your accounts easily and securely.
- 3 Skype is a technology that enables users to _____ over the Internet for free.
- 4 In many universities, students are encouraged to _____ using PowerPoint in order to make their talks more visually attractive.
- 5 The Web has revolutionized the way people _____ – with sites such as Google and Wikipedia, you can find the information you need in seconds.
- 6 Cookies allow a website to _____ on a user's machine and later retrieve it; when you visit the website again, it remembers your preferences.
- 7 With the latest mobile phones, you can _____ with multimedia attachments – pictures, audio, even video.

Spelling and Recognition

Task 1: Spell the correct word. The first letter is given as a hint.

To temporarily store data in fast memory.

C

It is used to search for information on the Internet.

B

To copy a part of the data so that the computer starts.

B

To move from webpage to webpage.

B

To remove duplicate information.

C

Semantics

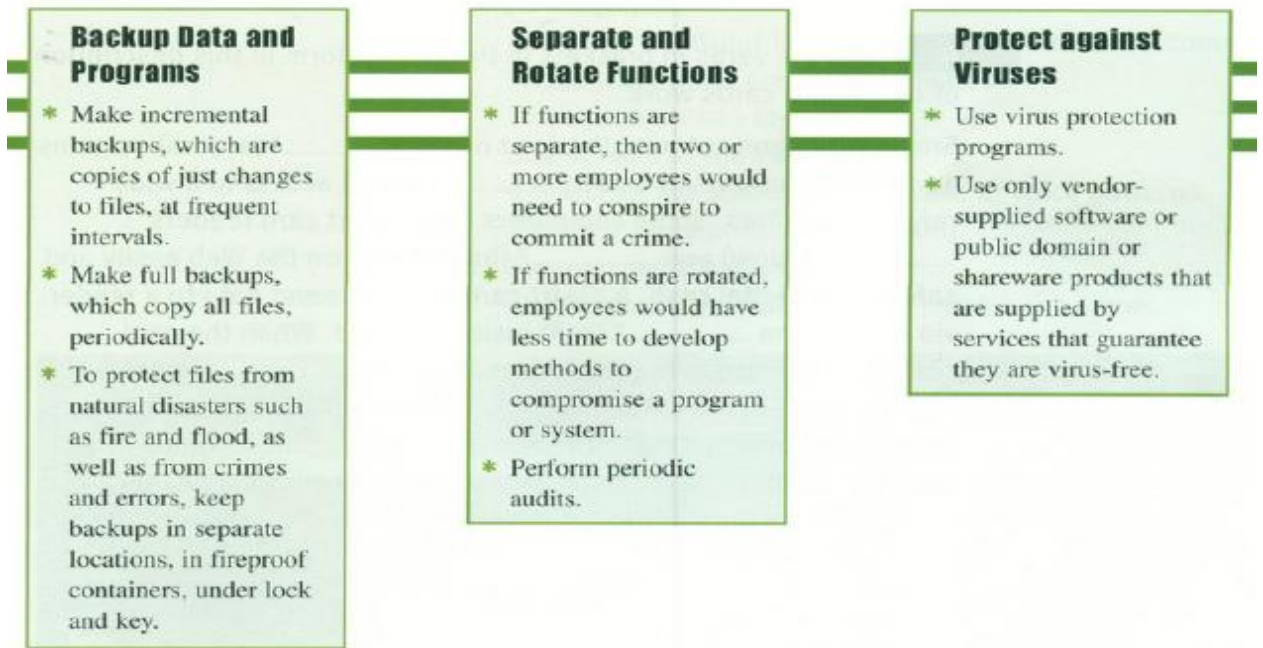
Meaning

Task 1: Match the words (1-5) with the definitions (a-e)

1 flowchart 2 source code 3 compiler 4 machine code 5 debugging	- a Program instructions written in a particular computer language - b The techniques of detecting and correcting errors (or bugs) which may occur in programs - c A diagram representing the successive logical steps of the program - d A special program which converts the source program into machine code – the only language understood by the processor - e The basic instructions understood by computers; it consists of 1s and 0s (binary code)

Task 2: Find words or phrases in the table which mean :

- 1 copies of changes to files made to reduce the risk of loss of data
- 2 software available for a short time on a free trial basis; if adopted a fee is payable to the author
- 3 cannot be disrupted or cut
- 4 put at risk
- 5 deciphered, worked out
- 6 protect data by putting it in a form only authorised users can understand
- 7 a combination of hardware and software to protect networks from unauthorised users
- 8 observe and record systematically
- 9 measuring physical characteristics such as distance between the eyes
- 10 at regular intervals



Context (Semantic Groups)

Task 1: Sort these words about General Purpose Packages into these sets.

Word processing	Databases	Spreadsheets	Graphics
bold	cell	column	draw
formula	justify	paint	field
search	selection rules	record	fill
tab	tool palette	sort	font
		underline	scale
			spelling checker

Polysemy

Task 1: Look the given words up in your dictionary. Give the literal meaning (direct meaning) and the technical meaning (computing meaning) of the following words:

Compile (verb)

.....

(Computing)

Bug (noun, verb)

.....

(Computing)

Interpret (verb)

.....

(Computing)

Loop (noun, verb)

.....

(Computing)

Task 2: Put the previous computing words in full sentences (computing context).**Synonyms****Task 1:** Refer back to the text (computer languages) and find the synonyms.

1. called
2. tremendous
3. ideas
4. react
5. take away

Antonyms**Task 1:** Refer back to the text (computer languages) and find the antonyms.

1. taken away
2. wide
3. limited
4. immovable
5. after

Speaking (Programming Languages)**Task 1:** Read the statements below. Which do you agree with more? Why ?

'Learning a programming language is like learning any natural language. The only difference is that you are communicating with a machine instead of another person.'

'I get annoyed when I hear people comparing programming languages with natural languages. They have almost nothing in common.'

Conclusion**Study Skills****Problem-Solving**

Task 1: Using the information in the reading text (computer languages) and the table in Task 3 (Reading), decide which languages would be best for these users and tasks.

- 1 A language for school pupils learning to program for the first time.
- 2 A language for professional programmers who want their software to run on any type of computer system.
- 3 A language for a student who wants to create her own webpage.
- 4 A language for a website designer who wants to include simple animation in a site.
- 5 A language for computing students who want to write a general purpose program as a college project.

Specific Writing Rubric (Paragraph Writing 1: Organizing Information)

A paragraph is a group of related sentences that develop an idea. In nearly every paragraph, there is one idea that is more important than all the others. The main idea of the paragraph is usually found at the beginning.

Sample paragraph 1:

All computers, whether large or small, have the same basic capabilities. They have circuits for performing arithmetic operations. They all have a way of communicating with the person(s) using them. They also have circuits for making decisions.

In sample paragraph 1, the first sentence, *All computers, whether large or small, have the same basic capabilities.* expresses the main idea of the paragraph.

All main idea sentences have a topic and say something about the topic.

Example:

All computers [topic], whether large or small, have the same basic capabilities [about the topic].

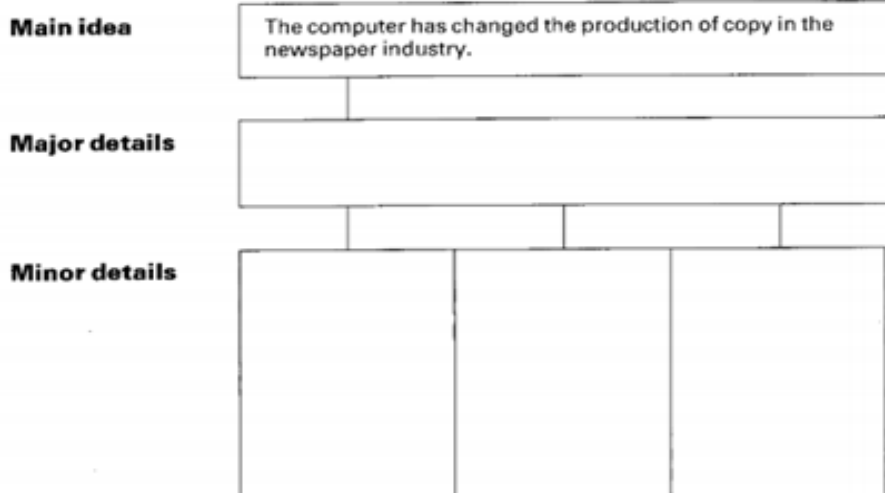
In some of your reading, finding main ideas may serve your needs but, in much of your studying, you need to understand details. It is sometimes more difficult to understand details than main ideas. You will find it helpful if you think of details as growing out of the main idea. In sample paragraph 1, there are three major details growing out of the main idea. These are the major details:

- 1 They have circuits for **performing arithmetic operations**.
- 2 They all have a way of **communicating with the person(s) using them**.
- 3 They also have circuits for **making decisions**.

A major detail often has minor details growing out of it. These minor details tell more about a major detail, just as major details tell more about a main idea. In studying, you often find a paragraph that has many small details that you must understand and remember. Breaking up a paragraph of this kind into its three components: the main idea, major details, and minor details will help you to understand and remember what it is about.

Task 1: Practice finding the main idea, major details, and minor details by completing the block diagram after reading the following paragraph.

The computer has changed the production of copy in the newspaper industry. There are three steps involved in the process: input, correction, and output. First, the computer numbers each story, counts words, and gives a listing of the length of each story. Then, a page is made up, advertisements are placed in, the copy is shifted or deleted, and corrections are made. Finally, the computer hyphenates words, and the result of all this is a newspaper page.

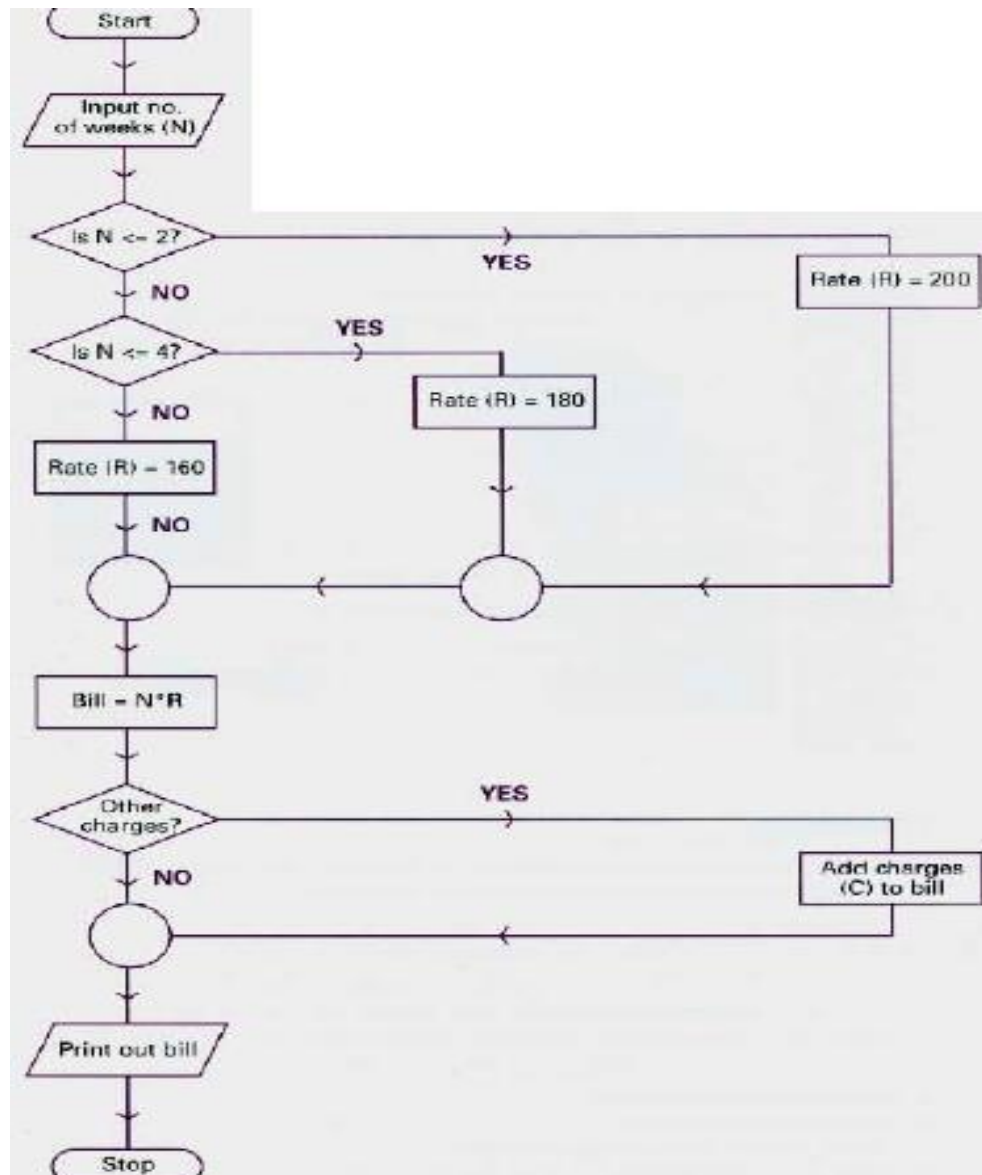


Evaluation

Writing (Flowchart Description)

Task 1: Read this description of the flowchart of Task 2, section 2 (Listening: calculating sales tax). Then write your description of the flowchart below.

A 'Start' symbol indicates where the program begins. When the program has started, the initial cost of the item is input. A decision is then taken on which rate of tax to use. This depends on the initial cost. If the cost is greater than 100, the program follows the 'Yes' route and sets the tax rate at 15%. Otherwise the program follows the 'No' route and sets the tax rate at 10%. The two different paths then come back together at the 'connector' symbol and follow the same route. The actual sales tax is now calculated by multiplying the cost by the tax rate. Finally the amount of tax is printed out and the program stops.



Homework (Flowchart)

Task 1: Draw a flowchart for one of these activities. Then compare your completed flowchart with other students in your group.

- using a payphone
- planning a holiday
- choosing a new computer
- preparing for an important exam

Project (at the End of the Unit)

Problem-Solving Task: Work in pairs or groups. Study these job requirements. Then try to match the requirements to the list of jobs which follows.

- a Visual Basic Developer
- b IT Engineer (Network & Database)
- c Web Developer
- d Network Support
- e E-commerce Consultant
- f Team Leader

1	2	3
- at least 5 years (2 at senior level) in: Unix, SYBASE or ORACLE, NT or Windows 2000, Terminal Server, TCP/IP, Internet. - strong project management (2 years) - willingness to travel abroad	- able to manage, lead and develop a team - knowledge of C, C++, Delphi - experience of object-oriented design within a commercial environment - ability to deliver software projects against agreed schedules and within agreed estimates	- proven track record in the delivery of e-solutions in banking environment - knowledge of Unix, NT and Oracle - willingness to travel internationally
4	5	6
- minimum 4 years lifecycle development experience - demonstrable skills using VB, SQL, RDBMS - able to develop core s/w - excellent communication skills	- minimum of 18 months commercial experience of Web development - knowledge of HTML, Java, ASP - full portfolio of URLs as examples	- experience of NT, Exchange, SQL Server, Monitoring Software, Verta, TCP/IP - solid grasp of networking 2 to 5 years experience in a network environment

4.11 Conclusion

The researcher aim in this chapter is to cater for computer science students' needs and meet the computing domain requirements. The chapter positions the Computer Science Syllabus designed for Master 1 students, including the sample lesson from the teaching Unit. It identifies the syllabus design process moving from defining the students' demands profile, formulating goals and objectives of the syllabus, to the syllabus content conceptualization by selecting the appropriate teaching/learning materials and activities. The proposed syllabus aims at providing the basic elements in the computing field along with the necessary language skills and aspects to equip the students with the valid requirements in their discipline. It tackles a variety of language tasks, study skills, and specific writing instructions. Moreover, it evaluates the students progress using tests, homework, and projects at the end of each unit which are most of the time problem-solving situations to

simulate the real-life situations therein the students are supposed to perform in their educational and occupational settings.

Each lesson in the suggested syllabus starts with a warming-up task followed by a listening activity (pre, while, post-listening tasks) to introduce the topics dealt with in the lesson. Furthermore, the syllabus stresses linguistic competence development (lexis, grammar, semantics) so that to prepare the students to write technical scientific research papers in the field at the postgraduation level. A content-based instruction coupled with communicative teaching structured upon vocabulary building, grammar practice, and the four language skills integration. These elements involved in the courses of instruction are likely to benefit the students' motivation, their learning experience, and to support the students to communicate effectively in the target situation. This syllabus will be delivered in the next chapter to determine its efficiency and its effect on Master 1 computer science students.

Chapter Five

Course Implementation and Evaluation Process

5.1 Introduction

5.2 The Intervention

5.2.1 Course Implementation: Teaching Practice

5.2.1.1 Teaching Method and Techniques: Eclecticism

5.2.2 Evaluation Process

5.2.2.1 ESP Courses Evaluation

5.2.2.2 Characteristics of ESP Course Evaluation

5.2.2.3 English for Computer Science Course Evaluation

5.2.2.4 Assessment, Testing and Evaluation in ESP

5.2.2.4.1 ESP Assessment Defined

5.2.2.4.2 The Aim of Assessment

5.2.2.4.3 Learners' Assessment for the Syllabus Effectiveness

5.2.2.4.4 Assessing the ESP Students' Writing Skill

5.2.2.4.4.1 Scoring of Writing Assessment

5.2.2.4.4.1.1 Holistic Scoring

5.2.2.4.4.2 Analytic Scoring

5.2.2.4.5 Testing in ESP

5.2.2.4.6 Tests Types in ESP

5.2.2.4.6.1 Diagnostic Test

5.2.2.4.6.2 Placement Test

5.2.2.4.6.3 Proficiency Test

5.2.2.4.6.4 Achievement Test

5.2.2.4.7 Attributes of ESP Tests

5.2.2.4.7.1 Validity

5.2.2.4.7.2 Reliability

5.2.2.4.7.3 Authenticity, Practicality and Bias

5.2.3 Evaluation Layout

5.2.4 Evaluation Instruments

5.2.4.1 Pre-Test

5.2.4.2 Post-Test

5.2.4.3 Focused Interview

5.2.5 Reporting and Interpreting the Evaluation Results

5.2.5. 1 Pre-Test Scores Analysis and Interpretation

5.2.5. 2 Post-Test Scores Analysis and Interpretation

5.2.5. 3 Focused Interview Analysis and Interpretation

5.2.6 Discussion of the Main Results

5.2.7 Further Pedagogical Recommendations

5.2.7.1 Collaborative Teaching

5.2.7. 2 ESP Learners as the Genesis of Discipline-Specific Knowledge

5.2.7.3 Writing Skill, Assessment and Timetabling

5.3 Conclusion

5.1 Introduction

In the last chapter, the researcher states the integration of action. That is to say, the implementation of the content-based syllabus coupled with the execution of novel learning and instructional techniques within the classroom to help students improve their learning outcomes, and acquire the language aspects to write technically in a more pleasant mode. Firstly, the investigator depicts the intervention process and its teaching practices. Afterwards, she specifies the evaluation procedures used to gauge the implementation of the courses and to assess the students' performance and development. Consequently, the researcher reports and discusses the evaluation results gathered from testing tools (pre- and post-test) and focused group interview with respect to the third and fourth hypotheses. Lastly, the chapter ends up with further pedagogical suggestions on how to better put into effect the content-based syllabus in an ESP situation.

5.2 The Intervention

In the following lines, the researcher will discuss the two facets of the intervention phase in the action research project proposed which are the course implementation and the evaluation process in order to enhance the students' learning outcomes, especially writing in the site under investigation. After the pre-intervention is accomplished; defining the students' requirements in the discipline after examining their necessities, lacks, and wants in the process of needs identification and analysis. The researcher used a set of research instrumentation to identify the computer science Master 1 students' needs in order to perform effectively in the target situation under the first research design which is a case study. That is to say, in this mixed-research method approach followed in the current investigation, the case study design along with the action research design are combined to depict the real image of the situation in the computer science department.

Moreover, it provides a concrete solution to the difficulties faced by Master 1 students, particularly writing problems. The implication is concerned with the

application of a sample lesson for an instructional period to make a change. In order to do so, the researcher moved to the second research design (action research) in which she interpreted the gathered data (case study) to determine the students' demands profile which paves the way to formulate goals and objectives of the courses of instruction. Then, she put forward her syllabus after conceptualizing the suitable computer science content for the study program. Afterwards, the learning activities and teaching materials selection and sequencing came in as bases so that to build the suggested syllabus into the discipline educational and professional requirements.

Right after the syllabus was ready, the implementation process took place in the Master 1 classroom to test its usefulness. Bluntly put, the researcher relied on different teaching techniques and procedures in the intervention phase, i.e., she opted for an eclectic teaching approach in her course implementation. The research project also evaluated the process of taking action by proposing a set of evaluation procedures like tests and focused interviews to gauge the effectiveness of the suggested course coupled with the students' performance using the target language. Firstly, the evaluation process stressed the testing of the students' pieces of writing to verify whether the intervention improved the students' technical writing capacities or not. Secondly, it addressed the students' attitudes and perspectives towards the study program that they had through using focused interviews to highlight the intervention impact on them. These twofold significant objectives of the evaluation process help get an in-depth examination of the course implemented, the teaching method, learning environment, and learners' achievements at the end of the course performance.

Action research as a type of research design permits the inquirer to make practical modification in the teaching/learning situation under investigation. In this respect, the current action research design brings about chances to take action as being a teacher in the ESP classroom so that to implement the content-based syllabus for computer science students. By the same token, the conducted design allows the ESP practitioner to try out the innovative learning strategies and teaching

techniques with the object of applying the suggested syllabus along with gauging its efficiency on the target students' performance, especially writing scientific composition in the discipline. Furthermore, the course implementation tests the learners' communicative abilities in the English language, the content knowledge, and the enjoyment of the overall learning experience in the classroom through using interactive teaching tools (data show, pictures, and software).

Once in the ESP classroom, the researcher used the instructional method to improve her students' communicative achievement. She applied an eclectic approach coupled with the communicative language teaching to instruct the intended course to computer science learners so that to boost their linguistic abilities. In a related move, the researcher implemented the designed course to confirm or reject the fourth hypothesis which states that 'a developed course based on the students' needs (content-based) in addition to the collaborative atmosphere where the ESP teacher is working hand-in-hand with the subject specialist for more computer science content specification will have a positive impact on the ESP students to be engaged in the scientific writing'. Moreover, the evaluation procedures undertaken after the teaching phase in the action research design help precisely identifying the students' difficulties related to the writing lacks (already determined in the identification and analysis of the needs, i.e, the third hypothesis). Their main difficulties concern the lack of computer science terminology awareness jointly with the necessary grammatical forms to write scientifically in the field. That is to say, computer science students have deficiencies at the level of linguistic competence: morphology, syntax, and semantics.

The set objectives for the intervention process are linked to broaden the students' linguistic knowledge, especially the computer science register, its meaning, and grammar through improving the four language skills comprehension and production. Second, the implemented course helps the students' engagement in various tasks related to the CBI principles like involving learners in problem-solving situations, pair work, and group work. These kinds of activities are meant to improve the students' communication skills, interaction, and cognitive abilities in

addition to language acquisition. The combination of linguistic tasks and communicative activities develops the students' comprehensive language mastery.

In other words, this intervention tried to counter both the target and learning needs of computer science students. The researcher used the students' demands profile as a pedestal to the interference statue. She designed a suitable content-based syllabus accordingly to fit the academic and professional discipline requirements. For the sake of improving the learners' comprehension of the related vocabulary, rules of the language (grammar), integrated language skills by means of a set of interactive tasks inside the classroom, homework, and project works outside the classroom. The end product courses will be evaluated at the final phase of the interference to determine to what extent it responds to the learners' demands. The teaching practices in the ESP classroom during the course application foster the use of some engaging and motivating techniques so that to maintain a positive atmosphere towards learning.

During the core of the interference, i.e. the teaching practice, the researcher instructed weekly lectures and dispensed knowledge of the sample lesson to her students at computer science department paying great attention to the teaching/learning operation in the classroom. While doing that, the teacher-researcher observed the classroom atmosphere to examine the course impact on the students' assimilation. On the grounds of evaluation purposes, she used some research instrumentations to collect data about the students' satisfaction, interaction, and performance during the lessons. The final findings urged the researcher to reflect upon the proposed hypotheses (mainly the third and fourth hypotheses), and to proffer further recommendations concerning the ESP teaching/learning in general, and English language teaching for computer science purposes in particular.

Bluntly put, the evaluation process assessed the course convenience and the instructional practice. As formally discussed in the previous chapter, evaluation as the last station in the methodological research design is also of a pivotal role in the ESP stages of a course design process (Negi, 2016). For Hutchinson and Waters (1987), after the course is implemented, there are two planes: course evaluation and

learners' assessment. The two evaluation types used in this investigation will be further discussed in the next sections.

5.2.1 Course Implementation: Teaching Practice

The researcher while instructing her content-based syllabus in order to tackle the students' linguistic competence to write scientifically for computing purposes, she handled an inquiry on how to teach effectively the content knowledge that she prepared. The exploration of the teaching methods and techniques falls into the researcher's responsibilities for efficient course performance. For the sake of stimulating the students' eagerness to acquire the target language in an interactive learning climate. Speaking about the population, context and timing of the intervention, the researcher in this investigation, as previously mentioned, observed Master 1 computer science classes for eight sessions. Four sessions were devoted to classroom observation procedure in the interest of having a thorough picture of what occurred inside the classroom environment. That is to say, classroom observation portrayed the students' linguistic competence in the intervening period (present situation), and their lacks to accomplish the requirements in their discipline, especially to write technically.

On the other hand, the remaining four sessions were allocated to the intervention phase when the researcher took action in the site under investigation. The four sessions covered the course implementation during the instructional phase. Owing to some administration issues (the researcher was allowed to teach only 4 sessions in the department because she had to make up for the ESP teacher who had a scientific leave for a month). Not only for this reason but, on account of some other hindrances out of the investigator's reach (Hirak Movement), the teacher-researcher instruction time was within a limited time frame (the month before the last at the end of the educational year 2018/2019) that she was forced to accept. The time constraint issue was one of the study limitations.

Therefore, the action research was conducted in the second semester of the academic year 2018/2019. The participants of the intervention were common course Master 1 students from the two specialities RSD and SIC (see Table 2.2).

Furthermore, the researcher's selection of this sample population to carry on her study remains the same for both the case study design and the action research design. The two specialities (SIC and RSD options) have one common session per a week of 'Technical English', and the researcher selected this Master 1 class due to the fact that only a few students from the two branches attend the ESP session. For the simple reason of cases loss (sample attrition) over sessions (Goodrich and Pierre, 1979), the teacher-researcher picked supposedly the large Master 1 class to undertake her action research. Moreover, the researcher's decision to implement the developed course to the same specialities who had already taken part in the questionnaire and classroom observation procedures (case study design) for the sake of having valid and credible pieces of information because they are stated from the same sample frame.

After devising a precise study programme, and defining the teaching practice method (eclecticism) for implementing the sample lesson to computer science Master 1 students, the syllabus time frame for each unit which has two lessons is about 9 hours (1 to 3 sessions for each lesson), a total of 45 hours for the whole study programme, of in 30 sessions of classroom time every week, i.e. for seven months and two weeks (one semester plus 10 sessions). In spite of that the computer science department allowed the researcher to teach only for a month (June 2019: four sessions). The researcher was obliged to adapt the sample lesson (sample unit: computer programming) to the restricted time frame. She combined the two proposed lectures of the unit within one sample lesson so that to gain more time, content benefit, and classroom tasks time.

During the process of the action research, the main intervention context was rooms 108 and 105. That is to say, the majority of the classes were in the two rooms (R108 and R105) reserved for the two specialities (RSD and SIC), i.e. each week in one room (see Table 5.1). Concerning the teaching equipment available, all the Master 1 classes contain two types of boards: black and whiteboards, and the administration provides projectors and other technological accessories if needed. Once in the teaching practices sessions, the number of students in the Master 1

classroom remained approximately the same during the whole teaching/learning operation (20, 25 to 30 students per session).

Timetable 2018/2019		Timetable 2018/2019	
Master 1		Master 1	
Networks and Distributed Systems (RSD)		Information System and Knowledge (SIC)	
Room 108		Room 105	
Wednesday	11 :30- 1 :00	Wednesday	11 :30- 1 :00
	RSD Common Course M1 (SIC/RSD) English		SIC Common Course M1 (SIC/RSD) Technical English

**Table 5.1: Computer Science Master 1 Timetable of English Sessions
(RSD and SIC Specialities)**

In the provided sessions, the tutor followed certain steps so that to complete each lesson. Firstly, at the start of each lecture, the tutor introduced some objectives of the course to raise the students' awareness of the lesson components, content, skills, tasks, and aims. For the simple reason that says informing adults learning (Master 1 students) with course details like its theme, description, and objectives gives learners the big image of their learning, i.e. their need to know how the tiny aspects fit into the overall lesson outlook (Myers et al, 2014). Next, the introductory phase of the lesson, in this part, the tutor launched into the lesson by providing two warming-up tasks so that to prepare the students for the main body part exercises. Afterwards, the body of the lesson, therein the teacher focused on the three language skills activities (listening, reading, and speaking), and language work tasks (linguistic competence: grammar, lexis, and semantics). The first body tasks were listening activities (steps in programming); they consisted of two main sections (programming and flowcharts, sample lesson content, see section 4.10, chapter 4), each section has two listening tasks.

Thereafter, reading comprehension activities (computer language) are composed of three activities: one pre-reading task, and two post-reading activities. The reading activities ranged from filling the gaps to answering reading comprehension questions to summarizing text information by completing a provided table. Later in the lesson, the teacher instructed tenses within language work section (present simple vs present continuous) along with a grammatical practice. In lexis section, she taught prefixes rules in English, i.e. how to form a word in the language using different types of prefixes (time, number, location morphology) again with a room for practising what had been learnt. Then, collocations, which are nouns and verbs go together in English (in computing context) to make set phrases, for instance 'access the Internet'. In this part, two tasks were provided in order to combine correct words so that to complete a sentence.

Next, students were trained on how to write particular computer science terms from computing glossary given to the students at the beginning of each session (spelling and recognition tasks). In the semantics part, seven activities under five rubrics (meaning, context, polysemy, synonymy, and antonymy) were practised so as to reinforce the semantic ability of the students. That is to say, words meaning tasks were meant to make the students recognise the computer science terms meaning in a context and the different semantic relationships (polysemy, synonymy, and antonymy). The used activities were: matching words to their definitions, sorting technical words into particular sets (semantic groups), and using dictionaries to give two meanings of the words (literal and technical meanings), etc. The final skill dealt with in the body of lesson is speaking. Its activity allowed the students to interact with each other discussing the topics at hand (programming languages) or arguing about their point of views.

The concluding part of each proposed lesson contained three sections: study skills activities, specific writing tasks, and an evaluation section. The evaluation exercises ranged from writing tasks, homework, projects or tests at the end of each unit. Study skills activity was under the 'problem-solving situation rubric'. It tested the students' organisational skills so that to handle a difficult situation and calmly

find solutions to this challenging situation. A specific writing rubric was the main target in the whole lesson sequence. It trained the learners how to write gradually (from organising information to paragraph writing) and correctly in their field of specialism (computing). The evaluation section comprised of three extra tasks under three rubrics which were as follows: writing task (flowchart description) to be performed in the classroom under the teacher guide and supervision. However, the homework (flowchart) and project (a problem-solving task at the end of the unit) were to be done outside the classroom, in which the students can work together to construct knowledge and achieve the attended tasks objectives.

The tutor made sure during her course performance to maintain a learner-centred approach as it should be in every ESP situation. In doing so, she tried to establish a student-teacher interaction along with student-student interaction in the sessions. The teacher-researcher involved her learners in the teaching/learning operation as much as possible by asking questions and raising discussions linked to the lesson themes. Moreover, practice time was arranged from easy tasks to more challenging activities. In addition to this, during certain types of tasks, the tutor engaged students in the lesson-related knowledge construction through organising them in pair work or group work so as to guarantee the assimilation of each task elements to identify solutions. Concerning the extra exercises provided at the end of each lesson, they assessed the students' understanding of what had been learnt and gave room for more in-class practice coupled with activities extended to outside the classroom.

In ESP context, linguists have shifted focus from only instructing rules of the English language to paying more attention towards the way language occurs in real-world communication (Widdowson, 1978). For this reason, the tutor's teaching practice emphasized the use of communicative tasks. Due to the fact that ESP teaching method is recognized with using specific activities and tasks related to the students' domain (Robinson, 1991). With regard to the teaching method, Strevens (1980:120) declared that communicative and functional teaching methods best fit the ESP situation. On the other hand, he went on to say that actually, an eclectic

method of teaching is the most relevant to ESP. He admitted that ESP does not emphasize the use of only one given method, techniques, activities or materials, but rather ESP is about 'the freedom to innovate' as one of ESP attributes (Strevens, 1980:120).

Another ESP aspect is the 'learner-centred' approach (Hutchinson & Waters, 1987; Nunan, 1989; Dudley Evans & St John, 1998). In this teaching approach, learners are the centre of the teaching/learning process, i.e. they are self-responsible for their learning while they are participating in the course of instruction. The learners in 'the learner-centred approach' seem to be more involved in the lesson, more active and stimulated to discuss lesson-related topics as acquiring new knowledge efficiently. Consequently, the researcher adopted a learner-centred approach in the classes as much as possible since most of the time students were reluctant to participate in the lesson so the tutor automatically shifted to the traditional approach of instruction (teacher-centred approach). English for Computer Science Purposes class needs to best reflect the students' requirements in order to build a sound language proficiency that mirrors the effective learning context. For this reason, the researcher adopted a content-based approach to design the suitable syllabus for these classes (Brinton et al, 1989).

The ESP teaching environment must also provide an engaging atmosphere for learners to be instructed. That is to say, students have plenty of opportunities to practice the target language in real-world situations like arguing, discussing, and commenting in order to gain a linguistic competence along with communicative competence. Specific vocabulary teaching is another facet of ESP teaching, in which ESP teachers are asked to highlight the most relevant computing terms needed for the students' educational and occupational purposes. Four language skills integration together with linked tasks are also important elements in every ESP lesson in the classroom like listening to audios, reading texts, and discussing a topic, etc.

ESP teachers or ESP practitioners as named by Robinson (1991; Swales, 1980; Dudley Evans, 1998) are responsible for a multitask function. That is to say, they

have to be tutors, facilitators, classroom managers, and monitors while administering the ESP course to their students. In addition to this, they need to be supple, i.e. they ought to deal with several situations and various kinds of learners. ESP practitioners have to be eclectic in their methods of teaching (flexible in the used teaching techniques) since eclecticism gives plenty of techniques for the teachers that best fit within the particular situation of ESP context (Miliani, 1994). ESP teaching, is like other English language teaching, aims at reaching the best language teaching/learning outcomes. Both teachers and learners in this process try to attain effective feedback from the evaluation procedures conducted at the end of each lesson.

However, as regards to the crucial teaching constraints faced by the tutor while instructing the proposed syllabus were the heterogeneousness of the two Master 1 specialities, i.e. mixed-ability classroom (under, normal and overachievers³⁸). Moreover, the lack of some audio materials like loudspeakers for instructing the listening skill, aural comprehension³⁹, and audio interviews activities. Even then in one session, there was no electricity, for this reason, the tutor adjusted her lesson in an appropriate way to the particular circumstances. On another note, the sitting positioning was regular not in the form of a U-shape which better suits the language classes due to the time constraint (limited time of instructional session). Nevertheless, the tutor proposed a variety of content-based activities in the instruction course time, novel teaching techniques according to the students different learning styles and strategies so as to energize the teaching/learning environment, derive maximum teaching efficiency and in-class tasks.

5.2.1.1 Teaching Method and Techniques: Eclecticism

The teaching process carried out during the language classroom respected an eclectic approach to instruct the courses. The adopted teaching approach tried to

³⁸ **Overachieving** means performing far better than what is expected. In academics, it is defined as one's academic performance which is way higher than one's performance in tests. On the other hand, an underachiever is someone whose performance is far below his potential.

<https://self-esteem.weebly.com/underachiever-and-overachiever.html>

³⁹ **Aural Comprehension** is concerned with the gradual improvement of the students' ability to understand a language in its spoken form (Bodier, 1945:282)

<https://doi.org/10.1111/j.1540-4781.1945.tb00274.x>

meet the students' several educational and professional demands, their different learning styles, and the multiple content-based syllabus objectives all at once. Eclecticism was the teaching methodology chosen by choice for the courses of instruction. The tutor opted for different teaching techniques from eclecticism to facilitate the students' understanding of the linguistic elements presented in each lesson. Communication-directed teaching was reinforced as much as possible in the classroom time or even outside (communicating with students outside the classroom). In her teaching practices, communication represented the cornerstone of the learning operation, and the gist of the provided pedagogical activities (Hedge, 2000). The researcher followed the traditional PPP (Presentation, Practice, Production) teaching approach whilst integrating communication to her instructional tasks. As declared by Herazo et al, (2009) that both the PPP approach coupled with the communicative teaching pave the way for better language learning outcomes. English for Computing Purposes strongly favours the teaching methodology that improves the students' linguistic competence of the target language and which is based on the learners' cognitive abilities (how their brains process linguistic new knowledge) (Hedge, 2000).

It is evident to assert that in the ESP teaching situations, scholars like Dudley Evans and St John (1998) and Prabhu (1990) declared that there is neither a magical teaching method nor teaching technique which fit best in the demanding context like ESP. Owing to this, several ESP practitioners opt for a combination of teaching techniques, i.e, what suits most their students' needs, students' learning styles, content-knowledge, and teaching/learning objectives. As a result, the researcher in this investigation selected from the open buffet of teaching methods and techniques to implement the proposed courses. After the needs analysis process, the target needs together with learning needs necessitate linguistic competence development. For this reason, the teacher-researcher relied on eclecticism as the main teaching method to improve the computing linguistic requirements of the students. In addition to some content-based instruction techniques with communicative teaching techniques that boost the students' reading and vocabulary knowledge to write technically in the discipline.

According to researchers such as Hutchinson (1988), Rao (2001), Widdowson (1983), Stern (1992), and Javid (2010), ESP practitioners need to select from the set of teaching approaches available in the ELT industry so that to administer an efficient language course. ESP practitioners are forced to opt for more than one teaching method due to the new challenges faced in ESP classrooms. This selection from a host of teaching methodologies is named 'eclectic approach'. 'Eclectic Approach' or 'Eclecticism' means « moving away from following one specific methodology and selecting techniques and activities from a range of language teaching approaches and methodologies »⁴⁰. Moreover, this approach appeals that ESP practitioner «decides what methodology or approach to use depending on the aims of the lesson and the learners in the group » (Rao, 2001:01). As stated by Widdowson (1983: 130), the suitable teaching approach has to be « at the very heart of the operation with course design at servicing its requirements » and it should stress the students' particular demands.

ESP lectures are said to be run collaboratively by language teachers and subject specialists 'ESP requires methodologies that are specialized or unique' to the special ESP situation (John and Dudley-Evans, 1991: 305). In computing purposes classrooms, after the analysis of target situation needs and learning situation demands, the ESP environment required a basic foundation of an appropriate syllabus. Furthermore, the researcher determined both the 'what ' and 'how' of the proposed syllabus that best remedy the existing situation. In order to address the specific learners' needs, the researcher needed to select the teaching method and techniques. As declared by Xiao-yun et al. (2007: 1) that « eclecticism in language teaching holds that although no single language teaching method manages to meet all the teaching and learning needs, many methods have valuable insights that should be drawn on ». That is to say, ESP practitioners are required to understand that no sole teaching methodology addresses the various precise learners' needs and the teaching climate. However, ESP teachers need to sort out

⁴⁰ https://en.wikipedia.org/wiki/Eclectic_approach

suitable elements of the teaching approaches body by applying an eclectic approach to deliver ESP courses effectively (Kumaravadivelu, 2006).

ESP learners, on the other hand, are asked to use the English language in different target situations such as educational, occupational, social, cultural settings. In this respect, Johns and Price-Machado (2002:43) commented that ESP learners use the target language in predefined contexts which require that « all language teaching should be tailored to the specific learning and language use needs of identified groups of students ». Consequently, ESP teaching methodology components ought to provide the necessary needs that the ESP situation requires and to cater for the learners' individual demands (Hutchinson, 1988). Additionally, the tutor relied on some related teaching techniques like information gap, jigsaw, tasks, content correction, and information transfer as being defined like teaching principles of study skills, problem-solving, and task-based instruction of communication teaching (Johnson, 1982). Therefore, a diversity of teaching techniques and activities caters best for the diverse learners' specific requirements. Several types of research in the ESP area suggested insights into the fact that ESP tasks and techniques are various such as 'gaps, prediction, integrated methodology, role play, and case studies ...' (Hutchinson and Waters, 1987; Huckins, 1988)

The history of ELT has been marked by the emergence of different teaching approaches: the 'Direct Method' was used after the Second World War, during the 1960s, the 'Situational Approach' won publicity, and the next decade noticed the reproduction of the 'Audio-Lingual Method' (Xiao-yun et al. 2007). All these teaching methods proved inadequate results, and ESL/EFL learners' needs were not efficiently met. Afterwards, in the 1980s, it was the dawn of the 'Communicative Approach' in order to meet the specific needs of the EFL/ESL learners in the teaching/learning situation. Again, this communicative teaching found to be not appropriate to suit the diverse ESP/EAP learners' needs in the target situation. The story of ELT around the world has been the same roller coaster of 'trial and error' so as to sort out the magical recipe of the ELT method to attain the distinct several students' needs of particular groups of learners. Accordingly, adopting an eclectic

approach to teaching was reported that it was found 'eclecticism' as the utmost solution to clear up this demanding ELT issue. Luckily, 'the host from all teaching methodologies' approach gained popularity in the ELT industry. Nowadays, this approach is used to cover the particularities of teaching situations worldwide, and it is an « eclectic blend of tasks each tailored for a particular group of learners » (Brown, 1995: 74). This dynamic approach takes care of both linguistic and non-linguistic needs during the instruction of the courses in the ESP classrooms. With this in mind, Javid (2011: 43) stated that in ESP teaching « learners have diverse language needs as well as they bear differences in their learning styles (LS) due to their diverse educational, social, ethnic and cultural background ».

From what has been previously mentioned, the ESP practitioners are asked to take care of the non-linguistic needs as well through using an eclectic approach. In the same vein, Roa (2001) noted that ESP teaching has to go with the diverse learning styles of the students since it affects directly the teaching effectiveness. Moreover, he added that ESP practitioners may use a set of several learning tasks and activities so that to overcome the mixed-abilities classroom issue and various learning styles hindrance in the ESP courses. As he carried on saying that ESP practitioners « also need to accommodate individual differences of their students by using diverse classroom activities and teaching techniques to ensure efficient and effective teaching » (Javid, 2011: 59).

Additional settings such as the socio-cultural environment and learning context, etc are major factors that any ESP teacher should take them into account when designing and implementing his/her developed language program. As a consequence, these factors fall to the language teachers' responsibilities to consider and select appropriate tasks accordingly for better teaching/learning outcomes (Canagarajah, 2002). As for Chen (2006), ESP practitioners have to explore the range of teaching approaches and methods so as to arrange them and opt for a suitable one for the teaching atmosphere. The chosen pedagogical method should match and address directly the different learners' personalities, their needs, the teaching/learning context, and the overall ESP situation peculiarities.

However, as declared by Tarone & Yule (1989:10), the ESP teacher needs to be trained and knowledgeable about the main teaching methods in order to be an eclectic tutor and to reach his/her instructional objectives. Eclecticism depends heavily on the current circumstances that the ESP teacher is in, i.e, each ESP context requires specific teaching method, techniques, and precise learning tasks. For Tarone & Yule (1989: 10), eclectic approach «involves a philosophy of local solutions to local problems ». The existing situation in the site under investigation urged the teacher-researcher to adopt an eclectic approach, not for the sake of varying her teaching methodology only but rather for satisfying the ESP context features in the computer science department. The learners' lacks, wants, necessities, learning styles, mixed-ability classes, and several students' attitudes towards learning ESP in computing discipline were the chief teaching factors that needed to be taken into consideration when performing an eclectic instructional course. That is to say, the tutor's responsibility is to decide on 'what' to instruct (syllabus content) and more importantly on 'how' to teach (teaching method and techniques).

In addition to this, the tutor paid attention to the students' cognitive abilities as she instructed the sample lessons since mental cognition is said to develop a practice with regard to teaching planning and learning assimilation (Simmonds, 2014). In other words, cognition which means how knowledge and behaviours are processed in the brain can help the ESP teacher designing and selecting the syllabus content, teaching materials, and learning tasks according to the students' mental abilities. Cognitive skills as a subfield of both psycholinguistics and neurolinguistics provide education, especially ESP teaching, with insights so that to ease the understanding of human learning at the level of the neural mechanisms and executions (Goswami, 2008). This is exactly why the tutor adapted teaching techniques based on how the students process information in order to attain communicative outcomes during the lesson performance. That is to say, the teaching practice emphasized the revision of the background knowledge (warming-up phase), practising different in-class and communicative tasks (body of the lesson phase), and finally applying what had been learnt in follow-up language activities and homework (concluding phase), i.e, Hilliard's Cognitive Model (2016).

Consequently, the lesson was run following the next diagram (Figure 5.1) which represents Hilliard's cognitive model (2016):

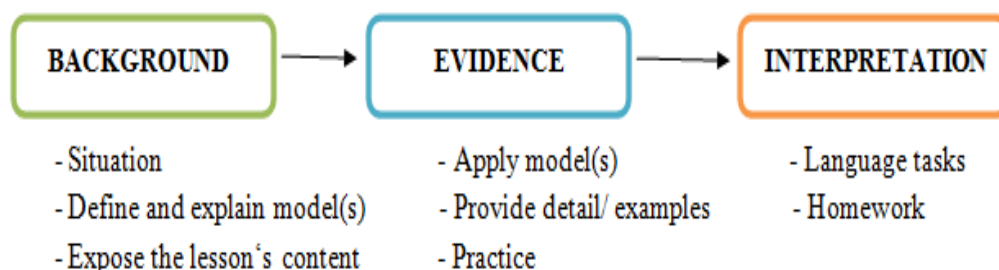


Figure 5.1: Hilliard's Cognitive Model (2016) (Adapted from Brahimi, 2018:205)

Along the teaching practice journey, the tutor relied on more different teaching techniques like shadowing and dictogloss. Concerning the 'shadowing' teaching technique, its procedure was as follows: students listened and repeated after a recorded native speaker (software engineer, for example) in a speech or interview using an audio script provided (Wood, 2006: 150). In the research work case, the tutor used this technique in the listening skill activities (pre and while listening tasks) to help the students acquired the oral language, new spoken computing terms, and deduce meaning from the recording.

Due to the fact that students were asked to improve their scientific writing abilities, the researcher tended to highlight after the needs analysis process the demand of developing the specific vocabulary knowledge as the basic linguistic component of the writing skill in particular and the overall target language mastery in general. She applied a 'lexical approach' in the ESP classroom in order to achieve this objective (computing terminology development). That is to say, the teacher-researcher joined the syllabus content to the teaching procedure, i.e, 'what' students learn and 'how' the courses are delivered to make learning feasible. As declared by Lewis (1997: 2) that the teaching process in the classroom is « an integrated set of theoretical and practical beliefs, embodying both syllabus and method ».

The lexical approach focuses on the acquisition and use of lexical specific items, and to develop fluency while speaking (Lewis, 1997). The teacher-researcher translated the lexical approach teaching techniques into the use of certain learning activities in the instruction of the courses such as gap-filling, matching, pictures labelling, words searches and categorising lexical computing terms. These classroom activities were for the purpose of helping students to recognize and acquire new lexis in the computer science field so that to reach language fluency and avoid communication barrier in the target situation. It motivated students to broaden their vocabulary awareness horizons processing a considerable number of lexical items as single and multi-word items (Ibid). The acquisition of single words meaning in the lesson was like word literal meaning, computing meaning, in spelling and recognition activities. However, the learning of multi-words meaning was in collocations, synonymy, antonymy, polysemy, and the lexical items in the given context. According to Lewis (1997: 2), collocations « occur as an organizing principle within syllabuses, and grammar as the structure is subordinate to lexis ». In other words, any ESP syllabus must highlight the teaching of 'collocations' as being a crucial element of lexis and language as a whole, i.e the ESP syllabus should emphasize the lexical understanding as a 'content knowledge' and as a 'teaching procedure'.

Moreover, the tutor used 'dictation' as a teaching technique under the lexical approach so that to improve the students' listening comprehension and reinforcing the holistic language acquisition. Dictation as a teaching technique can be used as an alternative to the traditional grammar teaching method (Wajnryb, 1990). In dictation, the students listen to what is dictated, then they are asked to reconstruct what they listened to in a form of sentences. Dictogloss as a strategy, it was used by students as well while listening to recordings and interviews jotting down whatever they can catch sometimes only keywords (Wood, 2006:152).

With the growing interest in international business, technology and education, EFL/ESP students face the urgent need to develop English language communicative skills. Communicative Language Teaching (CLT) as a teaching approach helps

language learners practice English in communicative situations. That is to say, this approach gained expansion as it facilitates the students' capacities to communicate effectively and fluently in several real-world situations (Littlewood, 2007). Within the same vein, Widdowson (1990 :241) stated that « people learn to communicate by communicating rather than by learning about the language system ». In computer science department, the teacher needed to develop the students' linguistic skills to write in the discipline along with the communicative skills for target language communication in real-life situations. In doing so, the tutor whilst instructing computing content of the proposed lessons, she made use of communicative tasks so as to practice language productively in unrehearsed situations.

Moreover, she applied a variety of strategies and techniques used in content-based instruction such as cooperative learning, task-based learning, and projects. Cooperative learning motivates students to communicate and share information while constructing knowledge (Crandall, 1994). Grouping teaching technique ameliorates the students' language proficiency in general, and boost their social-communicative abilities in particular. (Richards & Rodgers, 2001; Crandall, 1994). All in all, these techniques fall into communicative teaching approach which is an important teaching methodology to be implemented in language classrooms, especially ESP: « The importance of the Communicative Language Teaching and Learning derives in great part from the opportunity it offers of linking language learning to everyday life and interest of learners and their future communicative needs » (Candlin, 1984:51).

5.2.2 Evaluation Process

The final stage to be considered in any course design is the evaluation process. It is meant to assess the students' language achievement at the end or throughout the instruction of the courses, and to evaluate the developed study program along with the teaching procedures. During this process, the ESP practitioners use research instruments such as tests to measure the students' development which help to identify the lessons shortcoming so that to facilitate the learning operation. Furthermore, the evaluation process gives valuable feedback from testing the

students' linguistic progress and from the teaching practices so as to improve the teaching/learning operation. Evaluation of the students' achievement comes into two types: formative and summative evaluations or assessments (see Section 1.10.2). Learners' assessment of the acquired skills and communicative abilities is held during the instructional sessions (formative assessment) and when the whole lesson, unit, or syllabus is finished (summative assessment). Consequently, the continuous form of assessment with the final assessment provided at the end of each teaching unit are deeply rooted in every ESP study program.

Accordingly, ESP practitioners must evaluate their students in an appropriate climate. In addition to this, the given scores should not be deemed as the firm decision of the students' language acquisition. That is to say, the students' grades do not reflect completely the assessment of the learners' level of linguistic competence. As confirmed by Hutchinson and Waters (1987: 151), for instance, the assessment of the reading skill "its real meaning lies in understanding the reasons why it was given and what it tells the students about how they might improve their future work". As previously mentioned, any evaluation process should take the learners' assessment and the course evaluation for a plain view of the landmark from the teaching/learning landscape. The evaluation process is seen as a double-fold continuum which takes into account the course evaluation and whether or not it attains the intended objectives. It deals as well with the course impact on the students' learning for a long-term period and to what extent it was effective in order to boost the students' language achievement (Lesiak-Bielawska, 2014).

In the fieldwork conducted by the researcher in this investigation, the teacher-researcher carried out the evaluation process to gauge the proposed syllabus effectiveness. The tutor-evaluator used evaluation procedures such as tests (pre-test and post-test) together with a focused interview to assess learners' language achievement at the end of the intervention phase and to gather the students' attitudes towards the instructional course, its implementation, teaching method and techniques, learning activities, etc. The pre-test and post-test were conducted within the time frame that the teacher was allowed to teach in. However, the focused

interview was undertaken in a separate session. Both tests highlighted the assessment of the writing skill in the field as it is the target skill to be developed coupled with the essential linguistic elements to write technically (lexis, grammar, and meaning). On the other hand, the focused interview was carried out to evaluate the course performance (teaching method and techniques), course content, learning activities, and the assessment procedures through gathering students' perspectives towards the proposed computing syllabus.

All in all, the researcher aimed at evaluating both the students' progress while and at the end of the instructional session. That is to say, she used in-class activities to evaluate the students' language acquisition while instructing the lesson, and at the end of the instructional sessions to measure the students' linguistic achievement. Also, she used the pre-test at the beginning of her course performance for placement purposes and as a basis for comparison later on with the post-test results. Additionally, the pre-test results helped to have more precise insights into the students' language difficulties, especially writing deficiencies to be developed in the intervention sessions. Moreover, the researcher tended to evaluate the course administered as for an in-depth teaching/learning picture using a focused interview so as to get an effective evaluation process.

5.2.2.1 ESP Courses Evaluation

Instructional courses in any ESP context are composed of evaluation operation as a crucial element to be included in the teaching practice. During the ESP course implementation, the evaluation process must provide answers to most asked questions linked to the course content, method, and techniques appropriateness. Moreover, the ESP course evaluation tries to address the courses objectives fulfilment, and the suitable administration of the teaching/learning materials. Within the same line of thoughts, Dudley-Evans and St John (1991: 129) stated that « Evaluation in ESP is concerned with the effectiveness and efficiency of learning; with achieving objectives (assuming that the Needs Analysis has set valid objectives). Has learning been maximized? Have resources been optimally employed? ».

As a consequence, ESP courses evaluation is carried out to examine whether the ESP learners attain the intended goals in the target situation or not. Furthermore, the program evaluation in ESP teaching looks for the most relevant informational constituent in the instructional session so that to reinforce their teaching and to eliminate the irrelevant instructional items. As a matter of fact, the needs identification and analysis process serves as a detector to uncover the ESP students' needs, wants, and learning objectives at the very beginning of any course design.

Afterwards, the ESP practitioners set out appropriate teaching materials and learning activities to accomplish the students' learning objectives, their needs, and their wants. As a result, the ESP practitioners consider NIA as the incipient backbone stage in any course development process. The needs identification and analysis procedure completes the course evaluation process at the end of the implementation phase, i.e. NIA determines the courses components to be included within the instructional units through the students' aid by using their contemplative intuition and diagnostic learning sense. By doing this, specified students' demands are set up at the very start to facilitate the course evaluation thereafter for the ESP tutors and other colleagues in the ESP industry.

According to Hutchinson and Waters (1987: 152), ESP evaluation is seen like «the starting point for any necessary revisions of the course, and may also help to guide the design of other similar courses». It paves the way for the ESP practitioners to draw near their learners educational and occupational needs. Moreover, they added that «Evaluation of the learners reflects not just the learners' performance but to some extent the effectiveness or otherwise of the course too» (Hutchinson and Waters, 1987: 152). As a result, students may indicate unintentionally some stumbling blocks when being evaluated. On account of these pitfalls, ESP practitioners detect impairments at the level of their course design process.

In the same vein, Momeni and Rasekh (2012) insist that ESP course evaluation is a must which is carried out in two assessment methods, i.e. formative and summative modes to take pivotal decisions concerning « curriculum changes,

documenting events, measuring cost-effectiveness, estimating the needs for teaching stuff, identifying unintended outcomes and clarifying the objectives » (2012:220). This is why evaluation signals the existence of prolific feedback whilst dealing with the course. That is to say, the evaluation feedback is in charge of the attainment of well-adjusted ESP courses that handle reliable learning activities to build up an effective study program. As for Dudley-Evans and St John (1998: 128), who note that evaluation as being a genesis of information to be «fed into repeated versions or related activities » considering it gives discernment and inferences about the well-functioned instructional elements and the less successful aspects in the courses.

5.2.2.2 Characteristics of ESP Course Evaluation

Every course building blocks are perceived to be evaluated as to course objectives, syllabus content, teaching methods and procedures, teaching/learning materials, in-class practices, assessment tools, and other pedagogical criteria. For the simple reason which says «evaluation showcases your [the teacher] achievements and helps to make your programme better » (Pope and Jolly, 2008:253). Consequently, the ESP course evaluation is to be accomplished by ‘who’ does the evaluation process, ‘how’ and ‘when’ the course evaluation is taken place in the course design journey. Hutchinson and Waters (1987: 152) pointed out certain ESP course evaluation characteristics in order to be attained in predestined inquiries. These aspects are as follows:

1. What should be evaluated?
2. How can the ESP course be evaluated?
3. Who should be involved in the evaluation?
4. When (and how often) should evaluation take place?

In the first place, ESP practitioners conduct any kind of evaluation for «the effectiveness and efficiency of learning » (Dudley-Evans and St John, 1998: 129). Put another way, any ESP evaluation tackles learners’ requirements as they are

target language learners and users at once (Hutchinson and Waters, 1987). Hence, if the students' needs above-mentioned are not attained, so the ESP practitioners are required to look for the fountainhead of insufficiency in the course design operation or course implementation. Either way, ESP course evaluation digs deep into the syllabus blemish, the teaching materials, teaching techniques, testing measurements, and the instructional evaluation, etc (Ibid). As a consequence, when we asked the question 'what should be evaluated?', in fact, just about everything requires evaluation, although it could be 'impractical' sometimes (Dudley-Evans and St John 1998). For the sake of taking decisions, reviewing judgement, and making changes for the better revision of the course. To shortly answer to the query, evaluation emphasizes on the materials applied, the in-class tasks, the out-of-class assistance, course development, teaching methodologies, the assessment instruments, it implies any element of the teaching/learning climate (Dudley-Evans and St John, 1998:129). Within the same line of thoughts, Hutchinson and Waters (1987) insisted on the following questions to start the query:

- Is the course of instruction attaining the learners' language learning needs?
- Has the course accomplished the learners' language using needs?

In order to proceed with this tiring process needs the participation of the administration, the institutions, teachers and first and foremost learners as being the core of the teaching/learning environment. In addition to everyone involved in the educational settings for more impartial, inclusive and well-run evaluation which drives to inventive judgments. Thus, a worthwhile evaluation operation is not far from stern bonds which are the capacity of collecting adequate data and the capability to freely apply them without paying attention to others' judgments or inconveniences (Hutchinson and Waters, 1987). Furthermore, for more productive evaluation outcomes, the ESP practitioners have to determine which element is not being fulfilled, and to point out the sources of the issues faced in the ESP classrooms using the next set of questions proposed by Hutchinson and Waters (1987:153):

- Were the unfulfilled needs identified during the course design process? If not, why not?

- How can the course design process be improved to avoid this problem in the future?

- How can the course be changed to take these needs into account?

- Finally, if these needs were identified during the course design process, why are they not being/ have they not been fulfilled?

Regarding the second question in ESP course evaluation which examines 'the forms in which ESP course can be evaluated', tutors and practitioners frequently apply a considerable number of procedures which match up with the particular teaching screenplay like emulations, recommendations, questionnaires, conversations and interviews, observations and checklists. Moreover, learners' results of homework, projects, and integrated tests are the trustworthy genesis for ESP practitioners to evaluate their study programs (Fenwick, 2003). In spite of the fact that there is no precise evaluation formula which can be seen as 'the magical' form owing to the several explanations of the concept 'evaluation', most ESP course evaluation programs work on a process which occurs in cycles, and starts with data collection and finishes with applying feedback (Taylor-Powell et al. 1996). What signals the appropriate way of evaluation applied by the teachers is reasonably connected to their teaching scenarios in the ESP courses. According to Hutchinson and Waters (1987:154), the next succeeding phases make the form in which ESP course evaluation normally occurs :

- Gathering the evaluation information ;
- Collating the information, and summarised if extensive;
- Discussing outcomes with all interested parties;
- Drawing conclusions ;
- Providing a detailed course evaluation report for further suggestions and discussions.

As stated by Hutchinson and Waters (1987), the process of evaluation begins with gathering information, analysing the findings and discussing them with all the administrative and logistical arrangements engaged in the entire operation. These actions are reported on as an account which portrays the inferences that propose practical suggestions to amend the existing situation, the course quality, imperfection in the syllabus, and inhibit the ineffective teaching practices. As a result, the evaluation operation contains six phases as asserted by Hounsell (2003 qtd in Meddour 2014: 185) and demonstrated below in the cyclical process. Besides, ESP tutors, subject specialists, graduated students, actual learners, sponsors, administration staff and institutions are ‘the participants’ in these six stages with regard to their engagement in the process, i.e. the answer to the third question ‘who should be involved in the evaluation’. As declared by Hutchinson and Waters (1987: 154), “it is important to get a representative cross-section of views and to take them properly into account”. Collectively, what form of evaluation you use and from whom you obtain answers will certainly have an impact on what you reach (Breen, 1985), i.e. being careful about every piece of information and contributors of information is highly advisable for more efficient adjustments.

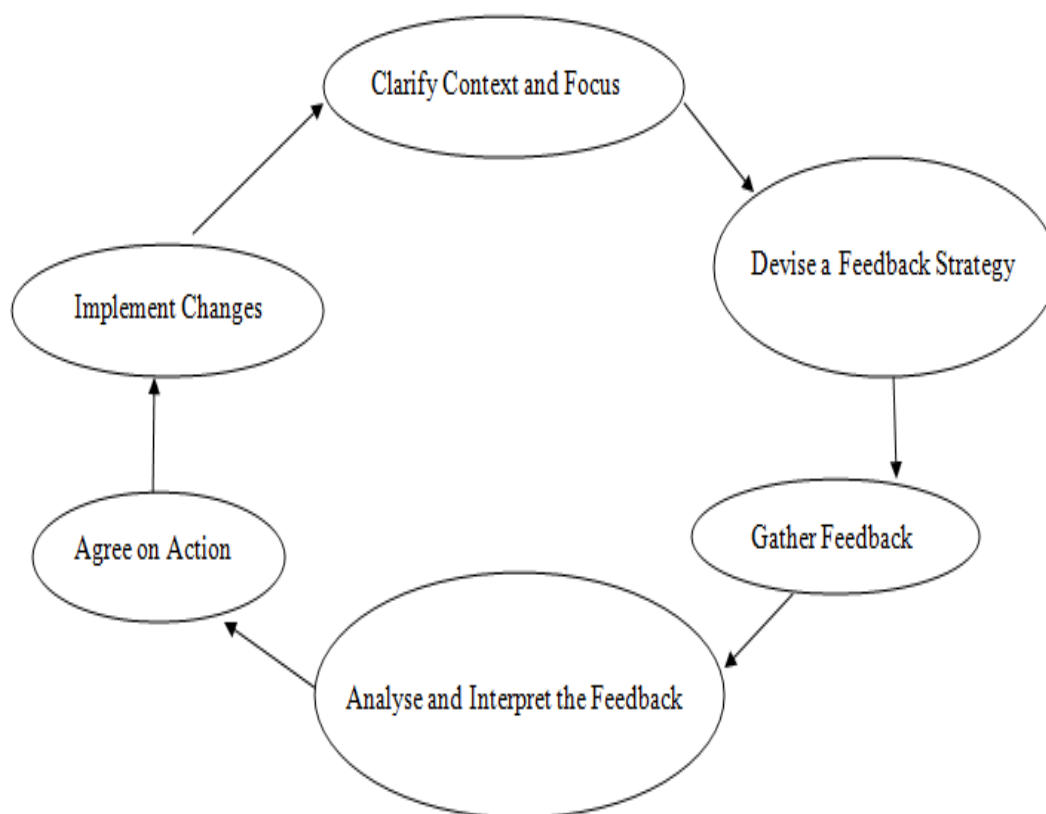


Figure 5.2: The Cycle of Evaluation (Hounsell, 2003 qtd in Meddour 2014: 185)

The pre-mentioned diagram (see Figure 5.2) starts with the determination of the study objectives and the context to identify the suitable strategy for gathering information. Thereafter, the ESP practitioners analyze and interpret the results that address the final judgement and conclusions for syllabus content enhancement and quality instruction development in the classroom. Furthermore, the evaluation operation figures are divided into interior and exterior bodies in the ESP industry which take part in forming worthwhile decisions for better in-class instructions. These inside and outside parties of the ESP industry often differ depending on their interests and concerns (Hutchinson and Waters, 1987: 154) about the evaluation procedures for the reason that evaluation normally reflects their conception and principles which may provide a productive or ineffective effect on the evaluation results. As reported by Dudley-Evans and St John (1998), learners, tutors, tests administrators are considered as the major roots of evaluation in ESP instructions. The link between these evaluation elements cooperatively and straightforwardly

should be seen in every evaluation process so that to ensure ‘frank and useful feedback’. (Hutchinson and Waters, 1987: 154).

Lastly, time and the rate of which ESP evaluation occurs or is repeated over a particular period in a given sample, i.e. frequency and time are of great importance in the ESP enterprise. Moreover, the two methods of evaluation are strongly viewed as the paramount procedures for any ESP course. As noted by Hutchinson and Waters (1987:155) that summative and formative evaluations bring development in any course of instruction even though 'it is difficult to prescribe how often course evaluation should be done' considering that it differs from one teaching practices to another. Evaluation can be conducted in several intervening periods of the course.

Within the same vein, Hutchinson and Waters (1987) point out four intervals to carry out an evaluation; (a) in the first week of the course, (b) at constant times throughout the course, (c) at the end of the course and (d) so far as possible after the course. They recommend the following intervening periods as the most important times for evaluation:

- ♦ In the first week of the course, as initial impressions may provide more accurate data than later ones;
- ♦ At regular periods throughout the course, every half term for instance;
- ♦ At the end of the course;
- ♦ And finally, if possible, after the course, which they characterise as the most valuable period since the learner will be in a suitable position to provide accurate judgements on how well the studied course will be of help for the target situation they are in currently (p. 155).

The method used for evaluation identifies the time of administration, i.e. formative or summative. Once having it conducted at various intervals throughout the session determines its continuing quality to gather as many as possible pertinent information regarding the running of the course. ESP tutors opt for several intervals in their course (warming up, body, conclusion phases) which are appropriate for evaluation occasions to hound the well-managed delivery of the instructions during

courses and warrant adaptations as needed. Consequently, it is suggested to take advantage of the various course intervals to track the arrangement of the teaching/learning system for more effective instructions and better accomplishment of goals.

Put differently, ESP materials as the backbone part in every course of instruction, materials evaluation is a way connected with exploring the learning materials so that to set up their worth. Along the same line, materials evaluation is considered as « a process that involves measuring the value (or potential value) of a set of learning materials » (Tomlinson, 2003:15). Once again, as ESP courses focus on students needs, even ESP course evaluation emphasizes the learners' appeasement of their demands. That is to say, « in language teaching, the process of measuring the value and effectiveness of learning materials » is ESP materials evaluation (Richards and Schmidt, 2010⁴¹). Otherwise stated, the evaluation process of ESP teaching/learning materials deals with the examination of the effectiveness of ESP instructional activities and materials in the classroom. This operation can be applied following the four phases demonstrated below.

⁴¹ Longman Dictionary of Language Teaching and Applied Linguistics.

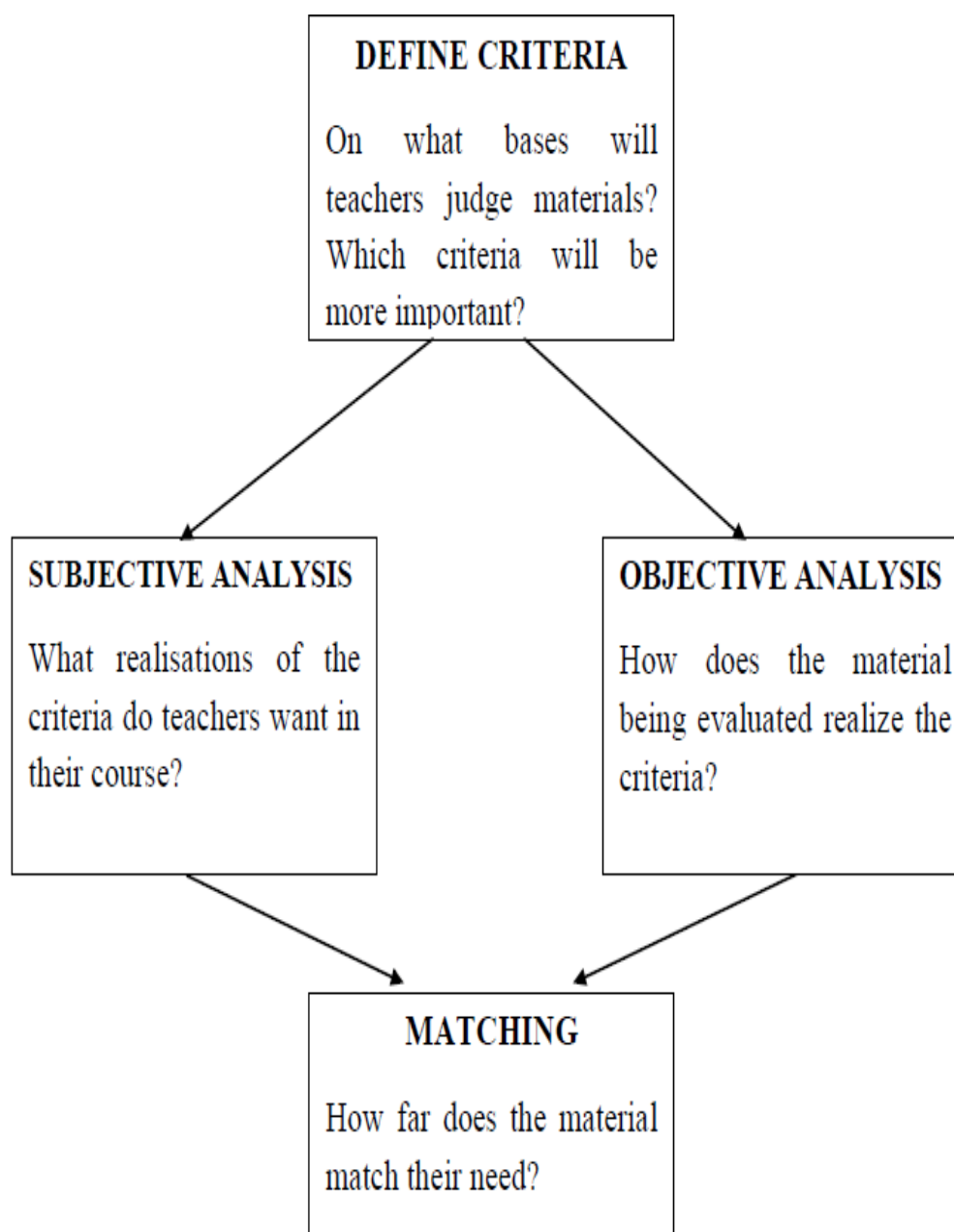


Figure 5.3: The ESP Materials Evaluation Process (Adapted from Hutchinson and Waters 1987)

According to Hutchinson and Waters (1987: 105), the evaluation process of materials is a convenient operation; « matching your own analysed needs with available solutions ». In addition to this, this operation corresponds resolutions for ESP issues which happen in terms of learning materials. As shown in the pre-mentioned diagram (see Figure 5.3), Hutchinson and Waters (1987) order evaluation operation into four main phases. To start with the first phase ‘defining

criteria' in which ESP tutors are asked to determine their objectives and goals for a given material, i.e. learning tasks and activities. Next, the phase of 'subjective analysis' tackles the development and testing of courses materials and their conditions. After that comes the third phase 'objective analysis' which is about the teachers' emphasis on the materials aims themselves. Finally, the stage of 'matching' where the ESP practitioners investigate encountered issues at the level of subjective and objective analyses. Thereafter, when ESP tutors finish the examination, they propose course adjustment, teaching methodology refinement, and content adaptation. On account of ESP materials importance in every instructional course, ESP materials evaluation, on the other hand, plays a pivotal part in ESP materials selection considering that it gives tutors opportunities to test teaching/learning materials along with having better ideas about what is constructive for instruction and what is not, to be avoided in the adjusted syllabus.

5.2.2.3 English for Computer Science Course Evaluation

The designed ESP courses for computer science students at Tlemcen University aimed at improving the students' technical writing skills in particular and the overall language proficiency in general. Moreover, the courses tried to improve the learners' educational communicative skills as well along with the problem-solving strategies. The implemented courses were organised into four sessions of teaching and a summative evaluation was carried out at the end of the intervention (tests: pre-and post-tests). That is to say, both administered tests, more precisely the post-test evaluated the students' assimilation of the instructed items, and whether the course rate reached success or failure. As reported by Bailey (2009: 707), evaluation « provides feedback for programme improvement », and it checks the teaching efficiency. Along the same line, Lodico et al. (2006: 18) claim that « summative data focus on determining whether programme goals were met ». In this present study, the researcher used an ESP programme evaluation which was based upon 'an objective-based approach'. This evaluation approach gauged how far the course objectives were accomplished as they were declared earlier in the syllabus design.

Indisputably, computing courses developed for technical students in the global language, i.e the English language has become the trend in nowadays domain of higher education training. Nevertheless, its efficiency has not been confirmed yet by trial and error at a broad level, especially in the Algerian context where French is the dominant language for educational purposes at the tertiary level, i.e. universities, institutions, colleges, etc. Attwell (2007) said that « these innovative approaches to training have been limited by the shortage of scientifically credible evaluation » (p.7).

As a consequence, the currently taught lectures with their evaluation draw closer in the guise of collaboration to boost the computer science courses quality and norms which are said to increase learners' outcomes and rise their involvement in the teaching/learning situation by experimenting the provided courses effectiveness. According to Attwell (2007), the deficiency in practical evaluation procedures of computer science courses was a consequence of the extensive emphasis on the technical developments of programs and software at the cost of educational embodiments and modifications. If these pedagogical implications and adjustments subsist, they are simply «descriptive rather than analytical or predictive » (Attwell, 2007:9) or they, for the most instances, are relative studies that show the distinction between conventional classroom teaching and the recently instructed computing programmes containing innovative teaching approaches with learning sites and platforms.

It has been proved that evaluating study programmes, not least computing programs contributes to achieving better assimilation and examination of the current challenges in the ESP domain. For doing this, several educational approaches and methods have been applied to utilize various information collecting instruments so as to form a fruitful evaluation of these ESP courses. The current program evaluation of computer science courses delivered to Master 1 students relied on tests together with a focus group interview as an evaluation survey to check the fulfilment of the courses objectives. Sometimes during the interviews, students were asked to agree or disagree with the particular statements based on the rating of the

Likert (1932) scale of evaluation. These survey checklists « are valuable evaluation devices when carefully developed, validated, and applied » (Stufflebeam 2000 qtd in Meddour 2014: 188).

The researcher proposed several steps for evaluating the provided courses in the computer science department based on Hutchinson and Waters' perspectives (1987). Moreover, the teacher-researcher made sure to evaluate all the teaching/learning materials. As a result, the implemented instructional content along with the teaching methods and approaches were of focal significance and required to be well-aimed as closely as possible. As far as the learning tasks are concerned, the evaluation procedures examined the topics dealt with during the courses and the types of activities performed during in-class exercises. On the other hand, the lexical approach followed proved effectiveness during ESP sessions; albeit, it was needed to explore it so that to assure its adequacy in the Master 1 computer science classes and the learners' linguistic and communicative requirements in their field. Furthermore, the dictation and shadowing instructional techniques were covered as well during the evaluation process.

After highlighting what to look for during the evaluation phase, it is high time to address the evaluation means used for exploring the given courses. As what has been pre-mentioned, there exist several evaluation instruments which depend on what best fits the ESP practitioners' teaching situations. Therefore, the researcher recommended applying tests, group and individual interviews, sometimes informal discussions as well, for evaluation purposes. As the researcher believed that in some cases, open and unstructured interviews, especially with learners, encouraged informants to be engaged in the conversation by providing more comfort while speaking and giving responses. Consequently, the researcher would get more valid and adequate data for remedial work. As it was believed that the informants' selection in the evaluation process in order to get their reliable answers was not an easy task for the evaluators. The ESP practitioners may take risks of being misunderstood whilst asking questions about the teaching/learning materials. That is to say, evaluators could get contradictory feedback when consulting the students

and other parties about the materials quality, or even may be seen as an ineligible teacher when doing so (Hutchinson and Waters, 1987). Therefore, the researcher relied, in the first place, on the Master 1 students, ESP teachers, subject specialists at the computer science department for the sake of getting assistance and a wide range of participants who were variant and homogeneous groups in the sample population.

On the whole, ESP course evaluation is critically an important step in the ESP process. The evaluation intervals in the study were as follows; first, at the beginning of the intervention phase (teaching computing courses), in order to situate the learners' background knowledge of computing topics (networks) in the target language together with examining their technical writing abilities (pre-test). Next, continuous evaluation (formative assessment) during the instructional sessions to have a precise idea on learners' standpoints of the instructional content and teaching method. More particularly, the researcher checked the effect of content-based instructions which highlight the development of the linguistic skills to write scientific papers in the field and its relationship with the communicative competence in the target situation, in general (courses objectives). Furthermore, well-organized intervals across the course, i.e. in-class activities and asking comprehension questions or synthesizing ideas uncovered more accurate data during classroom teaching time. Jointly, the researcher outside the class time tried to evaluate and explore more data with other participants in the ESP scenario to get more valuable evaluation information (homework and projects). Lastly, at the end of the intervention period, i.e. after the instructional courses planned, the last evaluation (post-test plus open discussions) is beneficial because learners after being taught the designed study program (four sessions), now they had better insights into their target situation to judge the courses provided. All in all, it is evident to assert that what matters the most in the ESP course evaluation, in fact, is not the several intervals during the examination operation but rather maintaining a harmonious rate at which evaluation procedures occur aiming at assuring the participants' responses quantity and quality.

5.2.2.4 Assessment, Testing and Evaluation in ESP

Before speaking about assessment, testing and evaluation in ESP, it is very important to make a distinction between the three terms in general. First of all, these three terms are sometimes used as synonymous. However, there is a slight difference between them, i.e. they do not possess the same significance (Angelo, 1995). As a matter of fact, when the teacher is assessing his students, he tries to recognize their performances and skills. That is to say, language teachers attempt to judge how well their students carry out a given task. Furthermore, the assessment procedure varies from the testing and evaluation procedures in its purpose for collecting information. Hence, the gathered data are used for the sake of promoting the students' learning and comprehension. Put another way, the collected information is used to explore to what extent students are moving forward in their learning (Angelo, 1995).

On the other hand, testing is another measuring instrument, and « it refers to the process of administering a test to measure one or more concepts usually under standardised conditions » (Braun and Kanjee, 2006:09). In that case, testing is a set of questions which are dispensed to learners with the object of « analyzing the learners' level and their degree of success in learning » (Zidane, 2010:06). Thus, one can declare that testing is distinguished from assessment in the sense that it is one device of assessment, while assessment embodies, in addition to testing, other methods and tools mainly the interview, questionnaire, ... (Zidane, 2010). On the contrary, evaluation is another term that is used in the field of language assessment. It is about a judgement about the program, curriculum, textbook and the teaching approach, i.e., it exceeds the learners' achievement and language assessment to deem all the features of teaching/learning process and to examine how educational decisions can be taken by the results of alternatives forms of assessment (Jabbarifar, 2009:02).

Cut a long story short, testing is an assessment tool to measure the students' ability. While the assessment is the design of classroom techniques and methods that give data on how students respond to given teaching approaches. Evaluation is

a summative result used for judging and appraising. It happens through quizzes, exams, papers or tests. On the whole, testing is used as an assessment instrument to serve the learning while evaluation is used to assess it (Covacevich, 2014). The following table (Table 5.2) summarizes the main differences between assessment and evaluation according to Angelo and Cross (1993:427):

Dimension of Difference	Assessment	Evaluation
Content: timing, primary purpose	<i>Formative:</i> ongoing, to improve learning	<i>Summative:</i> final, to gauge quality
Orientation: focus of measurement	<i>Process-oriented:</i> how learning is going	<i>Product-oriented:</i> what's been learned
Findings: uses thereof	<i>Diagnostic:</i> identify areas for improvement	<i>Judgmental:</i> arrive at an overall grade/score

Table 5.2: The Difference between Assessment and Evaluation (Adapted from Angelo and Cross, 1993:427)

In the ESP industry, when the ESP practitioners dispense specific courses, they need assessment tools, like in all other language programmes therein the tutors use several instruments to gauge their students' progress and their deficiencies. As a result, ESP is not distinct from any other language teaching/learning study programs in their requisite for assessment procedures which mirror the content and the teaching methodology of courses. Speaking about courses, Long (2005:1) demonstrated that «every language course should be considered a course for specific purposes, varying only and considerably, to be sure in the precision with which learner needs can be specified... ».

For Dudley Evans and St John (1998: 20), «Evaluation in ESP situations is concerned with the effectiveness and efficiency of learning; with achieving the objectives ». This means that evaluation and assessment give data about the learners' performance, in addition to achieving the intended goals and objectives of the courses. In the same vein, Suskie and Banta (2009) put forward three main definitions of evaluation in ESP. First of all, the standpoint which is concerned with

the relationship between evaluation and the clarification of the assessment results in order to take decisions and sensible conclusions about the students' accomplishment of the designed learning objectives. Moreover, the evaluation in ESP reveals the students' strengths and weakness in the instructional sessions. The evaluation looks also for the teaching method used for delivering the ESP courses so as to propose the suitable teaching methodology in the classroom to fulfil the various sets of goals and objectives in the teaching/learning operation.

Next, the second significance suggested by Suskie and Banta (2009) indicates that evaluation is about the relationship between the actual outcomes and the planned outcomes of the assessment operation. Hence, assessment and students' evaluation of learning are most of the time considered as equivalent. Thirdly, evaluation deals with the examination of the study program quality rather than the students' learning. In this sense, evaluation denotes that it is larger in scope than assessment. Consequently, evaluation covers the comprehensive measurements of all the characteristics included in the teaching/learning process through the use of several instruments such as tests and other forms of examination to have information about students' achievement. In other terms, assessment sometimes indicates testing, and language tests aim is to diagnose the students' knowledge, skill, and capacities through using examination for the sake of « ...providing information for making a variety of decisions » (Bachman, 1990:70).

In this regard, Hicks and Littlejohn (2000:155) stated that «the role of tests is very useful and important ». It is a medium of demonstration for both learners and teachers how far the learners have acquired during a course. Halliday (1966:215) asserted that « tests are an attempt to construct an instrument for measuring attainment, or progress, or ability in language skills ». The significance given by Halliday indicates that testing deals with the operation of gauging students' capacities and advancement. Consequently, one can deduce that « the general progress or specific knowledge of the students can always be checked » (Hughes, 1989:05). Hence, testing in addition to assessment forms are to examine the learners' achievement and knowledge so as to make a judgement regarding whether

they will be able to pass from the current level to the next one, to be positioned in particular options or groups, to obtain qualifications, or being viewed as underachiever students. As a whole, ESP assessments are used for a particular area of language usage and are developed from the appreciation of various attributes of precise purpose demands. Accordingly, ESP evaluation must emphasize evaluating, assessing, and testing the learners' capacities and production to use the target language specifically in different situations.

5.2.2.4.1 ESP Assessment Defined

Assessment as a concept has been given much scholarly attention in the recent years, and it has been viewed by many scholars especially in the educational systems, not least the teaching of English in specific contexts (ESP). Yet, it is a constant activity in the classroom at all levels so that to form opinions about the learners' performance (Abedi, 2010). In defining assessment, Angelo (1995: 07) has this to say:

Assessment is an ongoing process aimed at understanding and improving students' learning. It involves making expectations explicit and public; setting appropriate criteria and high standards for learning quality; systematically gathering, analysing and interpreting evidence to determine how well performances match those expectations and standards and using the resulting information to document, explain and improve performances.

What has been clarified in the above definition is that assessment is a procedure to gather several types of information which are going to be analysed by the ESP teacher so as to form interpretations about the learners' achievement or knowledge for educational decisions with the aim of developing the process of teaching/learning. Despite that the ESP teacher who does not perform the assessment in his/her class cannot recognize the learners' comprehension, to what extent they grasp from his/her instructions and how these instructions are convenient to students' style of learning, their capacities and their levels, and to

what extent the course attains the learners' requirements so as to decide what to do (Covacevich, 2014).

As for Chapelle and Bindlley (2002:267), assessment in any language teaching/learning study programs makes reference to the « act of collecting information and making judgments about the learner's knowledge of a language and ability to use it ». That is to say, the process of collecting data about how learners are learning the target language to allow the tutors to know more and portray these learners precisely is the assessment operation. In this context, Palomba and Banta (1999:04) identify assessment as «the systematic collection, review, and use of information about educational programs undertaken for the purpose of improving learning and development ». For other scholars like Carr and Harris (2001:35), assessment embraces also ESP practitioners' observation in their classrooms and analysing their students work. Assessment is « an integral part of instruction... effective classroom assessment is relevant to immediate learning » (Ibid).

5.2.2.4.2 The Aim of Assessment

Assessment can be aimed at several purposes, involving grouping students into suitable levels, measuring the learners' achievement, and exploring the teaching/learning process as a whole. It is a device that gives diagnostic feedback about the students' work, skills, and aids tutors to gain information about the impact of the teaching practices on students. On top of everything else, assessment procedures stimulate the students' accumulation of the instructional content and motivate their self-evaluation for the intended progress. It is a pedagogical instrument that analyses and calculates the related data of the most important learning outcomes. In ESP situations, particularly, it provides teachers with a wide sight into the learners' language requirements, needs, desires, and lacks which on their turn support the determination of directions for subsequent teaching/learning improvements.

Once again, assessment aims at serving to better teaching. It is a recognized element in the classroom instructions and has decisive functions in the acquisition operation. Learners' assessment also has a strong relationship with the teachers'

professional development. In the sense that it checks the teachers' decisions, expectations, beliefs, methods and approaches to draw conclusions about their instructional practices in the future (Jabbarifar, 2009). The information gathered from the assessment tools are about what the students learn during or after the courses of instruction. It collects these data from various sources to help teachers fulfill their students' demands and attainments. It serves the students' learning by providing information about their skills, abilities, learning styles, backgrounds, etc. In sum, assessment in ESP or any other language teaching programs has several ways and techniques that encourage both learners and their teachers to meet satisfactorily the purposive objectives and goals.

5.2.2.4.3 Learners' Assessment for the Syllabus Effectiveness

The ascertainment of the worth of certain study programs along with its improvement rely heavily on evaluation and learners' assessment procedures which are executed by ESP practitioners in several instructional levels. Learners' assessment is « a tool which can be used to help teachers judge whether a curriculum or instructional approach is being implemented as planned, and to assess the extent to which stated goals and objectives are being achieved » (Fleishman and Williams, 1996:208). By the same token, Richards and Schmidt (2002: 188) report assessment of learners in classrooms is « related to decisions about the quality of the programme itself and decisions about individuals in the programme » considering that there exists a vigorous and firm tie between successful instructions and learners' outcomes (Mathers et al. 2008). According to Johnstone (2005: 2), evaluation or assessment is seen as «the means by which a course or a curriculum change can be monitored to see if, in fact, it is what it claims to be and if it achieves, in students, the intended outcomes ».

Regarding learners' assessment, Little et al. (2009) view it as a sort of questionnaire that seeks for calculating and inferring decisions about several teaching parts like teachers' conduct, lessons content, pedagogical practices, learners' feedback. The examination of teaching effectiveness has become worthwhile and compulsory within the meaning that it supports teachers'

judgements for more appropriate educational decisions which best suit students' efforts and sustain the output they produce for the future progress of the learning outcomes (Boggino, 2009). Thus, the optimum purpose behind such a process is to « improve educational efforts » (Taylor-Powell et al. 1996: 3) and entrust tutors to boost students' accomplishment and makes suitable amendments in relation to teaching materials, objectives, syllabus sequence as well as gaining continuing feedback from learners to enhance the teaching quality (McNamara et al. 2002). In this respect, Keane and Labhrainn (2005) maintain that the success of evaluation drives to applicable adjustments in courses. It quantifies the extent of the syllabus execution and goals fulfilment to proclaim succeeding changes in courses of action.

In spite of the fact that sometimes it is not the merely and foremost instrument, the use of learners' assessment as a tool to rate the success or deficiency of any language instructional syllabus has been progressively performed in many academic institutions worldwide as elementary identifiers of the effective instruction in the classrooms (Emery et al. 2003; Keane and Labhrainn 2005; Marsh and Roche 1997). As a demonstration, Murray (2005: 1) claims that learners' assessment of instructions has been carried out in North American educational institutions for over 40 years. The conflict triggered by learners' assessment of teaching among scholars has not prevented academics and instructors on a sole level to hold over carried it out regardless of its restrictions. He has this to say, concerning the situation in North American countries « Student evaluation of teaching got accepted and spread like wildfire across North America [...] according to surveys I have seen, something like 70-75% of faculty members support the use of student evaluations » (Ibid).

The above-mentioned statements are a thorough clue of the value of such an evaluation in chasing the perfection in teaching and enhancing the qualification of education to optimistically meet the wanted objectives. The agreement of all the involved parties in the ESP teaching industry on the execution of learners' ranking in evaluation programs given approved causes to be a prevalent procedure to gauge instructors' performance, course organization and learners' feedback. According to Chen and Hoshower (2003: 71), who value learners' assessment by stating that it is

«a routine in most colleges and universities » to increase and legitimate the excellence of course running and attain sound outcomes to tutors. They note three major motives of learners' assessment: (a) to offer formative feedback to develop the instruction, course content and structure; (b) to set out a measure of teaching effectiveness for decision making; and (3) to provide necessary information to students about the courses and the teachers (Ibid). By the same token, Keane and Labhrainn (2005: 5) summarized the purposes of any instructional evaluation in what follows:

- As a formative and diagnostic feedback mechanism (for use, for example, in efforts to improve teaching and courses);
- As a summative feedback mechanism (for use, for example, in personnel and administrative decision-making);
- As a source of information for prospective students when selecting course units and lectures; and
- As a source of data for research on teaching.

The instructional program will be more beneficial if learners receive pertinent rankings on its effectiveness and approbation in getting ready for their end products and goals. Learners' assessment is also seen as an explicit reflection of tutors' courses of action, students' results and the eligibility of the instruction that they are given. Correspondingly, instructors are asked to ponder on their learners' ratings to take closely related adjustments in the syllabus by virtue of their beliefs and behaviours to reach strength and avoid weakness in their courses running. All in all, learners' assessment in ESP cases, it is considered as a process that rate students and evaluate the accomplishment of syllabus goals. Metz (2007: 4) concludes by reporting that « process evaluations assess whether an intervention or a programme model was implemented as planned, whether the intended target population was reached, and the major challenges and successful strategies associated with programme implementation ».

5.2.2.4.4 Assessing the ESP Students' Writing Skill

The identification of learners' difficulties is the constructive part of any type of assessment which leads right after to encourage the students' language proficiency. The collected information from the assessment procedures works for monitoring students' performance toward reaching their target and learning needs and to gauge how much their language mastery has increased. Speaking about monitoring, Nation and Macalister (2010:205) have this to say « monitoring is a process that can be related to assessment. It probably plays a much bigger role in most courses than assessment does ». The act of monitoring happens when the instructors observe and check the learners' progress over the instructional period to see if the intended attainments went as expected. The monitoring aims as assessment does at making sure learners will reap as much as benefits from the provided courses.

In the regular computer science study program in the site under investigation at Tlemcen University, Master 1 students had 'Technical English' as a module. Tests are given at the end of each semester (summative assessment) in the form of exams during the academic year so as to assess the students' progress. The exams subjects either comprise of direct questions from the ESP courses or reading comprehension questions tests including a part which is devoted to summarizing the given text as a way to evaluate the learners' writing abilities. Moreover, the reading comprehension questions vary from WH questions, true/false questions, multiple-choice questions preceding by normally a relevant scientific text. Furthermore, the exams papers consist of some vocabulary and grammatical exercises to demonstrate difficult terms, tenses, etc. That is to say, students get only two examinations per year, i.e., they have two official marks in one educational year. Hence, one can deduce the assessment of ESP courses and students' language proficiency at the Department of Computer Science is already a backbone duty, considering that it is the final phase when designing a language course.

It is evident to assert at this level of analysis that the teacher/researcher in her study work tried also to rely on the same perspective while evaluating Master 1

students since they already had an idea about these kinds of evaluative activities (questions, writing short paragraphs, grammatical tasks, etc). On the contrary to what had been adopted while instructing the developed sample courses, the instructor designed the content-based courses to what is more adjusted and modified according to the students' language requirement to improve the writing skill. Therefore, the indented assessment did follow the already existed norms in the department with some changes surely, however, the teaching practices were completely brand-new eclectic, and innovative with promising amendments. In addition to this, the tutor did count on the formative assessment as well as the summative assessment (pre and post-tests) whilst instructing, for instance, in-class activities, homework, and projects. Likewise, she observed and monitored the students' writing performance and their linguistic deficiencies during the whole intervention phase (teaching plus evaluation).

For the simple reason that the ability to write in English is very substantial for both educational and occupational needs. In professional domains, the necessity to write in English has become prerequisite for all careers, since it permits citizens from numerous backgrounds and cultures to communicate through reports, scientific papers, e-mails, letters, websites, etc. When teaching English at the Computer Science Department, an essential part of ESP courses is allocated to translation sometimes so as to assess the learners' writing production. However, ESP students had deficiencies in writing composition. For this reason, Masters' language teachers opted for translation through using reading relevant articles in the field and translated them from English into French and vice versa, and oral production occasionally to practice the language acquired.

Hence, according to the ESP teachers, the more their students read in the field the more they are likely to produce written passages. As a matter of fact, it is so true, however, ESP teachers did not address their linguistic difficulties along the way with reading to improve writing. Moreover, they considered reading courses and translation sessions as the magical recipe for developing students' writing abilities besides boosting students' classroom motivation. Additionally, the ESP

teachers used tests which assessed both reading and sometimes writing skill as learners were required to write paragraphs or essays to answer the related questions. In a similar way, writing tests, if they had any, would incorporate a lot of reading.

In the current study, however, the tutor did emphasize reading skill in her lectures as it was agreed upon the sound link between reading and writing skills, especially to develop technical writing. She used the writing activities during class time to address the language gaps to write effectively in English for computing purposes. Besides, learners while brainstorming, drafting, and editing in the classroom writing tasks, they would learn from their faults and measure their writing performance through the help of teacher assessment and their peer evaluation as well. On the other hand, once assessing learners' writing production during the instruction time, ESP teacher could put her finger on the specific students language difficulties that hinder students from composing technical pieces of writing to remedy them gradually. Specific writing tasks such as report writing, paragraph composition, describing graphs, giving instructions, etc.

Whether be it at the end of their regular semester or the close of the researcher's intervention phase, ESP learners have to pass an achievement test from which language teachers can identify their language proficiency along with their linguistic strengths and weaknesses. Additionally, the achievement test is carried out at the end of the educational semester as a final assessment to gauge the students' progress after instructional courses as well as to explore the efficiency of the ESP courses provided. In this respect, Hutchinson and Waters (1987:147) declare that:

An achievement test is the kind of test the ESP teacher is most likely to have to construct. More than that, it is also one part of our program assessment because, from the test results, we can find out how much progress the learner has made and how successful the project has been.

(Hutchinson and Waters, 1987:147)

With regard to computer science students' weaknesses, they encounter many difficulties when they are writing in the field. Some reasons behind such difficulties are the lack in the former linguistic background (acquired in the early educational stages: elementary and secondary levels), being uncomfortable when writing in the classroom due to their linguistic inability (faults fear), and the lack of practice in their spare time. Their major lacks in the target language mastery are certainly anxieties that they have about mainly organizing ideas (textual knowledge), lexical lacks (choice of lexis in the domain), grammatical difficulties (tenses, adjectives, adverbs, etc), and semantic problems (vocabulary significance in precise contexts). For these reasons, ESP learners are usually students who already have some shortages with English and they are learning the target language so that to improve the competencies needed to function in a particular discipline, occupation, or workplace. In the same vein, Mackey and Mountford (1978:02) insist that: « ESP is generally used to refer to the teaching of English for a clearly utilitarian purpose ». In order to reach this end, students must be instructed the target language in a way that permits them to communicate a variety of professional skills to execute determined activities linked to either their specialised studies or their occupational functions.

5.2.2.4.4.1 Scoring of Writing Assessment

In this research work, the main focus is assessing learners and their writing abilities. In order to do so, the researcher used tests to measure the students' written progress before and after the intervention period and to analyse the proposed syllabus effectiveness. She evaluated the students' language performance using both single grades and discrete marks. That is to say, when scoring the learners' written production in EFL/ESP situations, teachers opt for different approaches. Among these widely used approaches are analytic and holistic scorings. For this reason, the following lines will clarify the scoring procedures used in the assessment process.

5.2.2.4.4.1.1 Holistic Scoring

In this scoring procedure, language instructors read the entire composition of the students quickly without paying attention to the specific abilities, and then they give a single mark for each product. Its advantages lie in the fact that it is useful when the teachers have many written productions to correct because of the fact that it does not require too much time. Besides, the tutors focus on their students' strengths in writing. Holistic writing, however, has disadvantages as it does not guide and help students to improve in their writing ability as it gives no details about their weaknesses in writing. In this regard, Brown (2004: 243) says that « it provides little washback into the writer's stages of learning ».

5.2.2.4.4.2 Analytic Scoring

In this approach to scoring, teachers examine the learners' written productions with paying attention to various aspects such as grammar, vocabulary, content, spelling, etc. These aspects are marked separately and the discrete marks are collected to get a final mark for the students' written products. It is helpful in the sense that it aids learners to identify their weakness in writing to better their performance. However, it yields some drawbacks like time constraint (Brown, 2004: 246).

5.2.2.4.5 Testing in ESP

Tests in ESP situations are what have been broadly recognized among scholars that language teachers relate to testing their students' acquisition in order to see who are learning as planned and who need help. Hence, the data collected from such a process are assumed to help instructors gaining ideas about the learners' language capacities and skills advancement in the target situation. Tests, as data gathering tools, are instruments for frequent use which are considered as strong procedures for collecting facts about the learners' actual knowledge, level, development, and achievement in language mastery. As stated by Brown (2001:384) that « ... a method of measuring a person ability of knowledge in a given domain...It is a set of techniques, procedures, and items that constitute an instrument of some sort that requires performance or activity on the part of the test taker... ». Thus, testing in

ESP should match the teaching practices methodology in the classrooms. By the same token, Benyelles (2009: 58) has this to say « Testing is oriented toward specific purposes, therefore, the testing framework will have to follow the same methodology, i.e. it is not a test as such, but reinforcement and consolidation of what has been taught ». In other words, testing is the shortest way towards reaching the intended objectives. However, before ESP practitioners conduct learners' testing, they must ask themselves a set of questions to infer the fundamental criteria of testing:

- What is my purpose of testing these students?;
- How is this related to the objectives of this course? ;
- What do I expect this test to show?;
- What precisely is being tested by this method of testing?;
- Am I really testing what my students have been learning?;
- By using these tests am I really finding out what my students know?

Rivers (1968:346)

When answering these set of questions, the language teachers have better monitoring of the main testing standards and they will be carried out practical and systematic testing instruments which will allow them to attain the course objectives. Testing is considered as an analysis process that scrutinises the learners' language mastery for the sake of detecting their linguistic deficiencies to repair their performances based on positive feedback. Consequently, testing as part of assessment and evaluation is an essential operation that identifies the effectiveness of the provided course through learners' progress and performance. As reported by Benyelles (2009:58):

To be able to answer these apparently simple questions means to understand the principles of testing. The assessment allows the teacher to check whether the objectives of the course have been reached. It provides an idea about the level of comprehension and present knowledge of the learners after a lesson presentation. Making use of the fact that a lesson is

a response to the specific needs of the students, the tests assess how much these needs have been satisfied.

Accordingly, testing and evaluation are two fundamental elements in the teaching/learning process. On the other side, tests help language instructors answer the question: have I been successful in my teaching? After each instructional session, ESP practitioners must ask themselves if they have been effective and if their students have understood the instructions presented. As a result, teachers recognize themselves throughout knowing their learners. This can be determined through the use of different types of tests such as proficiency tests and achievement tests. Since tests are important parts of any language program, a test is defined as « a systematic method of eliciting performance which is intended to be the basis for some sort of decision making » (Skehan, 1998:153). It is assumed that in order to study language, learners have to hold the acquaintance of its components. Thus, it is of great value to test the acquisition of these parts. However, sometimes the understanding of the elements of language is not sufficient unless the users are able to communicate using the language, i.e. combining its elements in a way which better suits the target situation in both written or oral forms (Canale and Swain, 1980; Canale, 1983; Bachman, 1990).

Task-based testing indicates an emphasis on language mastery which means criteria-referenced performance rather than a relative performance that is norm-referenced. This type of testing is strongly recommended for classroom practising time since it highly motivates the students' engagement and understanding of the instruction. Otherwise stated, criterion-referenced tests give information about what the learner can perform using the target language, however, norm-referenced tests provide data about learners at the end of courses (McLean 1995:146). Thus, any language instructors are asked to think about specific types of texts while constructing their tests. The reading passages in tests need to be authentic or based on authentic texts sometimes illustrated with pictures, charts, and diagrams. For instance, a typical test may contain 'text tasks' which means questions related to the texts, 'short questions', 'gap-filling', etc. The researcher in the evaluation process

relied on some of the given tasks in the constructed tests. This is one way to achieve 'construct validity' that implies assessing how well tests measure the constructs (Bachman, 1988). In this regard, the tests developers need to set up a framework within which the test might be designed. That is to say, they are asked to determine the purpose of their evaluation procedures and the target population to be given the tests for more valid data.

In view of this, testing and evaluation must be undertaken in conformity with the teaching content and objectives. Thus, there exist numerous forms of testing such as written presentations, classroom discussions, in-class activities, etc. Tests in ESP examine the validity of the teaching techniques being used as well as the knowledge learnt by each learner. By the same token, Heaton (1988:07) reported that « a test which sets out to measure student's performance as fairly as possible without in any way setting traps for them can be used to motivate them ». By setting specific testing objectives according to the students' communicative needs, students will hold positive attitudes towards testing. This answered the two questions often asked by ESP practitioners 'what and how should we test?'

Moreover, are the language instructors engaged in testing the learners' knowledge of a specific discipline or are they testing language mastery? In the current research work, the test provider/researcher checked the students' ability to communicate in a written form. This implies the assessment of content knowledge, language performance, communication capacities used properly. Hence, the researcher was involved in language use, especially writing skill, in the specific related areas of the students' specialism. For instance, the reading materials used in tests (post-test) help evaluating the linguistic aspects of language through different types of questions (WH-questions, matching questions, etc) which interpret the text given from different perspectives (lexical, grammatical, linguistic, situational standpoints).

As for communicative needs of learners, while teaching a content-based instruction, Wesche and Skehan (2002: 222) have this to say « content-based instruction or teaching is, by definition, a “strong” form of communicative language

teaching, where the primary goal for learners is to develop mastery of subject matter and fluency in speaking and writing in “language-sensitive” content courses ». Thus, identical to CBI, content-based assessment covers assessment in which language and content are assessed together (McKay, 2006) and the assessment of a given language skill, say, writing, involves the testing of a series of operations (i.e., subskills: vocabulary, its meaning, grammatical structures). In this view, the test activities used in content-assessment must relate to the exercises students have performed in the classroom activities. In the current evaluation, the language and content were incorporated into both in-class practices and tests items so that students were familiar with the topics of tests and they did not find task contexts impertinent to the courses.

As part of the test construction in the current evaluation, the investigator considered the principles of testing using reading comprehension questions viewed by Weir and Huizhong (2000) in the administered post-test. These essences of testing reading were ‘topics of texts must be familiar to learners in order to avoid potential bias triggered by topic awareness’ and more important ‘different reading passages can be used to permit the testing of several kinds of skills’. The inquirer applied in the given tests activities and content that were closely related to the students’ field of specialism and well known to all the test takers. Consequently, she corresponded the content-based with task-based testing to be in agreement with the teaching/learning practices at the instructional sessions. The computer-based texts used in the tests aimed at facilitating the reading comprehension of the tasks questions as well as examining the learners’ attitudes towards the tests, i.e., whether they activated the learnt knowledge in the provided courses very well, or not.

5.2.2.4.6 Tests Types in ESP

Tests as a means of data collection in the ESP field, they possess different roles to play in the teaching/learning situation. Moreover, there are several rationales for incorporating tests in any language course. Tests provide students with information about their learning accomplishment. Also, they give instructors in-depth insights into their learners' acquaintance of language. In addition to this,

tests mirror the effectiveness of teaching methods and techniques so that to repair their students' learning and their instructional practices. For these reasons, there are numerous types of tests for several purposes in EFL/ESP contexts. As asserted by Valettes (1977:06) that « achievement tests are designed to measure the effect of a specific programme of instruction or training; whereas, proficiency tests aim at determining whether the student's language ability corresponds to specific requirements ».

5.2.2.4.6.1 Diagnostic Test

This type of test is the first undertaken procedure that each language instructor takes at the start of his/her course of instruction. As its name implies, it diagnoses the students' strengths and weaknesses in order to facilitate the teachers' practices. Besides, diagnostic tests help to reach the learners' demands through providing opportunities for in-class tasks which better suit their level. These tests have certain objectives like (a) provide learners with a way to start learning with their learning programme or what would be called in the literature of testing learning paths (b) provide learners with a way to test their knowledge of a language. (c) provide learners with better information about their strengths and weaknesses (Benmostefa, 2013:20). For Underhill (1991:14) « a diagnostic test provides the student with a variety of language elements, which will help the teacher to determine what the student knows or does not know ». In sum, a diagnostic test is an educational technique which EFL teachers, not least ESP instructors use at the beginning of each new academic year to identify the students' level, weaknesses, strengths, teaching goals and objectives.

5.2.2.4.6.2 Placement Test

This test emphasizes the testing of learners in order to place them into specific groups of the same level. As reported by Hughes (1989:7) that « this type of test is also used to decide which group or class the learner could be joined to ». As a matter of fact, it places students at a convenient level in a study program or course of instruction. In the same vein, Carroll (1980:75) asserts that placement test is used « ...to assess an applicant's language level so that he can be placed in a class

suitable for his abilities ». Consequently, its purpose is to sort students into groups in line with their levels. According to Hutchinson and Waters (1987), a placement test is used to ‘put’ learners in the ESP course most suited to their demands. It usually comes at the beginning of the course. For this reason, it is very essential for ESP practitioners to have ideas about their learners’ abilities for the purpose of assuring the thoroughness of the teaching operation. This type of test helps to identify the sort of course needed and the best instructions that serve the students’ demands. Placement test gives clear insights into the learners’ state of knowledge (lacks, necessities, strengths, etc), linguistic aspects (vocabulary, grammar, etc), skills (writing, reading, etc) before the start of the ESP course. In other words, the placement test is formative in value terms, i.e., it aids the tutors to specify the ‘what’ (the content of the lessons) and the ‘how’ (the instructional method) so that to meet the expectations of both ESP parties, tutor and learners (Hutchinson and Waters, 1987).

5.2.2.4.6.3 Proficiency Test

The proficiency test is handed over to students to gauge their capacity to use the language. Put differently, it is designed to examine the learners’ language competence. For Hughes (1989:10), he presented a corresponding significance of proficiency tests noting that « training is not the thing that it is emphasised, but the language itself ». He put further that « proficient in the case of proficiency tests, means possessing a certain ability to use the language according to an appropriate purpose». In this respect, setting the standards of testing is a primacy in several stages, every single item is linked to a given linguistic aspect. Furthermore, Harrison et al. (2016:270) proclaim that « the aim of a proficiency test is to assess the student’s ability to apply in actual situations what he has learnt ». As a result, this type of testing is developed to assess language capacity as a whole. This type of test is considered as a summative in its essence. It combines between students’ prosperous learning experience and their accomplishment of the language requirements for the target situation. Thus, language instructors administer a proficiency test at the end of a given instructional period, unit, semester, curriculum, or as in our case a designed course. Its aim is to assess the resultant

learning and skills acquired by the learners. As being a summative test in nature, Abbot (1981) points out three main norms demarcating the summative tests : (1) the tests, assignments, or projects are used to ascertain whether learners have acquired what they must learn, (2) summative tests execute at the end of a particular instructional duration, and ergo they are considered mainly as evaluative, rather than diagnostic, i.e., they are more adequately applied to deduce the learning development and accomplishment of the students, (3) summative tests results are noted as grades which are registered into the students' constant educational record.

5.2.2.4.6.4 Achievement Test

This test is also named as attainment test, it is administered at defined terms throughout the academic year; at the end of a course, program, instructional period as an eventual exam. In conformity with Genesee and Upshur (1996:153), « achievement tests provide information about student attainment in relation to instructional objectives or a defined domain of language ». Moreover, achievement test has essential results for students, it guides teachers to judge whether learners achieve success in learning a study program or they fail. Dyer (1995:456) reports that « an achievement test is in effect a sample of all the kinds of tasks that a given course of study is striving to get students to master ». As opposed to the proficiency test which determines the mastery level rather than inferring students to pass or fail the exercise. Along a similar vein, Davies and West (1984 qtd in Hutchinson and Waters, 1987: 149) stated that « proficiency testing designed to assess whether candidates will be able to perform the language tasks required from them ». These kinds of tests provide language instructors with adequate data about the sort of achievement attained by each student and to take decisive judgements about their learning. On the grounds of achievement test outcomes and results, a conclusion is made about learners' success or failure. In other words, Alderson and Hughes (1981 qtd in Hutchinson and Waters, 1987: 147) elaborate that achievement test should not go along with extrinsic authorities, but rather has to mirror the essence and content of the course itself. They added a set of elementary bases so as to be taken into account while constructing tests in general and achievement test in particular: (a) test what you can reasonably assume the learners have learnt, (b) your test

should test what you actually want it to test, (c) avoid bias in the test, i.e., the important point is that getting the correct answer should not depend on specialist subject knowledge outside the material used in the test (p.147). These principles assure the accuracy and efficiency of such tests and they guarantee the specification of the test content, skills, and items. In sum, one can deduce that all these ESP tests types help language tutors to form and gather adequate information about their students' learning. In the current evaluation operation, the researcher in her turn used an amalgamation of these given ESP tests types in her pre and post-tests to collect as much valid data as possible about the students' language and writing abilities.

5.2.2.4.7 Attributes of ESP Tests

Tests in ESP, or general EFL/ESL study programs must contain definite content and techniques and encompass specific activities which need to be performed by the ESP learners. Consequently, ESP tests as data collection instruments in the teaching/learning process, language teachers rely heavily on the analysis of these tests outcomes. According to what stated by Douglas (2000:19), ESP test is;

A specific purpose language test is one in which test content and methods are derived from an analysis of a specific purpose target language use situation, so that tests tasks and content are authentically representative of tasks in the target situation, allowing for an interaction between the test taker's language ability and specific purpose content knowledge, on the one hand, and the test tasks on the other. Such a test allows us to make inferences about a test taker's capacity to use language in the specific purpose domain.

Thus, a test in ESP situation must to some extent reflect the tasks in the target situation, i.e., the test activities have to be authentic and relevant to the specific content knowledge of every specialism in ESP domain. Stated differently by Moss (1994:06) that « there cannot be validity without reliability or sometimes the border between these two notions can just blur; while a good test should be efficient as

well». Therefore, both these two terms ‘reliability and validity’ are of great value in the test construction. Moreover, tests must possess some attributes which make them more sound and credible. Reliability, validity, authenticity, bias, and practicality are the characteristics of a good test.

5.2.2.4.7.1 Validity

One of the testing characteristics is validity. Validity means the fact which implies it gauges what it is supposed to be gauged. It examines what it should test. As a matter of fact, it is closely associated with the degree to which the test achieves what it was administered for. According to Pilliner (1973: 30), validity refers to «the extent to which it does what it is intended to do ». In other words, validity is strongly linked to the essence of the notion that what is examined, is mirrored in the test end outcomes. Tests, in general, require students to perform a task or an activity. As a result, a valid activity ought to reflect knowledge or performance. That is to say, tasks performance needs to be relevant to what is being assessed (ability to write, to read, and to infer the meaning from a context...). It falls to the language teachers to think critically about the background knowledge of the learners in the classroom during the process of assessment so that to avoid discrimination in testing their performances. In brief, tests should reflect the purpose for which they are originally developed and test takers have to share the same background knowledge before the administration of the test (Harmer, 2001). Hence, there exist numerous forms therein validity can be assessed and it is very vital for instructors to recognize and sense the genuine significance of validity. Yet, language tutors in order to be confident about having a valid test, they need to distinguish the five kinds of validity according to Weir (1990:22):

- 1- **Construct Validity** is related to the extent to which proof can be found to promote the implied notional construct on which the test is based. According to Weir (1990:22), «construct validity is a theoretical concept that involves other types of validity ». Therefore, construct validity is a test that measures a construct.

- 2- **Content Validity** is the degree to which the content of a test can be said to be adequately representative and thorough of the purpose for which it has been developed. In other words, it is the degree to which the content of the test coordinates with the instructional objectives. In this vein, Flavell (1983 :11 qtd in Benmostefa, 2013 :73) asserts that :

The content specification is important because it ensures as far as possible that the test reflects all the areas to be tested in suitable proportions and also because it represents a balanced sample, without bias towards the test material which happens to be available.

- 3- **Face Validity** means the degree to which the test is considered to mirror the intended purpose. In this regard, Weir (1990:22) has this to say «it is not theory or samples design. It is how the examinees and administration staff see the test: whether it is constructed and content valid or not ». Hence, face validity is about test relevance and its evaluation by test takers and testees. Moreover, both notions ‘face validity’ and ‘content validity’ stress the fact that the test activities are related to reality. As posited by Bachman (1990:307) that « face validity is the appearance of real-life; content relevance is the representation of real-life». On account of this, the two notions refer to authenticity that means the extent to which test activities reflect the language usage in real-world situations.
- 4- **Criterion- Related Validity** implies the extent to which the test results agree with those previous or forthcoming test scores of students' performances. As defined by Weir (1990:22) that « ...it is connected with test scores link between two different performances of the same test: either older established test or future criterion performance ». As a result, it is about the interrelationship which occurs between the end outcomes of two tests.
- 5- **Wash-back Validity** simply refers to the impact of testing on both instructional practices and students' learning experience. As reported by Hughes (1989:01) that « it is the effect of testing on teaching and learning

process. It could be both negative and positive ». It denotes whether the teaching/learning process succeeded in achieving accuracy along with the intended objectives or failed.

5.2.2.4.7.2 Reliability

Reliability is closely connected to regularity, coordination and dependability. In agreement with Miles and Huberman (1994:278), reliability is «whether the process of the study consistent and reasonably stable over time ». This refers to the fact that reliability is accuracy, firmness and consistency of the test results. Put another way, students ought to have the same results after various tests, identical outcomes and stable grades in several tests. According to Nunan (1992:14), «Reliability refers to the consistency of the results obtained from a piece of research ». Furthermore, reliability is linked to the quality of the test scores. It is considered as the degree to which testing is persistent and constant overtime to gauge learners' proficiency. Owing to the fact that test takers have to obtain similar scores in different tests, language tutors ought to use intelligible instructions in tasks with providing relaxing testing atmosphere. In doing so, some test designers argue that tests should be marked by more than one tester in order to avoid subjectivity (Harmer, 2001). In Linn and Miller's (2005) words, reliability refers to the consistency of measurement. There are psychological factors which may affect students' performances, for instance, the case of the learners' anxiety, loss of memory, fatigue, etc. Consequently, oral presentations sometimes while testing form a hurdle for students due to the fact of being anxious. For this reason, this can affect the validity of scores, on the contrary, written tasks like in our case can be more valid and increase reliability.

5.2.2.4.7.3 Authenticity, Practicality and Bias

First of all, authenticity means the degree to which test activities mirror the language used in a real situation. Simply said, the authentic test requires to use target language tasks, i.e, the language of the test should reflect everyday discourse in real-life situations (Brown, 2001:43). As a result, authenticity is accomplished once the test results give information about the students' capacities to execute the

language in actual situations. Tests in ESP need to be authentic as much as possible (Larsen-Freeman, 2000). In our research work, a test task asked students to write down a short essay about how to program a computer; this type of question is highly authentic since it represents a real-life activity. Furthermore, this test item gauges the students' specific writing abilities which is our main concern in the study. The real-life tasks were incorporated even in classroom practices to motivate and prepare students to execute the language in actual situations. However, language teachers are not asked to be involved in testing the scientific knowledge of the students, but what is important for ESP teachers is to assess the grammatical sentences, and specialized vocabulary used.

Next attribute is practicality which is about the ease of administering and scoring tests. The practicality resources are test designers, providers and material supplies like papers, money, time, physical settings for administration. Furthermore, a sound test needs to be adequate in length for the allocated time, comprehensible by the testees, readily scored and well-developed, managed and administered (Brown, 2004:19). Bias, on the other hand, refers to the test aspects which systematically affect the majority or entire learners. As an illustration, to treat learners on the grounds of their religion, gender, and ethnicity is a kind of bias (Longman Dictionary, 1987). Therefore, testing instruments must not be established on subjectivity or bias, whereas, tests tasks need to be objective and having the status of equity (Gipps and Murphy, 1994:77).

5.2.3 Evaluation Layout

Starting from needs analysis process as a case study design, then the researcher moved on to an action research design to carry on her investigation and implemented the developed course. Thus, the intervention procedures comprised of the instructional period and the evaluation intervals to check the implemented courses effectiveness. The researcher opted for tests along with a focus group discussion as assessment instruments. Pre and post-tests were undertaken before and after the courses of instruction, as well as the focused interview was conducted to consult students' views about the teaching atmosphere and courses content. The

following diagram (Figure 5.4) summarizes the different stages carried out in this research work.

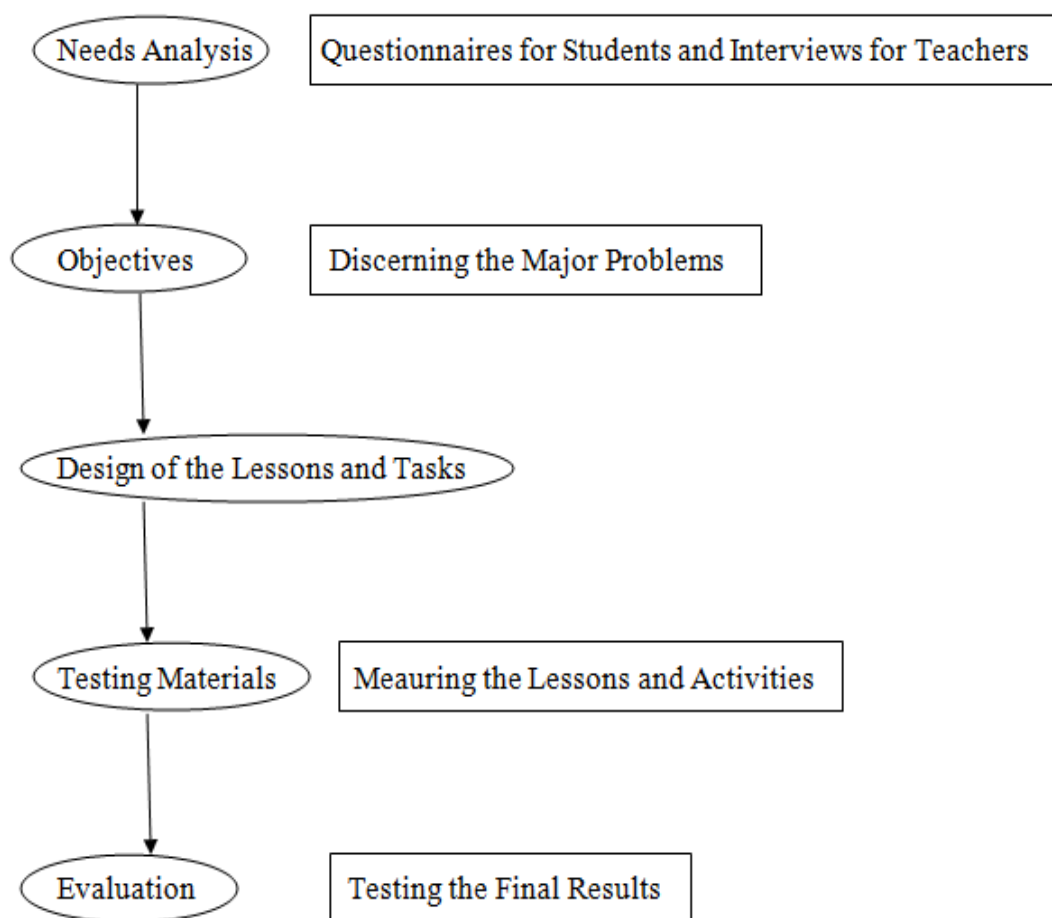


Figure 5.4: Research Work Outline

5.2.4 Evaluation Instruments

Evaluation tools in any ESP context have to be designed by the instructors. It is the ESP practitioners' role to design both the teaching/learning materials and afterwards to assess how well these materials have achieved the intended objectives. For doing so, the investigator has selected the content of his evaluation tools in collaboration with other ESP teachers and subject specialists. The study used a testing design to see how much the students had learned from the courses. The tests were designed by the investigator and piloted before the course, and administered at the pre-test and post-test stages. With regards to the content of the tests, their

themes correspond with the students' content courses. That is to say, the themes used to correlate with the given lessons purport.

Similarly, the inquirer has emphasized in the first test on assessing the general technical essay writing abilities. Students were asked to write a comparative essay⁴² which compares and contrasts numerous aspects of the subjects in question. The first test was conducted before the instructional phase to discern precisely the students' writing difficulties in general and linguistic competence shortages (vocabulary, its meaning, and grammar) in particular. It was piloted beforehand to see if it is clear or ambiguous. As a matter of fact, both tests were piloted before the intervention phase with a number of students (seven students) out of the population in order to check if students can answer the related tests questions and to identify what they cannot understand. Piloting the study stresses the fact that it permits the researcher to gather feedback about how the procedure works and whether it executes the role it has been developed for or not (Dornyei, 2007:63). The piloting outcomes allow the investigator to elaborate more adequate testing materials in cooperation with an ESP teacher and a subject specialist.

The second test, on the other hand, has been also based on computer-based themes. The focus has been put on one of the crucial controversial topics in computer science domain, i.e. the confusion between programming languages and markup languages⁴³. That is why the post-test was a reading comprehension test to explore the effect of the instructional courses on students' technical writing proficiency. The second test was undertaken certainly after the intervention period at the end of the given sample lessons. The results obtained from the second test help the teacher/researcher to detect whether learners' scientific writing capacity shows any progress. That is to say, the researcher tends to compare the students' competences before and after the intervention through contrasting the results of both

⁴² **Comparative Essay** is a composition made of many paragraphs that try to explain how two subjects are either similar or different.

<https://www.aresearchguide.com/write-comparative-essay.html>

⁴³ A **Markup Language** is a computer language that uses tags to define elements within a document. It is human-readable, meaning markup files contain standard words, rather than typical programming syntax.

https://techterms.com/definition/markup_language

tests to draw a conclusion. The post-test contains one block paragraph speaking about the markup languages such as SGML (Standard Generalized Markup Language), HTML (HyperText Markup Language), and XML (eXtensible Markup Language) used to create web documents. These types of languages (metalanguages⁴⁴) use instructions, known as markup tags, to format and link text files.

For the sake of meeting the students' level of language proficiency, the text, chosen as further specialist reading to continue the programming/data programming lecture, provided in the post-test, this text has been adapted to fit appropriately their learning and target needs. The text words which comprise the sentences are both technical and sub-technical lexis like extensible language, metalanguage, browser, parse, etc. By this token, one can say that this type of vocabulary is part of Baker's (1988) initial sort of expressions and words that are technical or semi-specified and sometimes common to all specific disciplines. The reason behind such a wording choice is to keep students away from confusion and misapprehension in contemplation of the investigator.

Determining the several tests objectives and items helps the inquirer to recognize the way the tests are formed. Furthermore, the investigator is asked to infer how tests are constructed for the purpose of ensuring the validity and reliability of the collected information. The researcher took into account certain criteria before constructing the intended tests. These criteria are proposed by Cohen et al. (2007:418) as follows: first of all, the purpose of the tests which refers to the rationale behind carrying out these tests. In other words, the study objectives are presented in the pre-test as identifying the students' written difficulties and exploring the effectiveness of the instructional courses in the post-intervention phase. With regard to the types of tests given, which are a placement test as a pre-test to diagnose the ESP teaching/learning hindrances, especially the writing inadequacies (placement test combined with a diagnostic test). Additionally, the

⁴⁴ A **metalanguage** is a form of language or set of terms used for the description or analysis of another language
<https://www.lexico.com/en/definition/metalanguage>

post-test is an achievement test to check the students' language proficiency (achievement test incorporated with a proficiency test).

The tests objectives are closely related to the content of the tests, i.e. the tests items can be discerned easily. More practically, the diagnostic test (pre-test) objectives are as follows: (1) to unveil the students' strengths and weaknesses while writing technical passages, (2) to determine the reasons behind the students' writing difficulties, (3) to identify the content of the syllabus of the developed courses based on the students' learning and target needs after the needs analysis process. In terms of the achievement test (post-test) objectives, are recapped in the following: (1) to gauge the students' writing proficiency whether it shows any progression, (2) to reveal the course efficiency, (3) to examine whether the students' writing difficulties and linguistic lacks (vocabulary, meaning, and grammar) still remain.

The tests check the students' linguistic competence to write technically in the discipline. For this reason, the content of tests, i.e. tests items address certain questions in both tests to meet this goal. The questions range from essay writing questions to test the overall writing ability of the students. Besides, the matching vocabulary with its meaning, fill in the gap with the correct form of the verb, reading to obtain information as the main questions to gauge the precise linguistic competence (lexis, its meaning, and grammar) in addition to the reading comprehension capacity which is the backbone of the writing skill.

The pre-test goal was to check the writing skill of the computer science Master 1 students while illustrating using specific terms to compose (terms related to a computer network). On the other hand, the post-test goal was to test the writing skill along with the linguistic aspects (lexis, grammar, and semantics) provided in the sample lessons in the mould of reading comprehension questions test (Markup languages). The reading comprehension test (post-test) has been adapted from the type of reading tests (Mackay and Mountford, 1978) combined with an essay writing question at the end. Its questions were namely dedicated to comprehension questions (reading to get information and infer meaning) plus a grammatical

activity. These questions help students have a wide view of the content of the text and recognize the text functions as a linguistic entity.

The questions used mainly in the post-test and pre-test were a combination of factual questions and inference questions. The earlier questions are linked to what is mentioned in the text. Answering these kinds of questions aid the learners to boost their engagement and self-confidence while composing their response. They would be more motivated and relaxed to answer the remaining questions and completing the test. The inference questions, on the other hand, are used to test the students' capacities to infer meaning and conclusions from the given text, i.e. their deduction abilities, especially while performing the essay writing task at the end of the test (post-test). This variety of questions is selected to compare whether the students were able to respond using different cognitive and reading strategies in order to compensate for their linguistic lacks and weaknesses while writing technical passages.

The researcher opted for an essay writing task as the main type of questions to test the technical writing ability of the students in both tests, mainly in the pre-test, and as a part question in the reading comprehension test (post-test). For the simple reason that they already have an idea about essay writing activities even before the intervention phase (pre-test), it reflects what had been taught (writing paragraphs), examines whether the students use the instructional background knowledge while writing technically or not. The inquirer did not use report writing, for instance, since they need to study the whole designed programme (five units) in order to be able to compose scientific reports in their discipline.

Equally important, the test items in every test need to hold discriminability and difficulty levels. Discriminability refers to the fact that tests aim at discerning between scores of two different examinations in order to compare students with each other. Thus, it is linked to the fact of discriminating between students' performance in two several tests and to discover whether students have acquired the specific body of knowledge. That is to say, if learners achieve very well or very poorly the intended objectives (Cohen et al. 2007:424). Concerning item difficulty,

this aspect is related to the difficulty level of the test. Consequently, it is which task or question is more adequate to the set objectives. Thus, 'if an objective is easily achieved then the test item should be easily achieved; if the objective is difficult then the test item should be correspondingly difficult' (Cohen et al. 2007:424). As a result, the investigator adapted the content of the tests to the predefined objectives using a medium level of difficulty while constructing tests items.

Another important element to be taken into account when constructing a test is the test format. The inquirer needs to ensure that the given tests are administered in a well-written layout with clear colours in order to be understood. As regards to the test instruction, the investigator is required to provide comprehensible questions so as to enable the students to understand what to perform and how. Also, the order of the test questions requires to be presented from easy to difficult items. In simple terms, the sequence of questions may have an effect on the students' responses.

The research emphasizes the collection of valid and reliable findings from the evaluation procedures (tests and focused interview) undertaken after the intervention period. Concerning tests, they need to represent the main issue covered in the study (writing proficiency) to be given to the research sample, i.e. this is one way to ensure content validity (Cohen et al. 2007:137-138). That is to say, she tended to include as many linguistic aspects as possible within the tests items to write scientific passages so that to check the students' competence related to morphology, syntax, and semantics. On the other hand, face validity is concerned with 'examining what it is designed to test' (Cohen et al. 2007:163). The investigator made sure that the tests are relevant to the overall objectives of the research study. Otherwise stated, the formulated questions are closely related to the linguistic aspects (lexis, meaning, and grammar) to explore the writing capacities of the students in their field of specialism.

Speaking about reliability, it is viewed as consistency. In other words, it is the stability of the test results, i.e. it means that approximately the same results are obtained by the same learners in the same context when tested several times (Cohen et al. 2007:146). In this study, the researcher can ensure this statistical item by

calculating it using percentages (the proportions of the answers), measures of central tendency (used for the analysis of data collected from tests which are mean, median, and mode), standard deviation (is a statistic that gauges the dispersion of a dataset relative to its mean and is calculated as the square root of the variance⁴⁵), frequency distribution (the arrangement of score values from high to low and score values above or below the average), t-test (to check the validity of all the statistical results using the t-test). These statistics or the descriptive statistics used in this study « are the most widely used measures in research reports and papers » (Calder and Sapsford, 2006). Furthermore, any statistically-based research along with a quantitative data analysis require depicting how the participants performed on each test by means of “descriptive statistics” and “graphic representations” to “understand the logic behind experimental evaluative research” (Nunan 1999: 28).

The researcher administered the tests to 30 students per each test (pre and post-tests) 60 students took part. The sample population of the evaluation phase differs from the needs analysis process and the instructional period. The number of informants in the questionnaire (needs analysis) was 40 learners, however, the total of students presented in the teaching practices period remained approximately similar in the courses of instructions (20 to 30 students each session). On the other hand, the students who participated in the testing procedures were 60 informants (30 students per test). Besides, only 12 students from both Master 1 specialities (RSD/SIC) agreed to take part in the focused group discussion to consider the pros and cons of the provided courses, i.e., their attitudes and reactions to the lessons content and teaching practices.

Worth noting at this level of analysis that, in fact, the pre-test was carried out before the intervention phase as an examination of the first semester (February 2019), ‘technical English exam’, so that the two Master 1 specialities (RSD and SIC) passed the exam. This means that the whole group members took the test since it is an official term exam, i.e. RSD whole students were about 33 and SIC

⁴⁵ **Standard Deviation** is calculated as the square root of variance by determining the variation between each data point relative to the mean.
<https://www.investopedia.com/terms/s/standarddeviation.asp>

informants were 37. However, the researcher did stress only random selection and correction of 15 papers from each speciality to have an equal number of participants in comparison with the post-test papers. For the reason that only 30 students from both specialities (15 from each branch: SIC and RSD) passed the post-test at the end of the intervention phase since only a few students attend the regular courses. Owing to the fact that the post-test was a continuous form of assessment during the ordinary sessions, not an official examination, only the presented students answered the achievement test. The pre-test and post-test were formulated in collaboration with the ESP teacher and subject specialists to determine the strengths and weaknesses of the students' writing production after and before the teaching practices.

Speaking about the marking scale and scoring, it is agreed that both tests are out of 20. Essay writing in the pre-test emphasized the structure of the essay (the form of an essay (10 pts), introduction (1.5pts), body paragraphs (5pts), conclusion (2pts) 10 out of 20, and ideas/content knowledge, i.e. the fact of using computer science terms in the essay is out of 10 (+0.25 pts for every specialized term used). Grammar was given importance as well since the more grammatical mistakes students made the more minuses they would get (-0.25 pts for each mistake) (pre-test correction, Appendix G). On the other side, post-test in the form of a reading comprehension assessment with essay writing at the end is out of 20. Once again, reading comprehension questions are out of 4.5, lexis task (matching terms in the table) is 3.5 pts, grammar activity is 2 pts, and the final specific essay writing is out of 10. Essay writing at the end of the post-test is divided once more in the content (4pts), grammar (1.75pts), lexis and spelling (1.25pts), meaning (context, word choice, etc equals 1 pts), the form (paragraphs out of 2 pts). Hence, the teacher tends to give all questions related to linguistic competence, reading comprehension, forms/structures, content/ideas, and inferring meaning equal marks so that to give equal importance to every language aspect translated in the tests items. What is more, these tests had been scored by two raters, namely the ESP teacher of Master 1 computer science students (ESP teacher in charge of RSD/SIC specialities) and the researcher herself. For the sake of understanding the several aims and objectives of

the tests used during the evaluation stage, i.e. before and after the intervention phase, it is of great importance to introduce each test separately.

5.2.4.1 Pre-Test

For quantitative data gathering, tests are regarded as the most powerful procedures of data collection (Cohen et al. 2007). They carried on saying that « ...an impressive array of tests for gathering data of a numerical rather than verbal kind » (p. 414). Tests help the investigator to collect more numerical and statistical information about the inquiry issue. Testing in this study aims at exploring several specifications at the site under investigation which the inquirer targeted at and gathered information about. The research work in its second part was action research therein two stages took place. That is to say, a pre-intervention phase with a pre-test used to examine the students' overall writing ability in their domain and discovering their writing hindrances. Afterwards, a post-intervention phase which used a post-test to gauge the impact of the intervention phase on students' writing proficiency.

The pre-test was a combination of a placement test and a diagnostic test in the form of a scientific essay writing test. The purpose behind such a test was to spot whether students were able to write a technical passage comparing the numerous sorts of computer networks. By doing so, students were portraying the set of linguistic competence features. Consequently, the gathered information from this test aids the investigator to expose the linguistic aspects which students cannot fulfil and may have an influence on their technical writing abilities. The numerical data obtained from the pre-test support the researcher interpretation of the several writing difficulties that hinder students from composing scientific writings in computer science. In other words, it evaluates the students' technical writing mastery before taking part in the intended study program. Besides, the information gathered from this test provides the researcher with data on how these students progress at the end of an ESP course. The researcher constructed the test with another ESP teacher and the assistance of the subject specialists to have closely related content to the computer science domain. They tended to adjust the test

constructs in conformity with the purpose of the study. As reported by Hutchinson and Waters (1987:146):

The aim of the placement test is to determine the learners' state of knowledge before an ESP course begins. In so doing it should indicate firstly whether the learners need the course at all and secondly, should a need be indicated what form, of course, should take.

The timing of the pre-test means two areas: when students would take the test (the day, month of the test), and the time allowances to be given to the test and its constituent items (Cohen et al, 2007:429). The pre-test took place February of the academic year 2018/2019 as an official examination. The time allocated to complete the test (essay writing) was one hour and a half (1h 30mnts). With regards to the test timing, is a chief part of reliability which may have an impact on the students' performance (Ibid). The researcher's goal behind such a pre-test timing (as an official exam) is to get many participants involved in the pre-intervention stage (more writing compositions to be analysed) to detect their writing strengths and weaknesses as she knows beforehand that only a few students from both Master 1 specialities attend the regular ESP sessions. In other words, for more reliable and valid research findings collected from a sufficient number of the sample population.

The pre-test was a comparative essay writing which emphasized on evaluating students' knowledge and skills linked to linguistic competence (vocabulary knowledge, semantic abilities, and grammatical skills) for composing technical writing. The reason behind such choice of testing is stated by Cohen et al, 2007: 428) that:

an essay, as an open form of testing, enables complex learning outcomes to be measured, it enables the student to integrate, apply and synthesize knowledge, to demonstrate the ability for expression and self-expression, and to demonstrate higher-order and divergent cognitive processes.

Moreover, essay writing fits exactly the purpose of the study in its start (pre-intervention stage) as it demonstrates the students' ability to write in the discipline

(Lewis 1983; Cohen et al. 2004: ch. 16). At the very beginning, the investigator needed to situate the students' writing abilities, and essay writing is the short direct path to reach this target. On the other hand, for more reliable essay writing testing outcomes, the researcher took into account the following criteria:

- ♦ The essay question must ensure that it is clearly linked to desired learning outcomes and that it is clear what behaviours the students must demonstrate.
- ♦ The essay question must indicate the field and tasks very clearly (e.g. 'compare', 'justify', 'critique', 'summarize', 'classify', 'analyse', 'clarify', 'examine', 'apply', 'evaluate', 'synthesize', 'contrast', 'explain', 'illustrate').
- ♦ Time limit is set for the essay writing test.

Cohen et al (2007:429).

The pre-test is divided into three main tasks. All the tasks are closely related to essay writing. The test was based on an essay testing item. The three tasks are constructed to help the students write a coherent essay. Then, students were asked to compare the portrayed computer networks while giving examples using the given computing terms (keywords, see Appendix G). The tasks incorporated into one essay writing test are about the 'different types of computer networks'. For more clarification, the test is accompanied with a descriptive diagram of the several computer networks. The questions in the test focus on the students' linguistic competence to write technically. The objectives of each question are as the following:

Essay Writing Test: To detect the students' linguistic competence

Questions one, two, and three are linked to the composition of a coherent comparative essay. The questions highlight the students' linguistic ability to write such as using related lexis, giving illustrations, using comparisons all along the essay.

Question One: after the main question which states the production of a 'coherent essay', the first task asks students to comment on the given diagram by 'comparing' between the several types of computer networks. The question objective is to determine whether the students can demonstrate diagram understanding through their ability to write comparisons of the different networks or not.

Question Two: secondly, in order to write correctly in the discipline, students were asked to use the given key works (computing terms) like: a computer network, wide, distance, speed, etc. This question is designed to see whether the students can show their linguistic competence, especially vocabulary knowledge (lexis) through using specific terminology while writing paragraphs or not.

Question Three: the last question is making sure the students would use illustrations and examples throughout the writing process. They were asked to 'illustrate with examples'. This question aims at testing the rate of the students' writing abilities and their potentials to exemplify while composing in technical English (comparative essay) since illustrating, arguing, etc are main constructs of the backbone of writing.

5.2.4.2 Post-Test

After the pre-test, English computing courses were implemented in the second semester of the academic year 2018/2019 with Master 1 students (SIC and RSD branches) at Tlemcen University, as the majority of them had taken part in the needs analysis process in the late 2017/2018, the beginning of 2018/2019. The attended students varied from 20 to 30 students maximum from both specialities as most students prefer to leave before they head back to their afternoon sessions since the ESP session is scheduled as the last morning session (from 11:30 a.m to 1:00 p.m, before lunch break). They simply consider the English module 'Technical Englis' as not being an important one.

The administration at the computer science department allowed the researcher to teach for four (4) sessions officially over four weeks (a month: one and a half hours for each instructional session) in order to dispense the designed sample

lessons. Worth noting that the number of sessions is not sufficient to accomplish the whole syllabus objectives. Consequently, the instructor/researcher altered the content of the instructional lessons suitably to fit the courses objectives. Therefore, the researcher administered the post-test after the students finished the four planned sessions. In this view, Richards et al (2002:7) have this standpoint « a test designed to measure how much a language learner has successfully learned with specific reference to a particular course ». In other words, the post-test was a language test administered at the end of the intervention stage so that to gauge how well Master 1 students succeeded in accomplishing the intended courses objectives. The post-test was administered to 30 students during the fifth week. It lasted for one hour and a half (1h 30mnts). For the reason that the post-test is a reading comprehension test composed of reading questions and essay writing task at the end, the researcher decided to give sufficient time for the students to answer appropriately the test questions.

The post-test is used after the instructional period (post-intervention phase) to evaluate the effect of the intervention on students' technical writing proficiency. Moreover, it tends to check the students' ability to fulfil the necessary linguistic criteria (morphology, syntax, and semantics) together with the reading proficiency to compose scientific pieces of writing. Therefore, the post-test was the incorporation of an achievement test with a proficiency test in the form of reading comprehension questions and essay writing at the end of the test. Its aim is to check the students' writing proficiency after the instructional courses. The reason behind such choice of the test (reading comprehension questions with essay writing) is to obtain numerical data that aid the researcher to explore whether students' have developed their writing abilities (essay writing) through using linguistic competence (vocabulary tasks, grammatical exercises) along with evaluating reading comprehension skill as the chief part of the writing process.

Another reason stated that one of the CBI principles is to instruct integrated skills so that the test tasks in content-based assessment need to be linked to the tasks learners had experienced in the classroom exercises. Thus, the content and language

were both unified into both in-class activities and post-test items (Johnstone, 2000). However, with respect to the pre-test items, they were constructed based on the background knowledge of computing (networks) therein students have already plenty of ideas to write about without instructions. Post-test, on the other hand, was in its gist an essay writing task (stages of programming) combined with reading comprehension questions (Markup Languages) to mirror the in-class activities during the intervention phase which emphasized the integration of skills to write in the discipline (reading skill to write technically). Hence, Cohen et al (2007:432) expressed that when devising a pre-test and a post-test to a given group of students, it must possess some guidelines such as:

- The pretest may have questions which differ in form or wording from the post-test, though the two tests must comprise and test approximately the same content, i.e. they contain computing topics. Besides, both tests targets are to measure linguistic competence (lexis, meaning, grammar) while writing technically in the discipline.
- The level of difficulty must be the same in both tests.

In addition to this, the researcher choice was based on Harold's views (1983) which reported that assessing the students' writing abilities can be achieved by using reading comprehension tasks and vice versa. For this reason, the post-test was an evaluation of computing writing through reading comprehension tasks, language work (vocabulary and grammar) and the final task to embody the test aim (essay writing). Thus, the post-test must measure « how specific features such as discourse topic/content, discourse domain ... manifest themselves in the teaching situation » (Selinger and Shohamy, 1989 qtd in Celce-Murcia and Olshtain, 2000: 2003). That is to say, the test types of tasks were previously used in the instructional courses. As a result, a test has to « incorporate a variety of items types that reflect those used in instructional setting » (Chalhoud –Deville, 2010:524). The post-test items help the students recall, analyse, and synthesize what had been learnt in the sample lessons, i.e. different orders of thinking: hierarchies of thinking (Bloom, 1956). The types of test items used in the post-test are reading comprehension questions or we can say

'short answer questions', the specific vocabulary task is in the form of 'matching pairs of items'. Besides, the grammatical activity which is a 'completion items', and finally the essay writing task which is the gist of the test or an open-ended question.

The researcher considered the kind of test items that best fit the objective of the study. As stated by Cohen et al (2007:425) that « the selection of the items needs to be considered in order to have the highest reliability ». For this reason, the researcher's choice of the test items is based on the grounds of 'each item is intended to gauge specific knowledge'. That is to say, to check the students' linguistic competence separately: vocabulary task, grammar task (for each language aspect, a task is devoted) are constructed. In addition to this, a reading comprehension task at the beginning is allocated to measure their reading skill before writing in the discipline as in the integrated skills lessons they had. As reported by Benyelles (1999:24) that testing needs to follow the same specific teaching methodology since it is a consolidation of what had been taught. At the end of the test, a combined form of linguistic testing is constructed again in a form of essay writing where students are asked to write scientifically while using the linguistic criteria learnt previously.

For more test items clarity and distinctness, the researcher modified the post-test questions to certain standards. In terms of short-answer questions or reading comprehension questions were constructed following Hanna's principles of this test item (1993: 139–41): (1) Make the blanks close to the end of the sentence, (2) Keep the blanks the same length, (3) Ensure that students know exactly the kind and specificity of the answer required, (4) Use short-answers for testing knowledge recall. As for the matching items question or vocabulary task, the researcher adapted Hanna's suggestions for more construct validity of items (1993: 150–2) which are:

- Ensure that the items for matching are homogeneous – similar – over the whole test (to render guessing more difficult)
- Sequence the options for matching so that they are logical and easy to follow (e.g. by number, by chronology)

- Avoid over-long columns and keep the columns on a single page
- Make the statements in the options columns as brief as possible
- Avoid ambiguity by ensuring that there is a clearly suitable option that stands out from its rivals
- Make it clear what the nature of the relationship should be between the item and the option (on what terms they relate to each other)
- Number the items and letter the options.

The completion question or ‘the grammatical task’ was adjusted according to Morris’ et al. guidelines (1987) as the following: (a) The number of blanks might indicate the number of words required, (b) The length of blanks might indicate the length of response required, (c) The space left for completion will give cues about how much to write. At last, the essay writing task which is an “‘an open-ended question’ where students are given guidance on how much to write (e.g paragraphs of programming stages)” (Cohen et al 2007: 425).

The post-test results are compared to the data gathered from the pre-test (pre-intervention phase). The distinction between these tests outcomes aid the investigator to check the impact of the intervention on students' writing proficiency development and their linguistic competence (vocabulary, meaning, and grammar) while writing computing essays. The text title of the post-test is 'XML Takes on HTML'. It comprises of one paragraph. It is adapted from *Oxford English for Information Technology* written by Glendinning, E. H., and McEwan, J. (2nd Edition) (2006: 100). It is closely linked to the students' domain, i.e. a computing theme with features that are relevant to the sample population. It was constructed by the inquirer herself, the ESP teacher and subject specialists. It looks after the same criteria which exist in the pre-test. In other words, it highlights questions that emphasize the testing of students' skills and knowledge relevant to linguistic competence, reading comprehension, and as a whole the students' writing skill scientifically.

The post-test is divided into several tasks unlike the pre-test (only tasks related to essay writing). It contains text reading questions, language work questions, and

essay writing questions like the provided courses (see Appendix H). The tasks were adapted from 'the specialist reading activities' in the previous book: *Oxford English for Information Technology*. An adjusted version of the pre-test is used in the post-test to check the students' writing performance at the end of the study program. Owing to the fact that the post-test comprises of a variety of activities unlike the pre-test, for the reason that the post-test variation of activities (text comprehension questions, matching items, completion task, paragraphs writing) is designed to prevent the humdrum in the test (to be the same as the pre-test) and to meet the numerous learning styles. With regards to text reading activity, students were asked to read the text carefully and answer the subsequent questions, i.e. short-answer questions. However, during the language work questions, learners were required to answer some structured questions linked to linguistic competence (vocabulary and grammar). While in the final task, i.e. essay writing question, students were asked to write paragraphs speaking about the stages of programming (technical writing). The test is made of four tasks to test the students' language proficiency. Each task has a specific objective to be accomplished. The questions objectives are reported below:

Reading Comprehension Test: To evaluate the students' linguistic competence

Question one, two, three, and four are relevant to test the students' writing abilities while reading and using the target language (vocabulary and grammar). The questions address the students' knowledge and skills linked to linguistic competence (morphology, syntax, and semantics) while answering reading comprehension questions and writing in the discipline (stages of programming). Table 5.3 below demonstrates the components of the post-test and their objectives.

Reading Comprehension Questions: Short-Answer Questions	- Answer some questions about the text (Markup Language: SGML, XML, HTML and Metalanguages.) <i>Question one:</i> after the students finish reading the text carefully 'XML Takes on HTML', this question tends to gauge the students' ability to understand the text ideas in a particular way. That is to say, it aims at testing the rate of the students' reading comprehension in order to prepare them for the latter tasks, mainly writing activity.

Vocabulary Question: Matching Items Task	- Match computing terms in the text with their meanings, i.e. finding similar meanings of some key expressions (metadata, metalanguage, HTML, XML, markup language) in the text. <i>Question two:</i> it involves the identification of computing terms in the text that students are reading. Once again, its aim is to test the students' reading comprehension not only of the main idea and particular thoughts but also the determination of the text-related keywords and expressions. For the sake of developing the students' specific terminology and its meaning (lexis, meaning: linguistic competence) to write scientifically.
Grammar Task : Completion Question	- Complete the gaps with convenient verbs of some computer terminologies (verbs conjugation: inflection), i.e. simple verbs forms (infinitive and present simple). <i>Question three:</i> in this question, students were tested to see if they can compose the correct verb form in each sentence or not. This question aims at supporting the researcher to uncover the students' grammatical abilities after the intervention phase, i.e., if their grammatical knowledge has been developed or not after the provided courses.
Specific Writing Task: Technical Essay Writing Activity	- Writing paragraphs about stages of programming following the given example of 'how to move a file from one folder to another using Windows Explorer', i.e. writing instructions in a form of small paragraphs on how to write a computer program. <i>Question four:</i> it requires students to write scientifically using what had been learnt before (using relevant vocabulary items and expressions learnt during the course) in the form of instructions writing of computer programming stages. That is to say, it aims at evaluating the students' specific writing abilities after the implementation of the courses along with their linguistic competence. The given example helps the students to understand and interpret the instructions writing model. The researcher's choice of the writing topic 'programming stages' not 'markup languages' because the implemented courses revolve around computer programming, stages, and programming languages. Simply put, the students had already had background knowledge about the topic and they had plenty of ideas to express, not like the 'markup languages which are one part of the computer programming but not essential as what had been presented in the lectures. (stages, languages, etc)

Table 5.3: Post-Test Components and their Objectives

5.2.4.3 Focused Interview

In general, interviews are data collection instruments used considerably in educational researches, not least the ESP inquiries. An interview is oral questions given to certain participants to be answered orally as well while providing more in-depth responses (Gall et al, 2003: 222). As a matter of fact, there exists growing attention to group interviews. The informants' answers were recorded through handwritten notes by the inquirer as in the current fieldwork. With regards to the interview settings, the researcher is the one in charge of the interview situation, plan, time, place, questions order and pace to conform to the surrounding circumstances. Moreover, the interview gives the researcher more comprehensive information about the observed phenomenon since it is a highly adaptive research tool. For other simple reason, interviews can maintain good rapport and solid trust in the research participants.

Interview or conversation is «an ‘inter-view’, an interchange of views between two or more people on a topic of mutual interest sees the centrality of human interaction for knowledge production, and emphasizes the social situatedness of research data », as stated by Kvale (1996: 14). As an interpretation, knowledge obtained from interviews is built between informants. Another fact is that each interview has to have a defined purpose. Owing to the fact that each type of interview holds a different interest and orientation, structure, types of questions, etc. In the current investigation, the researcher adopted the interview type that best fits the study evaluative purpose at its end. Consequently, a focus group interview was the last research instrumentation used to gather the students' attitudes and perspectives of the instructional courses that they had during the intervention stage.

The group interview means addressing questions to a group of people who have been gathered for a particular purpose (Gall et al 2003:238). Moreover, the research choice of the sample population taking place in this kind of interview is based on how much the participants were informed or involved in the experience. In the last stage of this research work, the researcher selected twelve (12) students from both Master 1 specialities (RSD/SIC) who already took part in the previous

processes: needs analysis, the implementation of the courses, testing procedures (pre- and post-tests) to be involved in the group interview. The focused interview was conducted after the post-test procedure, i.e. during spare time session of the fifth week after the intervention phase. It took about one hour and a half (1h 30mnts) of discussion. The investigator recorded the conducted focused interview using a phone audio tape recorder while handwriting notes and key expressions.

For Watts and Ebbutt (1987 qtd in Cohen et al, 2007:373), a group interview holds advantages including ‘the potential for discussions to develop, thus yielding a wide range of responses’. They insisted that such ‘interviews are useful’. They explained that the group interview is « . . . where a group of people have been working together for some time or common purpose, or where it is seen as important that everyone concerned is aware of what others in the group are saying ». Group interview gives rise to a wide range of responses than in individual interviews. However, for some scholars focus groups are ‘adjunct to group interviews’. Focus groups are « a form of group interview, though not in the sense of a backwards and forwards between interviewer and group. Rather, the reliance is on the interaction within the group who discuss a topic supplied by the researcher » (Morgan, 1988: 9). Thus, it provides collective views rather than individual standpoints. That is to say, the informants interact with each other rather than with the interviewer. It is from 'the interaction of the group that the data emerge' (Cohen et al 2007: 376). According to Krueger and Casey (2000:18), focus group interview or focus groups characteristics are as the following:

It is a carefully planned discussion designed to obtain perceptions on a defined area of interest in a permissive, nonthreatening environment. It is conducted with approximately seven to ten people by a skilled interviewer. The discussion is relaxed, comfortable, and often enjoyable for participants as they share their ideas and perceptions. Group members influence each other by responding to ideas and comments in the discussion.

The interview results are qualitative outcomes about the participants' feelings and perceptions that they would not express in individual interviews (Gall et al. 2003: 238). The participants of focus groups initiate the discussion and take responsibility for sharing views to other group members (Kitwood, 1977). The researcher selected a focus group interview to gain the students' attitudes and views of the experience that they went through. The participants gave their self-perceptions of their progress regarding linguistic competence along with scientific writing skill acquired during the instructional stage. Their views were about the implemented courses content (types of tasks and texts variation, etc), the teaching practices (teaching approaches, methods and techniques, etc), and evaluation procedures (tests and interview).

The investigator also addressed the students' spoken language proficiency, i.e. to check their language achievement when they express themselves (written with oral discourses). The interview results enable the researcher to reflect upon the students' unexpected responses related to the learning experience and to test the validity of her proposed hypotheses (mainly the third and four hypotheses). The results were cross-checked with those of the pre- and post-tests findings. This evaluation research tool was undertaken by the end of both the instructional cycle and the evaluation stage to check the efficacy of the intervention. The interview guide (see Appendix I) highlights the major areas of evaluation inquiry to facilitate the relevant data collection process (Merton and Kendall, 1946). The interview tool was conducted as an evaluation survey to test the accomplishment of the courses goals and objectives. Some interview questions were constructed according to the rating of Likert⁴⁶ 'The scale of evaluation' (Stufflebeam, 2000) to support the students' discussion with each other or with the interviewer, i.e., whether they agree or disagree with a particular statement and to develop more arguing and commenting speaking skills (they had been tackled during the in-class speaking activities).

⁴⁶ Likert, R. (1932). *A Technique for the Measurement of Attitudes*. New York: Columbia University Press.

The group interview is composed of eleven (11) questions. Each question has subquestions to collect in-depth information about the students' attitudes towards the given lectures and evaluation procedures. These questions are gathered under three main rubrics. Each set of questions (rubric) has particular objectives as follows:

Questions 1 to 6 aspire to reveal students' perspectives concerning 'the implemented courses content'. The questions go around the succeeding points :

- Texts selection, variation and reading comprehension capacity.
- Learning materials: types of tasks (in-class, out-of-class activities)
- Computing content (content-based approach for syllabus design)
- Skills integration tasks to boost scientific writing ability.
- Language aspects items (grammar, vocabulary, meaning and context).
- Motivation, interest and educational climate.

Questions 7 to 9 point at examining the students' attitudes in terms of 'the teaching practices' when instructing the sample lessons (lessons delivery). The questions tackle the subsequent ideas :

- Teaching approaches, methods and techniques.
- The instructor's role in the ESP classroom
- Classroom interactions

Questions 10 and 11 aim at exploring the students' standpoints as regards to 'the evaluation procedures' during the intervention stage. This rubric covers the following points :

- Course evaluation (in-class specific writing tasks, and outside classroom activities)
- Learners' assessment (pre-and post-tests, group interview)

The focus group interview served as an evaluation form to obtain students' ratings of the efficiency and significance of the study program that they followed on their performances. Moreover, the researcher gathered some viewpoints before the

implementation phase from some ESP teachers and computer scientists involved in the process. These pre-implementation thoughts provide encouraging insights from well-engaged individuals. All the teachers' views (language teachers and subject specialists) endorse the researcher's interest and suggest to use the content-based approach for syllabus design and instructions as well. As for teaching approaches and methods, the ESP teachers agreed on using eclecticism and communicative language teaching to instruct specific vocabulary (lexical approach) and scientific writing in the discipline.

5.2.5 Reporting and Interpreting the Evaluation Results

In this evaluation stage, the researcher addressed both a quantitative and qualitative data analysis, i.e. mixed methods approach. Both analysis approaches are used in tandem for the sake of gaining multi-level analysis and therefore reaching a near full picture of reality. The mixed-method approach combines the structure of qualitative research with the flexibility of the quantitative investigation (Creswell, 2014:51).

The tests scores are analyzed using a quantitative approach in order to make percentages of the students' scores. This analysis is done through the use of 'Standard Deviation' (SD), 'Centre Tendency' (mean, median and mode). The aim of these measurements is to designate the middle and the most frequent scores within students' performances of the same test. Besides, the researcher used a 'paired- sample t-test' so that to compare and examine the differences of the scores gained before and after the training phase. The group interview results are analyzed qualitatively in order to explore more in-depth the phenomenon under investigation. The two analysis approaches are said to 'have a complementary function'. They « are used to measure overlapping but also different facets of a phenomenon, yielding an enrich understanding by illustrating, clarifying, or elaborating on certain aspects » (Greene et al, 1989 qtd in Dörnyei, 2007: 164).

5.2.5. 1 Pre-Test Scores Analysis and Interpretation

This analysis helps the researcher to explore the different issues and weaknesses linked to students' linguistic competence together with the general scientific writing ability. The pre-test was an essay writing task divided into three main tasks in order to write a coherent essay (see Appendix G). The three tasks emphasize the linguistic competence to write technically. The researcher provides a statistical summary to highlight the main results. The following table represents (Table 5.4) the pre-test scores of the informants:

Informants	Scores	Informants	Scores
I. 1	13	I. 16	10
I. 2	16	I. 17	1
I. 3	10.50	I. 18	8
I. 4	10.50	I. 19	8.50
I. 5	9.25	I. 20	11.50
I. 6	8.25	I. 21	14
I. 7	12	I. 22	7.25
I. 8	6.50	I. 23	3.75
I. 9	13.50	I. 24	10.50
I. 10	14.75	I. 25	11.25
I. 11	14	I. 26	6.50
I. 12	15.25	I. 27	15
I. 13	13	I. 28	13.25
I. 14	12.75	I. 29	12
I. 15	13.25	I. 30	9.25

Table 5.4: Informants' Pre-Test Scores

The pre-mentioned scores are interpreted in terms of Central Tendency Measures; including Mean, Median, Mode and Standard Deviation.

- The Mean is a well-known statistic of summary used for obtaining the average of a set of numbers. For this study, it was obtained manually as follows :

$$M = \frac{\sum x}{N}$$

‘ $\sum$ ’ is the total of scores while ‘N’ is the number of sample scores.

$$M = \frac{324.25}{30} = 10.80$$

- The Median is the middle score in the list of scores, which is in this case: **11.25**
- The Mode is the most repeated score in the list of scores, i.e. **10.50**
- The Standard Deviation reveals how much variation there is from the average (mean)⁴⁷. To calculate the value, we need the subsequent formula :

$$SD = \sqrt{\frac{\sum(x-M)^2}{N}} = SD = 3.39$$

‘ $\sum$ ’ refers to ‘sum of’, ‘x’ is a value in the scores set (example: 10.50), M is the Mean and N is the number of scores as displayed in the table above. Therefore, the standard deviation is 3.39. All the statistical values are presented in the following table (Table 5.5):

Pre-Test Values	
Mean	10.80
Median	11.25
Mode	10.50
Standard Deviation	3.39

Table 5.5: Measures of Central Tendency and Standard Deviation of the Pre-Test

The pre-mentioned table of the pre-test statistical values represents that the majority of respondents achieved the average, and it was shown through the median that the average of the students’ scores was significantly high (66.66 % of the informants had above the average, 33.33% had below the average). With regard to standard deviation, it is quite low which denotes that the scores tend to be close to the mean, mirroring a sample population of homogeneous capacities. Owing to the fact that they had all attended (some did not) the instructional courses, which makes them quite possibly to develop the language abilities to an identical level (scores).

The pre-test results are presented in a descriptive analysis for the exploratory data gathered and specifying the students’ answers of questions related to linguistic competence (lexis, grammar, meaning) under three analytical scoring rubrics

⁴⁷ Fisher and Fisher, 2002.

following Cohen's (1987) analytical scoring of writing assessment. The content rubric is related to both essay ideas, computing vocabulary and its meaning. In addition to this, the two other rubrics address to 'grammar' and 'essay structure'. The students' performance regarding each rubric displays in the table below (Table 5.6) to contrast the informants' scores with the mean, i.e. so that to compare their achievement with the average.

Informants	Content Task 10/20	Essay Structure 8.5/20	Grammar Activity 1.5/20	Informants	Content Task 10/20	Essay Structure 8.5/20	Grammar Activity 1.5/20
I. 1	5.25	6.25	1.50	I. 16	4.50	4.50	1
I. 2	7	7.5	1.50	I. 17	0.25	0.50	0.25
I. 3	6	3.5	1	I. 18	4.50	3	0.50
I. 4	5.50	4	1	I. 19	4.50	3	1
I. 5	5	3.25	1	I. 20	5	6	0.50
I. 6	3.25	4	1	I. 21	6.50	6	1.50
I. 7	5	5.5	1.50	I. 22	2.25	4	1
I. 8	3	2.5	1	I. 23	1	2	0.75
I. 9	6.50	5.5	1.50	I. 24	4.50	4.50	1.50
I. 10	6.50	6.75	1.50	I. 25	4.50	5.25	1.50
I. 11	4.25	8	1.50	I. 26	4	1.50	1
I. 12	6.25	8	1	I. 27	6.75	6.75	1.50
I. 13	5	6.5	1.50	I. 28	5	6.75	1.50
I. 14	6	6	0.75	I. 29	3	8	1
I. 15	5.75	6.5	1	I. 30	4.75	3	1.50
Mean	4.85	4.95	1.05	Mean	4.85	4.95	1.05

Table 5.6: Informants' Performance in Pre-Test Rubrics (Linguistic Competence)

The above rubrics scores elucidate that the majority of students performed well and achieved the average in the three rubrics: content 53% of the informants got it right (lexis, meaning), grammar 90 % did not make grammatical mistakes, and essay structure 60% of the students achieved the comparative essay form. However, the content rubric grades are the lower values due to the fact that students had specific vocabulary difficulties. Besides, students showed insufficiencies in organizing ideas (computing expressions and types of networks) while writing scientifically.

As an interpretation of the pre-test statistical values calculated, the majority of students got scores above the central value (66.66% scored above the average). This declares that the test had been made accessible for students, respecting the language skills and items of the students' background knowledge (essay writing with linguistic aspects). The grammatical use within the students' pieces of writing is considered to be good to some extent. In spite of that, the students show some linguistic insufficiencies (using computing vocabulary, organizing ideas while writing, etc) due to the lack of time devoted to instructing the scientific writing skill (organizing ideas) together with specific vocabulary teaching. This acknowledges the findings of the needs analysis process.

5.2.5. 2 Post-Test Scores Analysis and Interpretation

The data gathered from the post-test are concerned for the quantitative analysis. This analysis helps the investigator to understand students' achievement of specific writing ability coupled with linguistic competence after the instructional period. The post-test was a reading comprehension test divided into four main tasks: reading comprehension questions, lexis and meaning task, grammar activity, and specific writing task (also contains the linguistic aspects in its evaluation) (see Appendix H). The evaluation of the linguistic competence in order to write technically in the discipline is double-counted to see to what extent the instructional courses help the students to develop the linguistic knowledge so that to compose scientific passages. The summary of the statistical post-test results are demonstrated in the table below (Table 5.7):

Informants	Scores	Informants	Scores
I. 1	17	I. 16	12
I. 2	6	I. 17	10.25
I. 3	11.50	I. 18	11
I. 4	8.75	I. 19	13.75
I. 5	9	I. 20	8.75
I. 6	10	I. 21	9
I. 7	16	I. 22	2
I. 8	17.50	I. 23	10
I. 9	12.50	I. 24	6
I. 10	11	I. 25	11
I. 11	10.50	I. 26	06.50
I. 12	11	I. 27	16
I. 13	11.75	I. 28	14
I. 14	15.50	I. 29	9.25
I. 15	13.75	I. 30	11

Table 5.7: Informants' Post-Test Scores

The above post-test scores are interpreted in terms of Central Tendency Measures; including Mean, Median, Mode and Standard Deviation. All the statistical values are presented in the following table (Table 5.8):

Post-Test Values	
Mean	11.075
Median	11
Mode	11
Standard Deviation	3.43

Table 5.8: Measures of Central Tendency and Standard Deviation of the Post-Test

The post-test statistical values demonstrate that students did achieve development regarding the post-test scores related to the reading comprehension questions, linguistic aspects, and specific writing. The majority of students (70%) achieved the average, and it was displayed through the median that the average of the students' scores was considerably high. Concerning the standard deviation, it is quite near above the pre-test value (high than the pre-test) but still low in general and this demonstrates that the scores again tend to be close to the mean, reflecting a sample population of similar abilities. Once again, this is due to the fact that students attended (the majority of them did not) the intervention phase sessions,

which makes them more likely to achieve approximately the same language abilities as of the pre-test (the researcher has signalled slight development). Moreover, the students' slow development was on account of the short time allocated to instruct the designed lessons (4 sessions).

The post-test results are demonstrated in a descriptive analysis of the exploratory data collected. The students' answers are specified under four analytical scoring rubrics following Cohen's (1987) analytical scoring. Reading comprehension rubric refers to students' reading proficiency of the computing text in order to write technically. Besides, the linguistic aspects rubrics which are: 'lexis, meaning' rubric and 'grammar' rubric combined into one section. The final rubric addresses to 'specific writing'. The students' performance in terms of each rubric is presented in the table below (Table 5.9) along with the mean in order to compare their achievement (scores) with the average.

Informants	Reading Task 4.5/20	Linguistic Aspects 5.5/20	Specific Writing 2/20	Informants	Reading Task 4.5/20	Linguistic Aspects 5.5/20	Specific Writing 2/20
I. 1	4.50	5.50	7	I. 16	3	4	5
I. 2	1.50	3	1.50	I. 17	2.50	2.75	5
I. 3	3	3.50	5	I. 18	3	3	5
I. 4	1.50	4	3.25	I. 19	4.50	4	5.25
I. 5	3	3	3	I. 20	3	3.50	2.25
I. 6	1.50	3.50	5	I. 21	1.50	3	4.50
I. 7	4.50	5	6.50	I. 22	0.50	0.75	0.75
I. 8	4.50	5.50	7.50	I. 23	2.25	2.75	5
I. 9	3	3.75	5.75	I. 24	2.25	1.50	2.25
I. 10	3	3	5	I. 25	3	3	5
I. 11	3	2.50	5	I. 26	2.25	2.25	2
I. 12	2	4	5	I. 27	4.50	5	6.50
I. 13	3	3	5.75	I. 28	3	4.75	6.25
I. 14	4.50	5	6	I. 29	2.25	2.75	4.25
I. 15	3	4.50	6.25	I. 30	2.75	3.25	5
Mean	2.85	3.49	4.71	Mean	2.85	3.49	4.71

Table 5.9: Informants' Performance in Post-Test Rubrics

The pre-mentioned scores show that the majority of students achieved the average (good performance) in the three rubrics: reading comprehension task, 80% of the respondents answered it correctly, linguistic aspects (grammar, lexis and meaning) only 13.33% did not respond right, and the specific writing activity 70% composed scientific written passages accurately (specific writing pre-test mean (M.pre): 3.61; specific writing post-test mean (M. post): 4.71). Worth mentioning at this level of analysis that the students did develop their specific vocabulary skills (lexis and meaning) in particular and their linguistic competence in general (linguistic aspects pre-test mean (M.pre): 2.95; linguistic aspects post-test mean (M. post): 3.49). The informants in the post-test did manage to organize ideas while writing scientifically, matching computing terms with their meanings, and using specific vocabulary in their written paragraphs.

As an interpretation of the post-test statistical values gathered, the majority of students got scores above the central value (70% scored above the average). This demonstrates that the second test as well had been made accessible for students, respecting the emphasized language aspects, skills, and content of the instructional period (programming languages). The reading comprehension right answers of the informants reveal that their reading proficiency has flourished during the intervention lessons, i.e. before, while and after reading tasks practised during the instructional phase support the students' reading understanding of the text at hand.

In terms of the activities related to both 'lexis, meaning', and 'grammar', the students had good grades in these sections. The correct answers linked to the specific terminology and its meaning are due to the lexical approach instructions coupled with gap-filling activities, matching items, pictures labelling tasks, i.e. synonyms, morphology, collocations, spelling, polysemy activities, etc. As regards to grammar teaching, the sample lessons focused on the most convenient scientific grammatical structures (present, present continuous and past simple) so that the students can recognize the appropriate structure through contextual clues, i.e. fill in the gaps with the appropriate grammar structure (verbs).

The final task of specific writing ability where students showed a high capacity to communicate an idea through writing. The majority of the students developed their scientific writing skills whereby they composed written instructions on how to write a computer program (stages of programming). As a matter of fact, the students did manage to use what they had acquired in the instructional lessons in order to construct sentences conveying meaning, i.e. the specific writing learning content (organizing information and paragraph structure) in conjunction with the bunch of specific writing tasks (in-class activities, homework, projects, etc) and the set of teaching methods and techniques (eclecticism, skills integration, dictation, etc).

The comparative analysis of the pre-test and post-test results denotes the students' progress at the level of linguistic competence and specific writing capacity. The statistical values contrast indicates that the majority of the students repair their difficulties concerning linguistic aspects (lexis, meaning, grammar) and the ability to compose computing written passages. The following table (Table 5.10) synthesizes and demonstrates both tests numerical findings (means) which mirror the Master 1 computer science students' language development.

Pre-test Values		Post-test Values	
Pre-Test Mean	10.80	Post-Test Mean	11.075
Linguistic Competence Mean	2.95 ⁴⁸	Linguistic Competence Mean	3.49
Specific Writing Mean	3.61 ⁴⁹	Specific Writing Mean	4.71
Standard Deviation	3.39	Standard Deviation	3.43

Table 5. 10: Comparative Analysis of the Pre-Test and Post-Test Results

Moreover, the t-test is considered to be the most adequate value to compare two means of tests. It is used to find out whether there are statistically significant

⁴⁸ Linguistic Competence Pre-Test Mean = Mean of 'Content' + Mean of 'Grammar'/2 = 4.85+1.05/2 = 2.95

⁴⁹ Specific Writing Pre-Test Mean = Mean of 'Content' + Mean of 'Grammar' + Mean of 'Essay Structure'/3 = 4.85+1.05+4.95/3 = 3.61

differences between two groups or two tests. The t-test value in this evaluation process is calculated following Cohen's et al. (2007:543) formula:

$$t = \frac{M.2 - M.1}{SE} = t = \frac{11.075 - 10.80}{SE} \quad t = \frac{0.275}{7.31} \quad t = 0.03$$

$$SE = \frac{SD2 - SD1}{\sqrt{N}} \quad SE = \frac{3.43 - 3.39}{\sqrt{30}} \quad SE = \frac{3.43 - 3.39}{\sqrt{30}} = 7.31$$

M.2 stands for Mean of test two (post-test), M.1 stands for Mean of test one (pre-test), SE means Standard Error⁵⁰, SD2 means Standard Deviation of test two (post-test), SD1 means Standard Deviation of test one (pre-test), N is the number of sample scores (number of informants). As a result, the more t-test value is small, the more administered tests are similar in level. Besides, the bigger the t-test value, the high possibility it is that the results are repeatable. The current t-test value is low (0.03). Consequently, the level of the tests is similar and the tests scores are not repeatable but they remain consistent over time. These are good signs of tests reliability and validity. In other words, this indicates that the pre-test scores were lower than the students' post-test performances which means that they highly achieved the test. The following histogram (Figure 5.5) further demonstrates the students' achievement progress in both tests, i.e. it compares the difference in their performances:

⁵⁰ The **Standard Error (SE)** of a statistic is the approximate standard deviation of a statistical sample population. In statistics, a sample mean deviates (*sample distribution*) from the actual mean of a population—this deviation is the standard error of the mean.
<https://www.investopedia.com/terms/s/standard-error.asp>

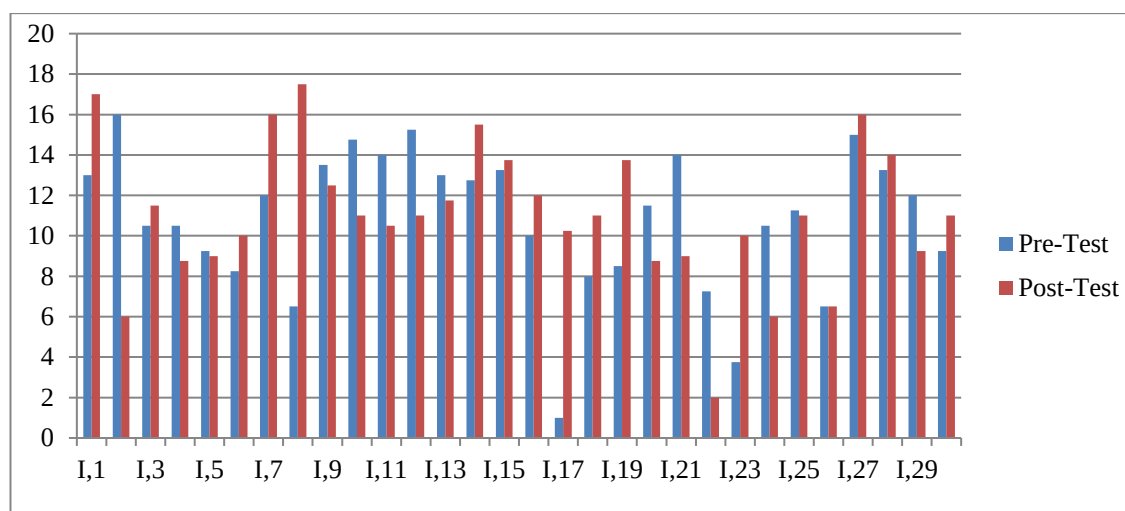


Figure 5.5: Pre-Test and Post-Test Scores Comparison

5.2.5. 3 Focused Interview Analysis and Interpretation

The group interview findings are analyzed qualitatively so that to examine the students' attitudes and perspectives towards the implemented courses and their evaluation procedures. In this final evaluation research tool, students provided a self-perception of their progress regarding language aspects and specific writing ability learned and the teaching procedures applied. They gave the point of views related to three main rubrics: the implemented courses content, the teaching practices, and evaluation procedures. The researcher's choice of a focus group discussion is for the sake of exploring the students' reasons behind their observed behaviours in the instructional and testing intervals. In addition to this, the researcher draws conclusions about the teaching content, practices, learning outcomes, and evaluation procedures. The focused interview considered the following rubrics:

I- The implemented Courses Content (Question 1 to Question 6)

The respondents' answers to these questions were almost alike. The majority agreed that the texts variation, selection and the learning activities included in the syllabus (in-class and outside classroom activities) were interesting and responded to the needs of their domain, their level, and their interest as well. They added that the choice of the texts did reflect to some extent their background knowledge. With

regards to reading comprehension skill, the selected texts and suggested tasks helped them to a great extent in understanding the detailed ideas of the text. These reading tasks helped students to develop their reading proficiency, and to be prepared so that to acquire the needed language items for technical writing in the academic and professional demands. However, only two students claimed difficulty in grasping the computing terms found in some texts. Besides, the majority of students (10 informants) stated that the content of the lessons (language aspects) and activities were highly connected to the computer science discipline. They expressed their satisfaction concerning the skills integration exercises. They reported that the integrated tasks support their overall language mastery in general, and the linguistic competence to write scientifically in particular. The students strongly agreed that lessons were presented enjoyably, well introduced, and they were motivated to practise the acquired language aspects and skills.

II- Teaching Practices (*Question 7 to Question 9*)

The large part of the interviewees (11) responded that the teachers' instructions during the ESP teaching sessions were predominantly intelligible. The main part of the informants (9) claimed that the language teacher's methods and techniques were not only interesting and entertaining but also aided them in better internalize information. Additionally, working in groups, pairs, doing projects and homework, were new teaching techniques for the participants, as reported. The majority (9 students) was excited about group work and problem-solving tasks agreed that it was beneficial to listen to one another and exchange information to solve real-world situations. Whereas, the three other students (3) claimed that they preferred working separately as they were used to. As far as vocabulary instruction (lexical approach) is concerned in order to develop linguistic competence, it seemed to be beneficial to most of the students as they felt an improvement. The speaking teaching techniques (shadowing, arguing, discussing, etc in speaking tasks) were of use as well since they helped the students to enhance their communicative abilities both in written and spoken discourses. The students' perspectives on their language

instructor were positive seeing that she was prepared, knowledgeable, enthusiastic to encourage them asking questions and interacting with each other.

III- Evaluation Procedures (*Question 10 to Question 11*)

When the students were asked to evaluate the instructional courses content in general, and the specific writing assignments in particular, the majority of them (11 informants) agreed that lessons content was highly appropriate and the given writing tasks were convenient for the course objectives. According to the greater number of informants, the specific writing assignments were interesting and met their target and learning needs in both educational and workplace settings. These tasks helped the students to develop their scientific writing abilities inside and outside the language classroom. On the contrary, only one student (1) declared that he felt sometimes anxious while expressing himself in either way, i.e. oral or written forms since he was embarrassed to make mistakes in front of his classmates. Speaking about the students' self-assessment of the proposed evaluation procedures (tests and the current interview), the main part (11 informants) strongly agreed that the taken tests made accessible for all of them i.e. tests level is just appropriate to the students' level. The testing tools mirrored the learning facets (linguistic competence and specific writing skill) acquired in the instructional sessions and reflected the students' background knowledge, as reported. The majority of students stated that tests were well written, instructed with a convincing rating scale. Their standpoints regarding the interview that they were taking part in, most students expressed that they had fun answering the interview questions and freely spoke in front of an audience. All in all, they felt satisfied with their English language level development as a whole and writing, speaking skills improvement, particularly as they got help from the provided lectures.

As an interpretation of the interview results, the students agreed on the satisfaction with the learning experience that they had had during the four weeks of the sessions, stating that they were pleased with the designed syllabus, teaching practices, and the evaluation procedures. They claimed that their reading abilities have enhanced, their communication skills have developed, and especially their

specific vocabulary acquisition has flourished. The speaking teaching techniques, as they reported, helped them to practise their speaking skills and monitored their stress when facing the audience. Students improved their specific writing abilities along with linguistic competence as they were the main students' targets. They were completely content about their developed language proficiency. In sum, the Master 1 computer science students' responses to the interview questions demonstrate the implemented courses effectiveness for teaching/learning English in a computing domain.

5.2.6 Discussion of the Main Results

In the last part of this research work, the researcher used action research to implement the designed lectures and evaluation tools to check the efficacy of the content-based syllabus and teaching practices on students' linguistic competence and specific writing abilities. The data gathered from the respondents in the action research through tests and focused group interview is intended to spotlight the degree to which the proposed syllabus helps Computer Science students be dynamically involved in the instructional content and achieve written communication skills, English language aspects, and specific writing capacities. Therefore, the researcher explores mainly the third and fourth hypotheses (already confirmed in the needs analysis process, see Section 3.6) in relation to the chief findings of this intervention. The evaluation results are cross-checked.

In regards to the third hypothesis, the investigator assumed that ESP students face difficulties while writing in the English Language. These hurdles were associated with the lack of computer science terminology (register) along with the grammatical structures to compose technical written passages in the discipline. In other words, students lacked the 'linguistic competence' (morphology, syntax, and semantics) so that to express themselves in written discourse. The first testing procedure (pre-test) administered to the needs analysis sample population (SIC/RSD Master 1 computer science students) showed that students did have linguistic difficulties when writing scientific essays in the discipline, especially a lack of specific vocabulary knowledge. Students' tests papers revealed that they

suffered from linguistic insufficiencies, mainly organizing ideas while writing and using computing vocabulary in the right context (see Appendix M). The students' difficulties are closely related to vocabulary in the discipline, spelling, and semantic problems which are about computing words meaning and their context. This verity was confirmed by the students' responses to different focused interview questions, and by teacher's pre-implemented perspectives on the designed courses and pre-test results. The students highlighted the fact that they did have writing and linguistic difficulties, mainly computing terminology deficiencies before the implementation of the courses, but after the intervention, students developed the specific vocabulary knowledge to write scientifically. They added that they were enthusiastic about the designed courses in general since they did not have enough classroom practice (in-class activities) and reading in the field. In fact, the results validate the third hypothesis.

Concerning the fourth hypothesis which warrants that designing an adequate course (content-based syllabus) to attain the specific learners' needs in addition to a collaborative atmosphere with subject specialist teachers may have a positive impact on the students' stimulation to enhance their linguistic competence and to be more engaged in specific writing in the discipline. After the implementation of the courses, the testing outcomes showed the students' scientific writing development in general and linguistic competence in particular. That is to say, when comparatively analyzing the pre-test and post-test results, it was clearly perceived that the students' scores were increased in the second test, i.e. it was displayed through the two tests' means comparison (the pre-test scores were lower than the students' post-test performances). This means that they did achieve progress during the instructional sessions due to the content-based syllabus, lexical approach instruction, and specific integrated in-class tasks. Consequently, this was affirmed through the students' well achievement in linguistic aspects section, reading comprehension section and specific writing skill section (students' post-test papers, see Appendix M). While interviewing the students in the focused group, they insisted on the fact that indeed they were satisfied with their involvement in the action research since it offered them an authentic learning experience through which

they could expand their linguistic knowledge to write and communicate using the English language. The students' positive performances in the achievement test (post-test) were confirmed through their responses in the interview. They held positive attitudes towards the development of vocabulary knowledge, reading comprehension, and specific writing ability. Owing to the teaching content, incorporating activities for them to practice the required linguistic aspects (computing terms instructions) and skills to achieve understanding and infer meaning. Their improvement is demonstrated in the sense that they could convert the linguistic knowledge acquired during the instructional sessions into communicative abilities (oral and written discourses). Students expressed contentment with the implemented courses and their current developed English language level. Again, these results approve the fourth hypothesis.

In sum, the data collected from the evaluation phase denotes that the implementation of an appropriate (content, task-based) syllabus may have a positive impact on students' linguistic competence to be motivated and engaged in specific writing. The discussion findings along with testing results revealed that the intervention content was beneficial for students in terms of specific vocabulary acquisition, its meaning, grammar, reading comprehension, and scientific writing skill. Besides, the evaluation outcomes proved the active engagement of students with the educational content and teaching practices. It indicates the contribution of the intervention courses of action together with the efficacy of the syllabus in expanding the overall students' communicative skills in English. As a result, the aforementioned hypotheses and the action research findings of this investigation permitted the investigator to determine the efficiency of the content-based syllabus for computer science students' specific writing ability.

5.2.7 Further Pedagogical Recommendations

After reporting and discussing the findings resulted from instructing the content-based syllabus to Master 1 students, this section aims at offering recommendations for better execution of the content-based syllabus in an ESP context to teach scientific writing for computer science students. This final section

objective is to give pedagogical implications relevant to computing setting. The provided recommendations are considered to enhance the students' technical writing skills. Besides, the suggestions facilitate the linguistic aspects acquisition (morphology, syntax, and semantics) in particular in order to reach good communicative capacities in both oral and written discourses.

5.2.7.1 Collaborative Teaching

In the ELT industry, Content-Based Language Teaching and English for Specific Purposes are excessively adopted. Hence, this formulation necessitates collaboration between language instructors and teachers in the specified disciplines. As a matter of fact, collaboration among teachers will help them work hand in hand and counsel each other in order to improve the teaching quality as well. Barnum and Aft (1986) declared that for well-grounded innovation and change to take place in academic institutions, teachers compel to begin supporting, monitoring and engaging with each other. Interdisciplinarity⁵¹ team teaching is a form to minimize the solitude of instructors as they are going to help one another (Austin and Baldwin, 1991).

5.2.7. 2 ESP Learners as the Genesis of Discipline-Specific Knowledge

ESP practitioners are counselled to grow elementary expertness in a particular subject-area (Robinson, 1991; Ferguson, 1997; Dudley-Evans, 1997). They are advised to follow Strevens' suggestions (1988: 42-43): 'become familiar with the ESP course materials', 'the language of the subject', and 'allow students to put them right!' This teaching/learning approach is considered to be a two-way process in which teachers share their knowledge with their students, and at the same time learn from them. Consequently, discipline-specific knowledge is not conceived as "a static commodity", but improving expertness, and many ESP practitioners may be surprised to find out "how much knowledge of the subject matter they 'pick up' by teaching the materials and talking to students" (Hutchinson and Waters, 2010: 163).

⁵¹ **Interdisciplinarity** or Cross-disciplinary refers to the combination of two or more academic disciplines into one activity.

<https://dictionary.cambridge.org/dictionary/english/interdisciplinarity>

5.2.7.3 Writing Skill, Assessment and Timetabling

As shown in the current research work, CBA supports students to enhance their skills of writing as stated by Early (1990). Moreover, “CBA instructions boost thinking, researching, and writing skills needed for academic writing tasks and does so more realistically than does traditional instruction that isolates rhetorical patterns and stresses writing from personal experience” (Sulistyo, 2014: 257). This indicates that discussing content in writing tasks was beneficial to reinforce the students' linguistic aspects linked to the topic being composed. Another important facet in this study is the students' assessment. The urgent need to assess the language abilities of ESP learners is of a fundamental significance. It is considered as an ongoing process therein the ESP practitioners use numerous procedures to gauge the learners' progress and their lacks. As stated by Nodoushan (2002:14), "if the assessment can be seen as a movie, then a test is a freeze-frame". The assessment could be seen as a teaching technique in order to design suitable ESP courses, a way to reach the teaching/learning objectives, and a tool to collect information about students. Additionally, the teaching time load is a significant factor in the ESP context. It is recommended to increase the number of teaching hours from one and a half to three or four hours per week. As a matter of fact, the coefficient needs to be increased (from 1 to 3) so that students realize the importance of the English language in the discipline and be motivated to attend and study the module.

5.3 Conclusion

Throughout this chapter, the inquirer interpreted and discussed the evaluation results collected in the action research stage by using three research tools: pre-test, post-test, and group interview. The results gained by the end of the intervention phase confirm the efficacy of the content-based syllabus on Master 1 Computer Science students, their ability to write technically in the discipline in general, and their vocabulary knowledge in particular. Each section of the implemented courses emphasized an important language aspect. That is to say, the courses layers focused on the essential linguistic components to write scientifically in the discipline, which were computing terminology, its meaning, grammar, language skills, and study

skills. The final findings demonstrated the students' progress in communicating effectively using both written and oral discourses. In conclusion, the chapter sheds light on further educational recommendations related to the fundamental elements in this study, which are teachers' collaboration, students as a source for discipline-specific knowledge, writing skill, assessment, and teaching time load.

GENERAL CONCLUSION

Due to the growing globalisation process globally, the demand to learn the English language has witnessed a protrusion since it is an open gate toward advanced technology, developed sciences, and international trade. It turns out to be the predominant language of communication worldwide. Thus, it ought to emphasize the teaching of English to learners, or vocational experts affiliated with a particular domain. For the sake of supporting them to acquire and perform effectively communicative tasks in the target situation since it is the main interest of teaching English for Specific Purposes.

The ESP field of research has been increased in the last few years. It gains evolution and new methodologies that are traced back to the Applied Linguistic studies alongside other domains of human sciences. In an ESP context, language instructors in specific fields, educational or occupational, are required to base their teaching practices on the learners' needs identification and analysis (NIA). Then, ESP practitioners should execute pertinent language activities and communicative tasks dictated by the learners academic and professional needs. The present research work begins with determining the Master 1 Computer Science students' needs and uncovering the teaching situation in the site under investigation. In the interest of elaborating an appropriate syllabus that stresses the students' demands in the target situation, mainly the needed writing skill in the discipline, the researcher suggests a convenient study program to enhance the Master 1 learners' linguistic competence so as to write technical passages. Besides, the proposed syllabus emphasizes the teaching methods and techniques that are the best catering for the students' requirements. It is comprised of a wide range of language skills, aspects, and communicative tasks to achieve good English language command.

Consequently, the aim of the present research work was to investigate the discipline-specific written discourses of Master 1 computer science students, to uncover the teaching/learning situation of the English language, especially specific writing skill at the department of Computer Science, Tlemcen University. Thereafter, the researcher carried out a needs analysis process among Master 1 learners, their English language teachers, and computer scientists. Therefore, a

GENERAL CONCLUSION

content-based syllabus was developed so that to appeal to the students' demands in educational and employment situations, and to help them communicate effectively, mainly in a written discourse. Lastly, an action research design was used to execute the developed syllabus coupled with evaluation procedures to gauge its effectiveness.

In order to realize the research aim and objectives, the subsequent research questions were raised:

- 1- How is the discipline-specific writing taught in the ESP course at the Department of Computer Science?
- 2- How is the specific writing assessed in the computer science discipline?
- 3- What are the main difficulties facing ESP learners while composing in English?
- 4- How can discipline-specific writing be best taught and assessed to achieve high performance?

In this sense, the researcher hypothesized what follows:

- 1- ESP students at Computer Science Department receive general English instructions which do not meet their professional nor their discipline-specific language needs.
- 2- ESP teachers assess their students' performance in specific writing using specific types of tests (formative and summative assessments in the form of reading comprehension tests)
- 3- The main difficulties concern their awareness of computer science terminology (register) along with the grammatical structures to write in the discipline (i.e. linguistic competence: morphology, syntax, and semantics)
- 4- Designing an appropriate course (content-task-based) to meet the specific learners' needs in addition to a collaborative atmosphere where the language teacher is working hand-in-hand with the subject specialist could both have a positive impact on the learners' linguistic competence to be motivated and engaged in specific writing.

GENERAL CONCLUSION

The fieldwork findings that were reached confirmed the four suggested hypotheses. In terms of the first hypothesis, the findings adduced from Master 1 students' questionnaire together with classroom observation revealed that students showed a medium level of English language proficiency which is viewed as the general type of language not the specialized language for their discipline. However, ESP teachers when asked about their writing skill teaching practices, their responses were the opposite of what they actually performed in their language classrooms. In fact, whilst attending the ESP sessions dispensed to computer science Master 1 students, ESP teachers only gave writing assignments with no room for writing skills practices in the classroom. On the other hand, when interviewing the computer scientists, they insisted on the necessity to communicate in English in both educational and professional settings despite the exclusive use of French in the study program. According to them, students need to develop mainly the writing skill to compose the required computing documents in particular and enhance the overall English language mastery to facilitate access to the latest literature on computing topics. These findings seem to affirm the first hypothesis.

For the second hypothesis, the above-mentioned research tools (students' questionnaire, ESP teachers' interview, computer scientists' interview, and classroom observation) uncovered that ESP learners are assessed by utilizing several types of assessment. This verity was particularly reinforced by attending ESP sessions delivered to Master 1 computer science students which displayed that ESP teachers gave their learners writing assignments and homework without classroom practice. Consequently, ESP teachers varied their assessment tools in order to achieve better learning outcomes. They relied on both formative (homework and assignments without classroom rehearse) and summative assessment (reading comprehension tests with or sometimes without writing skill task) to gauge their students' overall language performance, not least the writing skill in the ESP context. These results assure the second hypothesis.

In regard to the third hypothesis which identifies the main ESP students' difficulties while writing in the English language. These lacks are related to computer science terminology as well as grammatical structures to compose written discourse in the discipline. The aforementioned research instruments showed that ESP learners do face writing difficulties that are linked to initially, the vocabulary of the discipline, mainly spelling and word formation (morphology). In the second place, the grammatical structures are related to tenses, conditional sentences, etc. In addition to semantics problems which are linked to specific words meaning, their context, and semantic relationships (synonymy, antonymy, and polysemy). Language teachers and computer scientists accentuated the importance of writing skill in the discipline. They emphasized the urgent need to develop the linguistic aspects (morphology, syntax, and semantics) so that to meet the students' target needs to write technical compositions. They further added that the role of the other language skills is of supreme significance, not least reading skill as being a mainstay to enhance the students' specific terminology alongside their writing abilities. A similar view was displayed during the classroom observation therein the investigator recognized the learners' language inadequacies. The evaluation procedures conducted after the course implementation, mainly the pre-test results also specified the ESP students' specific vocabulary difficulties along with grammar when writing in the discipline. Therefore, they wanted to develop specific writing skill and improve computing vocabulary comprehension through the content-based syllabus. These results confirm the third hypothesis.

As far as the fourth hypothesis is concerned, which states that developing an appropriate study program (content-based syllabus) to satisfy the specific learners' needs besides the collaborative work of both language teachers and subject specialists may affect positively the students' motivation to be engaged in specific writing and enhance their linguistic competence. The data gathered from the different research tools of both the needs analysis instruments and action research procedures (pre-test, post-test, and focused interview) revealed that Master 1 students preferred a content-based approach to enhance their linguistic aspects in the target situation. They suggested further innovative techniques of teaching to

attract them in the ESP lectures, such as skills integration and specific vocabulary instruction. Language teachers and computer scientists stressed the role of working collaboratively as they put special focus on language activities, reading tasks, and communication exercises to improve the learners' writing abilities. Thereafter, the investigator elaborated a content-based syllabus to aid computer science learners to accomplish effective specific writing capacities.

The findings of the intervention conducted therein the syllabus was implemented, elucidated the learners' involvement in the ESP classroom by employing interactive tasks and real-world situations activities. Through testing procedures, the investigator measured the writing skill development resulting from the use of content-based tasks, and specific lexis instructions. The ESP learners' final testing outcomes showed a good performance in the specific writing activities and in the vocabulary section where they displayed good assimilation of the computing terms used in their writing productions. This was affirmed by the focus group interview in which learners demonstrated their satisfaction and enthusiasm about being involved in content-based and interactive activities. They expressed their abilities to transform their linguistic aspects and knowledge into communicative abilities (spoken and written discourses). These findings validate the fourth hypothesis.

The ESP teaching field is making progress throughout the world. Therefore, the Algerian educational system needs to take imperative attentions towards advancements in this movement. On top of that, the Ministry of Higher Education is required to give more careful considerations to English language teaching for all the specialist subjects. It is advocated to provide each specific field of study with an adequate English language syllabus and coaching newbie ESP teachers. With reference to the Computer Science discipline, it is suggested for learners as well as the teaching staff to keep up with the universal renewals and stress the English language teaching progress in order to achieve good language learning outcomes in the discipline. Hence, educational policymakers need to make swift resolutions so as to highlight the interest of ECP instructions and grub for efficient teaching

methods and techniques to instruct the English language at the post-secondary level. Besides, the English language has to be introduced across all the scientific study programs.

As a matter of fact, the current research work faced limitations when being carried out. To exemplify, these limitations were time constraints, unavailability of the entire group of students, and heterogeneous sample population. Moreover, the implemented English courses were dispensed to only a few students of the whole group solely in the second semester of the academic year, i.e. only a few sessions. As a result, the investigator had a restricted time to carry out a needs identification process and to undertake the intervention. Furthermore, not all group members did attend the implemented courses. Thus, the generalizability of the findings is quite problematic in the direction that the fieldwork only deemed one group (two specialities) of Master 1 students. Besides, data collection was not an easy task in that some teachers (computer scientists) did not cooperate to conduct interviews. Also, many students did not fill the whole questionnaire; many items kept unanswered in addition to the incompleteness of some tests sections. Last but not least important, the mixed-ability class was to a great extent challenging for the inquirer in the sense of attaining appropriate instructional materials which best satisfy the students' level and interest as they had different learning styles and preferences in the group. More content-based syllabus implementation along with some web-based instructions are recommended to Master 1 students and basically for first-year undergraduate students as well so that to inspire further beneficial learning outcomes in the ECP context.

On the whole, the current doctoral dissertation has endeavoured to explore Master 1 Computer Science students' language needs to highlight the role of written discourse in the educational and vocational domains. It suggested a content-based approach to aid students enhance their linguistic competence (lexis, grammar, and meaning) and communicative skills so that to improve their specific writing abilities. It is, thus, recommended that Algerian academic institutions estimate their researchers' findings and consider adaptation and application of the elaborated

study programs according to the pedagogical needs of learners. The designed syllabi could be adjusted to the language researchers and instructors' input as well.

As suggestions for further researches in the breadth of inquiry, undoubtedly, the researcher tried to focus on the computer science students' needs to write in the discipline so as to achieve betterment in the future teaching practices due to their significance in the field of specialism. In spite of that, the significant importance of specific written discourse in the discipline and its assessment remain for most of the time outside the researchers' scope of inquiries. That is to say, the writing skill of ESP students in general, not least Master 1 computer science learners in the location under investigation, is still a questionable issue which can be based on some other standards. In fact, there are other facets which need investigation in future research, such as the Network-Enabled Transfer of Writing Skill/E-Learning, i.e. the use of Information and Communications Technology (henceforth ICT) in teaching and assessing the specific writing skill in ESP contexts, or even the investigation of the E-Assessment effect on the students' specialized writing performance in ESP settings, and instructing techniques for effective teacher/tester of the writing skill in ESP disciplines, etc.

BIBLIOGRAPHY

- Abbot, G. (1981). Encouraging communication in English: A paradox. *ELT Journal*, 35 (3), 228–230. Available online http://eltj.oxfordjournals.org/cgi/pdf_extract/XXXV/3/228 . (10th November 2019)
- Abedi, J. (2010). *Performance assessment for English language learners*. California: Stanford Center for Opportunity Policy in Education.
- Ahuja, R. (2010). *Research Method*. New Delhi: Rawat Publication.
- Alderson, J. C. & Hughes, A. (eds.). (1981). *ELT documents III: Issues in language testing*. London: British Council.
- Alharby, M. (2005). *ESP target situation needs analysis: The English language communicative needs as perceived by health professionals in the Riyadh area*. (Doctoral Thesis). University of Athens, Georgia.
- Allen, J.P.B. (1984). General-purpose language teaching: A variable focus approach. In C.J. Brumfit (ed.), *General English syllabus design (ELT Documents 118)* (pp.3-24). London: Pergamon/The British Council.
- Allwright, R.L. (1982). Perceiving and pursuing learners' needs. In M. Geddes & G. Coffey, B. (1984). *ESP- English for Specific Purposes. Language Teaching*, 17(1).
- Altrichter, H., Posch, P. & Somekh, B. (2005). *Teachers investigate their work: an introduction to the methods of action research*. London: Routledge.
- Anderson, G. (1990). *Fundamentals of educational research*. London: The Falmer Press.
- Anderson, T.D. (2006). Uncertainty in action: Observing information seeking within the creative processes of scholarly research. *Information Research*, 12(1). <http://informationr.net/ir/12-1/paper283.html> (30th September 2019).

- Angelo, T. A. & Cross, K. P. (1993). *Classroom assessment techniques: A handbook for college teachers*. San Francisco, CA: Jossey-Bass.
- Angelo, T. A. (1995). Reassessing (and defining) assessment. *The AAHE Bulletin*, 48, 7-9.
- Anthony, L. (1997). Preaching to Cannibals: A look at Academic Writing in Engineering. In *The Japan Conference on English for Specific Purposes Proceedings*. January 31th, 1998.
- Aronoff, M., & Fudeman, K. A. (2011). *What is morphology?* Chichester, West Sussex, U.K.: Wiley-Blackwell.
- Assassi, T. (2017). *The Effect of Formulaic Language on ESP Learners' Conversation Competence: The Case of Aviation Professionals in Algeria*. (Doctoral Thesis). University of Tlemcen, Tlemcen, Algeria.
- Attwell, G. (2007). Personal Learning Environments - the future of eLearning? *ELearning Papers*, 2(1), January 2007, pp. 1-8. Retrieved March 30th, 2019 from <http://www.elearningeuropa.info/files/media/media11561.pdf>
- Austin, A. E., & Baldwin, R. G. (1991). *Faculty collaboration: Enhancing the quality of scholarship and teaching*. Washington, DC: The George Washington University, School of Education and Human Development.
- Bachman, L. F. (1990). *Fundamental considerations in language testing*. Oxford: Oxford University Press.
- Bachman, L. F. (1988). Task and ability analysis as a basis for examining content and construct comparability in two EFL Proficiency test Batteries. *Language Testing*, 5 (2), 128-159.
- Bachman, L.F., & Palmer, A.S. (1996). *Language Testing in Practice: Designing and Developing Useful Language Tests*. Oxford etc.: OUP.

- Badger, R and White, G. (2000). A Process Genre Approach to Teaching Writing. *ELT Journal*, 54, 153-160. <http://dx.doi.org/10.1093/elt/54.2.153> (09th August 2019)
- Bailey, K. M. (2009). Issues in language teacher evaluation. In Long, M. H., and Doughty, C. J. (Eds). (2009). *The handbook of language teaching*. UK, Oxford: Blackwell Publishing Ltd.
- Baker, C. (1988). Normative testing and bilingual populations. *Journal of Multilingual and Multicultural Development*, 9(5), 399–409.
- Barnes, J. (ed.) (1984). *The Complete Works of Aristotle, 1*. Princeton: Princeton University Press.
- Barnett, J. A. (1977). *ESP in ELT. English for Specific Purposes: An International Seminar*. London: British Council.
- Barnum, C., & Aft, L. (1986). Joint venture: Technology and tech writing team teaching. *Proceedings 33rd International Technical Communication Conference* (pp. 193—198). Washington, DC: Society for Technical Communication.
- Basturkmen, H. (2006). *Ideas and Options in English for Specific Purposes*. London and New jersey: ESL and Applied Linguistic Professional Series: Eli Hinkel, Edition.
- Bazely, P. (2003). Teaching Mixed Methods. *Qualitative Research Journal*, 3 (Special issue), 117 -126 (www.latrobe.edu.au/aqr). (13th September 2018)
- Beiske, B. (2003). *Research methods: Uses and limitations of questionnaires, interview, and case studies*. London: Manchester School of Management.
- Belcher, D. (2006). English for specific purposes: Teaching to perceived needs and imagined futures in worlds of work, study, and everyday life. *TESOL Quarterly*, 40 (1), 133-156.

- Bell, R. (1981). *An introduction to applied linguistics: Approaches and methods in language teaching*. London: Batsford.
- Bell, T, Witten, I & Fellows, M. (1998). *Computer Science Unplugged: Off-line activities and games for all ages*. Retrieved from Computer Science Unplugged. Retrieved April, 12th, 2019, from: < jmvidal.cse.sc.edu/library/bell98a.pdf>
- Bell, T., Witten, I. H., Fellows, M., Adams, R., & McKenzie, J. (2006). Computer science unplugged. *An enrichment and extension programme for primary-aged children* (teacher ed.). Retrieved from <http://www.csunplugged.org/> (27th April 2017)
- Benmostefa, N. (2013). *Reflections upon the Baccalauriate EFL Tests as a Source of and a Means for Innovation and Change in ELT in Algeria*. (Doctoral dissertation). Unpublished Doctorate thesis. University of Tlemcen, Tlemcen, Algeria.
- Benson, P. (2003). Learner autonomy in the classroom. In D. Nunan (ed.), *Practical English language teaching* (pp. 289–308). New York: McGraw Hill.
- Benyelles, R. (1999). *The design of ESP materials for second year students of economics (University of Aboubakr Belkaid)* (Magister's thesis). Tlemcen University, Tlemcen, Algeria.
- Benyelles, R. (2009). *Teaching ESP at Post Graduate Level*. (Doctoral disseration). Unpublished Doctorate Thesis. University of Tlemcen, Tlemcen, Tlemcen, Algeria.
- Berardo, S. A. (2006). The Use of Authentic Materials in the Teaching of Reading. *The Reading Matrix*, 6(2).
- Bhatia, V. K. (1993). *Analysing Genre: Language Use in Professional Settings*. London: Longman.

- Black, P. (1995). Can teachers use assessment to improve learning? *British Journal of Curriculum and Assessment*, 5(2), 5-11.
- Bloom, B. S. (1956). *Taxonomy of educational objectives, handbook I: Cognitive domain*. New York: David McKay Co Inc.
- Blume, L., Baecker, R., Collins, C., and Donohue, A. (2009). A communication skill for Computer Scientists course. In *Proceedings of ITiCSE 09*, July 6-9, Paris, France.
- Bocanegra-Valle, A. (2010). Evaluating and designing materials for the ESP classroom. *Utrecht Studies in Language and Communication*, (22), 141.
- Bodier, M. A. (1945). Aural Comprehension. *The Modern Language Journal*. <https://doi.org/10.1111/j.1540-4781.1945.tb00274.x> . (27th May 2019)
- Boeckner, K. & Brown, C. (2002). *Oxford English for computing: Student's book*. Oxford: Oxford University Press.
- (1993). *Oxford English for computing: Answer book*. Oxford: Oxford University Press.
- Boggino, N. (2009). Evaluation as a strategy for teaching. Evaluating processes and results. Sísifo. *Educational Sciences Journal*, 09, 79-86. Retrieved from [October 8th, 2018] at <http://sisifo.fpce.ul.pt>
- Bonamy, D. (2009). *Oxford English for Careers: Technology 1 Teacher's Resources Book*. Oxford: Oxford University Press.
- Botma, Y., Greef, M., Mulaudzi, F. M. & Wright, S.C.D. (2010). *Research in Health Sciences*. Cape Town: South Africa Pearson Education (Pty) Ltd.
- Bouabdallah-Haddam, F. (2008). *Conducting a needs analysis for an ESP course design: The case of Fourth year students at the Department of Cellular and Molecular Biology- University of Tlemcen*. (Magister's thesis). Tlemcen University, Tlemcen, Algeria.

- Bouyakoub-Bouabdallah, N. (2012). *Exploring writing in an academic context: The case of first year University students*. (Doctorate Thesis). University of Tlemcen, Tlemcen, Algeria.
- Bouزيد, A. (2012). *A Task-Based Syllabus for Post-Graduate Students of Genetics at Abou Bekr Belkaid University of Tlemcen*. (Magister Thesis). University of Tlemcen, Tlemcen, Algeria.
- Boyd, N. (2005). *What is sampling in research: Definition, method & importance*. Retrieved from <https://study.com/academy/lesson/what-is-sampling-in-research-definition-methods-importance.html#/partialRegFormModal>. (09th February 2019)
- Bracht, G.H., & Glass, G.V. (1968). The external validity of experiments. *American Educational Research Journal*. 5, 437-474.
- Brahimi, B. (2018). *Designing a multi-focus syllabus to teach ESP for communication: The case of Pharmacy students at Blida University*. (Doctoral thesis). University of Tlemcen, Tlemcen, Algeria.
- Braun, H. & Kanjee, A. (2006). Using assessment to improve education in developing countries. *Educating all Children: A Global Agenda*, 303-354.
- Breen, M. (1987a). Learner contributions to task design. In C. Candlin and D. Murphy (Eds.), *Language Learning Tasks*. Englewood Cliffs NJ: Prentice-Hall.
- Breen, M. (1987b). Contemporary paradigms in syllabus design. *Language Teaching*, 20 (2), 81-92 and 157-174. (1, 10).
- Breen, M. P. (1985). Authenticity in the language classroom. *Applied Linguistics*, 6(1), 60-70.
- Brinton, D. (2003). Content-Based Instruction. In Nunan, D. (Ed.), *Practical English Language Teaching*. McGraw-Hill Contemporary.

- Brinton, D., Snow, M. & Wesche, M. (1989). *Content-Based Second Language Instruction*. Boston: Heinle and Heinle Publishers.
- Brookshear, J. B. (2012). Computer science: An overview (11th ed). Pearson Books
- Denning, P, J. et al. (1989). *Computing as a Discipline*, 32(1). Communications of the ACM. Retrieved May, 22nd, 2019, from: <http://denninginstitute.com/pjd/PUBS/CompDisc.pdf>
- Brown, H. D. (2000). *Principles of Language Learning and Teaching* [M]. (4th ed.). NY: Longman.
- Brown, H. D. (2001). *Teaching by Principles: An Interactive Approach to Language Pedagogy*. New-York: Longman.
- Brown, G. T. L. (2004). Teachers' conceptions of assessment: Implications for policy and professional development. *Assessment in Education: Policy, Principles and Practice*, 11(3), 305-322
- Brown, J. D. (1995). *The Elements of Language Curriculum: A systematic approach to programme development*. Boston, MA: Heinle & Heinle Publishers.
- Brown, D. (1996). *The Elements of Language Curriculum: A Systematic Approach to Program Development*. Boston, MA: Heinle & Heinle.
- (2007). *Principles of language learning and teaching*. (5th ed.). White Plains, NY: Pearson Education.
- Brumfit, C. J. (1984a). *Communicative methodology in language teaching: The roles of accuracy and fluency*. Cambridge: Cambridge University Press.
- Brumfit, C. J. (1984b). Theoretical implications of interlanguage studies for language teaching. In Davies, A., Criper, C., and Howatt, A. P. R. (eds.) *Interlanguage*. Edinburgh: Edinburgh University Press.
- Brumfit, C. J. & Johnson, K. (1979). *The communicative approach to language teaching*. Oxford: O.U.P.

- Bryman, A. E. & Burgess R. G. (Eds.) (1999). *Qualitative Research* (4 volumes). London: Sage.
- Burns, R.B. (1997). *Introduction to Research Methods* (3rd ed.). South Melbourne: Addison Wesley Longman Australia.
- Burke, J.R. & Onwuegbuzie, A.J. (2005). The validity issue. *Mixed Research in the Schools*, 13(1), 48 – 63.
- Burke, J.G., O'Campo, P., & Peak, G. L., Gielen, A. C., McDonnell, K. A., & Trochim, W. M. (2005). An introduction to concept mapping as a participatory public health research method. *Qualitative Health Research*, 15(10), 1392-1410.
- Calder, J. and Sapsford, R. (2006). Statistical techniques. In Sapsford, R, and Jupp, V. (Eds). *Data collection and analysis* (2nd Ed). India. SAGE publications in associations with the Open Library.
- Canagarajah S. (2002). Reconstructing local knowledge. *Journal of Language, Identity, and Education* (1), 243-259.
- Canale, M & Swain, M. (1980). Theoretical bases of communicative approaches to second language teaching and testing. *Applied Linguistics*.
- Canale, M. (1983). From Communicative Competence to Communicative Language Pedagogy. In J. C. Richards, & R. W. Schmidt (Eds.), *Language and Communication* (pp. 2-14). London: Longman.
- Candlin, C. N. (1987). Towards Task-Based Language Learning. In C. Candlin, & D. Murphy (Eds.), *Language Learning Tasks* (pp. 5-22). Lancaster Practical Papers in English. Lancaster: Lancaster University.
- Candlin, C. N. (1984). Syllabus design as a critical process. *ELT Documents*, 118, 29-46.

- Cannon, H.M. (2004). *Redesigning the principalship in Catholic Schools*. (Doctoral dissertation). Unpublished Doctoral Thesis. Australia Catholic University.
- Carr, J. F & Harris, D. E. (2001). *Succeeding with Standards Linking Curriculum, Assessment, Action Planning*. Alexandria: Association for Supervision and Curriculum Development.
- Carr, W, & Kemmis, S. (1986). *Becoming critical: Education, knowledge and action research*. London: Falmer.
- Carroll, B.J. (1980). *Testing communicative performance*. Oxford: Pergamon Press.
- Carter, D. (1983). Some propositions about ESP. *The ESP Journal*, 2, 131-137.
- Carter, R., (1993). *Introducing Applied Linguistics*. London: Penguin Books.
- Celce-Murcia, M., & Olshtain, E. (2000). *Discourse and Context in Language Teaching: A Guide for Language Teachers*. Cambridge: Cambridge University Press.
- Celce-Murcia, M. (2001). *Teaching English as a second or foreign language* (3rd ed.) USA: Heinle & Heinle.
- Chalhoub-Deville, M. (2010). Technology in standardized language assessments. In R. Kaplan (Ed.), *The Oxford handbook of applied linguistics* (2nd ed. pp. 511– 26). Oxford, England: Oxford University Press.
- Chapelle, C. A & Bindlley, G. (2002). *Assessment, An Introduction to Applied Linguistics*. Oxford: Oxford University Press.
- Chelli, S. & Khouni, W. (2013). Writing assessment under the competency-based approach. *Current Trends in Foreign Language Teaching and Learning- Flexibility- Creativity and Innovation*, 1-22.

- Chen, T. (2000). Self-training for ESP through action research. *English for Specific Purposes*, 19(4), 389-402.
- Chen, Y. (2006). From common core to specific. In Robertson, P., & Jang, J (eds.), *The Asian ESP Journal*, 1(1), 24-50. British Virgin Islands.
- Chen, Y., & Hoshower, L. B. (2003). Student evaluation of teaching effectiveness: An assessment of student perception and motivation. *Assessment and Evaluation in Higher Education*, 28 (1), 71-88.
- Cherchab, D. F. (2012). *Authentic materials in ESP: An evaluation proposal at the department of Computer Sciences within the LMD system*. (Doctoral Thesis). University of Oran, Oran, Algeria.
- Chomsky, N. (1965). *Aspects of the Theory of Syntax*. Boston: MIT Press.
- Clark, J. L. (1987). *Curriculum renewal in school foreign language learning*. Oxford: Oxford University Press.
- Clements, A. (2013). *Computer Organization & Architecture: Themes and Variations*. Cengage Learning. ISBN 1285415426. Archived from the original on 2017-11-20.
- Cochran-Smith, M., & Lytle, S. (1999). The teacher research movement: A decade later. *Educational Researcher*, 28(7), 15–25.
- Coffey, B. (1984). ESP-English for Specific Purposes. *Language Teaching*, 17(1).
- Cohen, L. (2005). *Research methods in education* (5th ed.). New York: Taylor and Francis e-library.
- Cohen, A. D. (1987). Studying language learning strategies: How do we get the Information? In A. L. Wenden & J. Rubin (Eds.), *Learner strategies in language learning* (pp. 31-40). Englewood Cliffs, NJ: Prentice-Hall International.

- Cohen, A. (1987). Student Processing of Feedback on Their Composition. In Wenden, A.L. & Rubin, J., (Eds), *Learner Strategies in Language Learning* (pp. 57-69). Englewood Cliffs, New Jersey: Prentice Hall.
- Cohen, L. & Holliday, M. (1979). *Statistics for Education and Physical Education*. London: Harper & Row.
- (1982). *Statistics for Social Scientists*. London: Harper & Row.
- (1996). *Practical Statistics for Students*. London: Paul Chapman.
- Cohen, L., Manion, L. and Morrison, K. R. B. (2004). *A Guide to Teaching Practice* (5th ed.). London: Routledge.
- Cohen, L., Manion, L. & Morrison, K. (2007). *Research Methods in Education* (6th ed.). New York: Routledge.
- Corder, S. P. (1973). *Introducing Applied Linguistics*. Harmondsworth: Penguin.
- Coulmas, F. (2003). *Writing systems: An introduction to their linguistic analysis*. (Cambridge Textbooks in Linguistics.) Cambridge: Cambridge University Press.
- Covacevich, C. (2014). *How to select an instrument for assessing students learning*. Washington: Inter-American Development Bank.
- Coyle, D., Hood, P., & Marsh, D. (2010). *CLIL content and language integrated learning*. Cambridge, UK: Cambridge University Press.
- Crookes, G. (1986). *Task classification: A cross-disciplinary review*. Technical Report No.4. Honolulu: University of Hawai'i at Manoa, Social Science Research Institute, Center for Second Language Classroom Research.
- Coombre, C. (2010). *Assessing foreign/second language writing ability*. Bingley: Emerald Group Publishing Limited.

- Crandall, J. A. (1993). Professionalism and professionalization of adult ESL literacy. *TESOL Quarterly*, 27, 497–515.
- (1994). Strategic integration: Preparing language and content teachers for linguistically and culturally diverse classrooms. In J. E. Alatis (ed.), *Strategic Interaction and language acquisition: Theory, practice, and research* (pp. 255-274). Washington, DC: Georgetown University Press.
- Creswell, J. W. (1998). *Qualitative inquiry and research design: Choosing among five traditions*. London: Sage Publications.
- (2003). *Research design: Qualitative, quantitative and mixed methods approaches* (2nd ed.). Thousand Oaks, CA: SAGE Publications.
- (2014). *Research Design: Qualitative, Quantitative and Mixed Methods Approaches* (4th ed.). London: Sage Publications Ltd.
- Creswell, J. W., Plano Clark, V. L., Guttman, M., & Hanson, W. (2003). Advanced mixed methods research designs. In Tashakkori, A., Teddlie C, (eds.), *Handbook on Mixed Methods in the Behavioral and Social Sciences*. Thousand Oaks, Calif: Sage Publications;209-240.
- (2011). Controversies in mixed methods research. In Denzin, N & Lincoln, Y. S (Eds.). *The Sage Handbook of Qualitative Research* (4th ed.). Thousand Oaks, CA: Sage Publications.
- Crystal, D. (1997). The Future of English. In *the Cambridge Encyclopaedia of the English Language*. Cambridge: Cambridge University Press.
- Cummins, J. (1978). Bilingualism and the development of metalinguistic awareness. *Journal of Cross-Cultural Psychology*, 9, 131-149.
- Cummins, J. (1979). Cognitive/academic language proficiency, linguistic interdependence, the optimum age question and some other matters. *Working Papers on Bilingualism*, 19, 121-129.
- Cunningsworth, A. (1983). Needs analysis- A review of the state of the art. *System*, 11(2), 149-54.

- Dakhmouche, F. R. (2008). *Meeting students' needs: An analysis of ESP teaching at the department of Computer Science*. (Magister's thesis). University of Constantine, Constantine, Algeria.
- Daniels, P. T. and Bright, W. (eds.). (1996). *The World's Writing Systems*. New York: Oxford University Press.
- Davies, S. & West, R. (1984). *The pitman guide to English language examinations*. London: Pitman Published Ltd.
- Denning, P., Comer, D., Gries, D. (1989). Computing as a discipline. *Communications of the ACM*, 32(1), 9-23.
- De vaus, D. A. (2001). *Research design in social research*. London: SAGE Publications.
- Dillman, D. A., Carley-Baxter, L, and Jackson, A. (1999). Skip pattern compliance in three test forms: a theoretical and empirical evaluation. *SESRC Technical Report* (pp.99–01). Social and Economic Sciences Research Center. Pullman, WA: Washington State University.
- Donesch-Jezo, E. (2012). English for Specific Purposes: What does it mean and why is it different from teaching General English? *CONFLUENCE*, 1-7. ISSN:2250-138X.
- Dörnyei, Z. (2007). *Research methods in applied linguistics*. Oxford: Oxford University Press.
- Douglas, D. (2000). *Assessing languages for specific purposes*. Cambridge: Cambridge University Press.
- Dudley, E. and St Johns. (1998). *Developments in ESP a Multi-Disciplinary Approach*. Cambridge: Cambridge University Press.
- Dudley-Evans, T., & St John, M. (1991). English for Specific Purposes: International in Scope, Specific in Purpose. *TESOL Quarterly*, 25, 297-314.
- Dudley-Evans, T. (1997a). An overview of ESP in the 1990's. *The Japan Conference on English for Specific Purposes Proceedings*, Aizuwakamatsu. November 8, 1997. (Thomas, O), ed: Retrieved November 14th, 2018 from <http://ericfacility.org> (ERIC: Educational

- Resources Information Center, US department of education: Indiana University, Bloomington.): ED 424 774. 1-9.
- Dudley-Evans, T. (1997b). Five questions for LSP teacher training. In R. Howard, & G. Brown (eds.), *Teacher Education for LSP* (pp. 58-67). Clevedon, England: Multilingual Matters.
- Dudley-Evans, T. (1998). *Developments in English for Specific Purposes. A Multi-Disciplinary Approach*. Cambridge: Cambridge University Press.
- Dueñas, M. (2004). The whats, whys, hows and whos of content-based instruction in second/foreign language education. *International Journal of English Studies*, 4, (1), 73-96. Doi:10.6018/ijes.4.1.48061 (06th December 2019)
- Durrheim, K. (2004). Research design. In M. Terre Blanche, & K. Durrheim (Eds.), *Research in practice: Applied methods for the social sciences* (pp. 29-53). Cape Town: University of Cape Town.
- Dyer, C. (1995). *Beginning Research in Psychology*. Oxford: Blackwell.
- Early, P. (1981). The ESP teacher's role – Implications for the knower-client relationship. In *The ESP Teacher: Role, Development, and Prospects* (pp. 42-52). ELT Documents 112. London: The British Council.
- Early, M. (1990). ESL Beginning Literacy: A Content Based Approach. *Test Canada Journal! Revue Test Du Canada*, 7(2).
- Elliott, J. (1991). *Action Research for Educational Change*. Buckingham: Open University Press.
- Ellis, M., & Johnson, C. (1994). *Teaching business English*. Oxford, England: Oxford University Press.
- Emery, C. R., Kramer, T. R., & Tian, R. G. (2003). Return to Academic Standards: A Critique of Students' Evaluations of Teaching Effectiveness. *Quality Assurance in Education: An International Perspective*, 11(1), 37-47.
- Esteras, S. R. (1999). *Infotech English for Computer Users*. (2nd Ed). Cambridge: Cambridge University Press.
- Esteras, S. R. (2008). *Infotech English for computer users: Student's book* (4th ed.). Cambridge: Cambridge University Press.

- (2008). *Infotech English for computer users: Teacher's book* (4th ed.). Cambridge: Cambridge University Press.
- Ewer, J. R., and Hughes-Davies, G. (1971). Further notes on developing an English programme for students of science and technology. *English Language Teaching*, 26(1), 65-70.
- Farrell, A. (2002). Lesson Planning. In Richard, J.C & Renandya, W.A (Ed), *Methodology in Language Teaching: An Anthology of Current Practice*. United Kingdom: Cambridge University Press.
- Fenwick, T. (2003). Reclaiming and re-embodiment experiential learning through complexity science. *Studies in the Education of Adults*, 35(2).
- Ferguson, G. (1997). The teacher education and LSP. The role of specialized knowledge. In R. Howard, G. Brown (eds.), *Teacher Education for LSP* (pp. 80-89). Clevedon, England: Multilingual Matters.
- Fischer, S. R. (2001). *The History of writing*. London: Reaktion.
- Fisher, J. D., & Fisher, W. A. (2002). The information-motivation-behavioral skills model. In DiClemente, R., & Crosby, R., & Kegler, R. (ed.), *Emerging Promotion Research and Practice* (pp. 40–70). San Francisco, CA: Josey Bass Publishers.
- Flanagan, T. (2007). *Harper's Team*. Montreal, QC: MC Gill- Queen's University Press.
- Flavell, R. (1983). *A Language Testing Handbook*. Essential Language Teaching Series. London: Macmillan Press London.
- Fleishman, H. L. and Williams, L. (1996). An introduction to programme evaluation for classroom teachers. Arlington, Massachusetts, USA. Developments Associates, Inc
- Fred, L. & Perry, Jr. (2005). *Research in applied linguistics: Becoming a discerning consumer*. New Jersey: Lawrence Erlbaum Associates.

- Fredericksen, J. (1984). *A system approach to educational testing*. Cambridge: American Academy of Arts and Sciences.
- Freiermuth, M. (2002). Connecting with computer science students by building bridges. *Simulation & Game*, 33(3), 299-315.
- Gall, M. D., Borg, W. R., & Gall, J. P. (1996). *Educational research: An introduction* (6th ed.). White Plains, NY: Longman.
- Gall, M. D., Borg, W. R., & Gall, J. P. (2003). *Educational research: An introduction* (7th ed.). Upper Saddle River, NJ: Pearson Education.
- Gardner, P.H, & Winslow, J. D. (1983). Present and proposed methods of determining the needs of students in public sector identifying language needs. In Ritcherich (Ed.), *Case Studies in identifying language needs* (pp. 69-79). Oxford: Pergam on Press.
- Gatehouse, K. (2001). *Key Issues in English for Specific Purposes (ESP): Curriculum Development*. Khoey [at] khae-service.com <<http://www.khae-service.com>>. (28th June 2017)
- Genesee, F., Lindholm-Leary, K., Saunders, W. M., & Christian, D. (2006). *Educating English language learners: A synthesis of research evidence*. New York: Cambridge University Press.
- Genesee, F. & Upshur, J. A. (1996). *Classroom- Based Evaluation in Second Language Education*. Cambridge: Cambridge University Press.
- Genesee, F. (1987). *Learning through two languages: Studies of immersion and bilingual education*. Rowley, MA: Newbury House.
- Giesen, J., Richter, S., & Cabrera, D. (2010). *Integrated Course Design to Improve Student Learning*. DeKalb, Illinois: Northern Illinois University.
- Gilbert, N. (2008). *Researching social life*. (3rd ed.). London: Sage Publications Ltd.

- Ginsberg, L.H. (2001). *Social work evaluation: Principles and methods*. Boston: Allyn and Bacon.
- Gipps, C.V. & Murphy, P. (1994). *A fair test? Assessment, achievement and equity*. Milton Keynes: Open University Press.
- Glanz, J. (1998). *Action research: An educational leader's guide to school improvement*. Norwood, MA: Christopher-Gordon.
- Glendinning, E.H & McEwan, J. (2003). *Oxford English for information technology: Student's book*. Oxford: Oxford University Press.
- (2006). *Oxford English for information technology: Student's book* (2nd ed.). Oxford: Oxford University Press.
- (2003). *Oxford English for information technology: Teacher's book*. Oxford: Oxford University Press.
- (1999). *Basic English for computing: Student's book*. Oxford: Oxford University Press.
- (1999). *Basic English for computing: Teacher's book*. Oxford: Oxford University Press.
- Glendinning, E.H. & Pohl, A. (2009). *Oxford English for Careers: Technology 2 Student's Book*. Oxford: Oxford University Press.
- Glendinning, E.H. (2009). *Oxford English for Careers: Technology 1 Student's Book*. Oxford: Oxford University Press.
- Goodrich, R. L. & St, Pierre, R.G. (1979). *Opportunities for studying later effects of follow through*. Cambridge, MA: ABT Associates.
- Goswami, U. (2008). Principles of learning, implications for teaching: A cognitive neuroscience perspective. *Journal of Philosophy of Education*, 42 (3-4).
- Grabe, W. & Kaplan, B. (1996). *Theory and practice of writing*. London and New York: Longman.

- Grabe, W., & Stoller, F. L. (1997). Content-based instruction: Research foundations. In M. A. Snow, & D. M. Brinton (Eds.), *The content-based classroom: Perspectives on integrating language and content* (pp. 5–21). NY: Longman.
- Graia Bouklikha, W. (2016). *Practice of the reading skill in an ESP context using web-retrieved materials: the case of Engineering students at the University of Tlemcen*. (Published Doctorate Thesis). University of Tlemcen, Tlemcen, Algeria. Available in <http://dspace.univ-tlemcen.dz/handle/112/887> (04th June 2018)
- Graves, K. (1996). *Teachers as Course Developers*. Cambridge: Cambridge University Press (CUP).
- (2000). *Designing language courses: A guide for teachers*. Boston, MA: Heinle & Heinle.
- (2001). *Teachers as Course Developers*. USA: Cambridge University Press.
- Greene, J.C., Caracelli, V.J., and Graham, W.F. (1989). Toward a conceptual framework for mixed-method evaluation designs. *Educational Evaluation and Policy Analysis*, 11(3), 255- 274.
- Grinnell, R. M. J. (1981). *Social Work Research and Evaluation*. Itasca : IL, F.E. Peacock.
- Grinnell, R. M. J., & Unrau, Y. (2005). *Social Work Research and Evaluation: Quantitative and Qualitative Approaches*. New York: Cengage Learning. <https://scholarworks.wmich.edu/books/306>. (12th September 2019).
- Haines, S. (1989). *Projects for the EFL Classroom: Resource Material for Teachers*. United Kingdom: Nelson: Walton-On-Thames Surrey.
- Halliday, M. A. K., McIntosh, A & Stevens, P. D. (1964). *The Linguistic Sciences and Language Teaching*. London: Longmans Green and co ltd.

- Halliday, M. A. K. and Hasan, R. (1976). *Cohesion in English*. London: Longman.
- Halliday, M. A. K., & Matthiessen, C. M. I. (2004). *An Introduction to Functional Grammar*. London: Routledge.
- Halliday, M. K. A. (1966). *The Linguistics Science and Language Teaching*. London: Longman.
- Hamzaoui, H. (2006). *An Exploration into the Strategies used for Essay Writing across three languages: The Case of EFL University Students*. (Doctoral dissertation). Unpublished Doctorate Thesis. University of Tlemcen, Tlemcen, Algeria.
- Hanna, G. S. (1993). *Better Teaching through Better Measurement*. Fort Worth, TX: Harcourt Brace Jovanovich.
- Hanna, G. S., & Dettmer, P. A. (2004). *Assessment for effective teaching: Using context-adaptive planning*. Boston, MA: Pearson A&B.
- Harding, K. (2007). *English for Specific Purposes*. Oxford: Oxford University Press.
- Harold, M. (1983). *Techniques in Testing*. Oxford: Oxford University Press.
- Harmer, J. (2001). *The practice of English Language Teaching* (3rd ed.). Essex : Pearson Education.
- Harmer, J. (2002). *How to Teach English: An Introduction to the Practice of English Language Teaching*. Malaysia : Addison Wesley Longman.
- Harmer, J. (1983). *The Practice of English Language Teaching*. New York: Longman Inc.
- Harris, M. (1993). *Introducing Writing: Assessing and Reading texts*. London: Penguin House.
- Harris, R., Guthrie, H., Hobart, B., & Lundberg, D. (1995). *Competency-based education and training: Between and training*. Adelaide: Macmilan Education Australia.

- Harrison, P. M. C., Musil, J. & Müllensiefen, D. (2016). Modelling melodic discrimination tests: Descriptive and explanatory approaches. *J. New Music Res.* 45, 265–280, <https://doi.org/10.1080/09298215.2016.1197953> (Retrieved 26th November, 2017).
- Harrison, H., Birks, M., Franklin, R. & Mills, J. (2017). Case study research: Foundations and methodological orientations. *Forum: Qualitative Social Research*, 18(1), Art. 19, 34 paras.
- Heaton, J. B. (1988). *Writing English Language Tests*. London: Longman Group Ltd.
- Hedge, T. (2000). *Teaching and Learning in the Language Classroom*. Oxford: Oxford University Press.
- Herazo, J. D. Jerez, S. & Arellano, D. L. (2009). Learning through communication in the EFL class: Going beyond the PPP approach. *Ikala, Revista de language y Cultura*, 21(9), 117-136 Available at <http://jalt.publications.org/tlt/articles>. (17th June 2019)
- Herman, S. & Egri, C. (2003). Triangulation in action: Integration of qualitative and quantitative methods to research environmental leadership. In K. Parry & J. Meindl (Eds.), *Grounding leadership theory and research: Issues, perspectives and methods* (pp 83-107). Greenwich, CT: Information Age Publishing.
- Hermawan, D. (2017). *Integrating content-based syllabus and task-based syllabus in ESP class for students of Akper Pemkot Tegal* (Master's thesis). Diponegoro University, Semarang, Indonesia.
- Hicks, D. & Littlejohn, A. (2000). *Cambridge English Worldwide Student's Book 5*. Cambridge: Cambridge University Press.

- Hill, D. (2012). *English for information technology 2: Course book*. England: Pearson Education Limited.
- Hill, D. (2012). *English for information technology 2: Teachers Notes*. England: Pearson Education Limited.
- Hilliard, B. A. (2016). *Optimizing viewer comprehension and shaping impressions and attention: Through the formatting of content in tools like Microsoft Power Point*. (PhD dissertation). Murdoch University, Perth, Western Australia.
- Hitchcock, G., & Hughes, D. (1995). *Research and the Teacher* (2nd ed.). London: Routledge.
- Ho, B. (2015). English communication needs of Computer Science internship and workplace. *International Journal of Language and Linguistics*, 2(2), 9-20.
- Hobson, D. (2001). Action and reflection: Narrative and journaling in teacher research. In Burnaford, G., Fischer, J., & Hobson, D. (Eds.), *Teacher doing research* (2nd ed) (pp. 7-27). Mahwah, NJ: Lawrence Erlbaum Associates.
- Holmes. J. (1982). Some Approaches to Course Design. *Working Paper* No.7, Brazilian ESP Project.
- Hooper, R., (ed.) (1971). *The Curriculum Context Design and Development*. Edinburgh. Scotland: Oliver and Boyd.
- Hopkins, K. D., Hopkins, B. R. and Glass, G. V. (1996). *Basic Statistics for the Behavioral Sciences* (3rd ed.). Boston, MA: Allyn & Bacon.
- Hornby, A. S., Cowie, A. P. (1986). *Oxford advanced learners' dictionary of current English* (3rd ed.). Oxford: Oxford University Press.
- Hounsell, D. (2003). The evaluation of teaching. In H. Fry, S. Ketteridge & S. Marshall (Eds.), *A handbook for teaching & learning in higher education* (pp. 200-212). London: Kogan Page.

- Huckins, T. N. (1988). Achieving professional communicative relevance in a generalized ESP classroom. In Chamberlain, D.; Baumgardner, R. J. (eds.), *ESP in the classroom: Practice and evaluation: ELT document* (pp. 128: 62-70).
- Huckins, T. N. (1988). Achieving professional communicative relevance in a generalized ESP classroom. In Chamberlain, D.; Baumgardner, R. J. (eds.), *ESP in the classroom. Practice and evaluation: ELT document 128* (pp. 62-70).
- Hughes, A. (1989). *Testing for Language Teachers*. Cambridge: Cambridge University Press.
- Hutchinson, T., & Waters, A. (1987). *English for Specific Purposes: A Learner-Centered Approach*. Cambridge: Cambridge University Press.
<http://dx.doi.org/10.1017/CBO9780511733031> (3rd Oct 2017).
- Hutchinson, T., & Waters, A. (2010). *English for Specific Purposes: A Learning-centred Approach*. Cambridge: Cambridge University Press.
- Hutchinson, T. (1988). *Making materials work in the ESP classroom*. In D. Chamberlain & R. J. Baumgardner (Eds.), *ESP in the classroom: Practice and evaluation. ELT document 128* (pp.71-75).
- Hyland, K. (2003). Genre-based pedagogies: A social response to process. *Journal of Second Language Writing*, 12, 17-29.
- Hymes, D.H. (1972). On Communicative Competence. In J.B. Pride and J. Holmes (Eds.), *Sociolinguistics. Selected Readings* (pp. 269-293) (Part 2). Harmondsworth: Penguin.
- Igbokwe, P. (2009). *Introduction to research and research methodology*. Anambra State, Nigeria: Rex Charles & Patrick Ltd.
- Igwuowo, F. I. (2016). *Fundamental of research methodology and data collection*. Nsukka: LAP Lambert Academic Publishing.

https://www.researchgate.net/publication/303381524_Fundamentals_of_research_methodology_and_data_collection . (10th September 2019).

Irons, A. (2008). *Enhancing learning through formative assessment and feedback*. London: Routledge.

Jabbarifar, T. (2009). The importance of classroom assessment and evaluation in education system. *Proceedings of the 2nd International Conference of Teaching and Learning*. 1-9. Malaysia: INTI University College.

Javid, C. Z. (2010). Addressing the causes that hinder effective English language teaching in Saudi universities: A case study. *Bani-Swaif University Journal*, 80, 479-513. Egypt.

----- (2011a). EMP Needs of Medical Undergraduates in a Saudi Context. *Kashmir Journal of Language Research*, 14(1), 89-110. ISBN: 1028-6640. AJK University.

----- (2011b). Saudi medical undergraduates' perceptions of their preferred learning styles and evaluation techniques. *Arab World English Journal*, 2(2), 40-70. ISBN:22299327. Available online [http://www.awej.org/awejfiles/ 77_6_8.pdf](http://www.awej.org/awejfiles/77_6_8.pdf). (12th October 2018)

John, A. & Dudley-Evans, T. (1991). English for Specific Purposes: International in Scope, specific in purpose. *TESOL Quarterly*, 25(2), 297- 314.

Johns, A. M. & Price-Machado, D. (2002). English for specific purposes: Tailoring courses to student needs and to the outside world. In M. Celce-Murcia (ed.), *Teaching English as a second/foreign language* (pp. 43-54). New York: Heinle & Heinle Publishers.

Johnson, D.M. (1992). *Approaches to Research in Second Language Learning*. New York: Longman.

Johnson, K (1982). *Communicative syllabus design and methodology*. Oxford: Blackwell.

- Johnson, K. and Morrow, K. (1981). *Communication in the classroom*. Essex: Longman.
- Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed methods research: A research paradigm whose time has come. *Educational Researcher*, 33(7), 14-26.
- Johnson, K. E. and M. Swain (eds). 1997. *Immersion Education: International Perspectives*. Cambridge, UK: Cambridge University Press.
<https://doi.org/10.1017/CBO9781139524667> (1st January 2018)
- Johnstone, S. M. (2000). The evolving learning environment. *Syllabus*, 14(1), 20.
- Johnstone, R. (2000). Context-sensitive assessment of modern languages in primary (elementary) and early secondary education: Scotland and the European experience. *Language Testing*, 17, 123–143.
- Johnstone, K.M., Ashbaugh, H. and Warfield, T.D. (2002). Effects of Repeated Practice and Contextual-Writing Experiences on College Students' Writing Skills. *Journal of Educational Psychology*, 94, 305-315.
<http://dx.doi.org/10.1037/0022-0663.94.2.305>. (14th July 2019)
- Johnstone, A. (2005). *Evaluation of Teaching: A Physical Sciences Practice Guide*. Physical Sciences Centre, Department of Chemistry, University of Hull, available at:
www.heacademy.ac.uk/assets/ps/documents/practice_guides/practice_guides... [Accessed 29th April 2019].
- Jordan, R. (1997). *English for Academic Purposes*. Cambridge: CUP.
- Kareva, V. (2013). English for specific purposes: Public administration and political sciences. *Procedia –Social and Behavioral Sciences*. 70, 1477 –1481.
- Kazdin, A. E. (1982). *Single-case Research Designs*. New York: Oxford University Press.
- Keane, E., & Labhrainn, M. L. (2005). Obtaining student feedback on teaching and course quality. *Center for excellence in learning and teaching (CELT)*.

Retrieved January 9th, 2017 from
http://www.nuigalway.ie/celt/documents/evaluation_ofteaching.pdf

- Kemmis, S. and McTaggart, R. (Eds) (1988). *The Action Research Planner* (2nd ed.). Geelong, Vic: Deakin University Press.
- Kemmis, S. and McTaggart, R. (2000). Participatory action research. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (2nd ed.) (pp. 567-605). Thousand Oaks, CA: Sage
- Kemper, E. A., Springfield, S., & Teddlie, C. (2003). Mixed methods sampling strategies in social science research. In Tahakkori, A & Teddlie, C, (Eds.). *Handbook of mixed methods in social and behavioral research* (pp. 273 – 296). Thousand Oaks, CA: Sage Publications.
- Kennedy, C.H. and Bolitho, R. (1984). *English for Specific Purposes*. London: Mc Millan press Ltd.
- Kitwood, T. M. (1977). *Values in adolescent life: Towards a critical description*. (Doctoral dissertation). Unpublished PhD dissertation, School of Education, University of Bradford.
- Kothari, C R. (2004). *Research Methodology: Methods & Techniques* (2nd ed.). New Delhi: New Age International Ltd Publishers.
- Krahnke, K. (1987). *Approaches to syllabus design for foreign language teaching*. Englewood Cliffs: Prentice Hall.
- Krueger, R. A & Casey. (2000). *Focus Groups: A practical Guide for Applied Research* (3rd ed.). Thousand Oaks, CA: Sage Publications.
- Kumar, R. (2008). *Research Methodology*. London: APH Publishing Corporation.
- Kumar, R. (2011) *Research Methodology: A Step-by-Step Guide for Beginners* (3rd ed.). New Delhi: SAGE Publications.

- Kumaravadivelu, B. (1994). The postmethod condition: (E) merging strategies for second/foreign language teaching. *TESOL Quarterly*, 1, 27-48.
- Kumaravadivelu, B. (2006). TESOL methods: Changing tracks, challenging trends. *TESOL Quarterly*, (40), 59–81.
- Kvale, S. (1996). *Interviews*. London: Sage.
- Laing, R. D. (1967). *The Politics of Experience and the Bird of Paradise*. Harmondsworth: Penguin.
- Lamri, C. E. (2016). An Introduction to English for Specific Purposes (ESP). *Online lectures for third year 'Licence' level*. University of Tlemcen, Tlemcen, Algeria.
- Lapidot, T & Hazzan, O. (2003). *Methods of Teaching a Computer Science: Course for Prospective Teachers*. 35(4). Department of Education in Technology and Science, Israel Institute of Technology. Retrieved May, 13th, 2019, from: <http://edu.technion.ac.il/Faculty/OritH/HomePage/MTCS_Course/Lapidot%26Hazzan_Inroads_2003.pdf>
- Larsen-Freeman, D. (2000). *Techniques and principles in language teaching*. Oxford: OUP.
- Leedy, P. D. (1997). *Practical research: Planning and design* (6th ed.). New Jersey: Prentice-Hall.
- Leedy, P. & Ormrod, J. (2001) *Practical Research: Planning and Design* (7th ed.). NJ and Thousand Oaks, CA: Merrill Prentice Hall and SAGE Publications, Upper Saddle River.
- Lekatompessy, F.M. (2002). Needs Analysis in Curriculum Development. In Richard (ed.), *Curriculum Development in Language Teaching*. USA Cambridge: UPI PASCA.

- Lesiak-Bielawska, Elzbieta. D. (2014). English for instrumentalists: designing and evaluating an ESP course. *English for Specific Purposes World*, 43(15), 1-32.
- Lewis, M. (1997). *Implementing the Lexical Approach*, Hove. English: Language Teaching Publications.
- Lewis, R. (1983). *How to write essays*. Cambridge: NEC.
- Likert, R. (1932). *A Technique for the Measurement of Attitudes*. New York: Columbia University Press.
- Lin, W. (2011). *Communication strategies in second language acquisition: A study of Chinese English learners' attitude and reported frequency of communicative strategies*. (Doctoral thesis). Kristianstad University, Kristianstad, Sweden.
- Lincoln, Y. S. & Guba, E. (1985). *Naturalistic Inquiry*. Beverly Hills, CA: Sage.
- Linn, R. L. & Miller, M. D. (2005). *Measurement and assessment in teaching* (9th ed.). Englewood Cliffs, N. J: Prentice Hall.
- Litte, O., Goe, L., & Bell, C. (2009). *A practical guide to evaluating teacher effectiveness*. Washington, DC: National Comprehensive Center for Teacher Quality. Retrieved from <http://www.tqsource.org/publications/practicalGuide> pdf. (23th March 2018)
- Littlewood, W. (2007). Communicative and Task-based Language Teaching in East Asian Classrooms. *Language Teaching*, 40, 243-249.
- Lodico. M. G, Spaulding. D. T., & Voegtle. K. H. (2006). *Methods in educational research: From theory to practice*. Jossey-Bass A Wiley Imprint. San Fransisco, CA, USA: John Wiley & Sons, Inc.
- Long, M. (ed) (2005). *Second Language Needs Analysis*. Cambridge: Cambridge University Press.

- Mackey, R & Mountford, A. (1978). *English for Specific Purposes: A Case Study Approach*. London: Longman Group Ltd.
- MacMillan, J.H. & Schumacher, S. (2001). *Research in Education. A Conceptual Introduction* (5th ed.). Boston: Longman.
- Marczyk, G., DeMatteo, D., & Festinger, D. (2005). *Essentials of Research Design and Methodology*. New York, NY: John Wiley & Sons, Inc.
- Marsh, H. W., & Roche, L. A. (1997). Making students' evaluation of teaching effectiveness effective: The critical issues of validity, bias and utility. *American Psychologist*. 52(11), 1187-1197. Retrieved March 2nd, 2017 from <https://wiki.uiowa.edu/download/attachments/18286715/Marsh+and+Roche--Making+Students+Evaluations+of+Teaching+Effectiveness+Effective.pdf>
- Martin, J. R. (1992). *English text: System and structure*. Philadelphia: John Benjamin's Publishing Company.
- Mathers, C., Oliva, M., & Laine, S. (2008). *Improving instruction through effective teacher evaluation: Options for states and districts*. Washington, DC: National Comprehensive Center for Teacher Quality.
- Maxell, J. A. (1998). Designing a qualitative study. In L. Bickman, & D. J. Rog (eds.), *Handbook of application social research methods* (pp. 69-100). Thousand Oaks, CA: Sage Publications.
- McCormick, R. & James, M. (1988). *Curriculum Evaluation in Schools* (2nd ed.). London: Croom Helm.
- McDonald, G., and McDonald, M. (1993). Developing oral communication skills of computer science undergraduates. In *Proceedings of STGCSE Technical Symposium on Computer Science Education*, 279-282.

- McKay, P. (ed.) (2006a). *Planning and teaching creatively within a required curriculum for school age learners*. Alexandria, VA: TESOL.
- McKay, P. (2006b). *Teachers introducing change in required curricula for school-age English language learners: Influences and processes*. In McKay, (ed.), 1–12.
- McLean, Z. Y. (1995). History of Bilingual Assessment and its impacts on best practice used today. *Newyork State Association for Bilingual Education Journal*, 10, 6-1.
- McNamara, T., Elder, C., & Iwashita, N. (2002). Estimating the difficulty of oral proficiency tasks: What does the test-taker have to offer? *Language Testing*, 19, 347-368.
- McNiff, J., & Whitehead, J. (2002). *Action Research: Principles and Practice* (2nd ed.). London: Routledge Falmer.
- Merriam, S. B. (1988). *Case Study Research in Education*. San Francisco, CA: Jossey Bass.
- (2009). *Qualitative research: A guide to design and implementation*. San Francisco, CA: Jossey-Bass.
- Merton, R. K. and Kendall, P. L. (1946). The focused interview. *American Journal of Sociology*, 51, 541–57.
- Mettetal, G. (2001). *Research about teaching ana learning*. Retrived March 1st, 2018, from Indiana University South Bend, Website: http://www.iusb.edu/-gmettetal/Research_about_teaching_and.htm #Comparison.
- Metz, A. J. R. (2007). Why conduct a programme evaluation? Five reasons why evaluation can help an out-of-school time Programme. *Brief research-to-results*. Washington D.C. Child Trends.

- Miles, M. and Huberman, M. (1994). *Qualitative Data Analysis* (2nd ed.). Beverly Hills, CA: Sage.
- Miliani, M. (1994). *English for Specific Purposes*. Seminar presented in Magister Course. I.L.E: Tlemcen.
- Mohan, B. A. (1986). *Language and Content*. Addison: Wesley.
- Momeni, M, and Rasekh, A. E. (2012). Investigating Class Coherence and its Effect on EAP Course Evaluation: A Case Study of MA Students of Geography and Tourism. *Journal of Education and Social Research*. 2 (2), pp 219-236. Retrieved April 19th, 2018 from http://www.mcser.org/images/stories/JESRJOURNAL/Jesr_May_2012/abbass_eslami_rasekh-investigating%20class%20coherence.pdf
- Morgan, D. L. (1988). *Focus Groups as Qualitative Research*. Beverly Hills, CA: Sage.
- Morris, L. L., Fitz-Gibbon, C. T. and Lindheim, E. (1987). *How to Measure Performance and Use Tests*. Beverly Hills, CA: Sage.
- Moss, P.A. (1994). Can there be validity without reliability? *Educational Researcher*, 23(2), 5-12.
- Mullen, D. N & Brown, P. C. (1989). *English for Computer Science*. Oxford: Oxford University Press.
- Munby, J. (1978). *Communicative syllabus design: A sociolinguistic model for defining the content of purpose-specific language programmers*. Cambridge: Cambridge University Press.
- Murphy, J. M., & Stoller, F. L. (Eds.). (2001). Sustained-content language teaching: An emerging definition. *TESOL Journal*, 10 (2/3), 3–5.
- Murray, H. G. (2005). Student evaluation of teaching: Has it made a difference? In *the Annual Meeting of the Society for Teaching and Learning in Higher Education*, June 2005 (pp. 1-15). Charlottetown, Prince Edward Island,

Canada. Retrieved March 2nd, 2019 from <http://www.stlhe.ca/wp-content/uploads/2011/07/Student-Evaluation-ofTeaching1.pdf>.

Myers, K., Conte, N., & Rubenson, K. (2014). *Adult Learning Typology*. Retrieved August 28th, 2019 from <http://www.srdc.org/media/199755/adult-learning-typology.pdf>.

Nation, I, & Macalister, J. (2010). *Language curriculum design*. New York: Routledge.

Negi, J. S. (2016). Improving teaching through action research; Perceptions, practices and problems (3Ps): Voices from secondary level teachers in an EFL context. *ELT Voices-International Journal for Teachers of English*, 6(4), 18-30.

Nodoushan, M. A. S. (2002). Text Familiarity, reading task, and ESP test performance: A case study on Iranian LEP and non- LEP University students. M. A. University of India. *Iranian Journal of Applied Linguistic (IJAL)*, 6(2), 1-22.

Nunan, D. (1988). *Syllabus design*. Oxford: Oxford University Press.

Nunan, D. (1989). *Designing tasks for the communicative classroom*. Cambridge: CambridgeUniversity Press.

----- (2001). Second Language Acquisition. In R. Carter, & D. Nunan (Eds.), *The Cambridge Guide to Teaching English to Speakers of Other Languages* (pp. 87-92). Cambridge: Cambridge University Press. <http://dx.doi.org/10.1017/cbo9780511667206.013> (24th May 2018)

----- (2004). *Task-based language teaching*. Cambridge: Cambridge University Press.

----- (1991). *Language Teaching Methodology: A textbook for teachers*. United Kingdom: Prentice Hall International (UK) Ltd.

----- (1992). *Research Methods in Language Learning*. Cambridge: CUP

- (1993). *Syllabus Design*. Oxford: OUP.
- (1999). *Second Language Teaching & Learning*. Boston: Heinle & Heinle
- OECD. (1968-2008). *Assessment for learning formative assessment*. OECD: Paris.
- Olejniczak, M. (2011). *English for information technology 1: Student's book*. England: Pearson Education Limited.
- Olejniczak, M. (2011). *English for information technology 1: Teachers Notes*. England: Pearson Education Limited.
- Ourghi, R. (2002). *The implications of critical reflection discourse awareness for educational change: The case of the writing curriculum, learner, and teacher development at the University level*. (Doctoral dissertation). University of Tlemcen, Tlemcen, Algeria.
- Palmer, H. E. (1931). New munitions (Editorial). *Bulletin of the Institute for Research in English Teaching*, 73, 1-2.
- Palomba, C. A. & Banta, T. W. (1999). *Assessment Essentials: Planning, Implementing, and Improving Assessment in Higher Education*. San Francisco: Jossey-Bass.
- Patton, M. Q. (1990). *Qualitative Evaluation and Research Methods* (2nd ed.). London: Sage.
- (2004). *Qualitative evaluation and research methods* (3rd ed.). Thousands Oaks, CA: Sage.
- Philips, S. (1993). *Young Learners*. Oxford: Oxford University Press.
- Philips, S (1997). What influences What and How Second and Language Teachers teach? *The Modern Language Journal*, 81, 37-67. ISSN 0026-7902.
- Pholsward, R. (1993). The English language needs of Thai computing professionals. *RELC Journal*, 24(1), 1-25.

- Pilliner, A. (1973). *Experiment in Educational Research*. E 341. Milton Keynes: Open University Press.
- Pohl, A. (2009). *Oxford English for Careers: Technology 2 Teacher's Resources Book*. Oxford: Oxford University Press.
- Polit, D.F., Beck, C.T. & Hungler, B.P. (2001). *Essentials of nursing research: Methods, appraisal and utilization* (5th ed.). Philadelphia: Lippincott Williams & Wilkins.
- Polit, D.F. and Beck, C.T. (2012). *Nursing Research: Generating and Assessing Evidence for Nursing Practice* (9th ed.). Philadelphia: Lippincott: Williams & Wilkins.
- Pope, J., & Jolly, P. (2008). *Evaluation step by step guide*. State government of Victoria, Australia. Department of planning and community development. Retrieved from website: http://www.dhs.vic.gov.au/_data/assets/pdf_file/0011/769943/Evaluation... (28th May, 2018).
- Prabhu, N.S. (1987). *Second Language Pedagogy*. Oxford: Oxford University Press.
- Prabhu, N.S. (1990). *The language teaching matrix*. Cambridge: Cambridge University Press.
- Procter, P. (ed.). (1987). *Longman dictionary of contemporary English* (2nd ed.). London: Longman
- Rao, Z. (2001). Matching teaching styles with learning styles in East Asian Contexts. *The Internet TESL Journal*, 7 (7). Available Online <http://iteslj.org/Techniques/Zhenhui-TeachingStyles.html> (23th April 2019)
- Rapoport, R. N. (1970). Three dilemmas in action research. *Human Relations*, 23 (6), 499–513.

- Reid, T. B. W. (1956). Linguistics, Structuralism and Philology. *Archivum Linguisticum*, 8(1), 28-37.
- Reid, J. (2001). Advanced EAP Writing and Curriculum Design: What do we need to know? In Silva, T and Matsuda, P.K. (eds.), *On Second Language Writing* (pp. 143-60). Mahwah, NJ: Lawrence Erlbaum.
- Reilly, E. D., Stafford, R. E., Williams, K. M., & Corliss, S. B. (2014). Evaluating the validity and applicability of automated essay scoring into two massive open online courses. *The International Review of Research in Open and Distance Learning*, 15(5), 83–98.
- Richards, J. C. (2001). *Curriculum development in language Teaching*. Cambridge: Cambridge University Press.
- Richards, J.C., et al. (1992). *Longman dictionary of language teaching and applied linguistics*. London: Longman.
- Richards, J. C., & Schmidt, R. (2010). *Longman dictionary of language teaching and applied linguistics*. London: Pearson Education Limited.
- Richards, J.C. and Schmidt, R. (2002). *Longman Dictionary of Language Teaching & Applied Linguistics* (3rd ed.). Essex: Pearson Education Limited.
- Richards, J. C., & Rodgers, T. S. (2001). *Approaches and methods in language teaching*. Cambridge: Cambridge University Press.
- Richards, J. C., Schmidt, R., Kendricks, H., & Kim, K. (2002). *Longman dictionary of language teaching and applied linguistics*. England: Pearson Education Limited.
- Richard-Amato, P., A. (1996). *Making it happen* (pp. 192-199). New York: AddisonWesley Publishing Group.
- Richterich, R., & Chancerel, J.L. (1980). *Identifying the needs of adults learning a foreign language*. Oxford : Pergamon Press.

- Riley, P. (1991). L'Éducation Interculturelle. In P. Yvard (ed.) *Le Rôle des Langues et la Dimension Européenne, Actes de la troisième université Européenne d'été*. Nantes : Université de Nantes.
- Riley, P. (1991). Intercultural Education. In P. Yvard (ed.) *The Role of Languages and the European Dimension, Proceedings of the third European summer university*. Nantes: University of Nantes.
- Rivers, W.M. (1968). *Teaching Foreign Language Skills*. Chicago: University of Chicago Press.
- Robinson, P. (1980). *English for Specific Purposes*. Oxford: Pergamon Press.
- (1989). A rich view of lexical competence. *ELT Journal*, 43(4), 274-281.
- (1991). *ESP today: A practitioner's guide*. New York: Prentice Hall.
- Robson, C. (2002). *Real World Research* (2nd ed.). Oxford: Blackwell.
- Roscoe, J. T. (1975). *Fundamental research statistics for the behavioral sciences* (2nd ed.). New York: Holt, Rinehart and Winston.
- Rosebery, A.S., Warren, B., & Conant, F. R. (1992). *Appropriating Scientific Discourse: Findings from Language Minority Classrooms*. UC, Berkeley: NCRCDSL Research Reports.
- Safont, P. (2005). *Third language learners: pragmatic production and awareness*. Clevedon: Multilingual Matters.
- Safont, M. P., & Esteve, M. J. (2004). Online resources for the EAP classroom: Ways of promoting EFL learners' autonomy. *Linguistic Studies in Academic and Professional English*, (17), 261.
- Sale, J. E. M., Lohfeld, L. H., & Brazil, K. (2002). Revisiting the quantitative-qualitative debate: Implications for mixed-methods research. *Quality and Quantity*, 36, 43-53.

- Saragih, E. (2014). Designing ESP Materials for Nursing Students Based On Needs Analysis. *International Journal of Linguistics*, 6(4), 59-70.
- Saunders, M., Lewis, P., & Thornhill, A. (2003). *Research Methods for Business Students* (3rd ed.). England: Prentice Hall
- Schofield, W. (1996). Survey sampling. In R. Sapsford & V. Jupp (eds.), *Data Collection and Analysis* (pp. 25-55). London: Sage and the Open University Press.
- Schon, D. (1983). *The Reflective Practitioner: How Professionals Think in Action*. London: Temple Smith.
- Schwardt, T.A. (2007). *The SAGE dictionary of qualitative inquiry* (3rd ed.). Urbana-Champaign: University of Illinois Press.
- Sekaran, U. (2003). *Research Methods for Business: A Skill-Building Approach* (4th ed.). New York: John Wiley & Sons.
- Selinger, H.W. & Shohamy, E. (1989). *Second language research methods*. Oxford: Oxford university press.
- Seth, A. & Thomas, H. (1994). Theories of the firm: Implications for methodology research. *Journal of Studies*, 31(2), 165–192. doi:10.1111/j.1467-6486.1994.tb00770. x. (15th Semptember, 2019).
- Sharp, H., Rogers, Y., & Preece, J. (2002). *Interaction design: Beyond human-computer interaction*. New York, NY: John Wiley & Sons, Inc.
- Singh, P. & Nayak, J. K. (2015). *Fundamentals of research methodology: Problems and Prospects*. New Delhi: SSDN Publishers.
- Simmonds, A. (2014). *How neuroscience is affecting education: Report of teacher and parent surveys*. London, UK: Wellcome trust. Retrieved from http://www.Wellcome.ac.uk/stellent/groups/corporatesite/@msh_peda/documents/web_document/WTP055240.pdf. (10th November, 2018).

- Skehan, P. (1998). *A Cognitive Approach to Language Learning*. Oxford: Oxford University Press.
- Snow, M. (2001). Content Based and Immersion Models for Second and Foreign Language Teaching. In Celce-Murcia, M. (Ed.), *Teaching English as a Second or Foreign Language* (3rd ed.). Boston, MA: Heinle & Heinle Thompson Learning.
- Snow, M. A., & Brinton, D. M. (1988). Content-based language instruction: Investigating the effectiveness of the adjunct model. *TESOL Quarterly*, 22(4), 553–574.
- Somekh, B. (1995). The contribution of action research to development in social endeavours: A position paper on action research methodology. *British Educational Research Journal*, 21 (3), 339–55.
- Spraul, A. (2005). *Computer Science Made Simple*. USA: Broadway Books.
- Stake, R. E. (1994) Case studies. In N. K. Denzin and Y. S. Lincoln (eds) *Handbook of Qualitative Research* (pp. 236–47). London: Sage.
- (1995). *The Art of Case Study Research*. Thousand Oaks, CA: Sage Publication.
- (2006). *Multiple case study analysis*. New York : The Guilford Press.
- Stenhouse, L. (1985). Case study methods. In T. Husen and T. N. Postlethwaite (eds.), *International Encyclopaedia of Education* (1st ed.) (pp. 640–6). Oxford: Pergamon.
- (1975). *An introduction to curriculum research and development*. London: Heinemann.
- (1979) *What is action research? (mimeo)*. Norwich: Classroom Action Research Network.
- Stern, H. H. (1983). *Fundamental Concepts of Language Teaching*. Oxford: Oxford University Press

- (1992). *Issues and options in language teaching*. Oxford: Oxford University Press.
- Stoller, F. (2002). Content based instruction: A shell for language teaching or a framework for strategic language and content learning? *Keynote presented at the annual meeting of Professors of English to Speakers of Other Languages (TESOL) 2002*, Salt Lake City, UT. Retrieved on December 1st, 2019 from CARLA Web site: <http://www.carla.umn.edu/cobaltt/modules/strategies/stoller.html>
- Stoller, F. L. (2002). Project work: A means to promote language and content. In J. Richards & W. Renandya (Eds.), *Methodology in language teaching: An anthology of current practice* (pp. 107-119). Also available at *English Teaching Forum*, 35, 4, (1997). Retrieved December 17th, 2019 from <http://exchanges.state.gov/forum/vols/vol35/no4/p2.htm>
- Stoller, F. and Grabe, W. (1997). A Six T's approach to Content-based instruction. In M.A. Snow and D. Brinton (eds.). *The Content-based Classroom: Perspectives on Integrating Language and Content*. White Plains, NY: Addison Wesley Longman.
- Stevens, P. (1977). *New Orientations in the Teaching of English*. Oxford: Oxford University Press.
- (1980). When is a localized form of English a suitable model for teaching purposes. In *Teaching English as an international language*. London: Pergamon Press.
- (1988a). The Learner and the Teacher of ESP. In D. Chamberlain & R. Baumgardner (eds.), *ESP in the classroom: Practice and evaluation*, 6, 39-44.
- Stevens, P. (1988b). The learner and teacher of ESP. In D. Chamberlain, R. Baumgardner (eds.), *ESP in the Classroom: Practice and Evaluation*

(pp. 39-44). ELT Document 128. London: Modern English Publications in association with the British Council.

Stryker, S. & Leaver, B. (1997). *Content-Based Instruction in Foreign Language Education*. Washington, DC: Georgetown University Press.

Stubbs, M. (1983). *Discourse Analysis: The Sociolinguistic Analysis of Natural Language*. Chicago, IL: The University of Chicago Press.

Stufflebeam, D. L. (July, 2000a). *Guidelines for evaluating checklists: the checklist development checklist (CDC)*. Retrieved December 16th , 2018 from www.wmich.edu/evalctr/checklists/

Stufflebeam, D. L. (2000b). Foundational models for 21st century program evaluation. In D. L. Stufflebeam, G. F. Madaus, & T. Kellaghan (Eds.), *Evaluation models: Viewpoints on educational and human services evaluation* (pp. 33-83). Norwell, MA: Kluwer.

Sturman, A. (1999). Case study methods. In J. P. Keeves and G. Lakomski (eds.) *Issues in Educational Research* (pp. 103–12). Oxford: Elsevier Science.

Sulistyo, T. (2014). Reading-Writing Connection: Maximizing its Benefits to Stimulate EFL Students' Writing Ability. *Proceeding of International Seminar in Jember*.

Summers, D. (2001). *Longman Dictionary of Contemporary English* (3rd ed.). Harlow: Longman.

Suskie, L. & Banta, T. W. (2009). *Assessing Student Learning: A Common Sense Guide*. USA: John Wiley and Sons.

Swales, J. M. (1988). *Episodes in ESP*. Hemel Hempstead: Prentice Hall International Ltd.

----- (1980). ESP: the textbook problem. *The ESP Journal*, 1 (1), 11-23.

- Swetnam, D. (2004). *Writing your dissertation*. Oxford: How to Books Ltd.
- Sznajder, H. S. (2001). Engineering Textbooks: Introducing reading skills for academic purposes in the English syllabus of the first-year technical telecommunications engineering. In S. Posteguillo & I. Fortanet & J.C. Palmer (eds.), *Methodology and new technologies in language for specific purposes* (pp. 389-398). Cstellón: Universitat Jaume I.
- Taba, H. (1962). *Curriculum Development: Theory and Practice*. New York: Harcourt Brace.
- Taffe, W. J. (1989). Writing in the Computer Science Curriculum. *Writing Across the Curriculum*, 1(1), 17-22.
- Taherdoost, H. (2016). Sampling Methods in Research Methodology; How to Choose a Sampling Technique for Research. *International Journal of Academic Research in Management (IJARM)*, 5(2), 18-27.
- Tallerman, M. (2015). *Understanding syntax*. London: Routledge.
- Tashakkori, A. & Creswell, J.W. (2007). Exploring the Nature of Research Questions in Mixed Methods Research. *Journal of Mixed Methods Research*. 1, 207-211.
- Taylor-Powell, E., Steele, S., & Douglass, M. (1996). *Planning a programme evaluation*. University of Wisconsin Extension. Retrieved April 12th, 2018 from <http://learningstore.uwex.edu/assets/pdfs/g3658-1.pdf>
- Teddlie, C., & Tashakkori, A. (2006). A general typology of research designs featuring mixed methods. *Research in the Schools*, 13(1), 12-28.
- Thornbury, S. (1997). *About Language*. Cambridge: Cambridge University Press.
- Tomlinson, B. (2003). *Developing Materials for Language Teaching*. London: Continuum.

- Tarone & Yule. (1989). *Focus on the Language Learner*. Oxford: Oxford University Press.
- Tribble, J. (1996). *Writing*. Oxford: Oxford University Press.
- Trochim, W. M. K. (2006). *The Qualitative Debate: Research Methods Knowledge Base*. <http://www.socialresearchmethods.net/kb/qualmeth.php>. (28th January 2018)
- Tuckman, B. W. (1972). *Conducting Educational Research*. New York: Harcourt Brace Jovanovich.
- Underhill, N. (1991). *Testing Spoken Language*. Cambridge: Cambridge University Press.
- Ur, P. (1981). *Discussions that Work*. Cambridge: Cambridge University Press.
- Ur, P. (1991). *A course in Language Teaching: Practice and Theory*. Cambridge: Cambridge University Press.
- Valettes, R. M. (1977). *Modern Language Testing* (2nd ed.). Newyork: Harcourt Brace Jovanovich.
- Van Wyk, B. (2012). *Research design and methods, Part I*. http://www.uwc.ac.za/Students/Postgraduate/Documents/Research_and_Design_I.pdf. (12th September 2019).
- Villalobos, O. B. (2013). Content-Based Instruction: A Relevant Approach of Language Teaching. *Innovaciones Educativas*, XV (20), 71-83.
- Wajnryb, R. (1990). *Grammar Dictation*. Oxford: Oxford University Press.
- Walters, L. (1983). A theoretical model for teaching students to write. *English Teaching Forum*, 21 (3), 17-22.
- Watts, M. and Ebbutt, D. (1987). More than the sum of the parts: research methods in group interviewing. *British Educational Research Journal*, 13 (1), 25–34.

- Wegener, B. (2008). Corporate English language training: The way to customized materials. In Josef Schmied and Christoph Haase (eds.), *English projects in teaching and research in Central Europe*. Göttingen: Cuvillier Verlag.
- Weir, C. J. (1990). *Communicative Language Testing*. New York: Prentice Hall – English Language Teaching.
- Weir, C & Huizhong, Y. (2000). *An Empirical Investigation of the Componentiality of L2 Reading in English for Academic Purposes*. (vol.12). Cambridge: Cambridge University Press.
- Wesche, M. B., & Skehan, P. (2002). Communicative, task-based, and content-based language instruction. In R. B. Kaplan (Ed.), *The Oxford handbook of applied linguistics* (pp. 207-228). Oxford: Oxford University Press.
- West, R. (1993). Needs Analysis in Language Teaching. In *Language Teaching*. (pp. 1-15).
- (1994). Needs Analysis in Teaching: State of Art. In *Language Teaching*, 27, 1-19.
- White, R. V. (1988). Process and Product. In P. Robinson (Ed.), *Academic Writing. ELT Document 129*, 4-16.
- White, R.V. (1988). *The ELT Curriculum: Design, Innovation and Management*. Oxford: Blackwell.
- Widdowson, H. (1983). *Learning Purpose and Language Use*. Oxford: Oxford University Press.
- Widdowson, H. G. (1978). *Teaching language as communication*. London: OUP.
- Widdowson, H. G. (1990). *Aspects of language teaching*. Oxford: Oxford University Press.

- Widodo, H. P. (2015). Designing and implementing task-based vocational English materials: Text, language, task, and context in Indonesia. In M. Thomas & H. einders (Eds.), *Contemporary task-based language teaching in Asia* (pp. 291–312). London: Bloomsbury Academic.
- Wilkins, D. A. (1981). Notional Syllabuses Revisited. *Applied Linguistics II*, 83-89.
- Wilson, N. and McLean, S. (1994). *Questionnaire Design: A Practical Introduction*. Newtown Abbey, Co. Antrim: University of Ulster Press.
- Winter, R. (1996). Some principles and procedures for the conduct of action research. In O. Zuber-Skerritt (ed.). *New Directions in Action Research*. London: Falmer.
- Wood, D. (2006). Uses and functions of formulaic sequences in second language speech: An exploration of the foundations of fluency. *Canadian Modern Language Review*, 63(1), 13-33.
- Wright, A et al. (1997). *Games for Language Learning*. Cambridge: Cambridge University Press.
- Xenodohidis, T. H. (2002). An ESP curriculum for Greek EFL students of computing: A new Approach. *ESP World*, 2 (1), 1-29.
- Xenodohidis, T.H. (2006). An ESP Curriculum for Greek EFL Students of Computing: A New Approach. *ESP World*, 1(2). Retrieved from <http://www.esp-world.info/index.Html> (22th November, 2018).
- Xiao-yun, Y. & Zhi-yang, Z & Peixing, D. (2007). Principled Eclecticism in College English Teaching in China. *Professional Teaching Articles*, 17(1). Available online asian-efl-journal.com/pta_Jan_07_yuy.pdf. (5th Juin 2018).
- Yalden, J. (1987). *Principles of Course Design for Language Teaching*. Cambridge: Cambridge University Press.

- Yin, R. K., (1984). *Case Study Research: Design and Methods*. Beverly Hills, Calif: Sage Publications.
- (1994). *Case study research: Design and methods*. London: Sage Publications.
- (2014). *Case Study Research Design and Methods* (5th ed.). Thousand Oaks, CA: Sage.
- Yule, G. (2006). *The study of language*. Cambridge: Cambridge University Press.
- Zainal, Z. (2007). Case Study as a Research Method. *Journal Kemanasloom*, 1 (9), 1-6.
- Zapata B., A. A. (2008). *A handbook of general and applied linguistics*. Trabajo de Ascenso sin publicar. Mérida : Escuela de Idiomas Modernos, Universidad de Los Andes.
http://webdelprofesor.ula.ve/humanidades/azapata/materias/english_4/unit_1_semantic_relationships.pdf (26th November 2019).
- Zeichner, K., & Noffke, S. (2001). Practitioner research. In V. Richardson (Ed.), *Handbook of research on teaching* (4th ed) (pp. 298–330). Washington, DC: American Educational Research Association.
- Zidane, R. (2010). *Validating holistic scoring for the assessment of EFL learners' writing performance. The case of fourth year graduate students at Abou Bekr Belkaid*. (Doctoral dissertation). University of Tlemcen, Tlemcen, Algeria.
- Zobel, J. (2014). *Writing for computer science* (3rd ed.). London: Springer-Verlag London Ltd.

APPENDICES

Appendix A: Students' Questionnaire

Appendix B: ESP Teachers' Interview

Appendix C: Computer Scientist Interview

Appendix D: Questionnaire aux Etudiants

Appendix E: Interview d'Informaticien

Appendix F: Classroom Observation Grid

Appendix G: Pre-Test

Appendix H: Post-Test

Appendix I: Focused Group Interview

Appendix J: CANEVAS

Appendix K: Computer Science Doctorate Articles

Appendix L: Designed Syllabus: English for Computing Purposes

(Unit 1, Unit 2, and Unit 3)

Appendix M: Students' Tests Papers (Pre-Test & Post-Test)

Appendix A

Students' Questionnaire

Dear students, this questionnaire aims to evaluate the specific written discourse in the module of —Technical English. In order to know your needs, your lacks and your wants. Thus, you are kindly requested to tick where appropriate and answer when necessary (multiple choices are allowed).

Section 1: Learners' Profile:

Age:

Gender: Male ☐ Female ☐

1- How long have you been learning English?

.....

2- How would you evaluate your command of English?

Beginner ☐ Intermediate ☐ Advanced ☐

Part 1: Learning Needs

3- Do you enjoy learning English?

Yes ☐ No ☐

4- Why are you studying English?

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.....
.....
.....

5- Why do you need to write in English in your field?

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.....
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.....

6- Do you read in English?

☐ Always ☐ Often ☐ Sometimes ☐ Never

Section 2: Specific Written Discourse

7 - In your field of study, where would you be required to write in English (Order your answer by giving numbers: 1, 2...)?

a) - Programming languages (java, c, and c++...) ☐

b) - Reports ☐

c) - Research papers ☐

d) - Articles ☐

e) - Theses ☐

f) - Planned speech (presentations) ☐

g) - Small paragraphs ☐

h) - Essay writing ☐

i) Other

.....
.....

Part 1: Difficulties of Written Expression

8- I write correct English...

☐ Always ☐ Often ☐ Sometimes ☐ Never

9- What are your writing difficulties?

a) Grammar

☐ Always ☐ Often ☐ Sometimes ☐ Never

b) Vocabulary

☐ Always ☐ Often ☐ Sometimes ☐ Never

c) Spelling

☐ Always ☐ Often ☐ Sometimes ☐ Never

d) Punctuation

☐ Always ☐ Often ☐ Sometimes ☐ Never

e) Cohesion (When your sentences are connected /Coherence: when your ideas are logically linked).

☐ Always ☐ Often ☐ Sometimes ☐ Never

f) Other problems

.....
.....

10- Your writing weaknesses are due to:

a) Inadequate teaching program (not good enough) ☐

b) Lack of time devoted to learning writing ☐

c) Lack of practice ☐

- d) Lack of reading ☐
- e) Others (please specify)

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Section 3: Learning Writing in the Discipline

11- Do you have sessions (or assignments) devoted to writing?

Yes ☐ No ☐

12- How many writing sessions do you have in a term?

1-4 ☐ 6≤ ☐ 12≤ ☐

13- How is the writing skill taught in these sessions?

- a) - Theory: e.g. definitions ☐
- b) - Practice: tasks and assignments ☐

14- In written expression sessions, should you focus on:

- a) - Product (Final draft) ☐
- b) - Process (Steps of writing) ☐

15- Do you want to learn writing through?

- a) - Language-based approach (grammar, punctuation,..) ☐
- b) - Content-based approach (computer science field) ☐
- c) - Task-based approach (practices) ☐

16- I want to learn writing in integration with other skills (speaking, listening, and reading)

Yes ☐ Not Always ☐ No ☐

Section 4: Linguistic competence and Writing in the Discipline

1- Lexis :

17- While writing specialized vocabulary, I find it difficult (Order your answer by giving numbers: 1,2...):

- a)- To write the correct form of words (spelling) ☐
- b)- To form the words (roots, affixes: word formation) ☐
- c)- Use Collocations (frequent use of two words together) ☐
- e)- You do not know any ☐
- f)- Other problems

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2- Grammar

18- While writing, I face grammatical problems relating to (Order your answer by giving numbers: 1,2...)?

- a)- differentiation between a noun, verb, adv, adj... ☐
- b)- Tense use ☐
- c)- Phrase/clause/sentence formation ☐
- d)- Articles (a/an, the) prepositions (in,on,at..) ☐
- e)- Passive/active voice ☐
- f)- Conditional sentences ☐
- g)- Other grammatical problems (specify)

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3- Meaning

19- While using Computer Science terminology, you are able to (Order your answer by giving numbers: 1,2...):

- a)- Recognize the meaning ☐
- b)- Recognize the context (situation) ☐

- d)- Differentiate meanings of the same word (Polysemy) ☐
- c)- Differentiate words that have the same meanings (Synonymy) ☐
- d)- Recognize words that have opposite meanings (Antonymy) ☐
- e)- Other problems

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Section 5: Assessing Writing in the Discipline

20- The number of tests programmed in a semester?

1 ☐ 2 ☐ 3 ☐ More ☐

21- Is the writing skill evaluated in the tests?

☐ Always ☐ Often ☐ Sometimes ☐ Never

22 - How is your writing evaluated?

a) A test at the end of the semester ☐

b) Continuous testing during the semester ☐

c) Part of a test only ☐

23 - The assessment is in the form of ...

a)- Reading comprehension questions ☐

b)- Activities ☐

c)- Synthesis questions ☐

d)- Homework ☐

e)- Essay writing ☐

f)- Summaries ☐

g)Others.....

.....

24- The teacher's evaluation focuses on?

a)- Content ☐

b)- Form ☐

c)- Both ☐

25- I would like to be evaluated in writing through:

a) Tests and exams ☐

b) Homework ☐

c) Projects ☐

d) Classroom activities ☐

e) Others, please specify

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26- Do you have any other suggestions for developing writing in your field?

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Thank you very much for your collaboration

ESP Teachers' Interview

The present interview aims at evaluating the specific written discourse of your Master 1 computer science students in the module of 'Technical English'. In order to know the students' needs, lacks and wants. Thus, you are kindly requested to answer the following questions to provide your standpoints concerning the English language courses.

The Interview Guide

I) Teacher's Profile

Degree :

Status:

Field of interest :

Teacher's Professional Experience (Computer Science/Master One) :

II) ESP Teaching Practices

- 1- What English do you teach? You can explain, I mean your focus is on what part (Technical/General)?
- 2- Do you have a syllabus to follow (who designed it)?
- 3- How would you evaluate your students' command of English, in general?
- 4- Provided that the main interests of students are content subjects, such as programming....Are your students motivated to learn English?
- 5- What do you do to motivate them?
- 6- Which of the four language skills do you focus on the most during classes?

III) Writing in the Discipline

- 7- Do your students need to write in the field of computer science?
- 8- What are their attitudes towards writing in English?
- 9- As a teacher, do you have interest (deep, superficial) in writing or you have another area of interest?
- 10- Do you reserve sessions for writing tasks?

- How many in a term?

- 11- How is the writing skill taught in these sessions (practice, theories, process, content, language, four skills)
- 12- Do they face difficulties when writing?
- 13- If yes, what are these problems?

-Lexis (spelling, morphology, collocations)

-Grammar (nouns/verbs, tense, sentence formation, prepositions, active/passive voice, conditional sentences)

-Meaning (context, polysemy, synonymy, antonymy)

- 14- What are the reasons behind students' weaknesses in writing (time, programme, reading, practice)?
- 15- Which approach would you give preference to when teaching specific writing in Computer Science ?

- Language-based Approach
- Content-based Approach
- Task-based Approach

IV) Assessing Writing in the Discipline

- 16- How do you assess your students' specific writing?
 - Frequency of assessment
 - Summative assessment/formative assessment
 - In which form (homework, exams, projects...)?
- 17- What are the criteria that you build on while assessing specific writing (content/form)?
- 18- What do you suggest to improve the students' achievement in specific writing?

Thank you very much indeed for your cooperation

Computer Scientist Interview

The present interview aims at evaluating the specific written discourse of your Master 1 computer science students in the module of 'Technical English'. In order to know the students' needs, lacks and wants. Thus, you are kindly requested to answer the following questions to provide your standpoints concerning the English language courses.

The Interview Guide

I) Subject-Specialist Teacher's Profile (Computer Science)

Degree :

Status:

Specialism :

Teacher's experience:

- 1- Do you think that good command of English is a prerequisite in studying a field like Computer Science?
- 2- If yes, why? Then in which way do you need it (the four skills)?

III) Writing in the Discipline

3- Do students in general, or I specify Master's 1 students, do they need developed writing qualities or they only need basics of communication?

- For their studies (thesis, articles, programming languages, English course, ..)
- For their careers (workplace, abroad, conferences, scholarships, ...)

4- What do the students lack in order to write correct English?

- Vocabulary
- Grammar
- Spelling
- Mechanism (punctuation)
- Others

5- Do you collaborate with the language teacher for more students' benefits?

-Syllabus/lesson content/terminology/Computer Science language

6- What would you recommend the English teacher (regarding the teaching of Writing skill)?

-Language-based Approach

-Content-based Approach

-Task-based Approach

7- What do you suggest for better English language teaching/learning outcomes?

Thank you very much indeed for your cooperation

Appendix D

Questionnaire aux Etudiants

Chers étudiants, le questionnaire actuel a pour objectif d'évaluer le discours écrit spécifique que vous avez dans le module «Anglais technique». Afin de connaître vos besoins, vos manques et vos désirs d'apprentissage. Vous êtes prié de répondre à ces questions en faisant des commentaires si cela est nécessaire (vous pouvez faire plusieurs choix).

Section 1: Profil des étudiants:

Âge:

Genre : Homme ☐ Femme ☐

1- Depuis combien de temps apprenez-vous l'anglais?

.....

2- Comment évaluez-vous votre maîtrise de l'anglais?

Débutant ☐ Intermédiaire ☐ Avancé ☐

Partie 1: Besoins d'apprentissage

3- Aimez-vous apprendre l'anglais?

Oui ☐ Non ☐

4- Pourquoi étudiez-vous l'anglais?

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5- Pourquoi avez-vous besoin d'écrire en Anglais dans votre domaine?

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6- Lisez-vous en anglais?

Souvent ☐ Rarement ☐ Pas du tout ☐

Section 2: Discours écrit spécifique

7- Dans votre domaine d'études, où seriez-vous tenu d'écrire en anglais (citez l'ordre numérique selon l'importance)?

a)- Langages de programmation (java, c, c++,...) ☐

b)- Rapports ☐

c)- Documents de recherche ☐

d)- Des articles ☐

e)- Les thèses ☐

f)- Discours prévus (présentations) ☐

g)- Petits paragraphes ☐

h)- Rédiger une dissertation ☐

i)- Autres

.....
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Partie 1: Difficultés d'expression écrite

8- J'écris bien anglais ...

Jamais ☐ Rarement ☐ Parfois ☐ Toujours ☐

9- Quelles sont vos difficultés d'écriture?

a) Grammaire

Jamais ☐ Rarement ☐ Parfois ☐ Toujours ☐

b) Vocabulaire

Jamais ☐ Rarement ☐ Parfois ☐ Toujours ☐

c) Orthographe

Jamais ☐ Rarement ☐ Parfois ☐ Toujours ☐

d) Ponctuation

Jamais ☐ Rarement ☐ Parfois ☐ Toujours ☐

e) Cohésion (Lorsque vos phrases sont liées / Cohérence: lorsque vos idées sont liées logiquement).

Jamais ☐ Rarement ☐ Parfois ☐ Toujours ☐

f) Autres problèmes

.....
.....

10- Vos faiblesses en écriture sont dues à:

a) Programme d'enseignement inadéquat (pas assez bon) ☐

b) Manque de temps consacré à l'apprentissage de l'expression écrite ☐

c) Manque de pratique ☐

d) Manque de lecture ☐

e) Autres (précisez s'il vous plaît)

.....
.....

Section 3: Apprendre l'expression écrite technique

11- Avez-vous des séances (ou devoirs) consacrées à l'écriture?

Oui ☐ Non ☐

12- Combien de séances d'expression écrite avez-vous dans un semestre?

☐ 1-4 ☐ 6≤ ☐ 12≤

13- Comment l'expression écrite est-elle enseignée lors de ces séances?

a) - Certaines définitions (Théorie) ☐

b) - A travers des exercices (Pratique) ☐

14- Dans les séances d'expression écrite, faut-il se concentrer sur :

a) - Produit (Version finale) ☐

b) - Processus (L'opération d'expression écrite) ☐

15- Voulez-vous apprendre à écrire par :

a) - Approche linguistique (grammaire, ponctuation, ..) ☐

b) - Approche basée sur le contenu (domaine informatique) ☐

c) - Approche par exercices (pratiques) ☐

16- Je veux apprendre à écrire en intégrant d'autres compétences (parler, écouter et lire)

Oui ☐ Pas toujours ☐ Non ☐

Section 4: Compétence linguistique et expression écrite dans la discipline

1- Vocabulaires:

17- En écrivant du vocabulaire spécialisé, j'ai du mal à (citez l'ordre numérique selon l'importance):

a) - Écrire la forme correcte des mots (orthographe) ☐

b) - Former les mots (racines, affixes: formation des mots) ☐

c) - Utiliser des collocations (utilisation fréquente de deux mots ensemble) ☐

e) - Vous les ignorez ! ☐

f) - Autres problèmes

.....
.....

2- Grammaire

18- En écrivant, quels sont les problèmes grammaticaux auxquels vous êtes confrontés (citez l'ordre numérique selon l'importance)?

a) -Différenciation entre nom, verbe, adv, adj... ☐

b) - Temps approprié ☐

c) - Construction de phrase ☐

d) - Articles (a / an, the) prépositions (in, on, at...) ☐

e) - Voix passive / active ☐

f) - Les phrases conditionnelles ☐

g) - Autres problèmes grammaticaux (précisez)

Interview d'Informaticien

Le présent entretien vise à évaluer le discours écrit spécifique de vos étudiants en Master 1 informatique dans le module d'anglais technique. Afin de connaître les besoins, les manques et les désirs des étudiants. Ainsi, vous êtes priés de répondre aux questions suivantes pour donner votre point de vue concernant les cours d'anglais.

Le guide d'interview

I) Profil de l'enseignant spécialisé dans la matière (Informatique)

Diplôme :

Statut:

Spécialité:

Expérience de l'enseignant :

- 1- Avez-vous besoin d'une bonne connaissance de l'anglais pour réussir dans votre domaine?
- 2- Si oui, quelle compétence (écrit- oral- écoute-lecture) est-elle demandée ?

II) Expression Ecrite dans la Discipline

3- les étudiants en général (ou précisément Master 1) ont-ils besoin seulement d'une simple base de communication ou d'un écrit développé ?

- Pour leurs études (thèse, articles, langages de programmation, cours d'anglais, ..)
- Pour leur carrière (lieu de travail, à l'étranger, conférences, bourses, ...)

4- Que manque-t-il aux étudiants pour écrire un anglais correct?

- Vocabulaire
- Grammaire
- Orthographe
- Mécanisme (ponctuation)
- Autres

5- Collaborez-vous avec l'enseignant d'anglais pour obtenir plus d'avantages pour les étudiants?

* Programme / contenu de la leçon / terminologie / langage informatique

6- Que recommanderiez-vous à l'enseignant d'anglais (en ce qui concerne l'enseignement des compétences d'écriture)?

- Approche basée sur la langue
- Approche basée sur le contenu
- Approche par exercices

7- Que suggérez-vous pour de meilleurs résultats ?

Merci beaucoup pour votre coopération

Classroom Observation Grid

Observer :		Level :		Date :	
ESP Teacher :		Speciality :		Time :	
Theme :		Number of students :		Room :	

To what extent the following issues are observed

			Teaching Specific Discourse	Not Observed	More Emphasis	Accomplished Very Well	Recommended		
Actions and attitudes towards writing			The Skill of focus (Listening-Speaking-Reading-Writing)						
			Learners						
			Learner centredness						
			Motivation (when writing)						
			Attitudes (towards writing)						
			Express themselves (mainly in writing)						
			Use specific words (mainly when writing)						
			Climate for learning			Teacher			
Teacher centredness									
Checking of Understanding			Rapport (eye contact-humor)						
			Learners’ needs met (clearly cited at each session)						
			Asking questions about :	Learners’ interest					
				Spesific terms					
				Language	Grammar				
					Lexis				
					Meaning				
Learners’ pieces of Writing									
Write spesific/difficult words on The blackboard									
Assessment of Writing	Specific writing assessment (assignments)								

Drawing Conclusions :

Remarks :

Pre-Test

Tlemcen University
Faculty of Sciences
Department of ICT

First Semester
Master 1
Technical English Exam

Feb 2019
Mss. Hammoudi
Time: 1h 30m

Full Name:

Group:

Room:

Mark:

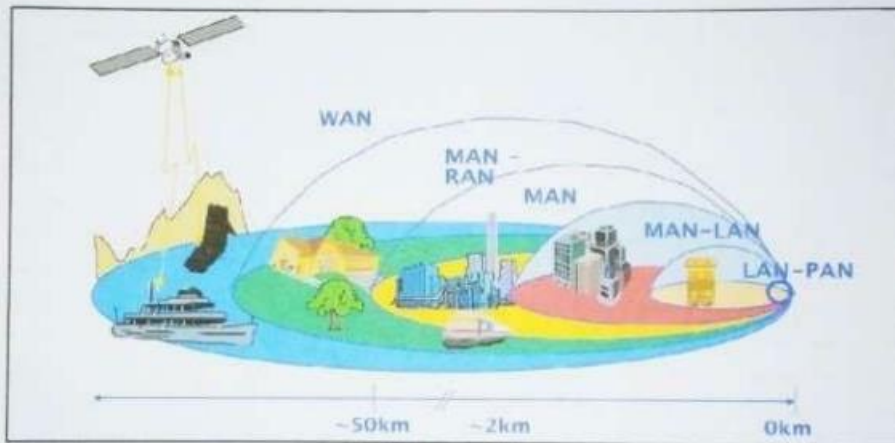
Observation:

Question: In a coherent ESSAY

1. Comment on the following diagram by **COMPARING** between the different types of computer networks.

2. You have to use the following **key words**: Computer network, area, personal, local, metropolitan, regional, wide, distance (short, shorter, long, longer, close, far, further), place (small, large, office, house, building, company, city), time (rapid, faster, slow), speed (more or less speedy), ownership (one person, many), privacy (private, public, easy or difficult for hacking), material (computers, printers, Bluetooth, laser).

3. Illustrate with examples.



Pre-Test Correction

Tlemcen University
Faculty of Sciences
Department of ICT

First Semester
Master 1
Technical English Exam

Feb 2019
Mss. Hammoudi
Time: 1h 30m

Level: Master 1

Groups: RSD, SIC

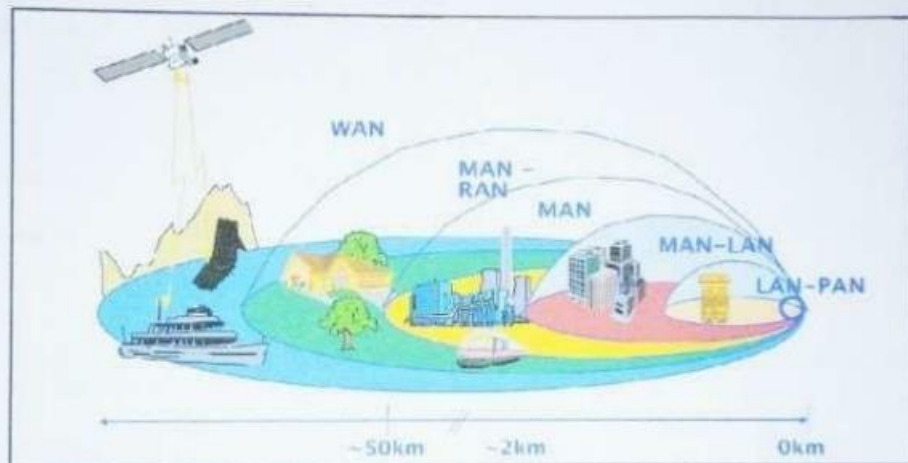
EXAM CORRECTION

Question: In a coherent ESSAY

1. Comment on the following diagram by **COMPARING** between the different types of computer networks.

2. You have to use the following key words: Computer network, personal, local, metropolitan, regional, wide, distance, place, time, speed, ownership, privacy, peripherals, material.

3. Illustrate with examples.



ANSWER

1. Structure/ form of an essay **10 pts**

Introduction: **1.5pts**

- should range from general to specific
- from 4 to 6 sentences
- thesis statement: giving the idea of the whole essay by mentioning the elements that are compared along the essay

Body: **5pts**

There are two types of body writings in a comparative essay

- point by point in one single paragraph**: we compare between all the items one after the other with regard to their points of difference by using expressions such as: while, when, on one hand, on the other hand, despite, etc.
- each paragraph designed for a given item of the comparison**: we dedicate each paragraph to a certain items of the comparison
- topic sentences and concluding sentences** are of crucial importance

Conclusion: 2pts

- Concluding the whole idea of the discussion
- Giving one's opinion
- Using key concepts such as: to conclude, to sum up, in a nut shell, etc.

Grammar: 1.5 pts if there are more than 4 grammatical mistakes, students will have - 0.25 pts for each mistake (counting starts from the 5th mistake).

2. Content/ ideas 10 pts

Key words should be mentioned in correct, grammatical sentences.

Network	Distance	Place	Time	Speed	Ownership	Privacy	Material
Personal Area N. Example 0.25 pts	0.25 pts no	0.25 pts desk	0.25 pts rapid	0.25 pts High	0.25 pts Personal/ one	0.25 pts private	0.25 pts PC
Local Area N. Example 0.25 pts	0.25 pts short	0.25 pts house	0.25 pts shorter	0.25 pts High locally	0.25 pts One/ many	0.25 pts Pri/ pub	0.25 pts chats
Metropolitan Area N. Example 0.25 pts	0.25 pts large	0.25 pts Same city	0.25 pts ---	0.25 pts ---	0.25 pts ---	0.25 pts ---	0.25 pts Digital media
Regional Area N. Example 0.25 pts	0.25 pts larger	0.25 pts One region	0.25 pts (distance dependent)	0.25 pts High regionally	0.25 pts ---	0.25 pts ---	0.25 pts WRAN
Wide Area N. Example 0.25 pts	0.25 pts broader	0.25 pts Separate areas	0.25 pts ---	0.25 pts Very high speed	0.25 pts ---	0.25 pts ---	0.25 pts Telephone system

Thesis statement: A computer network is a group of two or more computer systems linked together. There are many types of computer networks.

P1. Personal Area Network- PAN

*A personal area network (PAN) is a computer network used for data transmission amongst devices such as computers, telephones, tablets and personal digital assistants.

P2. Local-Area Network -LAN

The computers are geographically close together (that is, in the same building).

*A computer network that spans a relatively small area.

*Most LANs are confined to a single building or group of buildings.

*Most LANs connect workstations and personal computers. Users can also use the LAN to communicate with each other, by sending e-mail or engaging in chat sessions.

P3. Regional Area Network – Ran

*For example, Wireless Regional Area Network is a network technology that uses underutilized parts of the radio frequency spectrum to provide internet connectivity for homes and businesses.

P4. Metropolitan Area Network – MAN

The computers are farther apart and are connected (that is, in the same city).

*Short for Metropolitan Area Network, a data network designed for a town or city.

*In terms of geographic breadth, MANs are larger than local-area networks (LANs), but smaller than wide-area networks (WANs).

*MANs are usually characterized by very high-speed connections using fiber optical cable or other digital media.

P5. Wide-Area Network – WAN

The computers are farther apart and are connected (that is, NOT in the same city).

*A computer network that spans a relatively large geographical area. Typically, a WAN consists of two or more local-area networks (LANs).

*Computers connected to a wide-area network are often connected through public networks, such as the telephone system. They can also be connected through leased lines or satellites.

*The largest WAN in existence is the Internet.

Conclusion: advantages/ personal opinion/ comments ...

Post-Test

Full Name :

Group :

Mark :

Observation :

XML Takes on HTML

Standard Generalized Markup Language (SGML) is the language that spawned both HTML (HyperText Markup Language) and XML (extensible Markup Language). SGML is not a true language, it is a metalanguage, which is a language from which you can create other languages. In this case, it is the creation of a markup language (a system of encoded instructions for structuring and formatting electronic document elements). HTML is an application-specific derivation of SGML. It is a set of codes, generally used for webpages, that creates electronic documents according to rules established by SGML. HTML is a language that is all about the presentation of your information, not what the actual data is. You can, therefore, say that HTML is a presentation language. XML is a subset of SGML, but it is also, like SGML, a metalanguage. XML defines a specific method for creating text formats for data so that files are program independent, platform independent, and support internationalisation (able to read different languages, etc.) In fact, because XML is an extensible language, you do not even have to have a browser to interpret the page. Applications can parse the XML document and read the information without any human intervention.

[Adapted from 'XML Takes On HTML', Smart Computing Guide Series Volume 8 Issue 1, January 2000. Graphic from 'Web learns new language', Guardian Online, Thursday November 25 1999] (Oxford English information technology, 2002)

1/ Find the answers to these questions in the text (4.5pts).

1. What languages were derived from SGML?
2. What type of language is used to structure and format elements of a document?

.....
.....
3. Name two metalanguages

2/ Match the terms in Table A with the statements in Table B (3.5pts).

Table A	Table B
a Metadata	i Extensible markup language
b Metalanguage	ii A coding system used for structuring and formatting documents
c HTML	iii Data about data
d XML	iv An example of a page presentation language
e Markup language	v A language from which you can create other languages

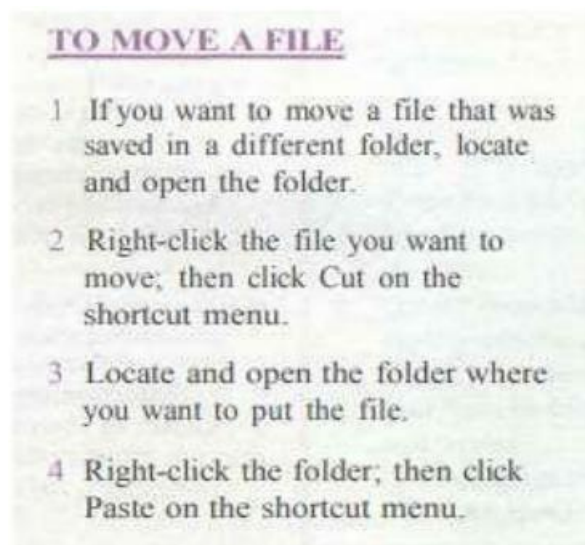
3/ Complete the gap in each sentence with the correct form of the verb in brackets (2pts).

Windows allows you (display)..... two different folders at the same time.

Adding more memory lets your computer (work)... faster.

4/ Essay Writing (10pts)

Study these instructions for moving a file from one folder to another using Windows Explorer. Then write your own instructions in a form of small paragraphs on how to write a computer program (stages of programming).



Post-Test Correction

XML Takes on HTML

Standard Generalized Markup Language (SGML) is the language that spawned both HTML (HyperText Markup Language) and XML (extensible Markup Language). SGML is not a true language, it is a metalanguage, which is a language from which you can create other languages. In this case, it is the creation of a markup language (a system of encoded instructions for structuring and formatting electronic document elements). HTML is an application-specific derivation of SGML. It is a set of codes, generally used for webpages, that creates electronic documents according to rules established by SGML. HTML is a language that is all about the presentation of your information, not what the actual data is. You can, therefore, say that HTML is a presentation language. XML is a subset of SGML, but it is also, like SGML, a metalanguage. XML defines a specific method for creating text formats for data so that files are program independent, platform independent, and support internationalisation (able to read different languages, etc.) In fact, because XML is an extensible language, you do not even have to have a browser to interpret the page. Applications can parse the XML document and read the information without any human intervention.

[Adapted from 'XML Takes On HTML', Smart Computing Guide Series Volume 8 Issue 1, January 2000. Graphic from 'Web learns new language', Guardian Online, Thursday November 25 1999] (Oxford English information technology, 2002)

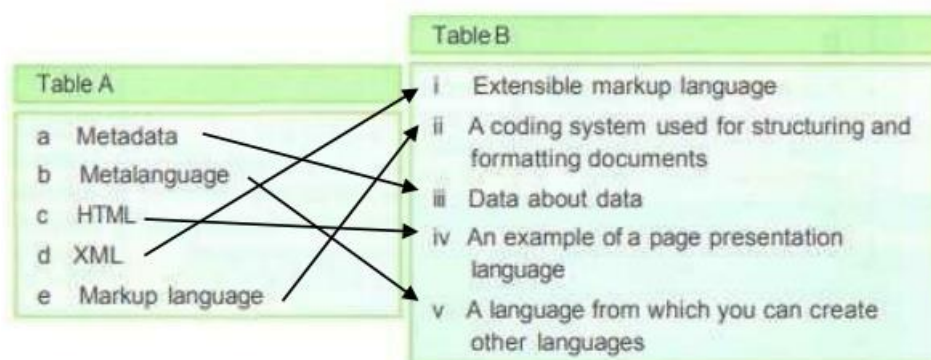
Reading Comprehension (text content)..... (4.5pts)

1/ Find the answers to these questions in the text. (4.5pts)

- 1- a HTML b XML (1.5pts)
- 2- A mark up language..... (1.5pts)
- 3- SGML and XML(1.5pts)

Lexis (Meaning) (3.5pts)

2/ Match the terms in Table A with the statements in Table B. (3.5pts)



Grammar (2pts)

3/ Complete the gap in each sentence with the correct form of the verb in brackets.

1- To display(1pt)

2- Works..... (1pt)

Specific Writing (10pts)

Essay Writing (10pts)

Content (4pts)

Steps of Programming (each step in a paragraph, element)

- Analysing and defining the problem to be solved

- Designing the problem

- Coding

- Testing

- Documenting training the users

- Obtaining feedback from users

Grammar(1.75pts)

Lexis (key words, spelling,...)... (1.25pts)

Meaning (Context, word choice,..)(1pt)

Form (Paragraphs) (2pt)

Focus Group Interview

The current group interview tends to evaluate the designed courses of ‘Technical English’ given to Master 1 computer science students at Tlemcen University. For the sake of gauging the development of your specific written discourse along with linguistic competence (grammar, vocabulary, and meaning). Hence, you are kindly requested to answer and discuss the following questions and statements using the given rating system to provide your views regarding the English language computing courses (assigning a corresponding number according to your opinion).

Rating System

1- Strongly agree 2- Agree 3- Unsure 4- Disagree 5- Strongly disagree

The Discussion Guide

I- The implemented Courses Content

1. Do texts selection and variation of reading comprehension tasks suit your level and interest? Do they reflect your background knowledge ? Do reading comprehension texts and tasks helped you develop your reading skills?
2. Does the variety of learning tasks motivate you to be engaged more effectively in the course and develop the needed language aspects for the course ? Do these tasks train you to use English, especially scientific writing skill in an academic and workplace settings ? Do the learning materials fit the course objective?
 - In-class tasks: cooperative learning activities, study skills tasks, communicative tasks, vocabulary acquisition tasks, information gap, jigsaw, information transfer.
 - Outside classroom activities: homework, projects.
3. Lessons and tasks are related in content to your discipline (computer science).
You are complacent about your discipline-specific writing courses.
4. The skills integration tasks helped you enhancing scientific writing capacity.

5. The language used in the lessons (grammar, vocabulary, meaning and context) is related to your discipline. Besides, do the language aspects items support the discipline-specific writing development?
6. Were you enthusiastic and motivated to learn during the instructional courses? Was the teaching/learning atmosphere relaxing and participative?

II- Teaching Practices

7. Are you satisfied with how the courses were dispensed? Did you understand the teacher's instructions?
8. The trainer was enthusiastic, prepared and knowledgeable about the subject. The trainer motivated participation and answered students' questions.
9. The instructor encouraged interactions with the students. The students kept eye contact with the instructor.

III- Evaluation Procedures

10. Course Evaluation

- The specific writing assignments were of the appropriate level of difficulty for the course. The specific writing tasks given for the class or outside were interesting. These writing assignments helped you improve your scientific writing skill. They met your target and learning needs. Your evaluation of the implemented courses content.

11. Learners' Assessment

- Is the level of both tests appropriate ? do they cover all the learning facets ? Are tests well written and clearly instructed? Is the tests' rating scale acceptable ? Are the tests scores convincing? Do they reflect both your background knowledge and what you have just learnt?
- You enjoy answering the current interview questions. You can express yourself correctly and freely. The teaching of speaking skill techniques and tasks

(shadowing, arguing, discussing, etc) helped you to develop your oral language.
Your assessment of your current English language level (written and oral language).

Thank you for your participation.

CANEVAS

Intitulé du Master : Systèmes d'Information et de Connaissance (SIC)
Semestre : S2

Intitulé de l'UE : UET1 (SIC24)

Intitulé de la matière : Anglais Technique II

Crédits : 01

Coefficients : 01

Objectifs de l'enseignement

Ce module constitue la suite du module "anglais technique I", couvre trois aspects: the comprehension, the listening and the speaking. Il permet, à travers l'étude de textes techniques qui relèvent de la spécialité, aux étudiants d'assimiler les trois aspects ci dessus.

Connaissances préalables recommandées

Anglais Technique I

Contenu de la matière

Etude de textes techniques qui relèvent de la spécialité informatique.

Mode d'évaluation :

Contrôle continu, Examen.

Références *(Livres et polycopiés, sites internet, etc).*

Intitulé du Master : Génie Logiciel

Semestre : S2

Intitulé de l'UE : GL24

Intitulé de la matière : Anglais II

Crédits :

Coefficients :

Objectifs de l'enseignement

Ce module couvre trois aspects: the comprehension, the listenning and the speaking. Il permet, à travers l'étude de textes techniques qui relèvent de la spécialité, aux étudiants d'assimiler les trois aspects ci dessus.

Connaissances préalables recommandées

Contenu de la matière :

- Comprehension
- Listenning
- Speaking

Mode d'évaluation : Examen + exposés

Références (*Livres et polycopiés, sites internet, etc).*

MyMediaLite: A Free Recommender System Library

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ABSTRACT

MyMediaLite is a fast and scalable, multi-purpose library of recommender system algorithms, aimed both at recommender system researchers and practitioners. It addresses two common scenarios in collaborative filtering: *rating prediction* (e.g. on a scale of 1 to 5 stars) and *item prediction from positive-only implicit feedback* (e.g. from clicks or purchase actions). The library offers state-of-the-art algorithms for those two tasks. Programs that expose most of the library's functionality, plus a GUI demo, are included in the package. Efficient data structures and a common API are used by the implemented algorithms, and may be used to implement further algorithms. The API also contains methods for real-time updates and loading/storing of already trained recommender models.

MyMediaLite is free/opensource software, distributed under the terms of the GNU General Public License (GPL). Its methods have been used in four different industrial field trials of the *MyMedia* project, including one trial involving over 50,000 households.

Categories and Subject Descriptors

H3.3 [Information Search and Retrieval]: Information Filtering—*Collaborative Filtering*

General Terms

Algorithms, Experimentation

Keywords

open source, e-commerce, personalization

1. INTRODUCTION

Free/open source implementations of recommender system algorithms are desirable for three reasons: (i) They

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RecSys 2011 Chicago, Illinois USA

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relieve researchers from implementing existing methods for their experiments, either for comparing them against newly designed methods, or as recommendation methods in other kinds of studies, e.g. in user interface research, (ii) they can play a crucial role in the practical adoption of newly developed techniques, either by providing software that can be directly adapted and deployed, or by at least giving example implementations, (iii) and finally they can be used for (self-) teaching future recommender systems researchers and practitioners. Additionally, well-designed software frameworks can make the implementation and evaluation of new algorithms much easier.

MyMediaLite aims to be such a framework. It targets both academic and industrial users, who may use the existing algorithms in the library, or use the framework for the implementation and evaluation of new algorithms.

2. FEATURES

MyMediaLite addresses two common scenarios in collaborative filtering: *rating prediction* (e.g. on a scale of 1 to 5 stars) and *item prediction from positive-only implicit feedback* (e.g. from clicks or purchase actions). It offers state-of-the-art algorithms for those two tasks, plus online-updates (where feasible), serialization of computed models, and routines for evaluation.

MyMediaLite is implemented in C#, and runs on the .NET platform. With the free .NET implementation Mono, it can be used on all relevant operating systems. Using the library is not limited to C#, though: it can be easily called from other languages e.g. Ruby and Python; code examples are included with the software.

Recommendation Tasks

Rating Prediction.

Ratings are a popular kind of explicit feedback. Users assess how much they like a given item (e.g. a movie or a news article) on a predefined scale, e.g. 1 to 5, where 5 could mean that the user likes the item very much, whereas 1 means the user strongly dislikes the item. *Rating prediction* algorithms estimate unknown ratings from a given set of known ratings and possibly additional data like user or item

¹Here we describe *MyMediaLite* 1.04, released in August 2011.

attributes. The predicted ratings can then indicate to users how much they will like an item, or the system can suggest items with high predicted ratings.

MyMediaLite contains different variants of k-nearest neighbor (kNN) models [15], simple baseline methods (averages, Slope-One [14]), and modern matrix factorization methods [21] for the task of rating prediction.

Item Prediction from Positive-Only Implicit Feedback.

Rating prediction has been popularized in the research community by systems (and corresponding datasets) like MovieLens [8] and Jester [7], and later by the Netflix Prize [13]. Nevertheless, most real-world recommender systems (e.g. in e-commerce) do not rely on ratings, because users are hard to persuade to give explicit feedback, and other kinds of feedback (user actions like selecting/buying an item, page views/clicks, etc.) are often recorded by the system anyway. Buying a product or watching a video is also a positive expression of preferences.

Note that not buying or watching an item from a large collection does not necessarily mean a user dislikes the item. *Item prediction from positive-only implicit feedback* is the task of determining the items that a user will perform a certain action on from such past events (and possibly additional data).²

The library contains kNN models for this task, as well as simple baselines (random/most popular item) and advanced matrix factorization methods like WR-MF [10] and BPR-MF [20].

Command-Line Tools.

For each of the two recommendation tasks, MyMediaLite comes with a command-line program that allows users to train and evaluate all available recommenders on data provided in text files, without having to write a single line of code. Newly developed recommenders are automatically detected, and do not have to be manually added to the programs. Most of the other library features described in this section are exposed to the user by the command-line programs; if not, this is explicitly mentioned.

Data Sources

Besides collaborative data, that is the ratings in the case of rating prediction and the implicit user feedback in the case of item prediction, recommenders in MyMediaLite also may access other kinds of data: User (like geographic location, age, profession) or item attributes (categories, keywords, etc.), and relations between users (e.g. the social network) or items (taxonomies, TV series), respectively. Algorithms in the library that make use of this data are for example attribute-based kNN methods [3], a linear model optimized for BPR [5], and SocialMF, a matrix factorization model that takes the social network of the users into account [11].

MyMediaLite contains routines to read such data from SQL databases (not supported by the command-line programs) and from simple text files.

²For the sake of brevity, we will call this task *item prediction* in the following, even though there are of course other item predictions tasks besides item prediction from positive-only feedback.



Figure 1: The MyMediaLite movie demo program.

Additional Features

Evaluation.

MyMediaLite contains routines for computing evaluation measures [9] like root mean square error (RMSE) and mean average error (MAE) for the rating prediction task; for item prediction, it supports area under the ROC-curve (AUC), precision-at-N (prec@N), mean average precision (MAP), and normalized discounted cumulative gain (NDCG).

For rating prediction, internal k-fold cross-validation is supported, and there is also preliminary support for hyperparameter selection using grid search and Nelder-Mead [19].

Incremental Updates.

Academic experiments on recommender system algorithms are usually conducted off-line, by training a prediction model and then evaluating it. Yet real-world recommender systems constantly get new user feedback that should be immediately incorporated into the prediction model. MyMediaLite offers an API for immediate updates to already trained prediction models. Besides being supported in a special online evaluation mode by the two command-line tools, the use of incremental updates is demonstrated in the GUI demo which asks the user for movie ratings and then immediately displays personalized movie recommendations (see Fig. 1).

Serialization.

Another feature that is required in practice is storing and loading trained recommenders, which allows e.g. to train recommenders on a different machine than the one that produces the recommendations. All recommenders in MyMediaLite support this feature.

Developer Support

Documentation.

The library is accompanied by broad documentation: Besides the complete API documentation, there are example programs in Python, Ruby, and C#, and how-tos on typical tasks like embedding recommenders into a program, implementing new recommenders, or using the command-line tools.

Best Practices.

In the development of the library, we employ best practices for (not only) free/open source projects, e.g. keeping the code in a public (and distributed) version control repository, having regular releases (roughly one per month) and

Dataset	$k = 5$	$k = 120$
MovieLens-1M (CV)	61 MB	61 MB
Netflix (single split)	1297 MB	1734 MB

Table 2: Memory usage for rating prediction.

a collection of unit tests, and performing static analysis³ of the compiled code.

3. RELATED WORK

Some researchers (e.g. [22]) have published their algorithms as free software. In this discussion, we limit ourselves to libraries that offer a wider choice of different recommendation methods.

Apache Mahout is a collection of mostly distributed implementations of machine learning and data mining algorithms. One section of the library is dedicated to collaborative filtering algorithms; the majority of algorithms (taken from the predecessor *Taste*) is not distributed; an item-based kNN model and Slope-One are available as a distributed implementation.

EasyRec is a recommender system web service that can be integrated into websites, however it does not contain any advanced personalized algorithms; it is more a framework for connecting a recommender service with an application. *RecLab* is a framework for performing live evaluations in online shopping systems; it contains an API to be implemented by the shop system, and another one for providing recommendations.

We collected information on some other recommender system algorithm libraries' features and compare them to those of MyMediaLite in Table 1. We concentrated on free software/open source⁴, and additionally included SUGGEST [12], which is not free software, but was a fairly early publicly available software.

4. EXPERIMENTS

We have performed several rating prediction experiments to showcase MyMediaLite's runtime performance and scalability. For this, we ran the *BiasedMatrixFactorization* recommender on the *Netflix* and *MovieLens-1M* datasets. For *Netflix*, we used the *probe* dataset for validation, on the *MovieLens* dataset we performed 5-fold cross-validation. We measured the time needed for one pass over the training, the time needed for predicting the validation set, and the memory usage reported by the program. Measuring the time needed for a pass over the training data should give a general idea of the performance of the employed data structures, not just the particular recommender. The evaluation scripts with all relevant parameter settings are available from <http://ismll.de/mymedialite/examples/recsys2011.html>.

MyMediaLite is capable of making between 1,400,000 ($k = 120$) and 7,000,000 ($k = 5$) predictions per second.

We have not performed a systematic comparison with other libraries yet. [2] reports on experiments involving several recommender system frameworks.

³We use *Gendarme* to find problems in MyMediaLite.

⁴See <http://www.gnu.org/philosophy/free-sw.html> and <http://www.opensource.org/docs/osd>.

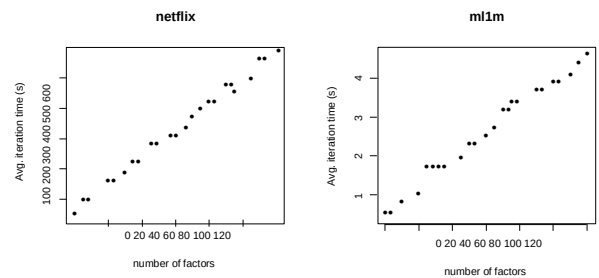


Figure 2: Runtime of *BiasedMatrixFactorization*.

5. MYMEDIALITE USAGE

MyMediaLite is based on parts of the framework [16] that has been used in four different industrial field trials of the MyMedia project, including one involving 50,000 households [17]. Application areas in the field trials were IPTV, web-based video and audio, and online shopping. Additionally, the MyMedia framework was used to perform user-centric experiments [4].

Towards the end of the project, we stripped off the framework's more heavyweight components, and released it as free software in September 2010. Since then, it has been downloaded more than 2,300 times (excluding search engine spider downloads), received numerous improvements, and has been used in several research activities, e.g. studies on student performance prediction [18], cold-start (new item) problems [5], and as a baseline for context-aware recommendation (winner of two tracks of the CAMRa 2010 challenge [6]).

6. CONCLUSIONS

We have presented MyMediaLite, a versatile library of recommender system algorithms for rating and item prediction from positive-only feedback. We believe MyMediaLite is currently one of the most complete free/open source recommender system frameworks in terms of recommendation tasks, implemented methods, efficiency, features, flexibility, and documentation (see section 3).

We will continue MyMediaLite's development in several directions. Porting the library to Java or C++ is worth considering, given the popularity of these programming languages. A Java port of a part of the library is already available for download. Another useful extension would be a web service interface for the easy integration of MyMediaLite e.g. into online shop software; we will consider existing APIs for this feature. We also plan to add additional recommendation tasks and types of input, e.g. item prediction from other kinds of implicit feedback like viewing times or click counts, or tag recommendation.

Finally, we would like to invite both researchers and practitioners in the field of recommender systems to use and extend MyMediaLite, and to give us feedback for possible improvements.

7. ACKNOWLEDGMENTS

The development of MyMediaLite was co-funded by the European Commission FP7 project MyMedia under the grant agreement no. 215006. We thank Chris Newell of BBC R+D

Library	Duine	MultiLens	LensKit	Mahout	GraphLab	SUGGEST	MyMediaLite
version date	4.0.0-RC1 2009-02-17	— 2004-10-22	0.04 2011-07-29	0.4 2010-10-31	v1.134 2011-07-29	1.0 2000-11-08	1.02 2011-08-03
actively developed	—	—	C	C	C	—	C
license	LGP	GPL	LGP	Apache	Apache	non-free	GP
language	L3 Java	Java	L2 Java	2.0 Java	2.0 C++	C	L3 C#
scalable	—	C	C	C	C	C	C
matrix factorization	—	—	C	C	C	—	C
rating prediction	C	C	C	C	C	—	C
implicit feedback	—	—	—	—	—	C	C
online updates	C	—	—	C	—	—	C

Table 1: Comparison of free/open source recommender system frameworks.

Software	URL
Duine	http://duineframework.org
GraphLab LensKit	http://graphlab.org http://lenskit.grouplens.org
Mahout MultiLens	http://mahout.apache.org
MyMediaLite RecLab	http://knuth.luther.edu/~bmiller/dynahome.php?page=multilens
SUGGEST	http://ismill.de/mymedialite http://code.richrelevance.com http://glaros.dtc.umn.edu/gkhome/suggest/overview
Gendarme	http://www.mono-project.com/Gendarme
Mono	http://www.mono-project.com

Table 3: Websites of software packages mentioned in the paper.

for giving valuable feedback about MyMediaLite, and for porting parts of the library to Java. We also thank all contributors to MyMediaLite. They are listed in the README file of the package.

8. REFERENCES

- [1] X. Amatriain, M. Torrents, P. Resnick, and M. Zanker, editors. *Proceedings of the 2010 ACM Conference on Recommender Systems, (RecSys 2010)*. ACM, 2010.
- [2] T. Angermann. Empirische Analyse von Open-Source-Empfehlungssystemen. Master's thesis, University of Hildesheim, 2010.
- [3] D. Billsus, M. J. Pazzani, and J. Chen. A learning agent for wireless news access. In *Intelligent User Interfaces*, pages 33–36, 2000.
- [4] D. Bollen, B. P. Knijnenburg, M. C. Willemsen, and M. Graus. Understanding choice overload in recommender systems. In Amatriain et al. [1].
- [5] Z. Gantner, L. Drumond, C. Freudenthaler, S. Rendle, and L. Schmidt-Thieme. Learning attribute-to-feature mappings for cold-start recommendations. In G. I. Webb, B. Liu, C. Zhang, D. Gunopulos, and X. Wu, editors, *ICDM 2010*. IEEE Computer Society, 2010.
- [6] Z. Gantner, S. Rendle, and L. Schmidt-Thieme. Factorization models for context-/time-aware movie recommendations. In *Challenge on Context-aware Movie Recommendation (CAMRa2010)*. ACM, 2010.
- [7] K. Goldberg, T. Roeder, D. Gupta, and C. Perkins. Eigentaste: A constant time collaborative filtering algorithm, 2000.
- [8] J. L. Herlocker, J. A. Konstan, A. Borchers, and J. Riedl. An algorithmic framework for performing collaborative filtering. In *SIGIR 1999*, New York, NY, USA, 1999. ACM.
- [9] J. L. Herlocker, J. A. Konstan, L. G. Terveen, and J. T. Riedl. Evaluating collaborative filtering recommender systems. *ACM Trans. Inf. Syst.*, 22:5–53, January 2004.
- [10] Y. Hu, Y. Koren, and C. Volinsky. Collaborative filtering for implicit feedback datasets. In *ICDM 2008*, 2008.
- [11] M. Jamali and M. Ester. A matrix factorization technique with trust propagation for recommendation in social networks. In Amatriain et al. [1].
- [12] G. Karypis. Evaluation of item-based top-n recommendation algorithms. In *CIKM*, 2001.
- [13] Y. Koren, R. M. Bell, and C. Volinsky. Matrix factorization techniques for recommendersystems. *IEEE Computer*, 42(8), 2009.
- [14] D. Lemire and A. Maclachlan. Slope one predictors for online rating-based collaborative filtering. In *Proceedings of SIAM Data Mining (SDM'05)*, 2005.
- [15] G. Linden, B. Smith, and J. York. Amazon.com recommendations: Item-to-item collaborative filtering. *IEEE Internet Computing*, 7, 2003.
- [16] P. Marrow, R. Hanbidge, S. Rendle, C. Wartena, and C. Freudenthaler. MyMedia: Producing an extensible framework for recommendation. In *NEM Summit*, 2009.
- [17] P. Marrow, T. Stevens, I. Kegel, J. Meenowa, and C. McCahill. Future IPTV services field trial report. Technical report, MyMedia project, 2010.
- [18] T.-N. Nguyen, L. Drumond, T. Horvath, A. Nanopoulos, and L. Schmidt-Thieme. Matrix and tensor factorization for predicting student performance. In *Proceedings of the 3rd International Conference on Computer Supported Education (CSEDU 2011)*, 2011.
- [19] M. Potté and M. Chabbert. The PragmaticTheory solution to the Netflix Grand Prize, 2009.
- [20] S. Rendle, C. Freudenthaler, Z. Gantner, and L. Schmidt-Thieme. BPR: Bayesian personalized ranking from implicit feedback. In *UAI 2009*, 2009.
- [21] S. Rendle and L. Schmidt-Thieme. Online-updating regularized kernel matrix factorization models for large-scale recommender systems. In *RecSys '08: Proceedings of the 2008 ACM Conference on Recommender Systems*. ACM, 2008.
- [22] M. Weimer, A. Karatzoglou, and A. Smola. Improving maximum margin matrix factorization. *Machine Learning*, 72(3):263–276, 2008.

TLEMCEM University

English for Computing Purposes

A Syllabus for Master 1 Computer Science Students

Meryem KOURICHI
2019/2020

Unit 1

Introduction to Computer Science

Lesson 1 Computers in the New Era

Lesson 2 Information Technology

Learning Objectives

In this unit, you will :

- Talk and write about computer applications in everyday life.
- Study the basic structure of a computer.
- Study Technology in relation to society.
- Learn about the present tense, precisely the verb 'To Be'.
- Learn to understand and formulate technical words in computing.
- Study the specific writing process.
- Deal with problem-solving situations in the digital era.

Unit 1 : Introduction to Computer Science

Living with Digital Artifacts : Computers

Lesson Plan 1

Lesson 1 : Computers in the New Era	1-3 Sessions (90mnts-270 mnts)
Topics /Themes :	- Living in a Digital Age
	- Computer Users
	- Computer Essentials
Course Description: The course describes the digital era that we are living in nowadays. Furthermore, it highlights the use of computers in this age, the computer components needed for the useful usage, and the language communicative skills required to perform effectively in the digital age.	
Course Objectives : By the end of this lesson, students should be able to :	
- Taking notes while listening	
- Read for specific information	
- Recognize and use computing words	
- Conjugate correctly the verb 'To Be'	
- Speak about their own use of computers	
- Write a short paragraph	
Realia :	- Computers related texts
	- Audios and recordings
	- Pictures and images
	- Data projector

Glossary of Computing Terms and Abbreviations

CNE /sɪˈɛn ˈiː/ noun U [22] abbreviation for Certified Novell Engineer. A qualification aimed at people interested in installing and planning the rollout of Novell-based networks.

coax(ial) (cable) /ˈkəʊæks/ noun C [16] a type of shielded cable for carrying signals. It is often used with radio frequency and video signals.

COBOL /ˈkəʊbəl/ noun U [5,21,22,25] acronym for Common Business-Oriented Language

code /kəʊd/ noun U [16,18,21,22] a piece of program text written in a programming language

code /kəʊd/ verb [21,23] to write the text of a program or part of a program using a computer language

codec /ˈkəʊdɛk/ noun C [16] abbreviation for coder/decoder. A program used for converting sound and video signals for use in a computer

compress /kəmˈpres/ verb [11] to reduce to a much smaller size

compression (scheme) /kəmˈpreʃn/ noun C [9,11] the process used for reducing a file to a much smaller size

computer /kəmˈpjʊtə(r)/ noun C [1,2,3,4,5,6,7,8,9,10,11,12,13,15,17,20,22,23,24,25] a general purpose machine that can be programmed to process data in a variety of ways

computer consultant /kəmˈpjʊtə kənˌsʌltənt/ noun C [22,25] a person who is paid to advise on computing system issues

computer engineer /kəmˈpjʊtə ɛndʒɪˌniə(r)/ noun C [17,22] a person who designs and develops computer systems

References

- Boeckner, K. & Brown, C. (2002). *Oxford English for computing : Student's book*. Oxford : Oxford University Press.
- (1993). *Oxford English for computing : Answer book*. Oxford : Oxford University Press.
- Esteras, S. R. (2008). *Infotech English for computer users : Student's book*. Cambridge : Cambridge University Press.
- (2008). *Infotech English for computer users : Teacher's book* (4th ed). Cambridge : Cambridge University Press.
- Glendinning, E.H & McEwan, J. (2003). *Oxford English for information technology : Student's book*. Oxford : Oxford University Press.
- (2006). *Oxford English for information technology : Student's book* (2nd ed). Oxford : Oxford University Press.
- (2003). *Oxford English for information technology : Teacher's book*. Oxford : Oxford University Press.
- (1999). *Basic English for computing : Student's book*. Oxford : Oxford University Press.
- (1999). *Basic English for computing : Teacher's book*. Oxford : Oxford University Press.
- Maja, O. (2011). *English for information technology 1 : Student's book*. England : Pearson Education Limited.
- David, H. (2012). *English for information technology 2 : Course book*. England : Pearson Education Limited.
- Glendinning, E.H. (2009). *Oxford English for Careers: Technology 1 Student's Book*. Oxford : Oxford University Press.
- Glendinning, E.H. & Pohl, A. (2009). *Oxford English for Careers: Technology 2 Student's Book*. Oxford : Oxford University Press.
- Bonamy, D. (2009). *Oxford English for Careers: Technology 1 Teacher's Resources Book*. Oxford : Oxford University Press.
- Pohl, A. (2009). *Oxford English for Careers: Technology 2 Teacher's Resources Book*. Oxford : Oxford University Press.

Lesson Plan

Introduction

Warming-Up

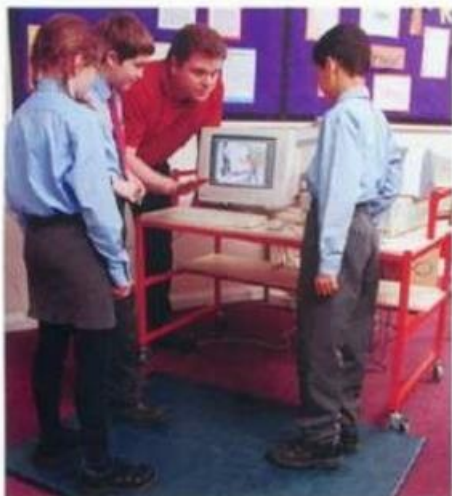
Task 1 : Work in groups. Share information on how you use computers in your free time. Compare answers with other groups and make a list of uses for your class.

Body of the Lesson

Listening (Computer Use)

Task 1 (Before Listening)

You are going to hear four people talk about how they use computers. Before you listen, try to predict the uses they describe.



User	Possible use
primary school teacher	
Open University student	
girl (Louise), aged 6	
artist	

Task 2 (While Listening : Take Notes)

Now listen to the recording and note the actual uses described.

User	Actual use
primary school teacher	
Open University student	
girl (Louise), aged 6	
artist	

Task 3 (After Listening)

Now Listen to the recording again to find the answers to these questions :

- 1 How does the story-telling program encourage children to work together?
- 2 In what way is the children's reaction to this program different from other uses they make of computers?
- 3 What is the OU student studying?
- 4 What opportunity has she to meet other students?
- 5 What can you do with Pets 3?
- 6 What does Louise do with clipart?
- 7 How did the artist display work to dealers in the past?
- 8 What is the difficulty in selling through a website?

Reading (What is a Computer ?)

What is a computer?

A computer is an electronic machine which can accept data in a certain form, process the data, and give the results of the processing in a specified format as information.

First, data is fed into the computer's memory. Then, when the program is run, the computer performs a set of instructions and processes the data. Finally, we can see the results (the output) on the screen or in printed form (see Fig. 1 below).

A computer system consists of two parts: hardware and software. **Hardware** is any electronic or mechanical part you can see or touch. **Software** is a set of instructions, called a program, which tells the computer what to do. There are three basic hardware sections: the **central processing unit (CPU)**, **main memory** and **peripherals**.

Perhaps the most influential component is the central processing unit. Its function is to execute program instructions and coordinate the activities of all the other units. In a way, it is the 'brain' of the computer. The main memory (a collection of RAM chips) holds the instructions and data which are being processed by the CPU. Peripherals are the physical units attached to the computer. They include storage devices and input/output devices.

Storage devices (hard drives, DVD drives or flash drives) provide a permanent storage of both data and programs.

Disk drives are used to read and write data on disks.

Input devices enable data to go into the computer's memory. The most common input devices are the **mouse** and the **keyboard**. **Output devices** enable us to extract the finished product from the system. For example, the computer shows the output on the **monitor** or prints the results onto paper by means of a **printer**.

On the rear panel of the computer there are several **ports** into which we can plug a wide range of peripherals – a modem, a digital camera, a scanner, etc. They allow communication between the computer and the devices. Modern desktop PCs have USB ports and memory card readers on the front panel.



A USB port

A USB connector

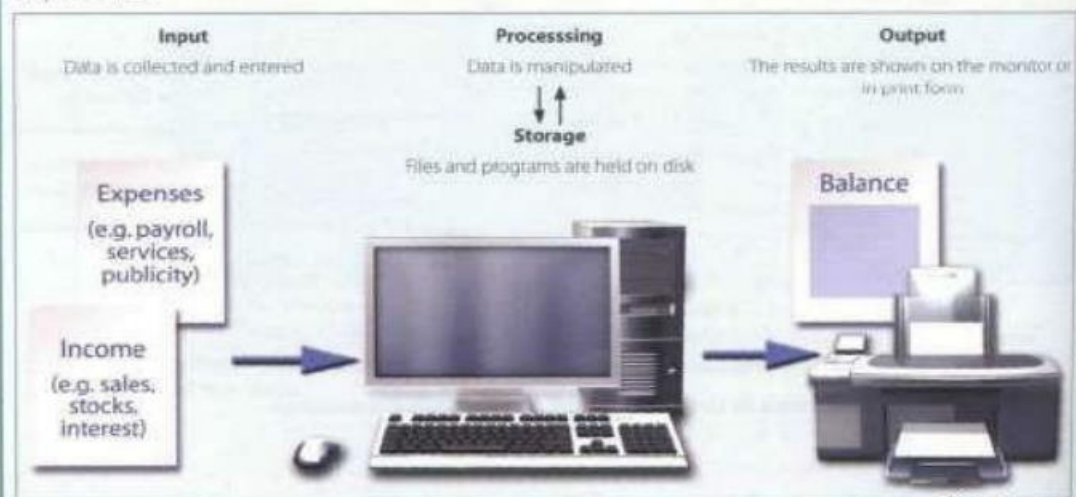


Fig. 1

Task 1 : Read the text then explain Fig. 1 in your own words.

Task 2 : Match these words from the text (1-9) with the correct meanings (a-i).

1 software	a the brain of the computer
2 peripherals	b physical parts that make up a computer system
3 main memory	c programs which can be used on a particular computer system
4 hard drive (also known as hard disk)	d the information which is presented to the computer
5 hardware	e results produced by a computer
6 input	f input devices attached to the CPU
7 ports	g section that holds programs and data while they are executed or processed
8 output	h magnetic device used to store information
9 central processing unit (CPU)	i sockets into which an external device may be connected

Language Work

Grammar (Present Tense of 'To Be')

We use be to say who somebody is or what something is.	I'm Sam.	I am Sam.
	You're/We're/They're from the UK.	You/ We/They are from the UK.
	He's/She's a website developer.	He/She is a website developer.
	It's in the US.	It is in the US.
We use be to ask personal questions.	Where are you from?	
	What's his name/job?	What is his name/job?

Task 1 : Complete this email with am, is, are, their, our or my.

Dear Colleagues

My name (1) _____ Jessica Martin and I (2) _____ the IT Support team leader. The IT Support team members (3) _____ : Mahmoud Al Banawy, Eli Ibrahim and Guido Pitteri. Mahmoud (4) _____ our network administrator. Eli and Guido (5) _____ system maintenance officers. (6) _____ job is to keep our systems going. (7) _____ job is to support you. (8) _____ contact number (9) _____ 675 567 567.

Best regards
Jessica Martin

Lexis

Morphology (Suffixes 1)

We have already seen how prefixes can change the meaning of a word. Let us now consider some suffixes, their usual meanings, and how they change the meanings of English words.

Suffixes			
Nouns	Verbs	Adjectives	Adverbs
-ance	-ize	-able	-ly
-ence	-ate	-ible	
-or	-fy	-less	
-er	-en	-ic	
-ist	-ify	-ical	
-ness		-ish	
		-ive	

Task 1 : Choose the correct word to complete each sentence. You may have to change some words slightly.

1 *instruction, instruct, instructed, instructor*

- a** Our maths _____ explained to us the principles of binary arithmetic.
- b** We were _____ to document our programs very carefully.
- c** Both _____ and data have to be changed to machine code before the computer can operate on them.

2 *compilation, compiler, compile, compiled*

- a** Our university computer does not have a PASCAL _____.
- b** Usually, a programmer _____ his program before he puts in the data.
- c** A source program cannot be directly processed by the computer until it has been _____.

3 *result, results, resulting*

- a** The linkage editor links systems routines to the object module. The _____ program, referred to as the load module, is directly executable by the computer.
- b** The _____ of these mathematical operations were obtained from the university mainframe and not from my micro.

4 *specification, specify, specific, specified, specifically*

- a** Our company bought three packages with very _____ applications: payroll, accounts receivable, and accounts payable.
- b** An applications program is designed to do a _____ type of work, such as calculating the stress factor of a roof.
- c** Did the analyst give the new programmer the _____ necessary to start on the project?

Collocations (Word Groups)

Some technical words look similar to each other but are used in different ways, for example, *mechanic* and *mechanics*. One way to remember these words and the differences between them is to put them into groups.

Mechanic belongs to a group containing **people and jobs**. *Mechanics* belongs to a group of **subjects**. You can think of your own groups to help you remember other technical terms.

Task 1 : Put the list of common technical words into groups using the table below.

mechanic	mechanics	mechanical	mechanism
electron	electronic	electronics	
technical	technology	technician	
electricity	electrical	electrician	
engine	engineer	engineering	
Subjects	People and jobs	Things	Adjectives
engineering	engineer	engine	engineering

Spelling and Recognition

Task 1 : Spell the correct word. The first letter is given as a hint.

A type of shielded cable for carrying signals.

C

A piece of program text written in a programming language.

C

The process used for reducing a file to a much smaller size.

C

A general purpose machine that can be programmed.

C

Semantics

Meaning

Task 1 : Match the words (1-10) with the correct meanings (a-j)

1 perform	5 digital	a keep, save	g collection of facts or figures
2 word processor	7 store	b execute, do	h describes information that is recorded or broadcast using computers
3 online	8 financial	c monetary	i program used for text manipulation
4 download	9 monitor	d screen	j copy files from a server to your PC or mobile
6 built-in	10 data	e integrated	f connected to the Internet

Context (Label Images)

Task 1 : In pairs, label the elements of this computer system.



Polysemy

Task 1 : Look the given words up in your dictionary. Give the literal meaning (direct meaning) and the technical meaning (computing meaning) of the following words :

Compression (noun)

.....

(Computing)

Coax (noun)

.....

(Computing)

Code (noun, verb)

.....

(Computing)

Task 2 : Put the previous computing words in full sentences (computing context).

Synonyms

Task 1 : Refer back to the text and find the synonyms.

1. job
2. comprehended
3. clever
4. cases
5. salary sheet

Antonyms

Task 1: Refer back to the text and find the antonyms.

1. basic
2. exceptional
3. run well
4. slowly
5. employer

Speaking (Computer Use)

Task 1 : Work in pairs. Find out this information from your partner. Make sure you use the correct tense in your questions.

For example :

download music from the Internet [what site]
 A Have you ever downloaded music from the Internet?
 B What site did you use?

1 send a video email attachment	[who to, when]
2 fit an expansion card	[which type]
3 replace a hard disk	[what model]
4 fix a printer fault	[what kind]
5 make your own website	[how]
6 have a virus	[which virus]
7 watched TV on the Internet	[which station]
8 write a program	[which language]

Conclusion

Study Skills

Problem-Solving

Task 1 : In groups, how do you think these professions might use computers ?

Compare answers with others in you group

architects
interior designers
farmers
landscape gardeners
musicians
rally drivers
sales people

Specific Writing Rubric (Writing Process₁ : Stages of Writing)

The Writing Process

When beginning the writing process, it's a good idea to give students an overview of what you plan to cover. Depending on the procedure in your grade, school, or district, there may be a formal plan in place that students are already familiar with. On the other hand, you may find yourself starting from scratch or starting with a group of students who haven't had the same experiences with the writing process. There are five basic steps that can be used to outline the writing process; however, these steps are repeated as needed until a finished product is produced. When writing your lesson plans, it is a good idea to spend time on each step so that you can share strategies that students can use each step of the way. Here are a few ideas:

Stages of Writing

1. **Prewriting** – This is the planning stage. You might want to practice ways to brainstorm ideas, share different types of graphic organizers they can use, do a lesson on using an outline, or model using writing prompts to get started.
2. **Drafting**– This is the first draft or the rough draft. This is where you will probably spend the most time teaching about introductions, paragraphs, conclusions, etc.
3. **Revising and Editing** – Revising is changing your writing to make it better. You might want to do a lesson on word choice here. Editing is correcting errors such as spelling, punctuation, and grammar mistakes. Lessons teaching students how to edit and use editing checklists would be beneficial.
4. **Rewriting** – Lessons on transferring text carefully or using something to track what you've completed would be good ones to reinforce this stage.
5. **Publishing** – You can keep it simple and have students type their work or come up with creative ways to publish and display their work. Just be sure they understand that presenting and sharing what they've written is an important step.

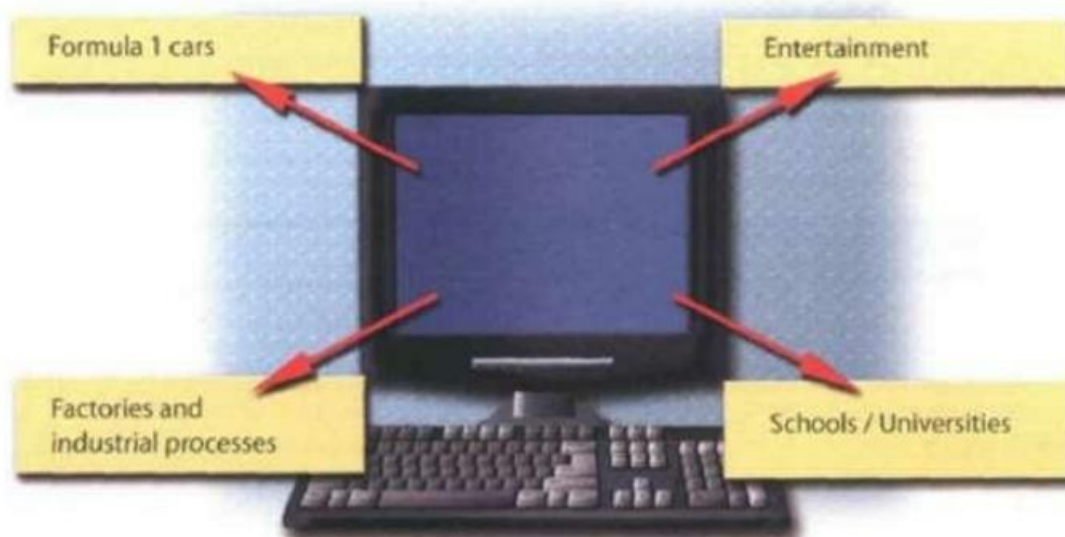
Task 1 : Describe how do you use computers in your study and in your free time.

Evaluation

Writing (Computer Users)

Task1 : In small groups, choose one of the areas in the diagram below and discuss what you can do with computers in that area. Look at the Useful language box below to help you.

¹ <https://www.time4writing.com/articles-about-writing/lesson-plans-on-the-writing-process/>



Useful language

Formula 1 cars: design and build the car, test virtual models, control electronic components, monitor engine speed, store (vital) information, display data, analyse and communicate data

Entertainment: download music, burn CDs, play games, take photos, edit photos, make video clips, watch movies on a DVD player, watch TV on the computer, listen to MP3s, listen to the radio via the Web

Factories and industrial processes: design products, do calculations, control industrial robots, control assembly lines, keep record of stocks (materials and equipment)

School/University: access the Internet, enrol online, search the Web, prepare exams, write documents, complete exercises online, do research, prepare presentations

Computers are used to ...

A PC can also be used for ...

People use computers to ...

Task 2 : Write a short presentation summarizing your discussion. Then ask one person from your group to give a summary of the group ideas to the rest of the class.

Homework (Computer System Upgrades and Options)

Task 1 : Study these 'System Upgrades and Options' for the computer. Which upgrades and/or options would improve these aspects of this computer.

- 1 capacity
- 2 speed
- 3 protection from damage due to power failure
- 4 network connections

Upgrades and options

10/100/1000 Ethernet controller

16X DVD +/-RW drive

Extra memory module

APC 1400 Smart-UPS

3 Year Next-Business-Day On-site maintenance

Project at the end of the Unit

Problem-Solving Task : Put these instructions for opening a computer in the correct sequence. Then match these figures to the instructions. Add these sequence words to your instructions : first, then, next, after that, finally.

- a Release the two catches underneath and lift up to remove panel.
- b Shut down your computer by choosing Shut Down from the Apple menu or the Special menu.
- c If there are security screws on the vertical plate on the back of the computer, remove them with a Philips screwdriver.
- d Unplug all the cables except the power cord from your computer.
- e Pulling gently, slide the tray out.

Fig 5
Opening a computer



i



ii



iii



iv

Unit 1 : Introduction to Computer Science

Information Technology

Lesson Plan 2

Lesson 2 :	Information Technology	1-3 Sessions (90mnts-270 mnts)
Topics/Themes :	- Technology and Society - Studying Technology - Branches of Technology	
Course Description: This course underlines the importance of technology in relation to society. Information technology plays a major role in everybody's lives these days. Computer science Master 1 students as being IT students, the current lecture addresses the branches of technology and the needed language aspects to execute effectively in the technological era.		
Course Objectives : By the end of this lesson, students will be able to :		
- Listen for specific information - Recognize and use computing words - Use the Present Tense - Speak about Informational age - Write a short paragraph		
Realia :	- Information Technology related texts - Audios and recordings - Listening script. - Help Box (Writing Emails) - Pictures and images - Data projector	

Glossary of Computing Terms and Abbreviations

date /deɪt/ noun U [6] a Unix and MS-DOS command for displaying the current date

DDR /diː diː ɑː/ adj [2] abbreviation for double data rate. A type of memory that transfers data on both the up and down cycles of the control signal, making it faster than earlier types of memory

debug /,diːˈbʌɡ/ verb [21] to find and fix faults in a program or system

DEC VAX /ˈdek vɪks/ noun U [6] a range of computers produced by the Digital Equipment Corporation using their Vax range of processors

decipher /diˈsaɪfə(r)/ verb [18] to change coded information into normal text

decode /,diːˈkəʊd/ verb [9] to decide what a program instruction means

decompress /ˌdiːkəmˈpres/ verb [9] to remove the compression, i.e. to expand to its original size

decrypt /,diːˈkript/ verb [11,18] to recover the original text from an encrypted message

defacing /diˈfeɪsɪŋ/ noun U [18] a computer crime that involves changing the information shown on another person's website without permission

default /dɪˈfɔlt, -fɔːlt/ noun C [10] an initial setting that can be changed by the user

crack /kræk/ verb [18,19] to break into a computer system in order to steal information or cause damage
crash /kræʃ/ verb [17,19] to fail suddenly and completely usually referring to the failure of a hard disk

corrupt /kə'rʌpt/ verb [18] to damage in such a way that prevents normal use
cp /si: 'pi:/ noun U[6] a Unix command for copying a file

References

- Boeckner, K. & Brown, C. (2002). *Oxford English for computing : Student's book*. Oxford : Oxford University Press.
- (1993). *Oxford English for computing : Answer book*. Oxford : Oxford University Press.
- Esteras, S. R. (2008). *Infotech English for computer users : Student's book*. Cambridge : Cambridge University Press.
- (2008). *Infotech English for computer users : Teacher's book* (4th ed). Cambridge : Cambridge University Press.
- Glendinning, E.H & McEwan, J. (2003). *Oxford English for information technology : Student's book*. Oxford : Oxford University Press.
- (2006). *Oxford English for information technology : Student's book* (2nd ed). Oxford : Oxford University Press.
- (2003). *Oxford English for information technology : Teacher's book*. Oxford : Oxford University Press.
- (1999). *Basic English for computing : Student's book*. Oxford : Oxford University Press.
- (1999). *Basic English for computing : Teacher's book*. Oxford : Oxford University Press.
- Maja, O. (2011). *English for information technology 1 : Student's book*. England : Pearson Education Limited.
- David, H. (2012). *English for information technology 2 : Course book*. England : Pearson Education Limited.
- Glendinning, E.H. (2009). *Oxford English for Careers: Technology 1 Student's Book*. Oxford : Oxford University Press.
- Glendinning, E.H. & Pohl, A. (2009). *Oxford English for Careers: Technology 2 Student's Book*. Oxford : Oxford University Press.
- Bonamy, D. (2009). *Oxford English for Careers: Technology 1 Teacher's Resources Book*. Oxford : Oxford University Press.
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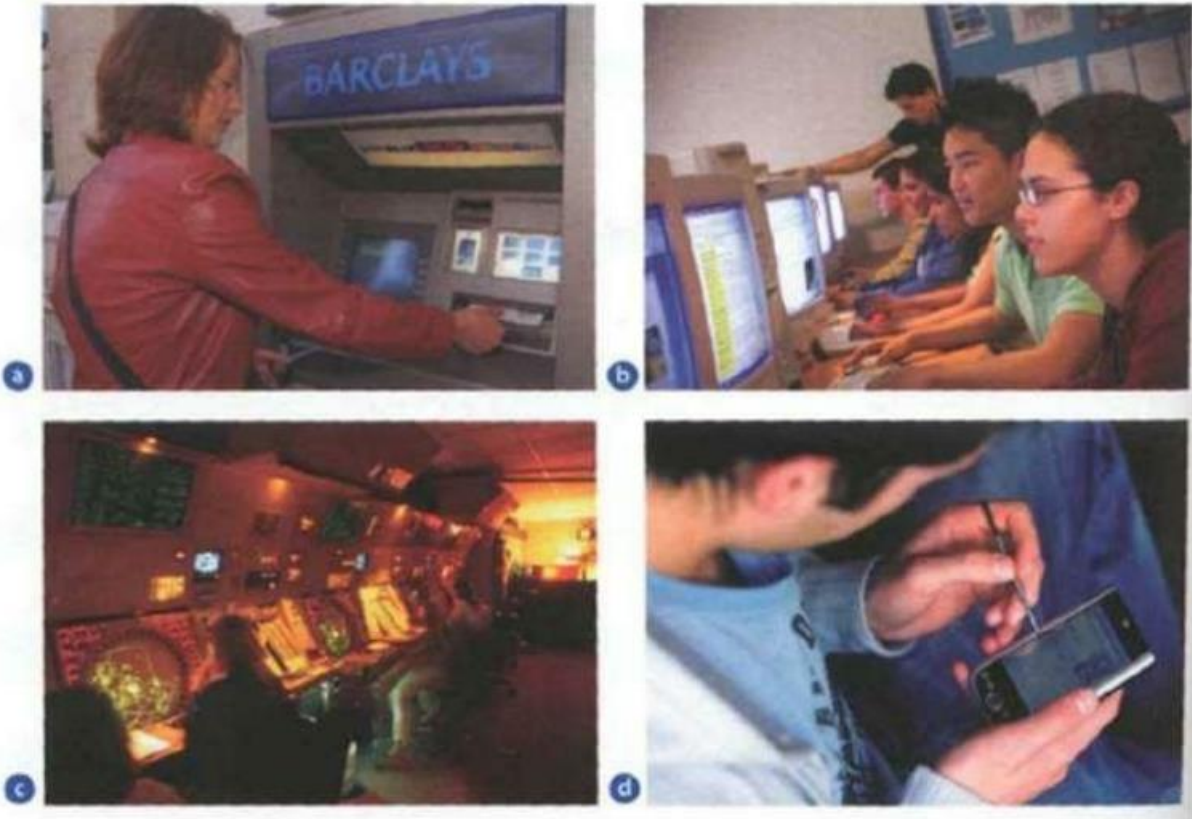
Lesson Plan

Introduction

Warming-Up

Task 1 : Match the captions (1-4) with the pictures (a-d).

- 1 In education, computers can make all the difference _____
- 2 Using a cashpoint, or ATM _____
- 3 The Internet in your pocket _____
- 4 Controlling air traffic _____



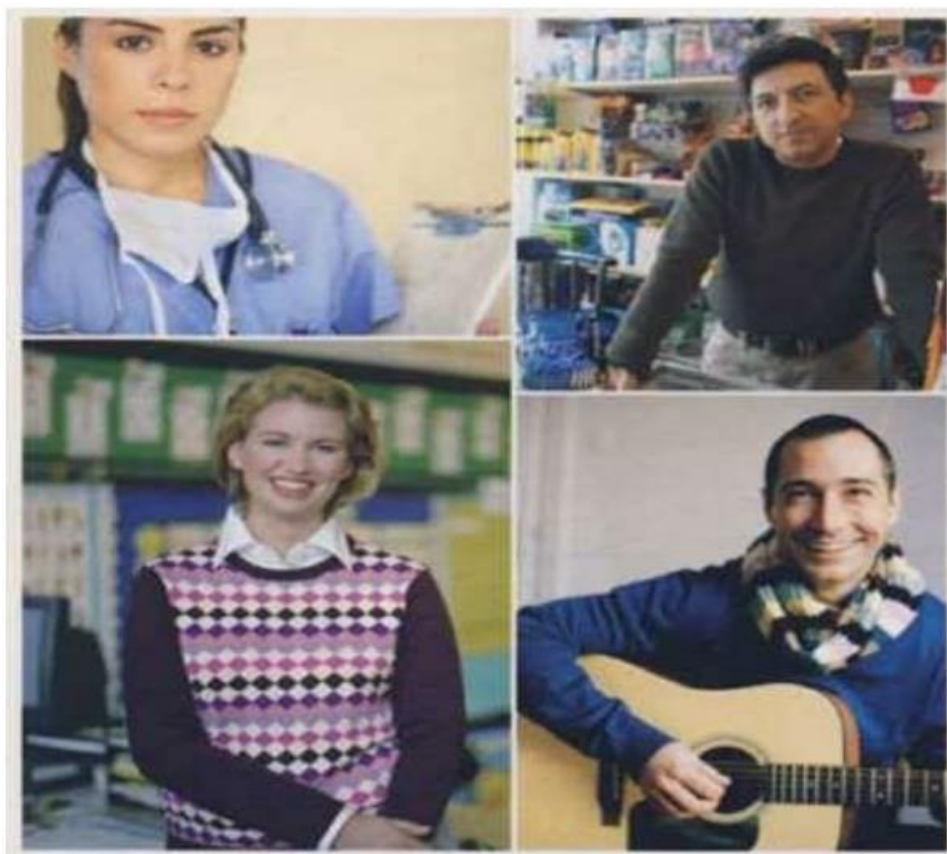
Task 2 : How are computers used in the situations above ? In pairs, discuss your ideas.

Body of Lesson

Listening (Technology and Work)

Task 1 : Listen to four people describing the effects of new technology on their work. Match person to his/her job.

1 Vera	a shopowner
2 Christine	b doctor
3 Gupta	c musician
4 Anton	d teacher



Task 2 : Listen again. Decide whether each person makes comments which are positive, negative, or both. Tick (✓) the correct column(s).

	Positive	Negative
1 Vera	_____	_____
2 Christine	_____	_____
3 Gupta	_____	_____
4 Anton	_____	_____

Task 3 : Work in pairs. Listen to the shop owner again and write down what he says. Help each other to make a complete and accurate version. Then compare with the Listening script below.

1
I can get patients' lab results – blood and biochemistry – through the Health Service intranet. No delays, no need to wait for paper copies. It's much faster.

2
My students can use the Internet to practise their German. They exchange emails with German students – half the time in English, half in German. It's more realistic. And I can use the Web to get up-to-date material in German. I have a satellite receiver at home so I can watch German TV and record programmes for use in class.

3
People pay with plastic. Now it's more cards than cash. It's safer because there's less money in the shop but I have to pay the card companies each time. And I don't get my money if someone uses a stolen card.

4
It's not good. My sales are much worse. Instead of buying CDs, people download individual tracks from the Internet.

Reading (Studying Technology)

Task 1(Before Reading)

The texts describe different ways of studying technology. Work in groups of three. Read one text each and note the information.

- 1 Which way of studying technology does your text describe?
- 2 Why did the student choose this way?
- 3 What kind of courses do the students take?
- 4 How long does it take to complete their study?
- 5 What kinds of jobs can they do when they complete their studies?

A University

Cristina is a second-year student of Electronic engineering at university. She decided to study at university because she wants the best choice of career and because she's interested in doing research in digital communications in particular. Most degrees take three years to complete, but some take up to five years because they include periods of work experience.

Degrees may have a broad focus, for example Electrical engineering, or focus on a specialized area, such as Power and High-voltage engineering. Cristina's course is broad-based to start, but she can specialize in digital communications later. Engineering can be studied in combination with other subjects. Cristina is taking German because she wants to spend six months in a German telecommunications company. This work experience will earn her credits towards her degree.

There is a wide career choice for graduate Engineers in design, production, quality assurance, and other fields. They may also work in marketing or become managers.

Cristina hopes to become a Research Engineer, finding new and better ways of doing things.

B Technical college

Okan is a first-year student at a technical college. He chose to study full time because he wanted to get a qualification before he started work. He thinks that being at college will give him more time to decide exactly which career he wants to follow and that having a qualification first will help him to get the kind of job he wants.

Colleges offer a wide range of vocational qualifications. Courses combine applied science, practical skills, and technical know-how. An Electronics Technician, for example, studies physics to understand the principles of the subject, learns how to find faults in equipment, and acquires a great deal of knowledge about electronic devices and components. Courses also include Communication skills to help students deal with communication at work and with the public.

College courses may take a year for a certificate and two years for a diploma. When he graduates, Okan can start work as a Technician or go on to further study at university.

Apprenticeship

Alessandro has just started as an apprentice Aircraft Fitter with a large defence industry company. Apprenticeships are a way of combining work with practical training. He chose an apprenticeship because he wanted to leave school and start working and earning money as soon as possible.

Today, apprentices combine work, on-the-job training, and part-time study on a day-release basis at a local college, paid for by their employer. Apprenticeships last from one to three years. In Alessandro's case, over the next two years he can obtain vocational qualifications to become a skilled Technician. He can also study to obtain entrance qualifications for higher-level studies so he can go on to become an Aeronautical Engineer.

Task 2 (After Reading)

Now find out from the others in your group about the texts they have read.

Language Work

Grammar (The Present Simple)

We use the present simple to talk about routines and things that are permanent or happen all the time.	What do you do ? I'm a programmer.
	What does she do ? She's a developer.
	Where does she work ? She works for IBM in Poland. She doesn't work in Estonia.
	Where do they work ? They work for Siemens in Egypt.
	Do you work in IT ? Yes, I do /No I don't .

Task 1 (Listening+Grammar)

Listen to three people talking about their jobs. Complete these job descriptions.

- Karl
 Job: software _____
 Responsibilities: he designs and _____ computer games.
- Heba
 Job: _____ analyst
 Responsibilities: he _____ computer problems.
- Wojtek
 Job: database _____
 Responsibilities: he analyses and _____ electronic data.

Lexis

Morphology (Suffixes 2)

1 Noun-forming suffixes:

Suffix	Meaning	Examples
-ance	state	performance
-ence	quality of	independence
-er, -or	{ a person who a thing which	programmer, operator compiler, accumulator
-ist, -yst	a person who	analyst, typist
-ian	pertaining to	electrician
-tion, -ation	the act of	compilation
-ness	condition of	readiness
-ion	action/state	conversion
-ing	activity	multiplexing
-ment	state, action	measurement
-ity	state, quality	electricity
-ism	condition/state	magnetism
-dom	domain/condition	freedom
-ship	condition/state	relationship, partnership

2 Verb-forming suffixes:

Suffix	Meaning	Examples
-ize/-ise	{ to make	computerize
-ate		automate, activate,
-ify		calculate
-en		simplify harden, widen

3 Adverb-forming suffix:

Suffix	Meaning	Examples
-ly	in the manner of	electronically, logically, comparably, helpfully

4 Adjective-forming suffixes:

Suffix	Meaning	Examples
-al	having the quality of	computational, logical
-ar		circular
-ic		magnetic, automatic
-ical		electrical
-able	capable of being	comparable
-ible		divisible
-ous	like, full of	dangerous
-ful	characterized by	helpful
-less	without	careless
-ish	like	yellowish
-ed	having the quality of	computed
-ive		interactive

Note: Words ending in *-ing* are formed from verbs. The *-ing* form may be used as a noun, part of a noun phrase, or part of a verb.

Examples:

- 1 **Programming** is an interesting job. (noun)
- 2 **Programming** in C is interesting. (part of noun phrase)
- 3 He is **working** as a programmer. (part of verb)

Task 1 : Read the following sentences and circle the suffixes. Underline the stem if it can be used on its own. The first one has been done for you.

- 1 A programmer designs, writes, and tests programs for performing various tasks on a computer.
- 2 A systems analyst studies organizational systems and decides what action needs to be taken to maximize efficiency.
- 3 Laser printers are preferable to other types of printing devices because of their speed and quietness.
- 4 The microcomputer we have purchased does not have a FORTRAN compiler. It is programmable in BASIC only.
- 5 We have found that operators who have the freedom to take short breaks during the day greatly improve their performance.
- 6 The number of shipments will increase over the coming months.
- 7 We decided to computerize the entire plant to give each division more independence.
- 8 Spooling is a way of storing data temporarily on disk or tape until it can be processed by another part of the system.
- 9 Turning your office into a paperless environment may be expensive at the beginning but can produce big savings in the long run.
- 10 Software developers are producing increasingly sophisticated applications for a growing global market.

Task 2 : Now, for each word that has a suffix, indicate what part of speech the word is (e.g. noun, verb, etc.).

Collocations (Recording New Words)

One effective way of recording key words used in technology is to group them into **word sets**. Study the example of how to group words related to *biotechnology*.

```

graph TD
    biotechnology --- lab
    biotechnology --- cell
    biotechnology --- technology
    biotechnology --- exp["(do an) experiment"]
    biotechnology --- res["(do) research"]
    biotechnology --- biology
    biotechnology --- sample
    biotechnology --- test
        
```

Another way to remember key words in technology is to make **word cards**. Study the example of a word card.

Information technology	
Key word	Translation
memory	
Part of speech	Pronunciation
noun (uncountable)	/ˈmeməri/
Sample sentence	Words often used with the key word
Memory is used for programs and data	chip, slot, card, random access

Task 1 : Work in pairs. Make word set for each of the branches of technology (Task 1, Section 2 : Context).

Task 2 : Design your own word cards to help you remember your technical vocabulary. Make word cards for six of the words you listed in the previous task. Use a good English-English dictionary, such as Oxford Wordpower, to help you.

Spelling and Recognition

Task 1 : Spell the correct word. The first letter is given as a hint. Spell 10 words from glossory (definitions)

To decide what a program instruction means.

D

To expand to its original size.

D

An initial setting that can be changed.

D

A failure of a hard disk.

C

Semantics

Meaning

Section 1 (Reading : Meaning and Context)

The digital age

We are now living in what some people call the *digital age*, meaning that computers have become an essential part of our lives. Young people who have grown up with PCs and mobile phones are often called *the digital generation*. Computers help students to **perform** mathematical **operations** and improve their maths skills. They are used to **access the Internet**, to **do** basic **research** and to

Students can also enrol for courses via the website and parents can download official reports.

Mobiles let you **make** voice **calls**, **send** **texts**, email people and download logos, ringtones or games. With a built-in camera you can send pictures and make video calls in *face-to-face* mode. New smartphones combine a telephone with web access, video, a games console, an MP3 player, a personal digital assistant (PDA) and a GPS navigation system, all in one.

In banks, computers **store** **information** about the money held by each customer and enable staff to **access** large **databases** and to **carry out** financial **transactions** at high speed. They also control the cashpoints, or ATMs (automatic teller machines), which **dispense** **money** to customers by the use of a PIN-protected card. People use a Chip and PIN

to communicate with other students around the world. Teachers use projectors and interactive whiteboards to **give** **presentations** and teach sciences, history or language courses. PCs are also used for administrative purposes – schools use word processors to **write** **letters**, and databases to **keep** **records** of students and teachers. A school website allows teachers to publish **exercises** for students to **complete** online.

cards to pay for goods and services. Instead of using a signature to verify payments, customers are asked to **enter** a four-digit **personal identification number (PIN)**, the same number used at cashpoints; this system makes transactions more secure. With online banking, clients can easily **pay** **bills** and **transfer** **money** from the comfort of their homes.

Airline pilots use computers to help them control the plane. For example, monitors **display** **data** about fuel consumption and weather conditions. In airport control towers, computers are used to manage radar systems and regulate air traffic. On the ground, airlines are connected to travel agencies by computer. Travel agents use computers to find out about the availability of flights, prices, times, stopovers and many other details.

Meaning

Task 1 : When you read a text, you will often see a new word that you do not recognize. If you can identify what type of word it is (noun, verb, adjective, etc.) it can help you guess the meaning.

Context

Task 2 : Find the words (1-10) in the text above. Can you guess the meaning from context? Are they nouns, verbs, adjectives or adverbs? Write n, v, adj or adv next to each word.

- 1 perform (line 6) _____
- 2 word processor (line 13) _____
- 3 online (line 16) _____
- 4 download (line 18) _____
- 6 built-in (line 21) _____

- 5 digital (line 25) _____
- 7 store (line 27) _____
- 8 financial (line 29) _____
- 9 monitor (line 42) _____
- 10 data (line 42) _____

Task 3 : Match the words in the previous task (1-10) with the correct meanings (a-j).

a keep, save _____	g collection of facts or figures _____
b execute, do _____	h describes information that is recorded or broadcast using computers _____
c monetary _____	i program used for text manipulation _____
d screen _____	j copy files from a server to your PC or mobile _____
e integrated _____	
f connected to the Internet _____	

Section 2 (Branches of Technology)

Task 1 : Read headlines 1-8 from recent news stories. Match the headlines to the correct branch of technology a-h.

1 Mice given human brain cells 2 15 billion text messages sent every month 3 USA developing a weapon to fire microwaves 4 MAJOR HACK ATTACK 5 World's tallest bridge opens 6 APPLE INTRODUCE WORLD'S LARGEST SCREEN 7 Sunlight will power spacecraft 8 <i>New ways to make shoes</i>	- a biotechnology - b defence - c crime - d information technology - e manufacturing - f civil engineering - g telecommunications - h transport

Polysemy

Task 1 : Look the given words up in your dictionary. Give the literal meaning (direct meaning) and the technical meaning (computing meaning) of the following words :

Decode (verb)

.....

(Computing)

Decompress (verb)

.....

(Computing)

Default (noun, verb)

.....

(Computing)

Crash (noun, verb, adjective)

.....

(Computing)

Task 2 : Put the previous computing words in full sentences (computing context).

Synonyms

Task 1 : Refer back to the reading text and find the synonyms.

1. developed
2. infers
3. joined
4. chosen

Antonyms

Task 1 : Refer back to the reading text and find the antonyms.

1. segregated
2. useless
3. narrow
4. well

Speaking (Future Use of Computers)

Task 1 : In pairs, discuss these questions.

- 1 How are/were computers used in your school?
- 2 How do you think computers will be used in school in the future?

Conclusion

Study Skills

Problem-Solving

Task 1 : Work in pairs. List the questions you expect to find answered in a description of a course in a college prospectus (Syllabus).

EXAMPLES

Which subjects will I study?

How much will this course cost?

How long will the course last?

Task 2 : Now study the course description. Each section begins with a question, as in the examples. Fill in the questions.

COMPUTING - WEB TECHNOLOGIES

Foundation Degree – Level 4 – Part Time

1 What does this course involve? / Who is this course for? / What are the course aims?

This course is a vocationally-focused higher education qualification. It provides the high level of technical skills that will be needed by many organizations. Foundation Degrees are designed for learners from a wide range of backgrounds, including those who have work experience but do not have conventional entry requirements.

3

The course is delivered using tutor-led classes, workshops, practical sessions, and tutorials. Additional support is given when requested.

7

All units are assessed and graded. Most units involve in-course assessments. Systems Design and Networks and Communications are assessed by examination. To be awarded a Foundation Degree, you must pass a minimum of ten modules.

2

The Foundation Degree in Computing (Web Technologies) will include IT Applications (Access and Excel), System Design, User Support, and Professional Studies. Additional modules enable particular specialisms to be developed. These include Website Development, Visual Programming, Database Systems, Networks and Communications, and Website Management.

4

For the two-year course: students must have at least one year of experience in related employment and an employer who is willing to support them by providing suitable work-based learning projects and academic monitoring. Prior knowledge of computing is helpful but not essential.

8

Further study:
The Foundation Degree in Computing (Web Technologies) has been designed to enable successful students to progress to the final stage of the University's Honours Degree in Computer Studies should they wish to do so. This would involve just one more year of full-time study or two years of part-time study.

5

The programme of study requires you to study twelve modules over two or three years.

6

Studying over two years requires attendance for one day per week from 9 a.m. till 9 p.m. with breaks.

A career:
A Foundation Degree opens up the possibility of a career in a wide range of areas throughout commerce, industry, entertainment, and the public sector. There is sustained growth in employment prospects for all IT specialists.

© Darlington College, 2006. Adapted from online prospectus

Task 3 : With the help of the text, explain these terms.

- 1 vocationally-focused
- 2 conventional entry requirements
- 3 work-based learning
- 4 prior knowledge
- 5 in-course assessments
- 6 sustained growth

Specific Writing Rubric (Contextual Reference)

Transitional markers are words used to link ideas together so that the text is easier to read. When pronouns such as *it, they, them, I, he, she, which, who, whose, that, such, one*, and demonstrative adjectives such as *this, that, these* and *those*, are used as transitional markers, they refer to a word, or words, mentioned earlier in the sentence or paragraph. Their function is to take your thoughts back to something that has already been mentioned. Other words which are often used to refer backwards are *the former, the latter, the first, second, etc., the last*.

Sample paragraph:

A computer like any other machine, is used because it does certain jobs better and more efficiently than humans. It can receive more information and process it faster than any human. The speed at which a computer works means it can replace weeks or even months of pencil-and-paper work. Therefore, computers are used when the time saved offsets their cost, which is one of the many reasons they are used so much in business, industry, and research.

Task 1 : Using the sample paragraph as a model, draw a rectangle around the word, or words, that the circle words refer to. Then join the ○ and the □ with arrows.

Modern accounting firms use spreadsheet software to do complicated calculations. They can provide their clients with an up-to-date report whenever it is needed. This software has many functions and can be integrated with other software. The spreadsheet's basic component is a cell. This may contain a formula which performs a mathematical operation. It could also contain a label or data. The former describes the information on the worksheet. The latter is the information itself.

The worksheet is the basic work area of a spreadsheet program. It is made up of cells arranged in rows and columns. The number of these varies depending on the software you are using. You can change the width and format of cells. Such parameters are usually quite easy to change with just a few keystrokes.

Evaluation

Writing (Benefits of Laptops and Tablets PCs : Email Writing)

Task 1 : Your school is considering buying tablet PCs to use in the classroom. Write an email to your teacher explaining the benefits for the students and the school.

Or

Your company is considering replacing all of the office PCs with laptops. Write an email to your boss explaining the benefits for the employees and the company.

Help Box

Email features

When you set up an account with an Internet Service Provider, you are given an **email address** and a **password**. The mail you receive is stored on the **mail server** of your ISP – in a simulated mailbox – until you next connect and download it to your hard drive.

There are two ways to get email over the Internet. One is by using a **mail program** (known as an **email client**) installed on your computer, for example Eudora or Outlook Express. The other way is to use **web-based email**, accessible from any web browser. Hotmail and Gmail are good examples.

You can make the message more expressive by including **emoticons**, also called **smileys**. For example, :-) for wink, :-D for happy, :-o for surprised, :-D for laughing, etc. You may also like to add a **signature file**, a pre-written text file appended to the end of the message. The name given to unsolicited email messages is **spam**.

The anatomy of an email

The diagram shows an email client window titled 'English Project'. It contains a header with 'To', 'From', 'Cc', 'Bcc', 'Subject', and 'Attachments' fields. The body of the email is visible below the header. Labels with arrows point to various parts of the interface:

- The header**: Points to the 'To' field.
- To: name and address of the recipient**: Points to the 'To' field.
- From: name and address of the sender**: Points to the 'From' field.
- Cc: carbon copy sent to another person**: Points to the 'Cc' field.
- Bcc: blind carbon copy**: Points to the 'Bcc' field.
- Subject: topic of the message**: Points to the 'Subject' field.
- Attachment: files added to the message**: Points to the 'Attachments' field.
- The username (a person's name or nickname)**: Points to the 'To' field.
- The @ sign, which means at**: Points to the '@' symbol in the email address.
- The domain name or network address – that is, the mail server where the account is located. The final part adds information about it, for example com = company, uk = United Kingdom, fr = France, etc.**: Points to the domain part of the email address.
- The body contains the message itself**: Points to the main text area of the email.

Homework (Computer Applications for Cars Safety)

Task 1 : Assuming cost is not a problem, what computer applications would make today's cars safer, more comfortable, more secure and more efficient ? List your ideas ; then compare ideas with others in your group.

Unit 2

Computer Programming

Lesson 1 Programming/Data Programming

Lesson 2 Programming Languages

Learning Objectives

In this unit, you will :

- Listen and read about computer languages.
- Ask and answer questions about programming.
- Learn more about Java and C computer languages.
- Differentiate between present simple, present continuous, and the past.
- Study basic concepts in programming.
- Learn how to write a correct paragraph in the discipline.
- Deal with problem-solving situations in programming.

Unit 2 : Computer Programming

Programming/Data Programming

Lesson Plan 1

Lesson 1 : Programming/Data Programming 1-3 Sessions (90mnts-270 mnts)

Topics/Themes : - Programming
 - Steps in Programming
 - Computer Languages

Course Description: The programming/data programming course focuses on the process of Programming, and the demonstration of steps of programming. Moreover, it emphasizes computer languages in addition to a different set of language communicative skills.

Course Objectives: By the end of this lesson, students should be able to :

- Listen to audios
 - Take notes and reply
 - Know and use related words (compilation, error, system,...)
 - Choose correctly between Present Simple and Present Continuous
 - Write a short paragraph
-

Realia : - Programming related texts

- Audios and recordings
 - Pictures and images
 - Flowcharts²
 - Data projector
-

Glossary of Computing Terms and Abbreviations

C /si:/ noun U [21,22] a general purpose computer programming language that was originally designed for writing Unix systems programs

C drive /'si: draɪv/ noun C [10] the first hard disk in a personal computer

C++ /si: plʌs 'plʌs/ noun U [5,21,22] an object-oriented superset of the C programming language commonly used for writing applications programs for the Microsoft Windows operating system

cache /kæʃ/ verb [2] to temporarily store frequently-used data in fast memory so that it can be accessed more quickly

cache /kæʃ/ noun C [2,13] fast memory used to temporarily store frequently-used data to allow it to be accessed more quickly

cache coherency /kæʃ kəʊ'hɪərənsi/ noun U [2] a system that ensures that any changes written to main memory are reflected within the cache and vice versa

cache controller /'kæʃ kən'trəʊlə(r)/ noun C [2] the set of electronic logic circuits that control the operation of cache memory

² **Flowchart** is a graphical representation of a computer program in relation to its sequence of functions. <https://www.edrawsoft.com/flowchart-definition.html>

boot /bu:t/ verb [5] to copy a part of the operating system into memory to allow a computer to start up

bridge /brɪdʒ/ noun C [11,15] a hardware and software combination used to connect the same type of networks or to partition a large network into two smaller ones

class /kla:s/ noun C [21] the term used for a collection of objects in object oriented programming

bot /'bɒt/ noun C [23] from the word robot. A computer program that runs automatically. Bots are often used for searching for information on the Internet

browse /braʊz/ verb [14,16] to move from webpage to webpage using a Web browser program

cleanse /klenz/ verb [3] a term used in data mining meaning to remove duplicate information and erroneous data

References

- Boeckner, K. & Brown, C. (2002). *Oxford English for computing : Student's book*. Oxford : Oxford University Press.
- (1993). *Oxford English for computing : Answer book*. Oxford : Oxford University Press.
- Esteras, S. R. (2008). *Infotech English for computer users : Student's book*. Cambridge : Cambridge University Press.
- (2008). *Infotech English for computer users : Teacher's book* (4th ed). Cambridge : Cambridge University Press.
- Glendinning, E.H & McEwan, J. (2003). *Oxford English for information technology : Student's book*. Oxford : Oxford University Press.
- (2006). *Oxford English for information technology : Student's book* (2nd ed). Oxford : Oxford University Press.
- (2003). *Oxford English for information technology : Teacher's book*. Oxford : Oxford University Press.
- (1999). *Basic English for computing : Student's book*. Oxford : Oxford University Press.
- (1999). *Basic English for computing : Teacher's book*. Oxford : Oxford University Press.
- Maja, O. (2011). *English for information technology 1 : Student's book*. England : Pearson Education Limited.
- David, H. (2012). *English for information technology 2 : Course book*. England : Pearson Education Limited.
- Glendinning, E.H. (2009). *Oxford English for Careers: Technology 1 Student's Book*. Oxford : Oxford University Press.
- Glendinning, E.H. & Pohl, A. (2009). *Oxford English for Careers: Technology 2 Student's Book*. Oxford : Oxford University Press.
- Bonamy, D. (2009). *Oxford English for Careers: Technology 1 Teacher's Resources*
-

Book. Oxford : Oxford University Press.

Pohl, A. (2009). *Oxford English for Careers: Technology 2 Teacher's Resources*
Book. Oxford : Oxford University Press.

Lesson Plan

Introduction

Warming-Up

Task 1 : Work in pairs. The stages in programming (1-7) are listed below. Fill in the gaps with the missing stages (a-d)

1	Analysing and defining the problem to be solved	
2	_____	
3	Coding	a Training the users
4	_____	b Testing
5	_____	c Designing the program
6	_____	d Documenting
7	Obtaining feedback from users	

Task 2 : In pairs, discuss what programing is.

Body of the Lesson

Listening (Steps in Programming)

Section 1

Audio script

I'd like to begin the course by giving you a very basic overview of the programming process. We'll then move on to the details. So, to write a program, we normally follow these steps:

A program usually provides a solution to a given problem – for example, how to calculate wages and income tax in a big company. First of all, you have to understand exactly what the problem is and define it clearly. This means you have to decide, in a general way, how to solve the problem. The next step is to design a step-by-step plan of instructions. This usually takes the form of a flowchart, a diagram that uses special symbols to show how the computer works through the program – where it makes decisions, where it starts and ends, where data is input, things like that.

Next, you write the instructions in a programming language, like BASIC, Pascal or C. These computer

instructions are called source code. Then you have to use a compiler, a special program that converts the source code into machine code – the only language understood by the processor, which consists of 1s and 0s.

Once you've written the program, you have to test it with sample data to see if there are any bugs or errors. The process of correcting these errors is called debugging. Computer programmers have to find the origin of each error, write the correct instruction, compile the program again, and test it until it works correctly.

Finally, you have to write program documentation, a detailed description of how to use the program. A great program is not much good unless people know how to use it.

Photocopiable © Cambridge University Press 2008

Task 1 : Listen to Andrea Finch, a software developer, talking to a group of students on a training course about how a program is written and check your answers to the previous task (warming-up).

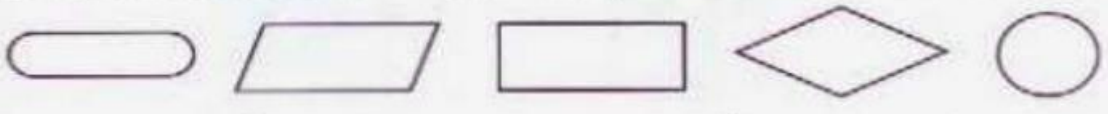
Task 2 : Listen again and put these steps into the correct order.

- ☐ Write instructions in a programming language
- ☐ Prepare documentation
- ☒ Understand the problem and plan a solution
- ☐ Make a flowchart of the program
- ☐ Compile the program (to turn it into machine code)
- ☐ Test and debug the program

Section 2 : Flowcharts

Task 1 :

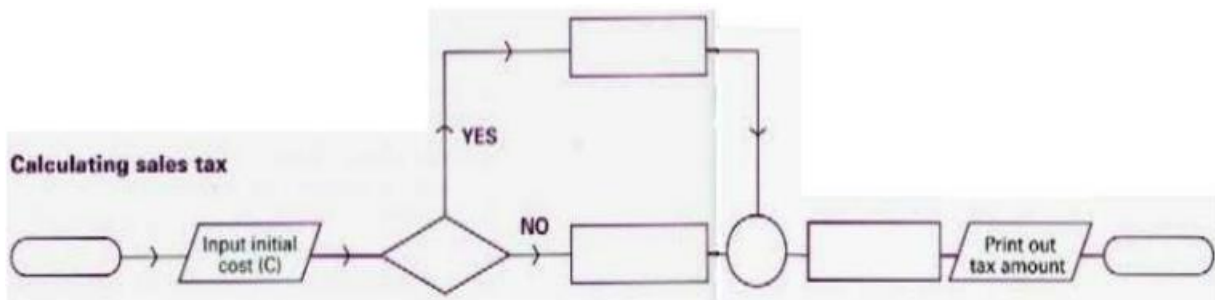
Programmers sometimes use flowcharts when planning a program.
Listen to Part 1 of the recording to identify these symbols used in flowcharts.



a _____ b _____ c _____ d _____ e _____

Task 2 :

Listen to Part 2 of the recording which describes this flowchart for calculating sales tax. As you listen, fill in the gaps where necessary.



Reading (Computer Language)

Task 1 (Before reading)

Before reading the text, try to fill in the gaps in these sentences.

- 1 A _____ is a program written in one of the high-level languages.
- 2 A program written in a high-level language must be interpreted into _____ before the computer will read and process it.
- 3 A program designed to perform a specific task is called an _____.
- 4 The _____ or _____ is the program produced when the original program has been converted into machine code.
- 5 A _____ is a program that converts a high-level language into machine code.
- 6 The systems program which fetches required systems routines and links them to the object module is known as the _____.
- 7 The _____ is the program directly executable by the computer.

Now read the text to check your answers.

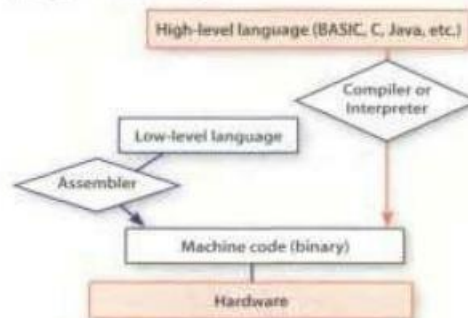
Computer languages

Unfortunately for us, computers can't understand spoken English or any other natural language. The only language they can understand directly is **machine code**, which consists of 1s and 0s (binary code).

Machine code is too difficult to write. For this reason, we use symbolic languages to communicate instructions to the computer. For example, **assembly languages** use abbreviations such as ADD, SUB, MPY to represent instructions. The program is then translated into machine code by a piece of software called an **assembler**. Machine code and assembly languages are called **low-level languages** because they are closer to the hardware. They are quite complex and restricted to particular machines. To make the programs easier to write, and to overcome the problem of intercommunication between different types of computer, software developers designed **high-level languages**, which are closer to the English language. Here are some examples:

- **FORTRAN** was developed by IBM in 1954 and is still used for scientific and engineering applications.
- **COBOL** (**C**ommon **B**usiness **O**riented **L**anguage) was developed in 1959 and is mainly used for business applications.
- **BASIC** was developed in the 1960s and was widely used in microcomputer programming because it was easy to learn. **Visual BASIC** is a modern version of the old BASIC language, used to build graphical elements such as buttons and windows in Windows programs.
- **PASCAL** was created in 1971. It is used in universities to teach the fundamentals of programming.
- **C** was developed in the 1980s at AT&T. It is used to write system software, graphics and commercial applications. **C++** is a version of C which incorporates object-oriented programming: the programmer concentrates on particular things (a piece of text, a graphic or a table, etc.) and gives each object functions which can be altered without changing the entire program. For example, to add a new graphics format, the programmer needs to rework just the graphics object. This makes programs easier to modify.
- **Java** was designed by Sun in 1995 to run on the Web. Java applets provide animation and interactive features on web pages. (See Unit 25)

Programs written in high-level languages must be translated into machine code by a **compiler** or an **interpreter**. A compiler translates the source code into **object code** – that is, it converts the entire program into machine code in one go. On the other hand, an interpreter translates the source code line by line as the program is running.



It is important not to confuse **programming languages** with **markup languages**, used to create web documents. Markup languages use instructions, known as **markup tags**, to format and link text files. Some examples include:

- **HTML**, which allows us to describe how information will be displayed on web pages.
- **XML**, which stands for **EX**tensible **M**arkup **L**anguage. While HTML uses pre-defined tags, XML enables us to define our own tags; it is not limited by a fixed set of tags.
- **VoiceXML**, which makes Web content accessible via voice and phone. VoiceXML is used to create voice applications that run on the phone, whereas HTML is used to create visual applications (for example, web pages).

```

<xml>
< name> Andrea Finch </name>
< homework> Write a paragraph describing
the C language </homework>
</xml>
    
```

In this XML example we have created two new tags: <name> and <homework>

Task 2 (After reading)

Read the text again and answer these questions

- 1 Do computers understand human languages? Why? / Why not?
- 2 What is the function of an *assembler*?
- 3 Why did software developers design high-level languages?
- 4 Which language is used to teach programming techniques?
- 5 What is the difference between a *compiler* and an *interpreter*?
- 6 Why are HTML and VoiceXML called *markup* languages?

Task 3 : Summarize the information of the text on different high-level computer language by completing the table below.

Language	Developed	Function	Characteristic
FORTRAN			
	1959		
		mathematical and scientific purposes	
			combines features of COBOL and ALGOL
BASIC			
		to support Unix operating system	
	1962		

Language Work

Grammar (Present Simple vs Present Continuous)

Language work:

Present simple vs Present continuous

Study these examples of the **Present simple** and the **Present continuous** from the interview with Colin. Which tense does Colin use for:

- 1 routines and procedures?
- 2 things happening now?
- 3 likes and dislikes which are always true?

Present continuous

an example of what we're working on at the moment

there are three main areas we're working in

I'm, at the moment, trying to learn how to use Active Server pages

we're now using a system called Visual Failsafe

Present simple

we speak to the users

we offer solutions

we don't spend a full day programming

we go to the canteen and work it out

I enjoy my work

We use the **Present simple** to describe routines, standard procedures, and things which are always true, such as likes and dislikes.

We use the **Present continuous** for actions going on at the moment.

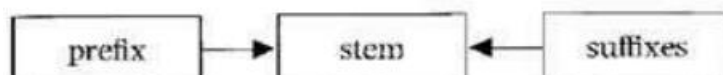
Task 1 : Complete these sentences by putting the verb in brackets into the Present Simple or Present Continuous.

- 1 At the moment I _____ (work) on a program for schools.
- 2 We always _____ (ask) the users, not the managers, what they need from the system.
- 3 Paul is a database expert so usually he _____ (do) anything on databases and I _____ (get) the interfaces.
- 4 We _____ (use) Active Server for this project because it's Web-based.
- 5 Commonly we _____ (use) C++ and JavaScript.
- 6 Whenever we _____ (finish) part of a project, we put a copy of the software in a sub-folder as a record.
- 7 I _____ (subscribe) to two magazines.
- 8 Right now I _____ (try) to learn how to use Active Server properly.
- 9 At the moment we _____ (develop) a Web-based project.
- 10 It's a magazine for people who know what they _____ (do).

Lexis

Morphology (Prefixes 1)

When you are reading, you will come across unfamiliar words. It is often possible to guess the meanings of these words if you understand the way words in English are generally formed.



An English word can be divided into three parts: a prefix, a stem, and a suffix. *Pre-* means 'before'. A prefix, therefore, is what comes before the stem. Consider, as an example, the prefix *de-* (meaning 'reduce' or 'reverse') in a word like **demagnetize** (meaning 'to deprive of magnetism'). A suffix is what is attached to the end of the stem. Consider, as an example, the suffix *-er* (meaning 'someone who') in **programmer** ('a person who programs').

Suffixes change the word from one part of speech to another. For example, *-ly* added to the adjective *quick* gives the adverb *quickly*. Prefixes, on the other hand, usually change the meaning of the word. For example, *un-* changes a word to the negative. **Unmagnetizable** means 'not capable of being magnetized'.

Let us now consider some prefixes, their usual meanings, and how they change the meanings of English words.

Prefixes				
Negative and positive	Size	Location	Time and order	Number
un-	semi-	inter-	pre-	mono-
non-	mini-	super-	ante-	bi-
in-	micro-	trans-	fore-	hex-
dis-		ex-	post-	oct-
re-		extra-		multi-
		peri-		

Task 1 : Read the following sentences and circles the prefixes. For each word that has a prefix, try to decide what the prefix means. Refer back to the table if you need help.

- 1 Floppy disks are inexpensive and reuseable.
- 2 If a printer malfunctions, you should check the interface cable.
- 3 The multiplexor was not working because someone had disconnected it by mistake.
- 4 Improper installation of the antiglare shield will make it impossible to read what is on the screen.
- 5 After you transfer text using the 'cut and paste' feature, you may have to reformat the text you have inserted.
- 6 You can maximize your chances of finding a job if you are bilingual or even trilingual.
- 7 Peripheral devices can be either input devices (such as keyboards) or output devices (such as printers).
- 8 Your pay rise is retroactive to the beginning of June and you will receive a bi-annual bonus.
- 9 The octal and hexadecimal systems are number systems used as a form of shorthand in reading groups of four binary digits.
- 10 As the results are irregular, the program will have to be rewritten.

Collocations

Verbs and nouns often go together in English to make set phrases, for example **access the Internet**. These word combinations are called **collocations**, and they are very common. Learning collocations instead of individual words can help you remember which verb to use with which noun. Here are some examples from the text on pages 2–3: **perform operations, do research, make calls, send texts, display data, write letters, store information, complete exercises, carry out transactions.**

Task 1 : Match the verbs (1-5) with the nouns (a-e) to make collocations.

1	give	a	money
2	keep	b	a PIN
3	access	c	databases
4	enter	d	presentations
5	transfer	e	records

Task 2 : Use the previous collocations to complete these sentences

- Thanks to Wi-Fi, it's now easy to _____ from cafés, hotels, parks and many other public places.
- Online banking lets you _____ between your accounts easily and securely.
- Skype is a technology that enables users to _____ over the Internet for free.
- In many universities, students are encouraged to _____ using PowerPoint in order to make their talks more visually attractive.
- The Web has revolutionized the way people _____ – with sites such as Google and Wikipedia, you can find the information you need in seconds.
- Cookies allow a website to _____ on a user's machine and later retrieve it; when you visit the website again, it remembers your preferences.
- With the latest mobile phones, you can _____ with multimedia attachments – pictures, audio, even video.

Spelling and Recognition

Task 1 : Spell the correct word. The first letter is given as a hint.

To temporarily store data in fast memory.

C

It is used to search information on the Internet.

B

To copy a part of data so that the computer starts.

B

To move from webpage to webpage.

B

To remove duplicate information.

C

Semantics

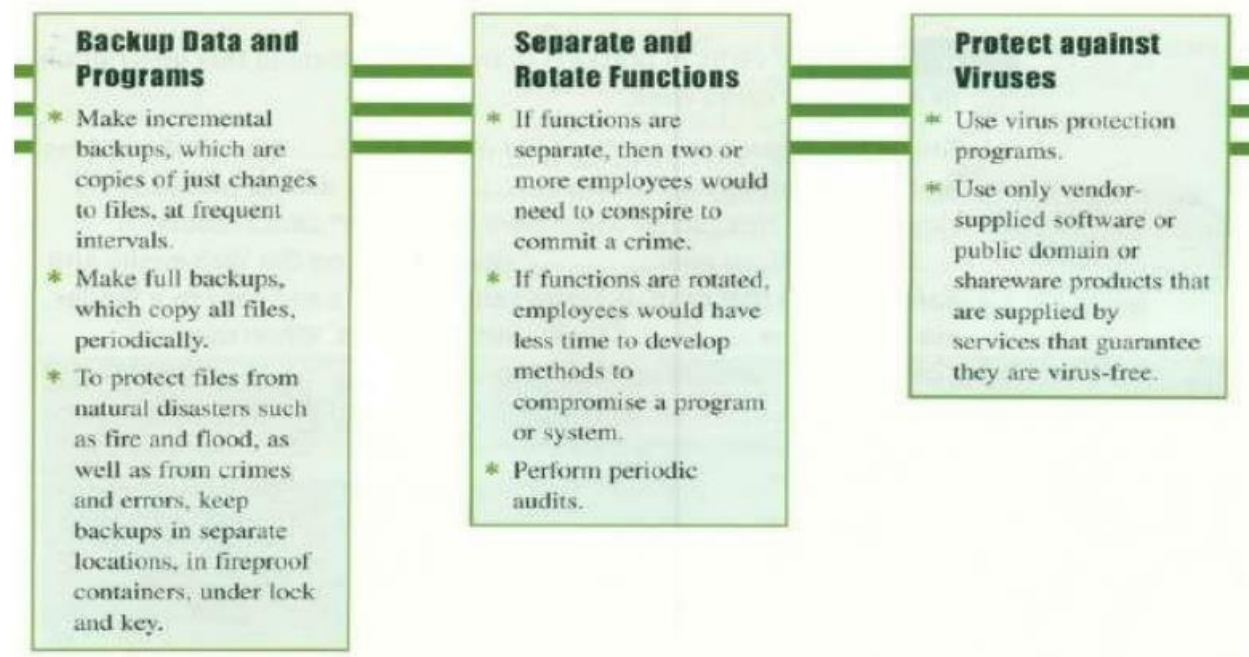
Meaning

Task 1 : Match the words (1-5) with the definitions (a-e)

- 1 flowchart
 - 2 source code
 - 3 compiler
 - 4 machine code
 - 5 debugging
- a Program instructions written in a particular computer language
 - b The techniques of detecting and correcting errors (or bugs) which may occur in programs
 - c A diagram representing the successive logical steps of the program
 - d A special program which converts the source program into machine code – the only language understood by the processor
 - e The basic instructions understood by computers; it consists of 1s and 0s (binary code)

Task 2 : Find words or phrases in the table which mean :

- 1 copies of changes to files made to reduce the risk of loss of data
- 2 software available for a short time on a free trial basis; if adopted a fee is payable to the author
- 3 cannot be disrupted or cut
- 4 put at risk
- 5 deciphered, worked out
- 6 protect data by putting it in a form only authorised users can understand
- 7 a combination of hardware and software to protect networks from unauthorised users
- 8 observe and record systematically
- 9 measuring physical characteristics such as distance between the eyes
- 10 at regular intervals



Context (Semantic Groups)

Task 1 : Sort these words about General Purpose Packages into these sets.

bold	cell	column	draw	field	fill	font
formula	justify	paint	record	rotate	row	scale
search	selection rules		sort	spelling checker		
tab	tool palette		underline			
Word processing		Databases	Spreadsheets		Graphics	

Polysemy

Task 1 : Look the given words up in your dictionary. Give the literal meaning (direct meaning) and the technical meaning (computing meaning) of the following words :

Compile (verb)

.....

(Computing)

Bug (noun, verb)

.....

(Computing)

Interpret (verb)

.....

(Computing)

Loop (noun, verb)

.....

(Computing)

Task 2 : Put the previous computing words in full sentences (computing context).

Synonyms

Task 1 : Refer back to the text (computer languages) and find the synonyms.

1. called
2. tremendous
3. ideas
4. react
5. take away

Antonyms

Task 1 : Refer back to the text (computer languages) and find the antonyms.

1. taken away
2. wide
3. limited
4. immovable
5. after

Speaking (Programming Languages)

Task 1 : Read the statements below. Which do you agree with more ? Why ?

'Learning a programming language is like learning any natural language. The only difference is that you are communicating with a machine instead of another person.'

'I get annoyed when I hear people comparing programming languages with natural languages. They have almost nothing in common.'

Conclusion

Study Skills

Problem-Solving

Task 1 : Using the information in the the reading text (computer languages) and the table in Task 3 (Reading), decide which languages would be best for these users and tasks.

- 1 A language for school pupils learning to program for the first time.
- 2 A language for professional programmers who want their software to run on any type of computer system.
- 3 A language for a student who wants to create her own webpage.
- 4 A language for a website designer who wants to include simple animation in a site.
- 5 A language for computing students who want to write a general purpose program as a college project.

Specific Writing Rubric (Paragraph Writing 1 : Organizing Information)

A paragraph is a group of related sentences that develop an idea. In nearly every paragraph, there is one idea that is more important than all the others. The main idea of the paragraph is usually found at the beginning.

Sample paragraph 1:

All computers, whether large or small, have the same basic capabilities. They have circuits for performing arithmetic operations. They all have a way of communicating with the person(s) using them. They also have circuits for making decisions.

In sample paragraph 1, the first sentence, *All computers, whether large or small, have the same basic capabilities*, expresses the main idea of the paragraph.

All main idea sentences have a topic and say something about the topic.

Example:

All computers [topic], whether large or small, have the same basic capabilities [about the topic].

In some of your reading, finding main ideas may serve your needs but, in much of your studying, you need to understand details. It is sometimes more difficult to understand details than main ideas. You will find it helpful if you think of details as growing out of the main idea. In sample paragraph 1, there are three major details growing out of the main idea. These are the major details:

- 1 They have circuits for **performing arithmetic operations**.
- 2 They all have a way of **communicating with the person(s) using them**.
- 3 They also have circuits for **making decisions**.

A major detail often has minor details growing out of it. These minor details tell more about a major detail, just as major details tell more about a main idea. In studying, you often find a paragraph that has many small details that you must understand and remember. Breaking up a paragraph of this kind into its three components: the main idea, major details, and minor details will help you to understand and remember what it is about.

Task 1 : Practice finding the main idea, major details, and minor details by completing the block diagram after reading the following paragraph.

The computer has changed the production of copy in the newspaper industry. There are three steps involved in the process: input, correction, and output. First, the computer numbers each story, counts words, and gives a listing of the length of each story. Then, a page is made up, advertisements are placed in, the copy is shifted or deleted, and corrections are made. Finally, the computer hyphenates words, and the result of all this is a newspaper page.

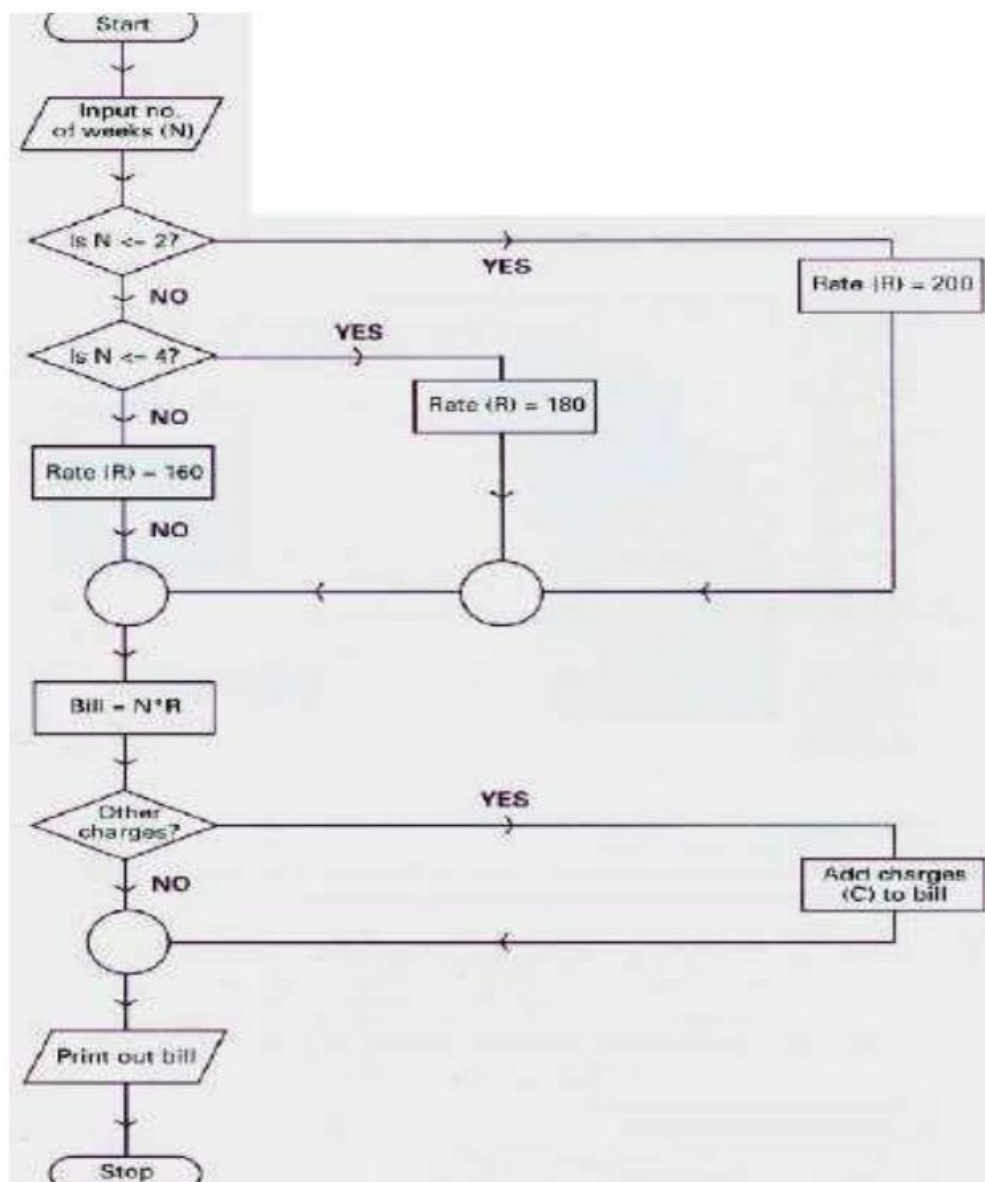
Main idea

The computer has changed the production of copy in the newspaper industry.

Major details**Minor details****Evaluation****Writing (Flowchart Description)**

Task 1 : Read this description of the flowchart of Task 2, section 2 (Listening : calculating sales tax). Then write your own description of the flowchart below.

A 'Start' symbol indicates where the program begins. When the program has started, the initial cost of the item is input. A decision is then taken on which rate of tax to use. This depends on the initial cost. If the cost is greater than 100, the program follows the 'Yes' route and sets the tax rate at 15%. Otherwise the program follows the 'No' route and sets the tax rate at 10%. The two different paths then come back together at the 'connector' symbol and follow the same route. The actual sales tax is now calculated by multiplying the cost by the tax rate. Finally the amount of tax is printed out and the program stops.



Homework (Flowchart)

Task 1 : Draw a flowchart for one of these activities. Then compare your completed flowchart with other students in your group.

- using a payphone
- planning a holiday
- choosing a new computer
- preparing for an important exam

Project (at the End of the Unit)

Problem-Solving Task : Work in pairs or groups. Study these job requirements. Then try to match the requirements to the list of jobs which follows.

- a Visual Basic Developer
- b IT Engineer (Network & Database)
- c Web Developer
- d Network Support
- e E-commerce Consultant
- f Team Leader

1	2	3
• at least 5 years (2 at senior level) in: Unix, SYBASE or ORACLE, NT or Windows 2000, Terminal Server, TCP/IP, Internet. • strong project management (2 years) • willingness to travel abroad	• able to manage, lead and develop a team • knowledge of C, C++, Delphi • experience of object-oriented design within a commercial environment • ability to deliver software projects against agreed schedules and within agreed estimates	• proven track record in the delivery of e-solutions in banking environment • knowledge of Unix, NT and Oracle • willingness to travel internationally
4	5	6
• minimum 4 years lifecycle development experience • demonstrable skills using VB, SQL, RDBMS • able to develop core s/w • excellent communication skills	• minimum of 18 months commercial experience of Web development • knowledge of HTML, Java, ASP • full portfolio of URLs as examples	• experience of NT, Exchange, SQL Server, Monitoring Software, Vesta, TCP/IP • solid grasp of networking • 2 to 5 years experience in a network environment

Unit 2 : Computer Programming

Programming Languages

Lesson Plan 2

Lesson 2 : Programming Languages	1-3 Sessions (90mnts-270 mnts)
Topics/Themes :	- Computer Languages - Java Computer Language - C Language
Course Description: The course of programming languages emphasizes more particularly, the programming languages for software development. For instance, Java language and C language are discussed in this course of instruction. Moreover, language skills along with communicative activities are performed.	
Course Objectives : By the end of this lesson, students should be able to : - Read for specific information - Taking notes while listening - Infer meaning and context from the read text - Form correctly the past of any verb - Write a paragraph	
Realia : - Programming languages related texts - Audios and recordings - Help Box (Homework) - Pictures and images - Data projector	

Glossary of Computing Terms and Abbreviations

clipart /'kli:pɑ:t/ noun U [1,15] professionally-prepared graphical images stored on a computer system	channel /'tʃ:enəl/ noun C [16,23] a path for the transmission of data
Clipboard /'kli:pbo:d/ noun U [7] the name used in Microsoft Windows for the section of memory that temporarily stores data while it is being copied and pasted	chat room /'tʃæt ru:m/ noun C [12,23] a virtual space on a website where on-line discussions organised around specific interests are held in real-time by users typing text messages
clock /klɒk/ noun C [2] the set of electronic circuits used to control the timing of signals and synchronise different parts of a computer system	check data /'tʃek deɪtə/ noun U [17] information written to disks in a RAID system which is used to restore data if one of the array drives fail
cluster /'klʌstə(r)/ noun C [3] a term used in data mining meaning a group of data that has similar features or is based on a limited data range	checksum /'tʃeksəm/ noun C [11] a calculated value that is stored with data to detect any errors that may occur when the data is copied or transmitted
clustering /'klʌstərɪŋ/ noun U [3] a method used in data mining that divides data into groups based on similar features or limited data ranges	chip /tʃɪp/ noun C [1,2,5,19,23,24] common name for a microchip. An electronic integrated circuit in a small package.

References

- Boeckner, K. & Brown, C. (2002). *Oxford English for computing : Student's book*. Oxford : Oxford University Press.
- (1993). *Oxford English for computing : Answer book*. Oxford : Oxford University Press.

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- Esteras, S. R. (2008). *Infotech English for computer users : Student's book*. Cambridge : Cambridge University Press.
- (2008). *Infotech English for computer users : Teacher's book* (4th ed). Cambridge : Cambridge University Press.
- Glendinning, E.H & McEwan, J. (2003). *Oxford English for information technology : Student's book*. Oxford : Oxford University Press.
- (2006). *Oxford English for information technology : Student's book* (2nd ed). Oxford : Oxford University Press.
- (2003). *Oxford English for information technology : Teacher's book*. Oxford : Oxford University Press.
- (1999). *Basic English for computing : Student's book*. Oxford : Oxford University Press.
- (1999). *Basic English for computing : Teacher's book*. Oxford : Oxford University Press.
- Maja, O. (2011). *English for information technology 1 : Student's book*. England : Pearson Education Limited.
- David, H. (2012). *English for information technology 2 : Course book*. England : Pearson Education Limited.
- Glendinning, E.H. (2009). *Oxford English for Careers: Technology 1 Student's Book*. Oxford : Oxford University Press.
- Glendinning, E.H. & Pohl, A. (2009). *Oxford English for Careers: Technology 2 Student's Book*. Oxford : Oxford University Press.
- Bonamy, D. (2009). *Oxford English for Careers: Technology 1 Teacher's Resources Book*. Oxford : Oxford University Press.
- Pohl, A. (2009). *Oxford English for Careers: Technology 2 Teacher's Resources Book*. Oxford : Oxford University Press.

Lesson Plan

Introduction

Warming-Up

Task 1 : Can you identify these programming languages ?


```

a
/* this program finds the minimum of two integers */
#include <stdio.h>

main()
{
    int j,k,m;

    printf("Input two integers: ");
    scanf("%d%d",&j,&k);
    m=min(j,k);

    printf("\n%d is the minimum of %d and %d\n\n",
        m,j,k);
}

```

```

b
1740 REM *****
1750 REM Capture alarm data
1760 REM *****
1770 GOS
1780 SCREEN 2
1790 COLOR BACK,PALL
1800 LOCATE 1,1
1810 INPUT "Alarm time: ",AT$
1820 ACS = MID$(AT$,3,1)
1830 AH$ = MID$(AT$,1,2)
1840 AMS = MID$(AT$,4,2)
1850 IF ACS <> "." GOTO 1770
1860 IF LEN(AT$) <> 5 GOTO 1770
1870 AH$ = VAL(AH$)
1880 AMS = VAL(AMS)
1890 IF AH$ > 23 GOTO 1770
1900 IF AMS > 59 GOTO 1770
1910 LOCATE 2,1
1920 INPUT "Alarm text: ",ATEXT$
1930 IF LEN(ATEXT$) > 30 THEN GOTO 1910
1940 ASW$ = " "
1950 SFT FAS$ = MKI$(AH$)
1960 LSET FAS$ = MKI$(AMS)
1970 LSET FATEXT$ = ATEXT$
1980 LSET FASWS = MKI$(ASW$)
1990 PUT #2,1
2000 CLS
2010 GOTO 2720

```

```

c
092900 B700-CONVERT-R80-DATE SECTION.
093000*
093100* IF CREDIT HAS NOT BEEN GIVEN OR A TRANSACTION, THE
093200* DATE USED IS THE TRANSACTION DATE. THIS SECTION
093300* CONVERTS THE TRANSACTION DATE TO A NUMBER OF DAYS
093400* SINCE 1900, PUTTING THE RESULT IN WS-CALC-DATE.
093500*
093600 B700-010.
093700*
093800 MOVE R80-DTTRAN TO WS-DATE-N.
093900 MOVE WS-DATE-X TO FLD-AREA.
094000 MOVE NORM-NDY-INPUT TO NO1-USER-FIELDS.
094100 MOVE ZERDS TO NORMALIZER-BUFFER.
094200 NO1-NBR-INTS.
094300 CALL "X2XFTB" USING TWAB.
094400 NO1-ARG-LIST.
094500 FLD-AREA.
094600 NORMALIZER-BUFFER.
094700 IF NO1-RTN-CODE NOT EQUAL TO ZERDS
094800 DISPLAY "B200: DATE CONVERSION FAIL. CODE.
094900 NO1-RTN-CODE.
095000 MOVE DAYS-SINCE-1900 TO WS-CALC-DATE.
095100*
095200 B700-090.
095300*
095400 EXIT.

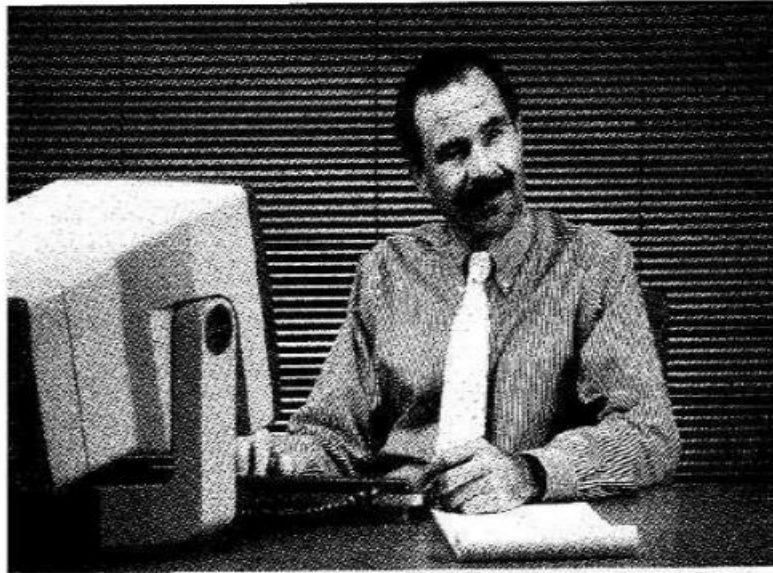
```

Body of the Lesson

Listening (C Language)

C language

Listening



Task 1 : Listen to this interview with David Wendt, an expert on C. Are the following sentences true (T) or (F) ?

- 1 ☐ C was written to support the development of the MS/DOS operat system.
- 2 ☐ C was based directly on a language called BCPL.
- 3 ☐ UNIX was rewritten in C in 1973.
- 4 ☐ C is rarely used for systems programming now.
- 5 ☐ C's main disadvantage is that it has a small set of operators.
- 6 ☐ C is more powerful than Assembler.
- 7 ☐ C can be used to access memory addresses directly.
- 8 ☐ Pascal and C produce equally fast and efficient code.
- 9 ☐ C is the ideal language for everyone.
- 10 ☐ A language called D is expected to replace C.

Task 2 : Listen again to the audio and fill in the gaps in the tapescript below.

INTERVIEWER: Could you give some examples of how it does that?

DAVID WENDT: Yes. With C, the programmer can access the underlying hardware. He can access memory addresses directly, he can perform operations on values stored as ¹ _____, and he can store variables in registers, just as in Assembler. This produces faster and more ² _____ code than is produced by high-level languages like PASCAL. At the same time, it provides the fundamental ³ _____ ⁴ _____ constructs required for well-structured programs: decision-making, loops, and ⁵ _____. These features combined together provide a very powerful tool for the programmer.

INTERVIEWER: You make it sound like the ideal language for everyone.

DAVID WENDT: Well, no, I'm not saying that. But if you need to write programs that are ⁶ _____, fast in execution, and yet ⁷ _____ from one computer to another, then C is the language you should be using.

Reading (The Java Language)

Task 1 (Before Reading)

Study these sample sections of programs. Rank them from 1 (easiest to understand) to 5 (most difficult to understand)

a	TABLE FILE SALES SUM UNITS BY MONTH BY CUSTOMER ON CUSTOMER SUBTOTAL PAGE BREAK END	e	A=0 X=1 INPUT Y FOR X=1 TO 3 A=Y**X PRINT A NEXT X END
b	10101001 01000010 00010100 11101110 11111111	d	mov ah, 3Dh mov al, 0 push cs pop ds
c	REPORT THE BASE SALARIES BROKEN DOWN BY REGION FOR MANAGERS IN ENGLAND		

Task 2 : Here is a list of language types used by programmers ranked from natural human language at the top to machine code at the bottom. Can you match any of the previous samples (Task 1) to this list ?

1 Natural language	4 Assembly language
2 Very high-level language	5 Machine code
3 High-level language	

The Java language

Java is a programming language developed by Sun Microsystems, specially designed to run on the Web. Java programs (called **applets**) let you watch animated characters and moving text, play music, and interact with information on the screen (for example, control animations and select options).

Characteristics of the Java language

Java is an **object-oriented** language, similar to C++, but more dynamic and simplified to eliminate possible programming errors. A Java program is both compiled and interpreted (see Unit 24). First, the source code (a file with a **.java** extension) is compiled and converted into a format called bytecode (a file with a **.class** extension), which can then be executed by a Java interpreter (see Fig. 1). Compiled Java code can run on most computers because there are Java interpreters, known as **Java Virtual Machines**, for most operating systems.

Java is **multi-threaded**, meaning a Java program can have multiple threads (parts) – that is, many different things processing independently and continuously. This enables the program to make the best use of available CPU power.

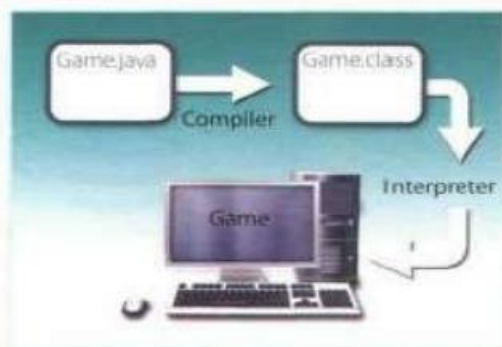


Fig. 1

Why is Java popular?

Most programmers like Java because it allows them to write applets which make web pages more interactive and attractive. They can create graphical objects (for example, bar charts and diagrams) and new controls (for example, check boxes and push buttons with special properties). A web page that uses Java can have sounds that play in real time, music that plays in the background, cartoon-style animations, real-time video and interactive games.

The Java Micro Edition platform (**Java ME**) is used in mobile devices. It provides flexible tools to create applications that run on mobile phones, PDAs, TV set-top boxes and printers. Nowadays, most phones are configured to use Java games.

Alternatives to Java

One alternative to Java is Microsoft's **C#**, pronounced 'C sharp', a **.NET** language based on C++ with elements from Visual Basic and Java. There are no substantial differences between C# and Java. When software developers do measurements on pieces of code, sometimes Java is faster, sometimes C# is.

Another competitor is Adobe **Flash** technology, which supports graphics, a scripting language called ActionScript, and the streaming of audio and video. Flash is used to create animation and advertisements, to integrate video into web pages, and to develop rich internet applications such as portals. **Flash files**, traditionally called **flash movies**, have a **.swf** file extension. They may be an object on a web page or be played in the stand-alone Flash Player.

Task 2(After Reading)

These statements about Java are all false. Read the text and correct them.

- 1 Java was invented by Microsoft.
- 2 With the interpreter, a program is first converted into Java bytecodes.
- 3 Java is not compatible with most computing platforms.
- 4 The Java language is single-threaded, one part executing at a time.
- 5 Java has no competitors.
- 6 Flash files are called *animations*.

Language Work

Grammar (The -ed form : The Past)

The -ed form

We use the **-ed** form in the following ways:

- To make the past simple (affirmative) of regular verbs
*Sun Microsystems **developed** Java in 1995.*
 Remember that not all verbs in the past simple end in **-ed**. See page 166 for a list of irregular verbs. See Unit 19 for more about the past simple.
- To make the past participle of regular verbs
*Flash is **used** to create animation.*

- To make the adjectival form of some verbs
*Java applets let you watch **animated** characters.*

The **-ed** is pronounced as:

- /t/ after voiceless sounds: /p/, /k/, /t/, /s/, /ʃ/, /tʃ/ (e.g. *developed, talked, pronounced*)
- /d/ after voiced sounds: /b/, /g/, /d/, /z/, /v/, /dʒ/, /m/, /n/, /ŋ/ and vowels (e.g. *compiled, designed, simplified*)
- /ɪd/ after /t/ or /d/ (e.g. *interpreted, multi-threaded*)

Task 1 : Put these verbs into the correct column.

stopped	asked	/t/	/d/	/ɪd/
described	decided			
produced	called			
watched	executed			
published	object-oriented			
programmed	persuaded			
configured	converted			
arranged	designed			

Task 2 : Complete this extract from the reading text (The Java Language) with the correct form of the verbs in the box.

call be begin can decide rename have support develop base

The idea for Java started in 1990, when a team of software engineers at Sun Microsystems (1) _____ to create a language for a handheld device that could control and interact with various kinds of electronic appliances, ranging from Nintendo Game Boys to VCRs and TV set-top boxes. They (2) _____ an object-oriented programming language that one of the engineers, James Gosling, (3) _____ *Oak*, after the tree outside his window. The device even (4) _____ an animated character named *Duke*, who would go on to become Java's mascot.

With the advent of the Web in 1993, the company made a web browser (5) _____ on the Oak language. Later on, this language was adapted to the Internet and (6) _____ *Java*. The 1.0 version of Java was officially introduced by Sun in May 1995.

At that time, web pages (7) _____ only display text, pictures and hyperlinks. With the arrival of Java, web designers (8) _____ able to include animation and interactive programs on web pages. The first major application created with Java was the HotJava browser. The Java language (9) _____ to attract serious attention from the internet community and was soon (10) _____ by Netscape Navigator and MS Internet Explorer. Today, Java is a hot technology that runs on multiple platforms, including smart cards, embedded devices, mobile phones and computers.

Lexis

Morphology (Prefixes2)

1 Negative and positive prefixes:

	Prefix	Meaning	Examples
Negative	un-	not	unmagnetized
	in-		incomplete
	im-		impossible
	il-		illegal
	ir-		irregular, irrelevant
	non-	not connected with	non-programmable,
	mis-	bad, wrong	misdirect
	mal-		malfunction
	dis-	opposite feeling	disagree
		opposite action	disconnect
	anti-	against	antiglare
	de-	reduce, reverse	demagnetize, decode
	under-	too little	underestimate
Positive	re-	do again	reorganize
	over-	too much	overload

2 Prefixes of size:

Prefix	Meaning	Examples
semi-	half, partly	semiconductor
equi-	equal	equidistant
mini-	small	minicomputer
micro-	very small	microcomputer
macro-	large, great	macroeconomics
mega-		megabyte

3 Prefixes of location:

Prefix	Meaning	Examples
inter-	between, among	interface, interactive
super-	over	supersonic
trans-	across	transmit, transfer
ex-	out	exclude, extrinsic
extra-	beyond	extraordinary
sub-	under	subschemata
infra-	below	infra-red
peri-	around	peripheral

4 Prefixes of time and order:

Prefix	Meaning	Examples
ante-	before	antecedent
pre-		prefix
prime-	first	primary, primitive
post-	after	postdated
retro-	backward	retroactive

5 Prefixes of numbers:

Prefix	Meaning	Examples
semi-	half	semicircle
mono-	one	monochromatic
bi-	two	binary
tri-	three	triangle
quad-	four	quadruple
penta-	five	pentagon
hex-	six	hexadecimal
sept(em)-	seven	September
oct-	eight	octal
dec-	ten	decimal
multi-	many	multiplexor

6 Other prefixes:

Prefix	Meaning	Examples
pro-	{ before, in advance forward	program progress
auto-	self	automatic
co- con- }	together, with	co-ordinate connect

Task 1 : Fill in the gaps with the correct prefix from the following list.

auto	de	dec	inter
maxi	mega	micro	mini
mono	multi	semi	sub

- 1 Most people prefer a colour screen to a _____chrome screen.
- 2 _____script is a character or symbol written below and to the right of a number or letter, often used in science.
- 3 A _____byte equals approximately one million bytes.
- 4 Once you finish your program, you will have to test it and _____ bug it to remove all the mistakes.
- 5 The introduction of _____conductor technology revolutionized the computer industry.
- 6 If a computer system has two or more central processors which are under common control, it is called a _____processor system.
- 7 The _____imal system is a number system with a base of 10.
- 8 When the user and the computer are in active communication on a graphics system, we refer to this as _____ active graphics.

Collocations

Task 1 : Match the words (1-6) with the words (a-f) to make technical terms from the text.

1 Java	4 web	a applet	d system
2 operating	5 source	b page	e object
3 programming	6 graphical	c code	f language

Task 2 : Complete the sentences with words from the box.

interpreted animated configured used pronounced object-oriented compiled

- 1 Java lets you watch _____ characters on web pages.
- 2 Java is an _____ language, similar to C++ but more dynamic.
- 3 First, the source code of a Java program is _____ into an intermediate format called bytecode. This is then _____ by any system possessing a Java interpreter.
- 4 The Java ME platform is widely _____ in mobile devices.
- 5 Nowadays, most mobile phones are _____ to use Java games.
- 6 Microsoft's C# is a simplified version of C and C++ for the Web. It's _____ 'C sharp'.

Spelling and Recognition

Task 1 : Spell the correct word. The first letter is given as a hint.

A path from the transmission of data

C

An electronic integrated circuit in a small package.

C

The set of electronic circuits used to control the computer system.

C

A group of data that has similar features.

C

Semantics

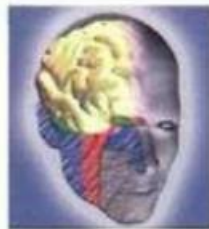
Meaning

Task 1 : Match the examples of Java programs, known as applets, (a-e) with the descriptions (1-5).

- 1 This Land Rover applet allows you to change the look of the vehicle.
- 2 The Pythagoras theorem applet gives the proof of the Pythagorean theorem without words. It allows you to manipulate triangles and go through the steps of the geometrical proof.
- 3 The Jman for Java applet permits medical researchers to view sequential MRI (Magnetic Resonance Images) of the brain.
- 4 An analogue clock applet displays the time according to the web user's computer and lets you set the colours and style of the hands and numbers.
- 5 A banner applet displays graphic images on websites in order to advertise products or services.



a _____



c _____



e _____



b _____



d _____

Task 2 : Match the terms (1-5) with the definitions (a-e).

- 1 Java
- 2 applet
- 3 plug-in
- 4 platform-independent
- 5 object-oriented programming

- a an auxiliary program that enables web browsers to support new content, for example animation
- b software that can run on any operating system
- c an island in Indonesia, coffee (in American slang), and a programming language for internet applications
- d a computer programming technique that allows the creation of objects that interact with each other and can be used as the foundation of others; used to create graphical user interfaces
- e a small Java application, usually designed to run automatically within a web page



Context (Semantic Groups)

Task 1 : Group these terms into the five headings, A to E, below.

A	B	C	D	E
Viruses and other destructive programs	Data protection	Communication systems	Internet	World Wide Web

anti-virus software	FTP	passwords
backups	GPS	router
bandwidth	IRC	trigger routine
browser	ISP	Trojan
domain name	hyperlink	URL
encryption	logic bomb	Usenet
firewalls	paggers	XML

Polysemy

Task 1 : Look the given words up in your dictionary. Give the literal meaning (direct meaning) and the technical meaning (computing meaning) of the following words :

Loop (noun, verb)

.....
(Computing)

Channel (noun, verb)

.....
(Computing)

Cluster (noun, verb)

.....
(Computing)

Chip (noun, verb)

.....

(Computing)

Task 2 : Put the previous computing words in full sentences (computing context).

Synonyms

Task 1 : Refer back to the text and find (The Java Language) the synonyms.

1. machine
2. designed
3. a lot
4. errors
5. solve

Antonyms

Task 1 : Refer back to the text (The Java Language) and find the antonyms.

1. old
2. a few
3. to include
4. contemporaries
5. still in use

Speaking (Software Development)

Task 1 : Work in small groups. Would you like to be good at programming ? Look at the expalnation below of a code and answer these questions.

- 1 Find an example of a constant in the code.
- 2 What do you think the value of x is, after the third instruction?

'a' is a variable. A variable is something that can change its value (which can be a number). The opposite is a constant: a constant can't change its value. For example, here the number '3' is a constant but 'a' is a variable: '3' is always '3' but 'a' can have any value an instruction gives it: it can be 1, 2, 3 or any other number. This instruction gives it the value '3', which it keeps until another instruction changes it. Variables can have any name, and sometimes variable names are quite long. For example, 'g_Turn' is a variable name.

<pre>01 a = 3; 02 b = 2; 03 x = a + b; 04 cout x;</pre>		line of code programming instruction to show something on the screen

Conclusion

Study skills

Problem-Solving

Task 1 : Work in small groups (Project Groups). Discuss the project. Review what you have accomplished so far.

Problem-Solving Task : Work in pairs or groups. Study these job requirements. Then try to match the requirements to the list of jobs which follows.

1	2	3
• at least 5 years (2 at senior level) in: Unix, SYBASE or ORACLE or Windows OS, Terminal Server, TCP/IP, Internet • strong project management (2 years) • willingness to travel abroad	• able to manage, lead and develop a team • knowledge of C, C++, Delphi • experience of object-oriented design within a commercial environment • ability to deliver software projects against agreed schedules and within agreed estimates	• proven track record in the delivery of e-solutions in banking environment • knowledge of Unix, Windows and Oracle • willingness to travel internationally
4	5	6
• minimum 4 years lifecycle development experience • demonstrable skills using VB, SQL, RDBMS • able to develop core s/w • excellent communication skills	• minimum of 18 months commercial experience of Web development • knowledge of HTML, Java, ASP • full portfolio of URLs as examples	• experience of Windows OS, Exchange, Monitoring Software, SQL Server, Verta, TCP/IP • solid grasp of networking • 2 to 5 years experience in a network environment

- a Visual Basic Developer
- b IT Engineer (Network & Database)
- c Web Developer
- d Network Support
- e E-commerce Consultant
- f Team Leader

Specific Writing Rubric (Paragraph Writing 2 : The Structure of a Paragraph³)

What is a paragraph?

Paragraphs are comprised of sentences, but not random sentences. A paragraph is a group of sentences organized around a central topic. In fact, the cardinal rule of paragraph writing is to focus on one idea. A solidly written paragraph takes its readers on a clear path, without detours. Master the paragraph, and you'll be on your way to writing "gold-star" essays, term papers, and stories.

³ <https://www.time4writing.com/writing-resources/paragraph-writing-secrets/>

Paragraph Structure

A basic **paragraph structure** usually consists of five sentences: the topic sentence, three supporting sentences, and a concluding sentence. But the secrets to **paragraph** writing lay in four essential elements, which when used correctly, can make a okay **paragraph** into a great **paragraph**.

The topic sentence connects the writing prompt with a summary of the main idea.

To keep the paragraph coherent, the most relevant details have been polished, and the others deleted.

The closing sentence summarizes the paragraph and emphasizes the main idea.

1. **Element #1: Unity.** Unity in a paragraph begins with the topic sentence. Every paragraph has one single, controlling idea that is expressed in its topic sentence, which is typically the first sentence of the paragraph.
2. **Element #2: Order.** Order refers to the way you organize your supporting sentences. Whether you choose chronological order, order of importance, or another logical presentation of detail, a solid paragraph always has a definite organization.
3. **Element #3: Coherence.** Coherence is the quality that makes your writing understandable. Sentences within a paragraph need to connect to each other and work together as a whole. One of the best ways to achieve coherency is to use transition words. These words create bridges from one sentence to the next. You can use transition words that show order (first, second, third); spatial relationships (above, below) or logic (furthermore, in addition, in fact). Also, in writing a paragraph, using a consistent verb tense and point of view are important ingredients for coherency.
4. **Element #4: Completeness.** Completeness means a paragraph is well-developed. If all sentences clearly and sufficiently support the main idea, then your paragraph is complete. If there are not enough sentences or enough information to prove your thesis, then the paragraph is incomplete. Usually three supporting sentences, in addition to a topic sentence and concluding sentence, are needed for a paragraph to be complete. The concluding sentence or last sentence of the paragraph should summarize your main idea by reinforcing your topic sentence.

Task 1 : Write the appropriate sentences to illustrate the following (equations).

- 1 $a \neq b$ _____
- 2 $a > b$ _____
- 3 $a \leq b$ _____
- 4 $a \geq b$ _____
- 5 $a < b$ _____
- 6 $a = b$ _____

Evaluation

Writing (Converting to a New System)

Task 1 : Write a paragraph describing each of these strategies for converting to a new computer system. Explain what its advantages and disadvantages are. The first strategy is described for you as an example.

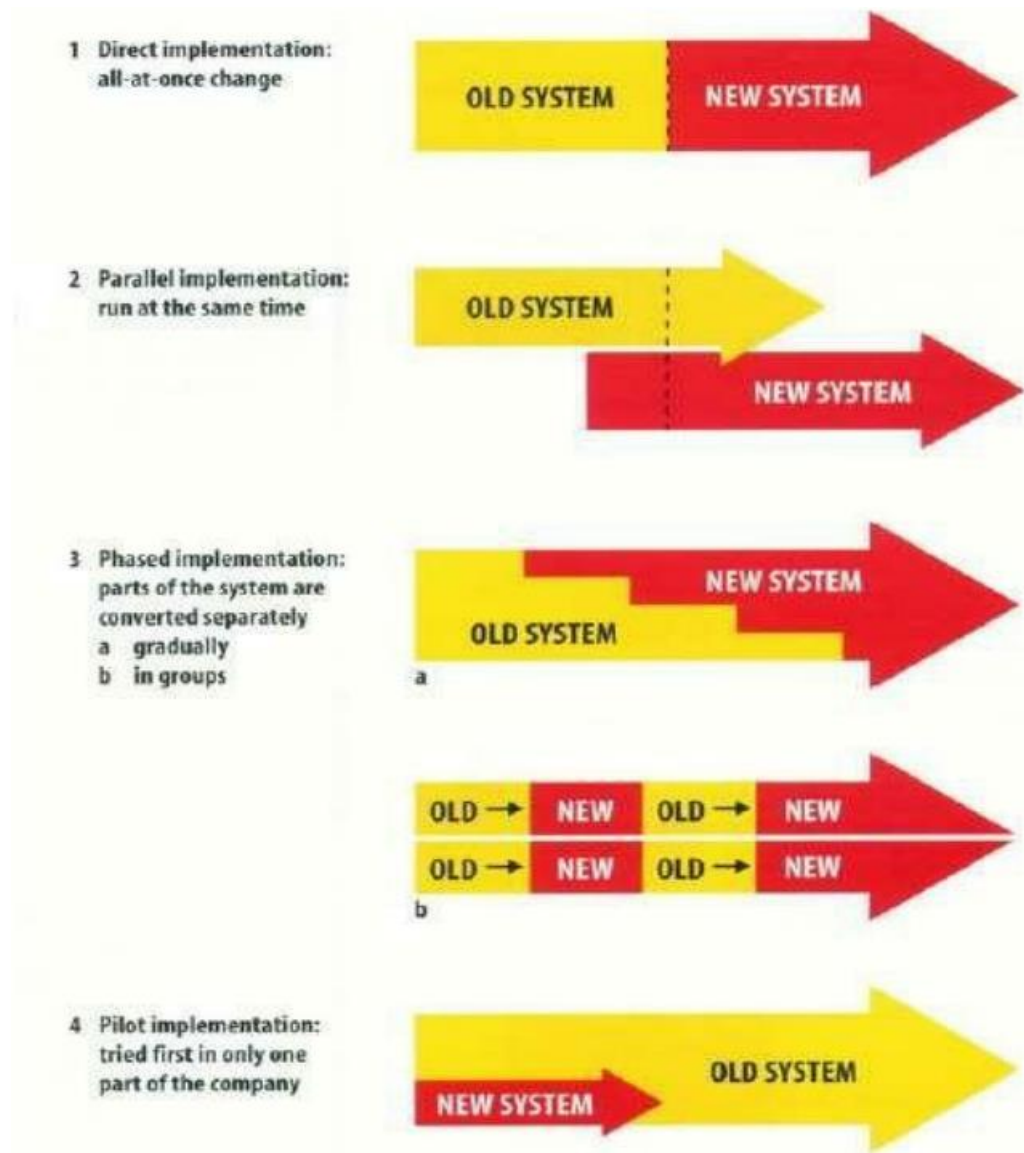


Fig 1

Strategies for converting to a new computer system

1 *Direct implementation:*

Direct implementation means that the user simply stops using the old system and starts using the new one. The advantage is that you do not have to run two systems at the same time. The disadvantage of this approach is that if the new system does not operate properly, there is nothing to fall back on.

Homework (Flowchart and Language work : Do until, do while)

Task 1 : Flowcharts are sometimes used for designing parts of programs. Describe this extract from a program flowchart using language structures like sequence expressions : first, then, finally... ; If X, then Y ; Do *until*, do *while* (look at the Help Box below).

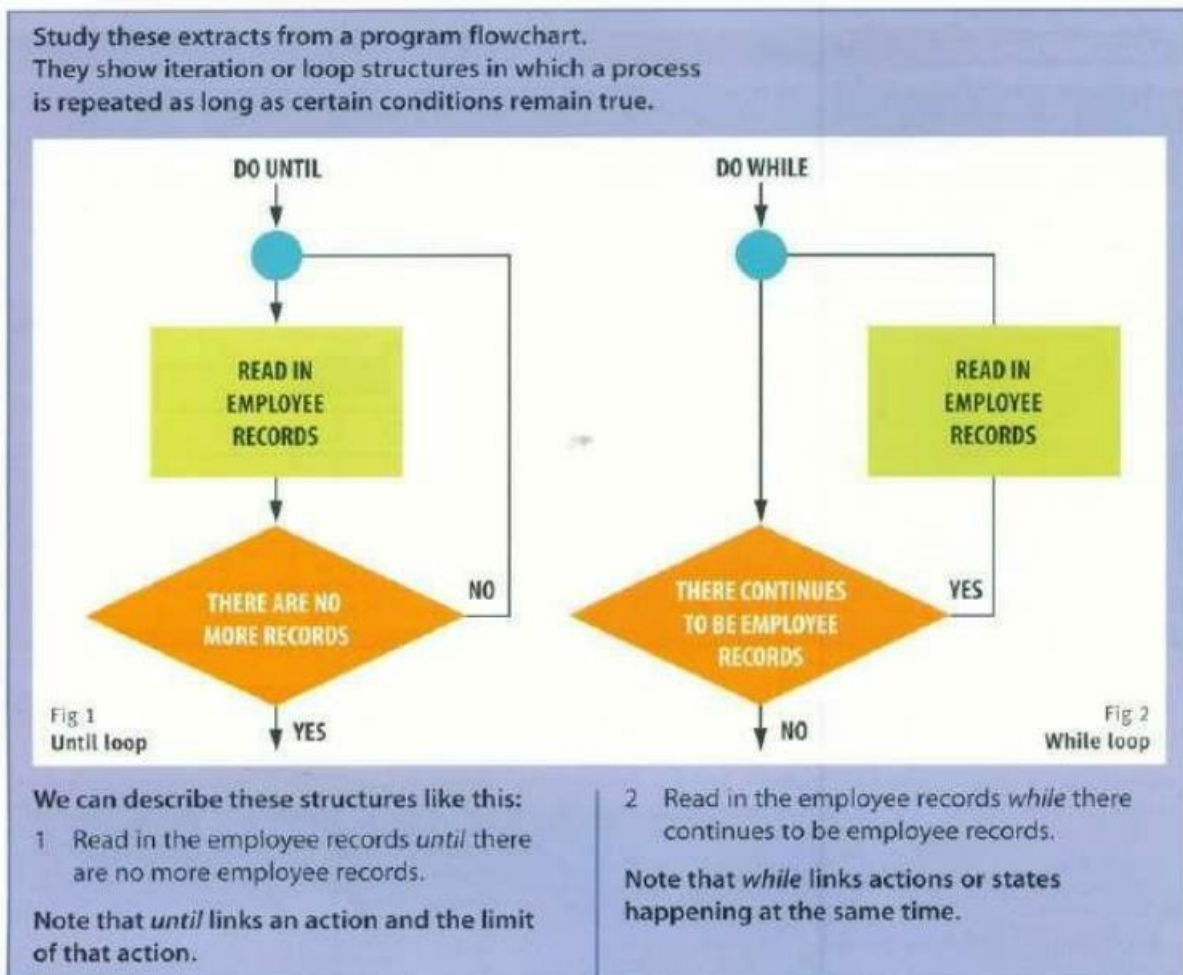
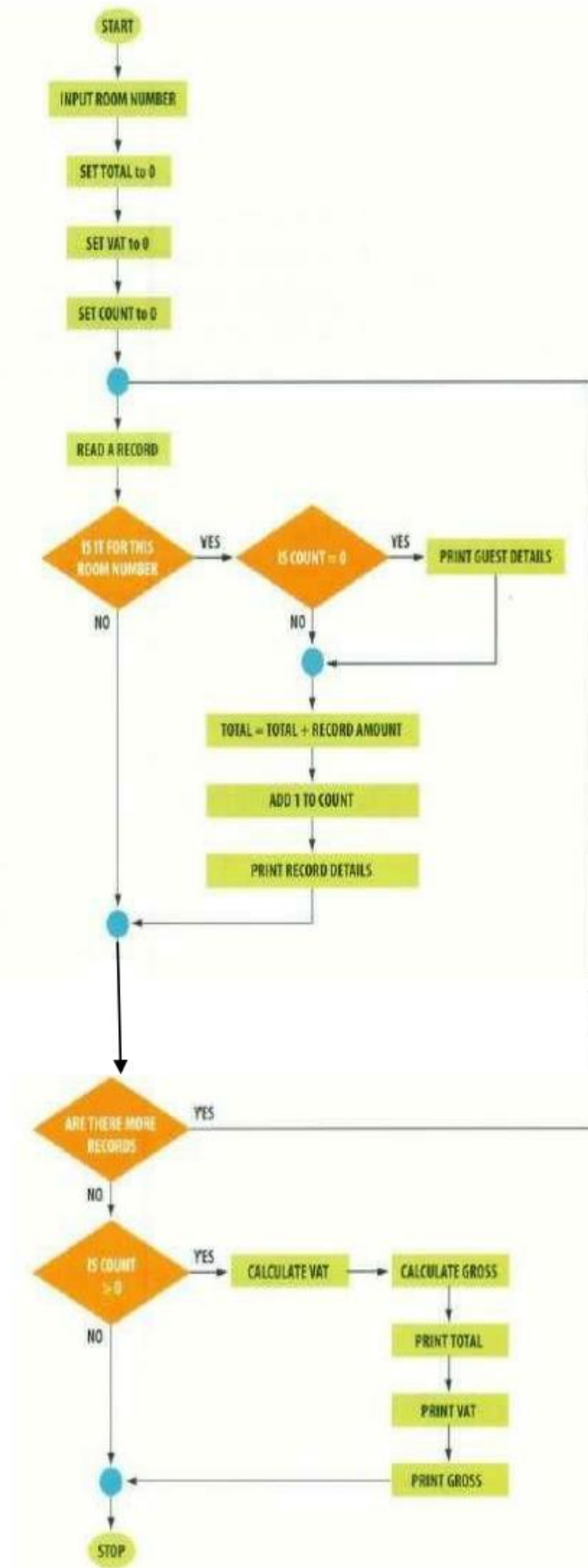


Fig 2
Hotel accommodation
invoicing flowchart



Unit 3

Distributed Systems

Lesson 1 Operating System

Lesson 2 Networks

Learning Objectives

In this unit, you will :

- Talk and write about computer distributed systems
- Learn about the function of the operating system
- Learn more about networks particularly the Internet
- Differentiate between past simple, present perfect, and the future.
- Study vocabulary related to operating systems and networks
- Learn about the specific writing in the discipline (give examples, explanations..)
- Deal with problem-solving tasks related to the Internet and operating system

Unit 3 : Distributed Systems

Operating System

Lesson Plan 1

Lesson 1 :	Operating System	1-3 Sessions	(90mnts-270 mnts)
Topics/Themes	- Computers Software - Computer Hardware - Working with Computer - Word Processing		
Course Description: The course addresses the inner operating system of the computer. It describes the computer software, hardware, word processing which are responsible for a computer functions. Furthermore, it stresses the communicative language abilities required by the students.			
Course Objectives : By the end of this lesson, students will be able to : - Listen and take notes - Recognize computing words - Choose correctly between Past Simple and Present Perfect - Speak with their peers - Write a correct passage			
Realia :	- Computer inner system-related texts - Audios and recordings - Pairwork Information : Student A (Speaking Task) - Pairwork Information : Student B (Speaking Task) - Pictures and images - Computers and Laptops - Data projector		

Glossary of Computing Terms and Abbreviations

digitise /'di:dʒɪtaɪz/ verb [16] to convert an analogue wave into a digital pulse

directory /dɪ'rektəri, dɪ-, dɪr-/ noun C [6] a storage area used for grouping files so that they can be easily located. A directory is sometimes called a folder.

disk /disk/ noun C [6,17,19] a flat circular storage device

disk array /disk 'a'reɪ/ noun C [19] a linked collection of storage devices that work together to act like a much larger disk

disk drive /'disk draɪv/ noun C [6,17] a storage device for reading from and writing to disks

divider /dɪ'vaɪdɪ(r)/ noun C [10] a vertical bar that divides a Windows Explorer window into two parts. One part shows the drive folders and the other part shows the filenames of the files in the selected folder.

drag and drop /,dræɡ ən 'drɒp/ verb [7,10,21] to move data from one location to another with a mouse. Holding down the mouse button while moving the mouse moves the selected data. Releasing the mouse button drops the data in the new location.

drive array /'draɪv ə'reɪ/ noun C [17] a set of hard disks that are used in a RAID system

driver /'draɪvə(r)/ noun C [15,17] a systems program that controls a peripheral device

DSL /,di: es 'leɪ/ noun U [16] abbreviation for digital subscriber line

DTP /,di: ti: 'pi: / noun U [8] abbreviation for desktop publishing. A process of designing documents for publishing using a computer system.

duplex /'dju:pleks/ adj [16] able to transfer data in both directions, i.e. can send and receive data

References

- Boeckner, K. & Brown, C. (2002). *Oxford English for computing : Student's book*.
Oxford : Oxford University Press.
- (1993). *Oxford English for computing : Answer book*.
Oxford : Oxford University Press.
- Esteras, S. R. (2008). *Infotech English for computer users : Student's book*.
Cambridge : Cambridge University Press.
- (2008). *Infotech English for computer users : Teacher's book* (4th ed).
Cambridge : Cambridge University Press.
- Glendinning, E.H & McEwan, J. (2003). *Oxford English for information technology :
Student's book*. Oxford : Oxford University Press.
- (2006). *Oxford English for information
technology : Student's book* (2nd ed). Oxford : Oxford University Press.
- (2003). *Oxford English for information
technology : Teacher's book*. Oxford : Oxford University Press.
- (1999). *Basic English for computing :
Student's book*. Oxford : Oxford University Press.
- (1999). *Basic English for computing :
Teacher's book*. Oxford : Oxford University Press.
- Maja, O. (2011). *English for information technology 1 : Student's book*. England :
Pearson Education Limited.
- David, H. (2012). *English for information technology 2 : Course book*. England :
Pearson Education Limited.
- Glendinning, E.H. (2009). *Oxford English for Careers: Technology 1 Student's Book*.
Oxford : Oxford University Press.
- Glendinning, E.H. & Pohl, A. (2009). *Oxford English for Careers: Technology 2 Student's Book*.
Oxford : Oxford University Press.
- Bonamy, D. (2009). *Oxford English for Careers: Technology 1 Teacher's Resources
Book*. Oxford : Oxford University Press.
- Pohl, A. (2009). *Oxford English for Careers: Technology 2 Teacher's Resources
Book*. Oxford : Oxford University Press.

Lesson Plan

Introduction

Warming-Up

Task 1 : Study this screen display and answer these questions.

- 1 How do you enter Unix commands?
- 2 Which Unix commands does it show?
- 3 What is the output of each command?
- 4 What will happen when the last command is entered?
- 5 Which other Unix commands do you know?

```
$ date
Mon Sep 19 12:45:38 BST 2005
$ passwd
passwd: Changing password for d3ea03
Enter login password:
New password:
$ ls
home  local  mnt    packages  scratch
$ logout >
```

Fig 1
Unix screen display

Body of the Lesson

Listening (Windows Vista)

Task 1 (Before Listening)

- 1 Why is Windows so popular?
Give two reasons.
- 2 Which Windows Vista edition is aimed at high-end PC users, gamers and multimedia professionals?

Task 2 (While Listening)

Listen to a podcast interview with Bill Thompson, a program developer, and answer these questions.



Windows Vista

Task 3 (After Listening)

Listen again and complete this fact file.

Windows Vista editions	Other features	Internet and security	Windows programs
(1) _____ is designed for users with basic needs, such as email and internet access.	The user interface has been redesigned with new icons and a new (4) _____.	Internet Explorer is more reliable and secure.	The most popular is still (8) _____, a suite that includes the (9) _____, Word; an email program; the Excel spreadsheet program; and the (10) _____ program, PowerPoint.
Home Premium is for advanced home computing and (2) _____.	It offers support for the latest technologies, from DVD creation to (5) _____.	The Security Centre includes an (6) _____ program called Windows Defender, and a firewall that protects your computer from (7) _____.	
The Business edition is ideal for (3) _____.			
The Ultimate edition is the most complete.			

Reading (Operating Systems : Hidden Software)

Task1 (Before Reading)

Match the labels to the four layers of this diagram with the help of the diagram caption.

- 1 applications programs
- 2 user
- 3 hardware
- 4 operating system

- 1 Why is Windows so popular? Give two reasons.
- 2 Which Windows Vista edition is aimed at high-end PC users, gamers and multimedia professionals?

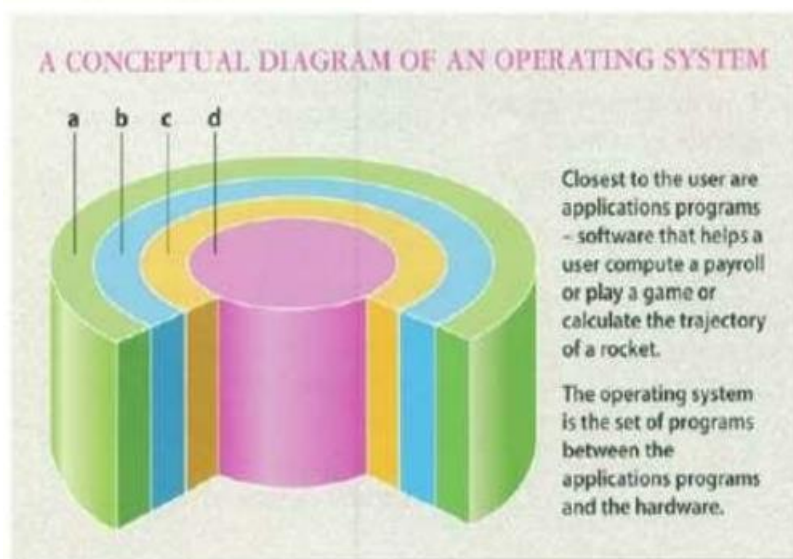


Fig 2
Conceptual diagram of an operating system

Task 2 (Before Reading : Inferring meaning, guessing)

Study this text title. What do you think it means ?

Operating Systems: Hidden Software

Task 3 (While Reading : Take Notes)

Now read this text to check your answer and to find the answers to these questions.

- 1 What difference is there between applications software and operating systems?
- 2 Why is the supervisor program the most important operating system program?
- 3 What is the difference between resident and non-resident programs?
- 4 What are the main functions of an operating system?

When a brand new computer comes off the factory assembly line, it can do nothing. The hardware needs software to make it work. Are we talking about applications software such as wordprocessing or spreadsheet software? Partly. But an applications software package does not communicate directly with the hardware. Between the applications software and the hardware is a software interface – an operating system. An operating system is a set of programs that lies between applications software and the computer hardware.

The most important program in the operating system, the program that manages the operating system, is the supervisor program, most of which remains in memory and is thus referred to as resident. The supervisor controls the entire

operating system and loads into memory other operating system programs (called non-resident) from disk storage only as needed.

An operating system has three main functions: (1) manage the computer's resources, such as the central processing unit, memory, disk drives, and printers, (2) establish a user interface, and (3) execute and provide services for applications software. Keep in mind, however, that much of the work of an operating system is hidden from the user. In particular, the first listed function, managing the computer's resources, is taken care of without the user being aware of the details.

Furthermore, all input and output operations, although invoked by an applications program, are actually carried out by the operating system.

Task 4 (After Reading)

Complete the gaps in this summary of the text on operating systems using these linking words and phrases.

<i>although</i>	<i>in addition</i>
<i>because</i>	<i>such as</i>
<i>but</i>	<i>therefore</i>

The user is aware of the effects of different applications programs operating systems are invisible to most users. They lie between applications programs, ... wordprocessing, and the hardware. The supervisor program is the most important. It remains in memory, ... it is referred to as resident. Others are called non-resident they are loaded into memory only when needed. Operating systems manage the computer's resources, ... the central processing unit., they establish a user interface, and execute and provide services for applications software. input and output operations are invoked by applications programs, they are carried out by the operating system.

Language Work

Grammar (Past Simple and Present Perfect)

Study these examples of the Present perfect from the recording of the artist.

- 1 *I've scanned* in about a third of these photographs.
- 2 *I've organised* the paintings into themes.
- 3 *I've added* a sound track.

Why doesn't the speaker use the Past simple?

- 4 *I scanned* in about a third of these photographs.
- 5 *I organised* the paintings into themes.
- 6 *I added* a sound track.

We use the Present perfect to describe past actions with present relevance. The artist uses the Present perfect because he is describing a CD he has just made and what he is going to do with it in the near future.

We use the Past simple to describe completed actions in the past. It is often used with time expressions such as *last year*, *before PCs were introduced*, *in 1998*. Note these examples from the recording:

- 7 *I made* one for Mary's birthday *last week*.
- 8 *We tried* it out *last term*.

Task 1 : The artist is being interviewed. Make questions to match his answers. Use the correct form of the Past Simple or Present Perfect, whichever is correct. For example :

Question: What *did you do yesterday*?

Answer: *Worked* on the computer.

- 1 Q What ...
A Worked on a CD of my paintings.
- 2 Q How many ...
A About a third.
- 3 Q What ...
A I destroyed them.
- 4 Q How ...
A I scanned them in.
- 5 Q How ...
A I've organised them into themes.
- 6 Q Have ...
A Yes, I've added a sound track.
- 7 Q How long ...
A It's taken me about a week.
- 8 Q When ...
A I started about ten years ago.
- 9 Q What ...
A Before I had a computer, I had to use slides.
- 10 Q Have ...
A Yes, I've sold a few.

Task 2 : Put the tenses in this dialogue in the correct form : Past Simple or Present Perfect.

- 1 A What (do) today?
- 2 B I (work) on my project. I (search) the Web for sites on digital cameras.
- 3 A (find) any good ones?
- 4 B I (find) several company sites – Sony, Canon, ... but I (want) one which (compare) all the models.
- 5 A Which search engine (use)?
- 6 B Dogpile mostly. (ever use) it?
- 7 A Yes, I (try) it but I (have) more luck with Ask Jeeves. Why don't you try it?
- 8 B I (have) enough for one night. I (spend) hours on that project.
- 9 A I (not start) on mine yet.
- 10 B Yeh? I bet you (do) it all.

Lexis

Morphology (Compound Nouns 1)

The language of computing in English contains an ever-increasing number of compound nouns, that is, a group of two or more nouns which act as a single noun.

Examples:

<i>memory capacity</i>	<i>an address bus</i>	<i>an arithmetic unit</i>
<i>information systems</i>	<i>a bar code scanner</i>	

It is important to be able to recognize how such compounds are formed in order to understand what they mean.

The exact relationship between the words depends on the particular expression, but all these expressions have one thing in common: the last word in the chain says what the thing is, while the preceding word or group of words describes the thing. So when we read compound nouns, we have to start with the last word and work backwards.

Examples:

*An **address bus** is a bus dedicated to address information.*

*The **memory capacity** of a computer is the capacity of its memory.*

A large number of possible meanings can be expressed by compound nouns. For instance, the first noun or group of nouns can tell us what the second noun is made of, what it is for, or what it is part of.

Task 1 : A device that scans bar codes is called a bar code scanner. What name is given to :

- 1 a unit that gives a visual display of information on a screen?
- 2 a device that reads magnetic cards?
- 3 a device that plots graphs?
- 4 a device that prints using a laser as the light source?
- 5 a unit that holds magnetic disks?
- 6 a device that prints using a jet of ink?
- 7 the rate of transmission of data?
- 8 a package for making presentations using multimedia?
- 9 a program which processes data in batches?
- 10 the process for the conversion of disks for computers?

Collocations (Using Non-Specialist Language : Customer Care)



Task 1 : A computer specialist is trying to advise a non-specialist about which monitor to buy. Which parts of his explanation might be difficult for a non-specialist to understand ?

“The monitor is an important part of the human interface with the computer. I advise this TFT XGA 19-inch flat panel. This model has 1024 by 768 pixels so you get a high-resolution display.”

Task 2 : Compare this version. Has the specialist missed out anything important ?

“When you work on a computer, the monitor is very important. It has to be the right size and give you a clear picture so it's comfortable to work with. The screen size is measured diagonally from one corner to another. You need at least a 19-inch screen. The picture is composed of tiny picture elements or 'pixels'. The more pixels you have, the sharper the display. This model has a high number of pixels so you'll get a very good display.”

Task 3 : Work in pairs. Prepare an explanation for a non-specialist of one of these topics or on a topic in your own field. Then try your explanation with a new partner.

- how a diesel engine works
- how a semiconductor works
- how GPS works
- how a nuclear power station works

Spelling and Recognition

Task 1 : Spell the correct word. The first letter is given as a hint.

A linked collection of storage devices.

D

A process of copying a file from the Internet.

D

A set of hard disks.

D

A vertical bar that divides a Windows Explorer window into two parts.

D

Semantics

Meaning (Labelling Pictures)

Task 1 (Labell and Translate : Meaning)

Look at this screenshots from Microsoft Word and translate the labelled features and functions into your own language.



Context

Task 2 : Complete these sentences with the correct features and functions above.

- 1 The Standard _____ lists the icons to save or print a document, spell check, etc. The _____ Toolbar is the area for changing font, alignment, indentation, etc.
- 2 A font consists of three elements: _____, type style and type size. For example, Palatino bold at 10 points.
- 3 Type style refers to a visual characteristic of a typeface, for example *B* for _____, *I* for _____ and *U* for underlined.
- 4 If you need to change indentation – the space between the page margin and where the text aligns – you can click the Increase or Decrease _____ buttons.
- 5 The _____ and _____ commands allow you to specify customized texts at the top and bottom of every page.

Polysemy

Task 1 : Look the given words up in your dictionary. Give the literal meaning (direct meaning) and the technical meaning (computing meaning) of the following words :

Drag (noun, verb)

.....

(Computing)

Drop (noun, verb)

.....

(Computing)

Duplex (noun)

.....

(Computing)

Directory (noun)

.....

(Computing)

Task 2 : Put the previous computing words in full sentences (computing context).

Synonyms

Task 1 : Match the adjectives (1-11) with their synonyms (A-K). Decide if each pair is positive or negative and write them in the chart.

1 angry	A rational
2 calm	B shy
3 vain	C obstinate
4 intelligent	D conceited
5 timid	E clever
6 selfish	F furious
7 impolite	G egotistical
8 irritable	H amiable
9 sensible	I grumpy
10 stubborn	J easy-going
11 friendly	K rude

Positive	Negative
_____	_____angry – furious_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Antonyms

Task 1 : Choose the correct antonym for each word.

1 <u>timid</u>	A noisy	B brave	C obstinate	D fine
2 <u>truthful</u>	A false	B different	C incorrect	D dishonest
3 <u>neat</u>	A messy	B reliable	C lazy	D tidy
4 <u>miserable</u>	A active	B cheerless	C cheerful	D funny
5 <u>sensitive</u>	A impolite	B upset	C thick-skinned	D angry
6 <u>modest</u>	A shy	B conceited	C selfish	D timid
7 <u>grumpy</u>	A contented	B sensible	C cross	D tired

Speaking (Operating Systems)

Task 1 : Work in pairs, A and B. Each of you has information about some popular operating systems. Find out from the information you have and by asking each other, the answers to these questions :

- 1 Which operating system is used on Apple Macintosh microcomputers?
- 2 What is Palm OS designed for?
- 3 Name one system used on IBM mainframes.
- 4 Which operating system is Linux related to?
- 5 Which operating systems are specifically designed for multimedia?
- 6 Which operating systems are produced by the Microsoft Corporation?
- 7 Which operating system is distributed as freeware?
- 8 Which network operating system is becoming less popular?
- 9 Which operating system is most suited for use in the living room of a family home?
- 10 Which operating systems are used by DEC VAX minicomputers?

Pairwork Information : Student A

Mac OS The graphically-oriented operating system used on Apple Macintosh microcomputers. The latest version is MAC OS X.

MVS, VM, OS/390 An operating system used on IBM mainframes.

NetWare An operating system that was widely used on local area networks (LANs) but is losing popularity.

Linux An operating system that was derived from Unix and is available as freeware.

Windows XP Microsoft Corporation's operating system for PCs.

Pairwork Information : Student B

Unix Old command-driven operating system that is still commonly used on most types of computer including mainframe and personal computers.

VAX/VMS An operating system used by DEC VAX minicomputers.

BeOS An operating system created especially for working with multimedia.

Palm An operating system designed for use on personal digital assistants (PDAs) and smartphones.

Windows Media Center A version of Windows XP designed to be simple to use in the home to control multimedia systems.

Conclusion

Study skills

Problem-Solving

Task 1 : try to find the commands from the lists below which will have these actions.

VMS	Unix
help	write
directory	cp
search	lpr
copy	ls
rename	mkdir
print	date
show users	rm
show time	man
create/directory	grep
phone	rwho
delete	mv

Action	VMS command	Unix command
List all the files in a directory		
Delete a file		
Rename a file		
Copy a file		
Send a file to a printer		
Obtain help		
Create a directory		
Show date and time		
Show users on system		
Talk to other users on system		
Search for a string in a file		

Specific Writing Rubric (Giving Examples, Explanations, and Definitions)

Section 1 : Giving Examples

When the main aim of a text is to inform the reader about a subject, the writer will often use examples, either to explain a point or to illustrate an idea or argument. When giving examples, it is important to differentiate between the idea itself and the illustration of the idea.

Some expressions for introducing examples are shown in the table below.

for example (e.g.)	examples of	shown by
for instance	instances of	exemplifies
an example (of this)	cases of	shows
as an example	illustrations of	illustrates
such as	exemplified by	a second/third example,
like	illustrated by	etc.
including	seen in	

Examples:

- 1 Office workers use many computer applications **such as** word processing, spreadsheets, and databases.
- 2 Computers have made radical changes in preparing income tax returns. **For example**, in some countries you can now send your income tax return on disk.
- 3 Students can make good use of computer technology at school. Essay writing, **for instance**, can be done using a word-processing program.

Note: Sometimes the markers follow the example, separated by commas, as in 3 above.

Task 1 : Read the following sentences. Circle the marker and underline the main idea for which the example is given. The first one has been done for you.

- 1 Networks also allow users in one locality to share expensive resources, such as printers and disk-systems.
- 2 There are a handful of clipboard computers now on the market, including GRIDPad, which is sold in the US.
- 3 The PC passes the query, written in a special language (e.g. Structured Query Language – SQL), to the mainframe, which then parses the query, returning to the user only the data requested.
- 4 Here's an example of a simple virus, the Lehigh virus.
- 5 If you use a shared PC or a PC that has public access, such as one in a college PC lab or a library, be very careful about putting floppies into that PC's drives without a write-protect tab.

Section 2 : Explanations and Definitions

Texts containing technical terminology frequently contain definitions and explanations. This is particularly the case if the text is aimed at non-experts or students of technical subjects, or if the purpose of the text is to inform specialists about new developments.

- 1 Common words and expressions used in definitions or explanations are listed below.

is/are	by ... we mean
means	by ... is meant
is taken to be	in other words
denotes	that is (to say)
is/can be defined as	

Examples:

- 1 A computer **is** an electronic device.
- 2 Printers **are** output devices.
- 3 The term computer **refers to** the processor plus the internal memory.
- 4 A microchip **can be defined as** a tiny piece of silicon or similar material carrying an integrated circuit.
- 5 By peripherals **we mean** those devices attached to the computer.

- 2 Some definitions and explanations give further distinguishing characteristics by means of a defining relative clause.

Examples:

- 1 A computer is an electronic device **which/that processes information.**
- 2 Tapes and disks are memory devices **which/that can be stored away for future use.**
- 3 A programmer is a person **who/that prepares programs to solve problems.**
- 4 The arithmetic-logical unit is the part of the CPU **where arithmetic and decision-making operations are done.**

Note: The relative pronouns used in this type of definition or explanation will be *who* or *that* for people, *when* for a period of time, *where* for a place or location, and *that* or *which* for things.

- 3 Another way of defining or explaining is to use a noun, a noun phrase, or a clause separated from the rest of the sentence by commas or dashes.

Examples:

- 1 Computers – **electronic devices for processing information** – are now used in practically every aspect of life. (noun phrase)
- 2 Turnkey systems, **complete hardware/software products which are ready for use**, are available from many suppliers. (clause)

Task 1 : Study the following definitions. A definition usually includes three parts : the term to be defined, the group it belongs to, and the characteristics which distinguish it from other members of the group.

Term	Group	Characteristics
A core	is a ferrite ring	which is capable of being either magnetized or demagnetized.
Silicon	is a non-metallic element	with semiconductor characteristics.

Now analyse the following definitions and identify the different parts:

- a** by circling the term
- b** by underlining the group once
- c** by underlining the characteristics twice.

Example: *A computer is a machine with an intricate network of electronic circuits that operate switches or magnetize tiny metallic cores.*

- 1** Input is the information presented to the computer.
- 2** The term 'computer' includes those parts of hardware in which calculations and other data manipulations are performed, and the high-speed interval memory in which data and calculations are stored during actual executions of programs.
- 3** A 'system' is a mixture of integrated parts working together to form a useful whole.
- 4** Large computer systems, or mainframes, as they are referred to in the field of computer science, are those computer systems found in computer installations processing immense amounts of data.

Evaluation

Writing (Describing an Operating System : Linux)

Task 1 : This description of the Mac OS X is drawn from the table below. Write a similar description of Linux.

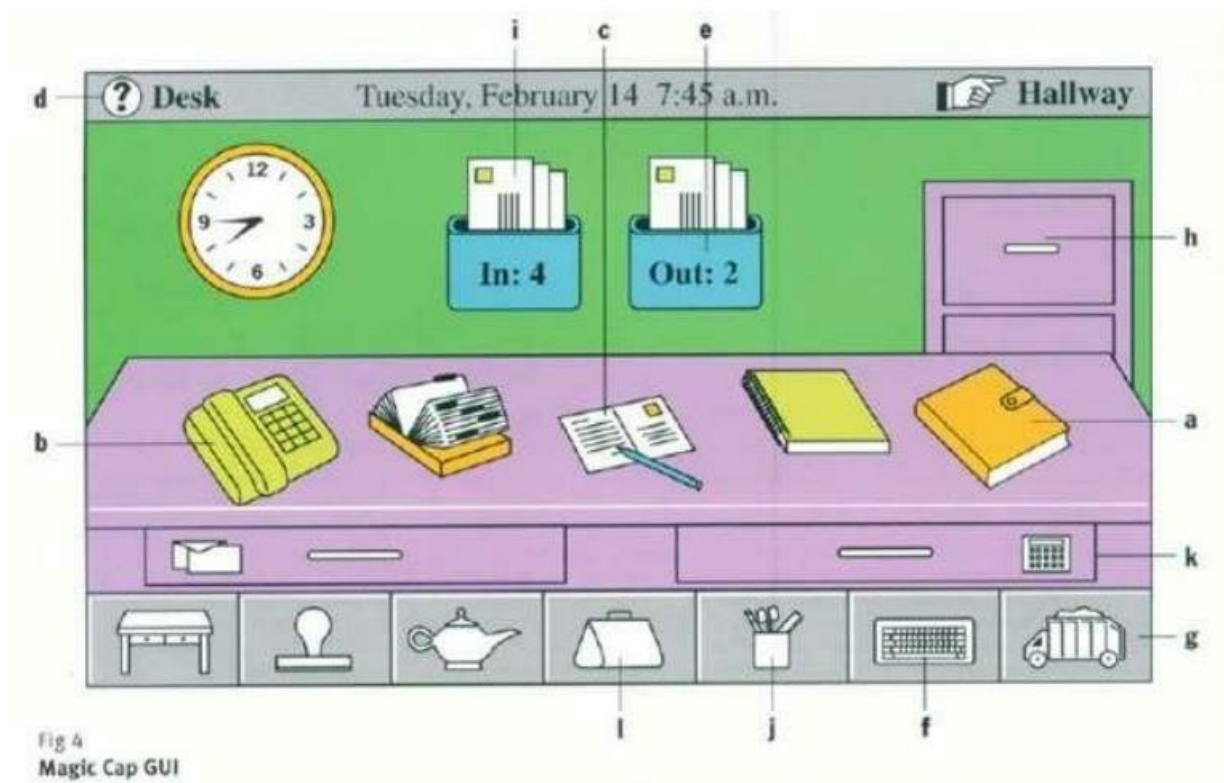
Mac OS X is a Unix-based operating system designed for use on Apple Mac computers. It includes memory-protection, pre-emptive multitasking and symmetric multiprocessing support. Graphics are provided by a graphics engine known as Quartz. It has advanced-PDF standards support, OpenGL and Quicktime integrated into the OS. The operating system features are accessed through a graphical user interface called Aqua.

	Mac OS X	Linux
type	Unix-based	Unix-based
computer	Apple Mac	wide variety
features	memory-protection, pre-emptive multi-tasking, symmetric multiprocessing support	variety of distribution kits available
graphics engine	Quartz	XFree86
standard support	advanced-PDF, OpenGL, Quicktime	
user interface type	GUI	command line, GUI
user interface	Aqua	KDE, Gnome
source code availability	not available	freely available

Homework (GUI : Graphical User Interface)

Task 1 : Study this version of a GUI. Which part of the screen would you touch if you want to :

- 1 make a phone call?
- 2 send an email?
- 3 access a keyboard?
- 4 record an appointment?
- 5 get help?
- 6 write new mail?



Task 2 : What do you think happens if you touch these areas of the screen g, h, i, j, k, l ?

Progress Test : Linux (at the End of the Unit 3)

LINUX



Linux has its roots in a student project. In 1992, an undergraduate called Linus Torvalds was studying computer science in Helsinki, Finland. Like most computer science courses, a big component of it was taught on (and about) Unix. Unix was the wonder operating system of the 1970s and 1980s: both a textbook example of the principles of operating system design, and sufficiently robust to be the standard OS in engineering and scientific computing. But Unix was a commercial product (licensed by AT&T to a number of resellers), and cost more than a student could pay.

Annoyed by the shortcomings of Minix (a compact Unix clone written as a teaching aid by Professor Andy Tanenbaum) Linus set out to write his own 'kernel' — the core of an operating system that handles memory allocation, talks to hardware devices, and makes sure everything keeps running. He used the GNU programming tools developed by Richard Stallman's Free Software Foundation, an organisation of volunteers dedicated to fulfilling Stallman's ideal of making good software that anyone could use without paying. When he'd written a basic kernel, he released the source code to the Linux kernel on the Internet.

Source code is important. It's the original from which compiled programs are generated. If you don't have the source code to a program, you can't modify it to fix bugs or add new features. Most software companies won't sell you their source code, or will only do so for an eye-watering price, because they believe that if they

make it available it will destroy their revenue stream.

What happened next was astounding, from the conventional, commercial software industry point of view — and utterly predictable to anyone who knew about the Free Software Foundation. Programmers (mostly academics and students) began using Linux. They found that it didn't do things they wanted it to do — so they fixed it. And where they improved it, they sent the improvements to Linus, who rolled them into the kernel. And Linux began to grow.

There's a term for this model of software development; it's called Open Source (see www.opensource.org/ for more information). Anyone can have the source code — it's free (in the sense of free speech, not free beer). Anyone can contribute to it. If you use it heavily you may want to extend or develop or fix bugs in it — and it is so easy to give your fixes back to the community that most people do so.

An operating system kernel on its own isn't a lot of use; but Linux was purposefully designed as a near-clone of Unix, and there is a lot of software out there that is free and was designed to compile on Linux. By about 1992, the first 'distributions' appeared.

A distribution is the Linux-user term for a complete operating system kit, complete with the utilities and applications you need to make it do useful things — command interpreters, programming tools, text editors, typesetting tools, and graphical user interfaces based on the X windowing system. X is a standard in academic and scientific computing, but not hitherto common on PCs; it's a complex distributed windowing system on which people implement graphical interfaces like KDE and Gnome.

As more and more people got to know about Linux, some of them began to port the Linux kernel to run on non-standard computers. Because it's free, Linux is now the most widely-ported operating system there is.

[Adapted from 'Smooth Operator' by Charles Stross, Computer Shopper magazine, November 1998]

SPECIALIST READING

A Find the answers to these questions in the following text.

- 1 What did Linus Torvalds use to write the Linux kernel?
- 2 How was the Linux kernel first made available to the general public?
- 3 What is a programmer likely to do with source code?
- 4 Why will most software companies not sell you their source code?
- 5 What type of utilities and applications are provided in a Linux distribution?
- 6 What is X?
- 7 What graphical user interfaces are mentioned in the text?

B Re-read the text to find the answers to these questions.

1 Match the terms in Table A with the statements in Table B.

Table A

- a Kernel
- b Free Software Foundation
- c Source code
- d Open Source
- e A distribution
- f X

Table B

- i A type of software development where any programmer can develop or fix bugs in the software
- ii The original systems program from which compiled programs are generated
- iii A complete operating system kit with the utilities and applications you need to make it do useful things
- iv A standard distributed windowing system on which people implement graphical interfaces
- v An organisation of volunteers dedicated to making good software that anyone could use without paying
- vi The core of an operating system that handles memory allocation, talks to hardware devices, and makes sure everything keeps running

2 Mark the following statements as True or False:

- a Linux was created in the 1980s.
- b Minix was created by a university student.
- c Linux is based on Unix.
- d Minix is based on Unix.
- e Linux runs on more types of computer than any other operating system.

Unit 3 : Distributed Systems

Networks

Lesson Plan 2

Lesson 2 :	Networks	1-3 Sessions (90mnts-270 mnts)
Topics/Themes :	- The Internet - Websites - The World Wide Web	
Course Description: This course emphasizes the networks use in the informational age. These networks include the Internet, the information service on the Internet, and the different websites of this information services. It focuses on the demonstration of the language communicative skills to perform related tasks in Networks.		
Course Objectives : By the end of this lesson, students will be able to : - Read related texts - Infer specific information - Form the Future Forms correctly - Solve problematic situations		
Realia :	- Networks related texts - Audios and recordings - Pictures and images - Pairwork Text : Student A (Speaking Task) - Pairwork Text : Student B (Speaking Task) - Computers and Laptops - The Internet - Data projector	
Glossary of Computing terms and Abbreviations		

Glossary of Computing terms and Abbreviations

earphone /ˈɜːfəʊn/ noun C [24] sound output device that fits into the ear of the user
earth /ɜːθ/ noun U [12] a common name for an electrical ground point or zero voltage point
ebook /ˈiːbʊk/ noun C [25] common name for an electronic book

executable /ˌeksɪˈkjʊtəbəl/ adj [21] containing instructions that can be run or executed by the processor
execute /ˌeksɪkjʊt/ verb [6,18,21] to perform a computer operation by processing a program instruction

encode /ˌenˈkəʊd/ verb [9,11,14,18] to write information in a coded form
encoder /ˌenˈkəʊdɜː(r)/ noun C [9] a computer program that converts WAV files into MP3 files or vice versa
encrypt /ˌenˈkript/ verb [11,18,19] to transform data into coded form to make it secure

References

Boeckner, K. & Brown, C. (2002). *Oxford English for computing : Student's book*. Oxford : Oxford University Press.

----- (1993). *Oxford English for computing : Answer book*.

-
- Oxford : Oxford University Press.
- Esteras, S. R. (2008). *Infotech English for computer users : Student's book*.
Cambridge : Cambridge University Press.
- (2008). *Infotech English for computer users : Teacher's book* (4th ed).
Cambridge : Cambridge University Press.
- Glendinning, E.H & McEwan, J. (2003). *Oxford English for information technology : Student's book*. Oxford : Oxford University Press.
- (2006). *Oxford English for information technology : Student's book* (2nd ed). Oxford : Oxford University Press.
- (2003). *Oxford English for information technology : Teacher's book*. Oxford : Oxford University Press.
- (1999). *Basic English for computing : Student's book*. Oxford : Oxford University Press.
- (1999). *Basic English for computing : Teacher's book*. Oxford : Oxford University Press.
- Maja, O. (2011). *English for information technology 1 : Student's book*. England : Pearson Education Limited.
- David, H. (2012). *English for information technology 2 : Course book*. England : Pearson Education Limited.
- Glendinning, E.H. (2009). *Oxford English for Careers: Technology 1 Student's Book*.
Oxford : Oxford University Press.
- Glendinning, E.H. & Pohl, A. (2009). *Oxford English for Careers: Technology 2 Student's Book*.
Oxford : Oxford University Press.
- Bonamy, D. (2009). *Oxford English for Careers: Technology 1 Teacher's Resources Book*. Oxford : Oxford University Press.
- Pohl, A. (2009). *Oxford English for Careers: Technology 2 Teacher's Resources Book*. Oxford : Oxford University Press.

Lesson Plan

Introduction

Warming-Up

Task 1 : With the help of this diagram, try to describe the function of these components of a typical network system :

1	a file server	5	a LAN
2	a bridge	6	a gateway
3	a router	7	a modem
4	a backbone		

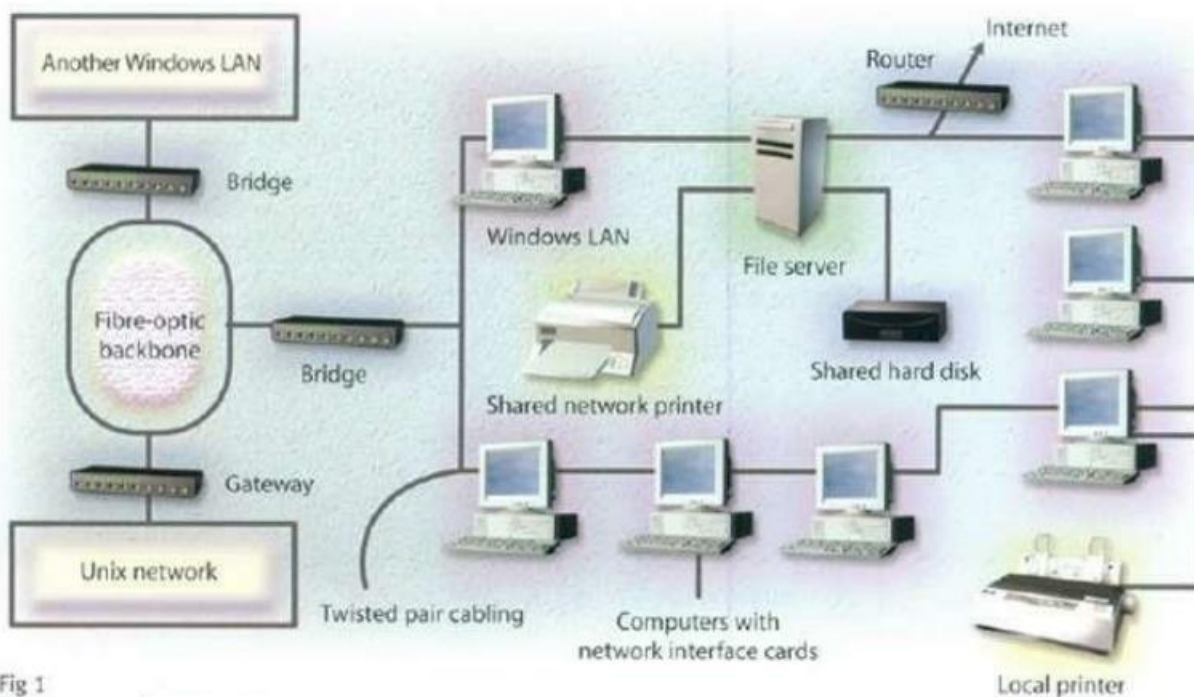


Fig 1
Components of a typical LAN

Body of the Lesson

Listening (Buying a PC)

Task 1 (Before Listening : Guessing)

Listen to a conversation between a customer buying a PC and a sales assistant. Why do you think the sales assistant has to explain so much about the Internet ?

Task 2 (After Listening)

Listen again and complete the customer's notes.

To connect to the Internet from home, I need:

(1) a _____ and (2) a _____.

Also need an account with an (3) _____ (a company that offers connection for a monthly fee).

If you want to connect lots of computers without using cables, you can use a (4) _____ router.

Wi-Fi uses (5) _____ waves to send data over medium-range distances.

Things you can do on the Internet:

(6) _____

'Web' or 'Internet'? The Web: huge collection of (?) _____ stored on computers all over the world. The Internet: the network which connects all the computers.

Reading (Wireless Networking)

Task 1 : Now study this text and the diagram of a wireless network setup. Match the diagram with key to the components of the network.

Wireless networking

Wireless (WiFi) networks are just like fixed LANs but instead of using cables, devices are linked by radio waves.

Each computer in a wireless network requires a wireless network interface card (NIC). These can be built in or you can use plug-in adaptors. These allow each component in the network to communicate with a wireless access point (AP) to create a wireless local area network (WLAN). The AP

operates like a router in a fixed LAN. It also provides a bridge which plugs into the hub of a fixed LAN allowing both fixed and wireless users to talk to each other. If your LAN is connected to the Internet, the WLAN can also use it. If not, you can connect the WLAN to the Internet via an ADSL or cable modem.

What are the advantages of a wireless network? You don't need cabling. In older buildings, it can be expensive to install cables and

access points. With WiFi, one access point can cover an entire floor or even a building. You can work anywhere within range of the access point. On a sunny day, you could work outside. You can make any room in the house your study. There are now WiFi hotspots in hotels, libraries and airports so you can link to a network away from home or your office.

There are disadvantages. Fixed LANs can run at 1000 Mbps. Wireless networks are much slower and the further you are from an access point, the slower the rate. Although there are savings on the cost of cabling, wireless NICs are more expensive than the wired versions. Then there is the problem of interference, if a neighbour is using the same channel, and security. Other users may be able to intercept your data. Encryption programs like Wired Equivalent Privacy (WEP) can help.

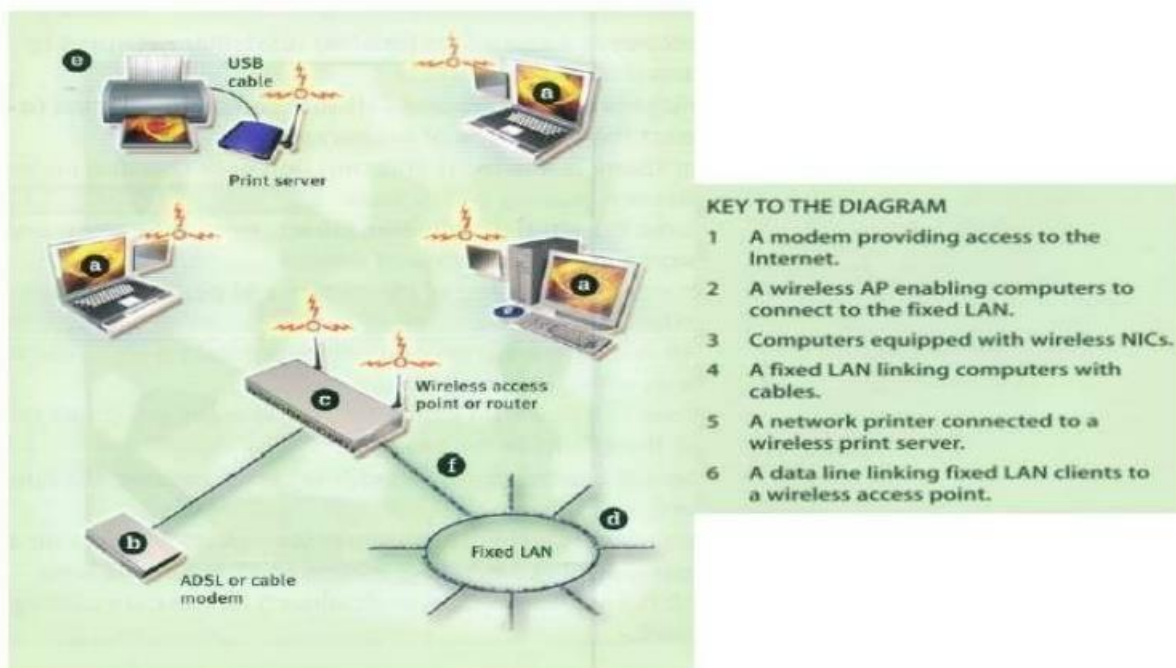


Fig 2
Wireless network

Language Work

Grammar (The Future Forms)

Future forms We use the future simple (will/won't + verb) in the following ways: - To make predictions when you don't have present evidence that something will happen <i>Nanobots will be injected into the body's bloodstream to treat diseases.</i> - To talk about hopes and promises, especially with the words expect, think, hope and probably <i>They hope that people will interact naturally with hundreds of smart devices at a time.</i> - To describe an instant decision, often when we make an offer <i>Sure, I'll help you with your homework.</i> - To talk about facts that will inevitably happen <i>She'll be 21 in May.</i>	We use be going to + verb in the following ways: - To describe future intentions <i>She's going to write a book about ubiquitous computing.</i> - To make predictions when you have present evidence that something is going to happen <i>By all accounts, nanotechnology is going to have a huge impact on business and our daily lives.</i> We use the future continuous (will be + -ing form of the verb) to talk about actions in progress at a specific time in the future. <i>In a few years, doctors will be using expert systems to diagnose illnesses.</i> We use the future perfect (will have + past participle) to talk about actions finished at a specific time in the future. <i>Soon, engineers will have built different types of android.</i>

Task 1 : Choose the correct words in brackets to complete these sentences.

- In the future, I hope we ('ll have / 're going to have) robots in the home to help us with the housework.
- Hey, Nick, be careful, you ('re going to spill / 'll spill) that coffee on the computer!
- It's John's birthday next week. We ('ll give / 're going to give) him a mobile phone.
- My laptop has crashed!
– Don't worry. I ('ll lend / 'm going to lend) you mine.
- The Internet (will probably change / is probably going to change) the publishing industry in the way that TV changed the movie industry.
- Futurists predict that smart technology (will be / is going to be) incorporated into fabrics, so you'll be able to email from your coat!

Task 2 : Complete these sentences with the correct future form of the verb in brackets. Use the future continuous or future perfect.

- Thanks to ICT, by the year 2030 we (find) _____ cures for the major diseases of our time.
- In twenty years' time, some people (live) _____ in space, perhaps inside a computerized colony.
- By this time next week, I (work) _____ for IBM.
- By this time next month, I (buy) _____ that BlackBerry that I've been wanting to buy for months.
- Scientists predict that in twenty years' time nearly everyone (live) _____ in smart houses.

Lexis

Morphology (Compound Nouns 2)

- 1 **Material:** the first noun tells us what the second consists of.

Examples:

a silicon chip (a chip made of silicon)
a ferrite ring (a ring made of ferrite)

- 2 **Function:** the first noun tells us what the second noun is for.

Examples:

an address bus (a bus dedicated to address information)
an input device (a device for inputting)
an arithmetic unit (a unit which performs arithmetic functions)

- 3 **Part:** the second noun refers to a part of the first noun.

Examples:

a computer keyboard (the keyboard of a computer)
a monitor screen (the screen of a monitor)
a program feature (a feature of a program)

- 4 **Activity or person:** the second noun refers to an activity or person related to the first noun.

Examples:

computer programming (the programming of computers)
a computer programmer (a person who programs computers)
systems analysis (the analysis of organizational systems)
a systems analyst (a person who analyses organizational systems)

- 5 **Multiple nouns:** sometimes a compound noun will join together with one or more other nouns to give an expression that has three or four words. In such cases, it is important to examine the expression very carefully to break it into its constituent parts. The secret, as always, is to read the expression from the back towards the front.

Example:

4 3 2 1
a document-image-processing program (a program which processes images of documents)

Note: some expressions are written separately, while others are joined by hyphens. There are no clear rules for this. Sometimes you will see the same expression written in different ways in different texts.

Example:

document-image-processing program
document image-processing program
document image processing program

However, it is important to be consistent within a single text.

Task 1 : Using the explanations in Task 1 Compound Nouns 1 (Lesson 1, Unit 3) as models, write short simple explanations of the following items :

- 1 an input device
- 2 an optical character reader
- 3 a graphics stylus
- 4 a document sorter
- 5 a fibre optics transmission system
- 6 a sequence control register
- 7 a liquid crystal display
- 8 network configuration information
- 9 a desktop document manager
- 10 a multimedia editing software package

Collocations

Collocations 2

A collocation is a pair or group of words that are often used together. For example, we say **make phone calls**, not **do phone calls**.

Here are some common types of collocation:

- verb + noun (see Unit 1)

surf the Web **download music**

- verb + particle

hack into a computer **log onto a bank account**

- adverb + adjective

highly sensitive information
freely available on the Web

- adjective + noun

mathematical formulas **up-to-date** information

The word **online** often collocates with other words and can function as adjective or adverb.

Adjective: They post opinions on **online** journals.

Adverb: A podcast is an audio recording posted **online**.

Task 1 : Match the words on the left (1-6) with the words on the right (a-f) to make collocations. There may be more than one possible answer.

1 online	a friends
2 take	b photos
3 email	c action
4 upload	d website
5 portable	e encyclopedia
6 official	f player

Task 2 : In pairs, make sentences using the collocations above.

Task 3 : Find the collocations in these sentences and say what type they are.

- 1 Once you are online , you can browse the Web, visit chat rooms or send and receive emails.
- 2 Instant messaging can be a great way to communicate with friends.
- 3 This software may not be fully compatible with older operating systems.
- 4 Most webcams plug into a USB port.
- 5 This highly addictive game will keep you playing for hours.
- 6 Companies are starting to use virtual reality on their websites.

Spelling and Recognition

Task 1 : Spell the correct word. The first letter is given as a hint.

A common term used for electronic business.

E

A type of memory often used in server computers.

E

Sound output device.

E

A key feature of object-oriented programming.

E

Semantics

Meaning (Reading to Infer Meaning and Context)

Internet FAQs: Part 1

How old is the Internet (the Net)? When was it created?

It's hard to say exactly. The research that led to what we now know as the Internet was begun in the 1960s.

Who created the Internet?

Again, it's hard to say exactly who created it. The initial research was carried out by the Advanced Research Projects Agency in America, funded by the US government.

Did the Internet become popular quickly?

It took many years for the Internet to become popular around the world. It's only really since the mid-90s that the Internet has been a part of our daily lives.

How do you get online?

To get connected, you need a computer, the right connection software and a modem connected to the phone line. You also need an account with an Internet Service Provider (ISP), which acts as a gateway between your PC and the rest of the Net.

How fast are today's Internet connections?

Today, ISPs offer a broadband, high-speed connection. The most common types are cable — offered by local cable TV companies — and ADSL (Asymmetric Digital Subscriber Line), which works through phone lines. They are both faster than the traditional dial-up telephone connection. Broadband access is also offered by some electricity networks. This competing technology, known as power-line Internet, provides low-cost access via the power plug, but is still in development.

How long has broadband existed?

Since the late 1990s.

How much does broadband access cost?

It depends on which company you choose. Nowadays, some companies even offer free broadband.

Why do you need a modem?

A modem (modulator/demodulator) converts digital signals into analogue signals so that data can be transmitted across the phone or cable network.

What does TCP/IP mean?

The language used for data transfer on the Internet is known as TCP/IP (transmission control protocol/Internet protocol). This is like the internet operating system. Every computer connected to the Net is identified by a unique IP address.

Are there other ways of accessing the Internet?

Other methods of internet access include Wi-Fi, satellite, mobile phones and TV sets equipped with a modem. Wi-Fi-enabled laptops or PDAs allow you to connect to the Net if you are near a wireless access point, in locations called hotspots (for example, a Wi-Fi café, park or campus). Satellite services are used in places where terrestrial access is not available (for example, on ships at sea). High-end mobile phones provide access through the phone network.

Task 1 : In pairs, discuss which of the internet systems (1-6) you would use to do the tasks (a-f). Then read Part 2 of the FAQs and check your answers.

1 Email	a transfer files from the Internet to your hard drive
2 The Web	b send a message to another person via the Internet
3 Newsgroups	c have a live conversation (usually typed) online
4 Chat and IM	d connect to a remote computer by entering instructions, and run a program on it
5 FTP	e take part in public discussion areas devoted to specific topics
6 Telnet	f download and view documents published on the Internet

Context

Task 2 : Find words and phrases in Part 2 with the following meanings.

- 1 a system used to distribute email to many different subscribers at once (in Email paragraph)
- 2 a program used for displaying web pages (in The Web paragraph)
- 3 to connect to a computer by typing your username and password (in Telnet paragraph)
- 4 a series of interrelated messages on a given topic (in Newsgroups paragraph)
- 5 a program for reading Usenet newsgroups (in Newsgroups paragraph)

Internet FAQs: Part 2

Email

Email lets you exchange messages with people all over the world. Optional attached files can include text, pictures and even audio and animation. A mailing list uses email to communicate messages to all its subscribers – that is, everyone that belongs to the list.

Which email program is the best?

Outlook Express is a popular program, but many users use web-based email accounts such as Hotmail.

The Web

The Web consists of billions of documents living on web servers that use the HTTP protocol. You navigate through the Web using a program called a web browser, which lets you search, view and print web pages.

How often are web pages updated?

It depends entirely on the page. Some are updated thousands of times a day.

Chat and Instant Messaging (IM)

Chat and Instant Messaging technologies allow you to have real-time conversations online, by typing messages at the keyboard.

FTP

FTP, or file transfer protocol, is used to transfer files over a TCP/IP network. Nowadays, this feature is built into Web browsers. You can download programs, games and music files from a remote computer to your hard drive.

Telnet

Telnet is a protocol and a program used to log onto remote computer systems. It enables you to enter commands that will be executed as if you were entering them directly on the remote server.

Newsgroups

Newsgroups are the public discussion areas which make up a system called *Usenet*. The contents are contributed by people who post articles or respond to articles, creating chains of related postings called message threads. You need a newsreader to subscribe to newsgroups and to read and post messages. The newsreader may be a stand-alone program or part of a web browser.

How many newsgroups are there?

There are approximately 30,000 active newsgroups.

Where can you find newsgroups?

Your newsreader may allow you to download the newsgroup addresses that your ISP has included on its news server. An alternative to using a newsreader is to visit web forums instead, which perform the same function but without the additional software.

Polysemy

Task 1 : Look the given words up in your dictionary. Give the literal meaning (direct meaning) and the technical meaning (computing meaning) of the following words :

Encode (verb)

.....

(Computing)

Execute (verb)

.....

(Computing)

Earth (noun, verb)

.....

(Computing)

Editor (noun)

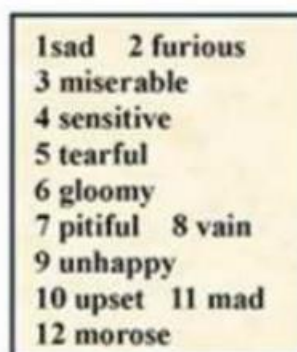
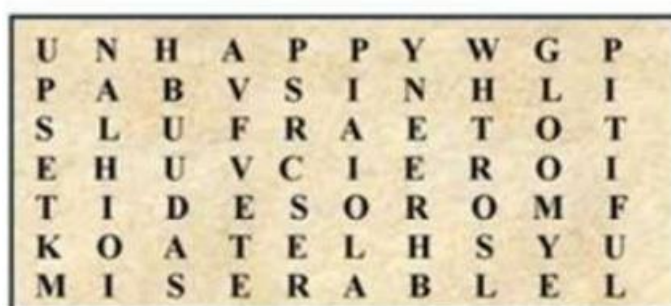
.....

(Computing)

Task 2 : Put the previous computing words in full sentences (computing context).

Synonyms

Task 1 : Find 8 words which all mean 'sad' in this word search. The synonyms are given in the box.



Antonyms

Task 1 : Choose the right option.

- 1 Enjoying other's company: _____ secretive / sociable
- 2 Annoyed or impatient about something: _____ irritated / contented
- 3 Feeling things very intensely: _____ sensitive/sensible
- 4 Not polite to others: _____ well-mannered / rude
- 5 Relaxed in attitude to self and others: _____ argumentative / easy-going

Speaking (Transmission Modes)

Task 1 : Work in pairs, A and B. Explain to your partner how one mode of transmission between computers operates with the help of the text provided. Your explanation should allow your partner to label his/her diagram.

Student A : Your explanation should allow your partner to label this diagram.

Asynchronous transmission

This method is also called start-stop transmission. In asynchronous transmission, data is sent one byte (or character) at a time. Each string of bits making up the byte is bracketed, or marked off, with special control bits. That is, a 'start' bit represents the beginning of a character, and a 'stop' bit represents its end. As a means of checking that the whole character has been

transmitted, an error check bit is generated immediately after each character.

Transmitting only one byte at a time makes this a relatively slow method. As a result, asynchronous transmission is not used when great amounts of data must be sent rapidly. Its advantage is that the data can be transmitted whenever it is convenient for the sender.

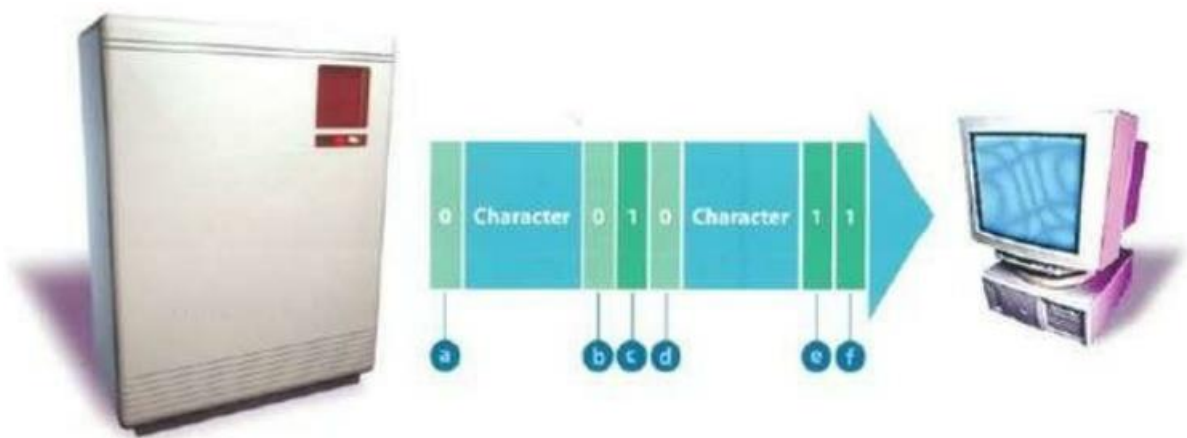


Fig 3
Asynchronous transmission

Student B : Your explanation should allow your partner to label this diagram.

Synchronous transmission

Synchronous transmission sends data in blocks of characters. Start and stop bit patterns, called synch bytes, are transmitted at the beginning and end of the blocks. These start and end bit patterns synchronise internal clocks in the sending and receiving devices so that they are in time with each other. Error check bytes are included immediately after each block of characters

to ensure that the whole sequence of characters has been correctly transmitted.

This method is more complicated and expensive than asynchronous transmission. It also requires careful timing between sending and receiving equipment. It is appropriate for computer systems that need to transmit great quantities of data quickly.



Problem-Solving

[illegible]

Specific Writing Rubric (Making Comparisons and Listing)

560

Formation

The regular comparative and superlative forms of descriptive words (adjectives and adverbs) are shown below:

- 1 Words of one syllable add the ending *-er* and *-est*.

Examples:

	Absolute	Comparative	Superlative
Adjectives	new old big	newer older bigger	newest oldest biggest
Adverbs	soon late	sooner later	soonest latest

- 2 Words with three or more syllables are preceded by *more* and *most*.

Examples:

	Absolute	Comparative	Superlative
Adjectives	interesting convenient beautiful	more interesting more convenient more beautiful	most interesting most convenient most beautiful
Adverbs	easily carefully	more easily more carefully	most easily most carefully

Use in sentences

Comparisons may show equivalence, non-equivalence, the highest degree of something, and parallel increase.

- 1 Equivalence: the following words or constructions are used to show that things or people are similar in some way.

as ... as	are similar	each
as many ... as	equal to	either
as much ... as	is like	all
the same ... as	similar/ly	both
similar to	equal/ly	alike
the same	compared to/with	

Examples:

- 1 Here, the term 'processor' is **equivalent to** the central processing unit.
- 2 Laptops are **as** powerful **as** microcomputers.
- 3 Some companies have **as many** computers **as** employees.
- 4 Some companies use **both** disks **and** conventional filing systems for storing data.
- 5 A computer virus is **like** a virus in the human body. It can do a lot of damage.
- 6 Many word-processing programs are **similar** in that they share certain common functions.

- 2 **Non-equivalence:** the following words and constructions are used to compare or contrast things or people that are separate from each other.

not as ... as	greater than	unequal(ly)
...-er than	not as many ... as	unlike
more ... than	not as much ... as	not the same as
fewer ... than	not equal to	not all
less ... than		

Examples:

- 1 A mainframe **is larger** and **more** expensive **than** a microcomputer.
 - 2 Learning to use a computer is **not as** difficult **as** learning to program.
 - 3 A fax board costs **less than** a fax machine.
 - 4 **Unlike** factory-sealed software, pirated versions may contain viruses.
 - 5 Desktop publishing is **the same as** electronic publishing.
 - 6 You can save money with a network because you will need **fewer** printers.
- 3 **The highest degree:** the following words and constructions are used to compare one member of a group with the whole group (superlative).

the ...-est	the most ...	the least ...

Examples:

- 1 This is **the most popular** package on the market today.
- 2 BASIC is probably **the least difficult** programming language to learn.
- 3 **The best** programs are those adapted specifically to your own needs.

Task 1 : Read the following sentences. Decide whether the sentences express equivalence, non-equivalence, or the superlative, then underline the words expressing the comparison.

- 1 equivalence Speeds for performing decision-making operations are comparable to those for arithmetic operations.
- 2 _____ Even the most sophisticated computer, no matter how good it is, must be told what to do.
- 3 _____ A computer can perform similar operations thousands of times, without becoming bored, tired, or careless.
- 4 _____ For example, modern computers can solve certain classes of arithmetic problems millions of times faster than a skilled mathematician.
- 5 _____ One of the most important reasons why computers are used so widely today is that almost every big problem can be solved by solving a number of little problems.
- 6 _____ Finally, a computer, unlike a human being, has no intuition.

Listing

It is important when reading to recognize and understand the relationship in which sentences and groups of sentences combine to present information. This information may be linked by means of a connective word or marker.

Making a list, for example when enumerating, and giving instructions, indicates a cataloguing of what is being said. It is important to note that most enumerations belong to clearly defined sets. The following table is a list of the markers that can be used to show the order in which things are to be said.

1, 2, 3, etc.	
one, two, three, etc.	
first(ly), second(ly), third place	
another, next, then	
furthermore, afterwards, moreover	
lastly/finally	
to begin/start with, and to conclude	
first and foremost	} mark the beginning of a descending order
first and most important(ly)	
above all	} mark the end of an ascending order
last but not least	

There are many ways of showing sequential relationships. Those given in the table above are not the only ones, they are the most common ones used in listing or enumerating. The *-ly* forms are usually used when listing.

Sample paragraphs:

More and more police departments are now using sophisticated devices to help control the increasing crime rate. Some of these devices are: *firstly*, a computer terminal inside a police vehicle to answer an officer's questions, *secondly*, a computer-controlled display unit for displaying fingerprints, and *thirdly*, educational systems for police officers such as terminals, enabling them to verify changes in laws, rules, and regulations.

The computer memory of many law enforcement systems contains all kinds of information. *First and foremost*, it has data on stolen items such as cars, licence plates, and property. *Second*, it has information on missing persons and wanted fugitives. *Last but not least*, it contains information on political extremist groups and their activities.

Computers have certainly revolutionized police work by providing access to millions of items of information with the least possible delay and speeding up the process of apprehending suspicious-looking characters.

Task 1 : Complete the following paragraph by filling in the blanks with appropriate listing markers.

Computers can do wonders, but they can waste a lot of money unless careful consideration goes into buying them. Businessmen and women thinking of buying a computer system should ¹ _____ admit they know very little about computers. ² _____, they must realize that the computer sales people don't always know how their business works. ³ _____, it is essential that buyers should get outside advice, not necessarily from consultants but from other executives who have had recent experience in buying a computer system. ⁴ _____ they should try to see systems similar to ones under consideration in operation. Because their operations will have differences that must be accommodated, they should ⁵ _____ find out what would be involved in upgrading a system. ⁶ _____ important thing to know before buying a computer is the financial situation of the supplier because computer companies come and go and not all are financially stable. ⁷ _____, the prospective buyer should demand that every detail be covered in writing, including hardware and software if they are supplied by different companies. There's nothing wrong with computers themselves, it's how and why they are used that can cause problems.

Task 2 : Complete the following paragraph about the various steps in the creation of a database by filling in the blanks with appropriate listing markers.

When you are creating a new database, you must ¹ _____ decide how many fields you will need in your database. ² _____, you will have to provide up to five items of information about each field. ³ _____, each field needs to have a name. ⁴ _____, the field type has to be defined. Character, numeric, date, and logical are some common types. ⁵ _____ choice to be made is the width of the field. However, some fields, such as date, have present default values. The ⁶ _____ step is to set the number of decimal places if the field is numeric. ⁷ _____, you will have to indicate whether the field is to be indexed or not.

Evaluation

Writing (Advantages and Disadvantages of Networks)

Task 1 : Using the lists you compiled in Task 1 (Problem-Solving), describe the advantages and disadvantages of networks. Try to link some of the advantages and disadvantages in these examples.

Advantages	Disadvantages
Allow data to be shared.	Permit viruses to spread quickly.
Users can share software on the server.	Server failure means no one can work.

- 1 Although networks allow data to be shared, they permit viruses to spread quickly.
- 2 Users can share software on the server; however, server failure means that no one can work.

Homework (Choosing ISP : Internet Service Provider)

Task 1 : Read these hints on choosing an ISP. Then decide which of the options available offer the best deal to these users. Be prepared to defend your choice.

- 1 a student looking for a cheap package
- 2 a small business
- 3 someone who enjoys online gaming
- 4 someone who sends occasional emails

Using an ISP requires no new technology – all you need is a computer, a modem, a telephone line (preferably broadband), and the appropriate software (which is available free of charge when you sign up with the service).

Most of the services are very similar, but it is still worth looking around for a service that offers at least the following features:

High speed

Connection can be provided by standard dial-up using an ordinary modem or by using a broadband connection. Standard dial-up is the slowest at 56 Kbps. Broadband such as ADSL (Asymmetric Digital Subscriber Line) provides different speeds for uploading (sending data) and downloading (receiving data) ranging from 256 Kbps to 2 Mbps.

sign-up software on CD-ROM that will automatically configure your computer to access the Internet.

Local rate calls

Nearly all ISPs provide local call access numbers. Any ISP that uses a national rate number or charges an initial set up or administration fee should be avoided.

Email

Having several email accounts is very useful – you can separate business and personal email for example, or provide an address for each member of your family. Many ISPs also offer only Web-based mail which is great if you need to get into your computer on the move as you can access it from any computer with Internet access. POP3 email, however, is faster and more efficient and can be downloaded to your PC to read offline – a combination of the two is ideal.

High Usage Allowance

The amount of data that you are allowed to upload or download in a given time period may be limited. Sending email, browsing the Web or downloading images does not require high usage allowances, downloading MP3 music files requires more. Online gaming and viewing video online will require a high usage allowance. Usage allowance is normally quoted as GB per month.

Good Value Packages

Various packages are available offering different options that can be paid monthly, annually, bi-annually etc. With these packages, after paying the initial fee, Internet access is usually unmetered. You can also opt for pay-as-you-go packages. Look for a package where the initial rate is reduced. You have to compare ISP offers carefully to find a package that provides what you want at the cheapest cost.

CD-ROM or Online sign up

Some ISPs require you to sign up for their service online (which obviously means you already need to have an Internet connection and some experience with setting up a dial-up networking connection). If you are a complete beginner, you'll need an ISP which can provide its

Junk mail filtering and virus checking

Spam (unsolicited email) is very common. It fills up your storage space and is time consuming to deal with. It is also one of the main sources of viruses that attack your computer. Look for an ISP that provides good filtering services to remove junk mail and viruses before they reach your computer.

Free Web space

A decent amount of free Web space would be around 25–50Mb. This would be sufficient for most of your own personal website developments. Also check to see if there are any restrictions on your use of web space, since some ISPs will not let you use the space for commercial purposes.

Customer Support

The accessibility and quality of customer support provided by ISPs varies greatly and some ISPs make an additional charge for support.

Reliable Service

Of course all the features in the world won't make a scrap of difference if the ISP is unreliable and you find it impossible to log on. Look out for recommendations from friends and shop around.

The screenshot shows the Virgin.net website interface. At the top, there's a red header with the 'virgin.net' logo and a 'Registration' link. Below the header, the page is divided into two main sections: 'New to Virgin.net...' and 'Existing customers...'. The 'New to Virgin.net...' section features a list of internet packages with their respective prices and 'Sign up' buttons. The 'Existing customers...' section offers links for changing packages, comparison tables, and reinstalling settings. On the right side of the 'Existing customers...' section, there is an illustration of a woman sitting and reading a book. The bottom of the page has a red footer with the website URL 'www.virgin.net'.

New to Virgin.net...	
An Internet package that suits you...	
Please select the Internet package you'd like to sign up for:	
Broadband Plan Three 512 Kbps - up to 10 times faster than a standard dial up connection No 12 month contract 3 GB download allowance Free activation and modem	£14.99 Sign up
Broadband Plan Two 512 Kbps - up to 10 times faster than a standard dial up connection No 12 month contract 5 GB download allowance Free activation and modem	£17.99 Sign up
Broadband Plan One 1 Mbps - up to 20 times faster than a standard dial up connection No 12 month contract needed 20 GB download allowance Free activation and modem	£24.99 Sign up
Unlimited Internet access No 12 month contract No additional charges	£12.49 Sign up
Virgin.net Pay As You Go No credit card needed No monthly subscription	from 1p per minute Sign up

Existing customers...	
Change your package or help	
Select your desired help or reinstallation option below:	
Comparison table We can help you find the right package here	>>
Changing your package Do you already use Virgin.net and want to change your package? Find out here	>>
Reinstall your Virgin.net connection settings Reinstall your account	>>
Virgin.net registration CD Click here to get it free!	>>

For further details of ISPs try:
www.net4nowt.com
www.ispa.org.uk

Progress Test : Linux (at the End of the Unit)

Students' Tests Papers (Pre-Test and Post-Test)

Pre-Test

Tlemcen University
Faculty of Sciences
Department of ICT

First Semester
Master 1
Technical English Exam

Feb 2019
Mss. Hammoudi
Time: 1h 30m

Full Name: Benmamoun Lohiane Group: SIC
Room: Mark: 10.00 Observation:

Question: In a coherent ESSAY

1. Comment on the following diagram by COMPARING between the different types of computer networks.

2. You have to use the following key words: Computer network, area, personal, local, metropolitan, regional, wide, distance (short, shorter, long, longer, close, far, further), place (small, large, office, house, building, company, city), time (rapid, faster, slow), speed (more or less speedy), ownership (one person, many), privacy (private, public, easy or difficult for hacking), material (computers, printers, Bluetooth, laser).

3. Illustrate with examples.

Network refers to a group of computers in a building linked together (peer-to-peer or client-server).

LAN is a computer network where computers are interconnected in a limited area such as building, office etc. LAN has a high speed connection, small number of users, private ownership and it's easy to manipulate. LAN consists of the following components: computers, network devices and network interface device.

Cont. 6
Str. 2
Gram. 1

LAN are designed to operate with a small area
Share Network (printer) - Files, and allow communication
between computers.

(0.7) MAN is a larger computer network. usually it spans
a city. Man can link a number of LANs.
it operates a large area. it has a medium number of users
with a medium speed. it can be private or public.

(0.8) WAN is more complex than LAN and MAN, interconnected
computer. in larger physical area, the network is
the basic example of WAN. it interconnects computer around
the world. WAN has a big number of users, with
a low speed and it is difficult to manipulate. it can be
private or public. WAN consists of the following components:
Modem, DSL, ISDN. it is designed to allow users to
communicate and gives e-mail, e-commerce.

Moreover, there are many technologies for each type
of network. for example LAN has Ethernet and DDPI
(Fibre integrated LAN).

(0.5) Another type is not mentioned in the illustration
called VPN (Virtual Private Network).

Full Name: Lassane Imane

Group: SIC

Room: 106

Mark: 11.5

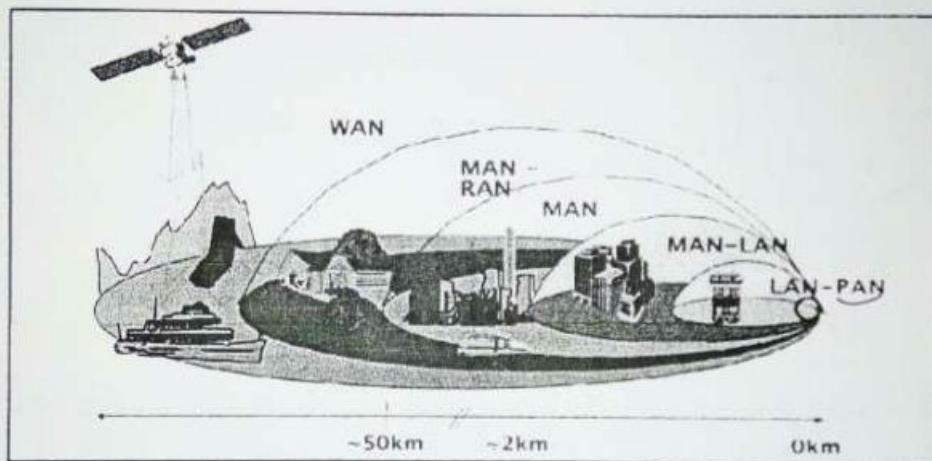
Observation: /

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3. Illustrate with examples.



^{used}
This time must many protocols to diffuse the information, in easy way and easy time.

Save the groupes of ingenieurs of telecommunication.

Developing the Net Working.

Now we have a different types of computer

Networks:

the PAN, it's a personal area network, that means

O.F
four
introduction
must be in
one block
not separate
sentences!

Cont. 5
Str. 6
Gram. 9.5

one computer network use with one person. Same the PAN used in the short distance, a small place in the house, the time of response is rapid and speedy. They use the private Id, that means a difficult for hacking.

The LAN, is a local area network, it's about a small area like the house. Use a small number of computers. The time of response is rapid and speed. LAN is like a PAN use the private Id, same difficult for hacking.

MAN, is for a long distance, a large area network like a company. They have a many user of computer, same the time of response is slow and less speedy. The Id is public/private (it's not security).

RAN, is a regional area network, a longer than MAN. Use for a large place. The time of response is slow and less speedy than MAN. RAN use Id public/private like a MAN, same not security.

WAN, is a wide area network, is longer than (MAN-RAN) use for a large place like a city. The time of response is slow and less speedy than (MAN-RAN), they have many user of computer. The (MAN-RAN)

the Id is public/private same we have a problem of attacks of hackers (not security).

Conclusion: in future we need a more than protocols because the users is longest!!

Full Name: SOUB. Mohamed EL. Amine

Group: SEC

Room:

Mark: 06/00

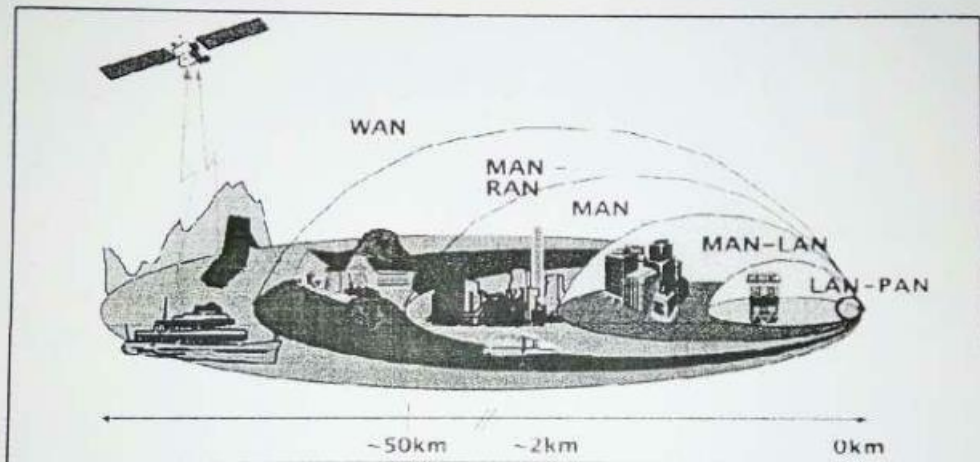
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3. Illustrate with examples.



..... A computer network is a group of two or more computers connected with each other for sharing resources and information

0.5

..... A simple computer network can be built only from two computers, while a complex computer network can be built from several thousand computers

..... A LAN is a computer network with spans over a small geographical area such as home, office, etc.

0.3

..... Computers are placed relatively close, since computers are located within small distances, they do not need special devices and cables to connect with each other.

0.25

Cont. 2.25
Str. 2
Gram. 2.1

A WAN is a computer network which connects two or more LAN networks within same city. When due to distance ~~distance~~ connecting them ~~is not possible~~ is not possible. (0.1)

MAN network is used. It is larger than LAN but smaller than WAN. It deploys special devices and cables to connect the LANs. (0.25)

WAN is a computer network which spans over a large geographical area such as state, region, country etc. (0.25)

WANs are typically used to connect two or more LANs or nodes which are located relatively very far from each other. (0.25)

To provide connectivity, this network uses special devices, cables and technologies.

Conclusion

Post-Test

Goal mine
SIC

14
20

XML Takes on HTML

Standard Generalized Markup Language (SGML) is the language that spawned both HTML (HyperText Markup Language) and XML (extensible Markup Language). SGML is not a true language, it is a metalanguage, which is a language from which you can create other languages. In this case, it is the creation of a markup language (a system of encoded instructions for structuring and formatting electronic document elements). HTML is an application-specific derivation of SGML. It is a set of codes, generally used for webpages, that creates electronic documents according to rules established by SGML. HTML is a language that is all about the presentation of your information, not what the actual data is. You can, therefore, say that HTML is a presentation language. XML is a subset of SGML, but it is also, like SGML, a metalanguage. XML defines a specific method for creating text formats for data so that files are program independent, platform independent, and support internationalisation (able to read different languages, etc.) In fact, because XML is an extensible language, you do not even have to have a browser to interpret the page. Applications can parse the XML document and read the information without any human intervention.

1/ Find the answers to these questions in the text.

- 1- What languages were derived from SGML? HTML and XML
- 2- What type of language is used to structure and format elements of a document?
HTML
- 3- Name two metalanguages. SGML, XML

2/ Match the terms in Table A with the statements in Table B.

Table A	Table B
a Metadata	i Extensible markup language
b Metalanguage	ii A coding system used for structuring and formatting documents
c HTML	iii Data about data
d XML	iv An example of a page presentation language
e Markup language	v A language from which you can create other languages

3/ Complete the gap in each sentence with the correct form of the verb in brackets.

- a Windows allows you (display) to display two different folders at the same time.
Adding more memory lets your computer (work) work faster.

4/ Essay Writing

Study these instructions for moving a file from one folder to another using Windows Explorer. Then write your own instructions in a form of small paragraphs on how to write a computer program (stages of programming).

6,25

TO MOVE A FILE

- 1 If you want to move a file that was saved in a different folder, locate and open the folder.
- 2 Right-click the file you want to move; then click Cut on the shortcut menu.
- 3 Locate and open the folder where you want to put the file.
- 4 Right-click the folder; then click Paste on the shortcut menu.

Content: 3

Gr: 0.50

Lexis: 1

Revising: 0.5

Form: 1.25

Computer programs are so used to solve many problems, and to make our life more easy.

Most problems that we can face are maths problems so that's why we write computer programs to solve it. We choose a language to define our variables, instructions and methods. One of the famous language is "C". To write a programme or a code with C, we should use code blocks for example like a platform, we create a new file and we save it in a folder in the computer, this file will contain our code. We begin with creating variables that we use to form instructions to solve the problem, by the end we compile this programme and we execute it.

Many people use the language "C" but there's more languages like Java, Python.

Terhi - Hanaime
Abessamed
SIC

12
20

XML Takes on HTML

Standard Generalized Markup Language (SGML) is the language that spawned both HTML (HyperText Markup Language) and XML (extensible Markup Language). SGML is not a true language, it is a metalanguage, which is a language from which you can create other languages. In this case, it is the creation of a markup language (a system of encoded instructions for structuring and formatting electronic document elements). HTML is an application-specific derivation of SGML. It is a set of codes, generally used for webpages, that creates electronic documents according to rules established by SGML. HTML is a language that is all about the presentation of your information, not what the actual data is. You can, therefore, say that HTML is a presentation language. XML is a subset of SGML, but it is also, like SGML, a metalanguage. XML defines a specific method for creating text formats for data so that files are program independent, platform independent, and support internationalisation (able to read different languages, etc.) In fact, because XML is an extensible language, you do not even have to have a browser to interpret the page. Applications can parse the XML document and read the information without any human intervention.

1/ Find the answers to these questions in the text.

- 1- What languages were derived from SGML? HTML, XML (1.5)
- 2- What type of language is used to structure and format elements of a document?
Markup language (1.5)
- 3- Name two metalanguages. SGML, XML (1.5)

2/ Match the terms in Table A with the statements in Table B.

Table A	Table B
a Metadata	i Extensible markup language
b Metalanguage	ii A coding system used for structuring and formatting documents
c HTML	iii Data about data
d XML	iv An example of a page presentation language
e Markup language	v A language from which you can create other languages

3/ Complete the gap in each sentence with the correct form of the verb in brackets.

- ① Windows allows you (display) to display two different folders at the same time.
Adding more memory lets your computer (work) more faster.

4/ Essay Writing

Study these instructions for moving a file from one folder to another using Windows Explorer. Then write your own instructions in a form of small paragraphs on how to write a computer program (stages of programming).

3

TO MOVE A FILE

- 1 If you want to move a file that was saved in a different folder, locate and open the folder.
- 2 Right-click the file you want to move; then click Cut on the shortcut menu.
- 3 Locate and open the folder where you want to put the file.
- 4 Right-click the folder, then click Paste on the shortcut menu.

Context: 1,5

Lexis: 0,75

Gr: 0,5

Morning: 0,25

Form: 0

Programs

spelling

- 1) Analyse the problem which want to be solved by a computer program (0,5)
- 2) Mention the feature, functionality of our future program which with them we will can resolve the problem.
- 3) Search the best language with it or we can implement all of the features.
- 4) Search the function of this language with the we can translate this feature to a line code.
- 5) Do the same thing of 4) for all the features.
- 6) Compile the program.
- 7) If the compiler show us one or a lot of error, we will repair resolve these error because if not, the program will not run and give us the solution of our problem.
- 8) If the compiler doesn't show us error, we run the program (click on the the button run or follow the procedure of running program) (or running) interpreter's
- 9) We see the result of our program which the computer solution of our problem.

(0,5)

Mabi Zarkaria.
M1. SIC

13.75
20

XML Takes on HTML

Standard Generalized Markup Language (SGML) is the language that spawned both HTML (HyperText Markup Language) and XML (extensible Markup Language). SGML is not a true language, it is a metalanguage, which is a language from which you can create other languages. In this case, it is the creation of a markup language (a system of encoded instructions for structuring and formatting electronic document elements). HTML is an application-specific derivation of SGML. It is a set of codes, generally used for webpages, that creates electronic documents according to rules established by SGML. HTML is a language that is all about the presentation of your information, not what the actual data is. You can, therefore, say that HTML is a presentation language. XML is a subset of SGML, but it is also, like SGML, a metalanguage. XML defines a specific method for creating text formats for data so that files are program independent, platform independent, and support internationalisation (able to read different languages, etc.) In fact, because XML is an extensible language, you do not even have to have a browser to interpret the page. Applications can parse the XML document and read the information without any human intervention.

1/ Find the answers to these questions in the text.

- 1- What languages were derived from SGML? Languages that are derived are: HTML, XML
- 2- What type of language is used to structure and format elements of a document?
HTML
- 3- Name two metalanguages. SGML, XML

2/ Match the terms in Table A with the statements in Table B.

Table A		Table B	
a	Metadata	i	Extensible markup language
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e	Markup language	v	A language from which you can create other languages

3/ Complete the gap in each sentence with the correct form of the verb in brackets.

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- 3 Locate and open the folder where you want to put the file.
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Content: 2.5

Lexis: 1

Gr: 1.25

Meaning: 0.75

Form: 0.75

(5, 25)

- writing a computer program is not a hard task to do, it just needs to be following a set of simple stages to accomplish that.

9 (0.5) First, before any code is typed, there should be a study of the problem, that means understanding and translating the problem into from the perspective of human natural understanding to a model of logical relationships between different data or action models like NCD (Model conception diagram).

Secondly, we convert from NCD to another stage NLD (Model language diagram), which is the step in which we transform our problem data structure into a Database Table Schemas.

Finally, is to convert all of the above into a programming language of our choice by a special software that generate the code automatically or manually by using the programmer's knowledge.

Summary

The aim of this investigation project is to highlight the English language needs of Master 1 Computer Science students at Tlemcen University, mainly their specific writing skill. Needs analysis showed that indeed specific written discourse takes the lead in educational and employment situations. As a result, learners are required to foster their linguistic competence, specific vocabulary understanding, and other language skills. To meet this purpose, a content-based syllabus was developed and implemented by virtue of action research. Thus, a wide range of communicative tasks, interactive exercises, language functions, and teaching techniques were incorporated within the syllabus content and teaching practices to satisfy the students' demands. The findings dissect the positive impact of the designed syllabus on students overall language proficiency and particularly the written specific communication.

Keywords : English for Specific Purposes, Computer Science, Discipline-Specific Written Discourse, Content-Based Syllabus, Linguistic Competence.

ملخص

الهدف من هذا المشروع البحثي هو تسليط الضوء على احتياجات اللغة الإنجليزية لطلاب ماستر 1 علوم الكمبيوتر، جامعة تلمسان، خاصة مهاراتهم في الكتابة. أظهر تحليل الاحتياجات أن الخطاب المكتوب المحدد بالفعل يأخذ الصدارة في حالات التعليم والتوظيف. ونتيجة لذلك، يعين على الطلاب تعزيز كفاءتهم اللغوية وفهم المفردات المحددة. لتحقيق هذا الغرض، تم تطوير وتنفيذ منهج قائم على المحتوى من خلال البحث الإجرائي. وهكذا، تم دمج مجموعة واسعة من المهام التواصلية والتمارين التفاعلية ووظائف اللغة وتقنيات التدريس في محتوى المنهج والممارسات البيداغوجية لتلبية متطلبات الطلاب. تشير النتائج إلى الأثر الإيجابي للبرنامج المصمم على المهارات اللغوية العامة للطلاب وعلى وجه الخصوص التواصل الكتابي المحدد.

الكلمات المفتاحية: اللغة الإنجليزية لأغراض خاصة، علوم الكمبيوتر، الخطاب الكتابي الخاص بالانضباط، المنهج القائم على المحتوى، الكفاءة اللغوية.

Résumé

L'objectif de ce projet d'investigation est de mettre en évidence les besoins de la langue anglaise des étudiants en informatique Master 1 de l'Université de Tlemcen, principalement leur compétence d'écriture spécifique. L'analyse des besoins a montré qu'en effet, un discours écrit spécifique prend les devants dans les situations d'éducation et d'emploi. Par conséquent, les apprenants doivent favoriser leurs compétences linguistiques et leur compréhension spécifique du vocabulaire. Pour atteindre cet objectif, un programme basé sur le contenu a été développé et mis en œuvre grâce à la recherche-action. Ainsi, un large éventail de tâches de communication, d'exercices interactifs, de fonctions langagières et de techniques d'enseignement a été intégré au contenu du programme et aux pratiques pédagogiques pour satisfaire les demandes des étudiants. Les résultats disséquent l'impact positif du programme conçu sur les compétences linguistiques globales des étudiants et en particulier la communication spécifique écrite.

Mots-clés: Anglais à des fins spécifiques, informatique, discours écrit spécifique à une discipline, programme basé sur le contenu, compétence linguistique.