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An Exploration and Analysis of Language Difficulties Faced while Writing Scientific Articles: Case of ESP Doctorate Students at Tlemcen University

Extended Essay Submitted to the Department of English as a Partial Fulfillment of the Requirements for the Degree of Master in Language Studies

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Declaration

I, Miss. Nour El Houda BENLAKHDAR, declare that this thesis submitted to the Department of English at Tlemcen University for the degree of master in Language Studies is the result of my own work and effort. I confirm that it has not been submitted for any other degree or professional qualification.

I declare that this research work was composed by me except where explicitly mentioned. I confirm that every intellectual property used in this thesis has been stated and cited. I, alone, take full responsibility for any work which has not been cited.

Dedications

To my parents, my grandparents, my aunts Fatima and Halima, my uncle Mohamed, my brother Amine, and Abd El Bassit whose help with all the difficult computer issues is priceless.

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Abstract

Building a strong foundation in writing is of an utmost importance for learners at any level in order to have a firm control of the different writing essentials. Considering that PhD students specialized in hard sciences are accommodated mostly with French or Arabic, composing a publication-worthy article seems to be an arduous task. Thus, this study aims at exploring all writing difficulties, whether simple or complex, ESP doctorate students confront. Additionally, the purpose of this research work is to suggest solutions to resolve doctorate students' writing difficulties. In this case study, two research instruments were used: a questionnaire for ESP doctorate students and a content analysis of students' research articles. The collected data were analyzed both qualitatively and quantitatively. The results revealed that the majority of ESP PhD students confessed encountering various writing difficulties related chiefly to grammatical notions, the clarity of ideas, and the organization of the text. Also, articles error analysis uncovered many writing issues which confirmed students' bad command of the English writing skill. When reading their manuscripts, it was observed that ESP doctorate students manifest a number of weaknesses responsible for generating long and awkward sentences which sometimes create obscurity and make the ideas difficult to understand. Finally, attempting to remediate this issue represented the research main goal for the sake of showing doctorate students the adequate way of writing.

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List of Acronyms and Abbreviation

Acronyms

BBC: British Broadcasting Corporation

CIA: Central Intelligence Agency

CNP: Communication Needs Processor

DVD: Digital Video Disk

EAP: English for Academic Purposes

EBE: English for Business and Economics

EFL: English as a Foreign Language

ELT: English Language Teaching

EOP: English for Occupational Purposes

EPP: English for Professional 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

EGAP: English for General Academic Purposes

ESAP: English for Specific Academic Purposes

ESOL: English for Speakers of Other Languages

FBI: Federal Bureau of Investigation

GE: General English

IT: Information Technology

ITA: International Teaching Assistant

MP: Member of Parliament

NASA: National Aeronautics and Space Administration

OPEC: Organization of Petroleum Exporting Countries

RAM: Random Access Memory

Tas: Teaching Assistants

TENOR: Teaching English for No Obvious Reason

UK: United Kingdom

USA: United States of America

VESL: Vocational English as a Second Language

WWII: World War Two

Vs.: Versus

General Introduction

General Introduction

Part of being a PhD student, publishing a research article in an international renowned peer-reviewed journal is a prerequisite. In fact, PhD students, regardless of their specialties, are expected to present a research work which studies an original issue written in the "lingua franca" of academia: English. Publishing a manuscript provides doctorate students with the opportunity to share their views following a scientific approach. Although manuscript submission announces the completion of the writing process, this does not guarantee that it will be accepted. As a matter of fact, journals receive a considerably large amount of submissions pushing the editorial staff to be quite selective which usually results in a high rate of research rejections. Actually, reasons behind a rejection vary and are numerous; some are attributed to the lack of originality, low quality, suboptimal content, or to scientific writing problems including long and ambiguous sentences, incoherent ideas, and incorrect grammar.

Although the reasons responsible for rejection vary, the present research work aims at examining language-related problems which are usually the most commonly observed issues when reading an article written at first attempt. Most of the time, doctorate students in natural and physical sciences are the ones subject to language inadequacies due to various issues notably the infrequent and limited number of English classes they receive in their higher education studies. In this study, the researcher attempts to achieve two principal objectives. First, explore the prevailing writing errors ESP doctorate students commit when composing their research articles, especially those regularly detected. Additionally, all doctorate students' writing difficulties should be studied and analyzed by throwing light on the different elements of writing such as the organization of ideas, the connections which link them, grammar, and the writing mechanics. The performed analysis will guarantee the construction of a course designed in the form of suggestions with a focus on strengthening doctorate students' weaknesses in written English.

It is worth mentioning that being a PhD student in a hard science does not eliminate the fact of producing unclear and poor writing. Examining the common pitfalls ESP doctorate students encounter in writing allows recommending the

convenient and specific course content. For this purpose, the following research questions have to be answered:

1. What difficulties do ESP doctorate students face while writing scientific articles?
2. What kinds of writing errors are most common among ESP doctorate students while writing their articles?

Accordingly, two hypotheses were formulated:

1. When writing their research papers, ESP doctorate students demonstrate a bad command of the writing skill.

2. It seems that doctorate students face writing problems that have to do with grammar, cohesion and coherence.

In order to obtain answers to the research questions previously asked and to check the validity of the hypotheses, the present work is carried out by adopting an exploratory case study for the sake of learning about the writing difficulties ESP doctorate students at Tlemcen University encounter. The research will collect both qualitative and quantitative data types by making use of two research instruments: a questionnaire for doctorate students and their rejected articles. The collected data of both types will be analyzed qualitatively and quantitatively.

This study is composed of three interdependent chapters each concerned with a specific goal. The first chapter is a review of the literature related to the investigated research problem aiming at providing the relevant body of knowledge. It aspires to give definitions of concepts related to academic writing and the field of English for Specific Purposes. First, it discusses the nature of writing by explaining its types. Next, it deals with the systems essential for language functioning. These include grammar, cohesion, and coherence. In addition, it concentrates on the definition of ESP from the researcher's standpoint as well as that of scholars', and gives a detailed description of the subject area. It also draws the difference between the latter and English for General Purposes, and deals with the different sub-branches that constitute

ESP. Finally, the chapter devotes attention to ESP course design by speaking about its pillar: needs analysis.

The second chapter focuses on data collection and interpretation. It consists of presenting the collected data in the form of numbers, figures, and tables which depict the results obtained from the conducted needs assessment. At the beginning, it introduces the research work objectives and methodology. Later, it elicits the details related to the sample population used in the current study. What follow are the research instruments used to collect data which include students' questionnaire and a systematic evaluation of their rejected articles. The answers obtained from the questionnaire are analyzed both qualitatively and qualitatively to procure as accurate and thorough information as possible. Also, the evaluation of the articles permits to draw a list of the writing errors exhibited in students' manuscripts. In fact, reviewing students' rejected articles is not only a useful reflection of their errors but it also allows comparing the extent to which those identified errors correspond with the validity of the answers they provide. Finally, all previous data are interpreted and linked to the research questions and hypotheses.

Concerning the third chapter, it focuses on making suggestions and recommendations. The latter are presented in the form of a course which addresses all writing challenges responsible for the errors and the lack of clarity of expression in ESP doctorate students' scientific works. It first discusses the different stages suggested by Graves in relation to the present work when designing a course in ESP. Next, different sample lesson plans targeting the writing and reading skills are presented. Each lesson includes a description of the content followed by the references of the materials which should be used. In addition, self-study resources are attached to the lessons that students can use to remedy their respective language weaknesses they spot through the self-evaluation portfolio provided at the end of each sequence. To ensure optimal results, a set of activities, mainly suiting beginner, pre-intermediate, and intermediate students, accompany every lesson to enable students to practice their writing skill. Within this chapter, ESP doctorate students are provided with the links to the books used in references and self-study resources sections. Finally, a list of some

useful self-study resources is presented to help students improve their written English. The aim of this chapter is to respond to doctorate students' writing demands by providing them with a collection of classes, exercises, and resources intended to assist them in composing compelling and analytical texts.

CHAPTER ONE

Review of Literature

Chapter One: Review of Literature

1.1. Introduction

1.2. Definition of Writing

1.3. Types of Writing

- 1.3.1. Formal Writing Style
- 1.3.2. Informal Writing Style

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1.1. Introduction

The activity of writing forms a prominent part of the world of academia. Complex in nature, writing is a process which calls for the simultaneous application of multiple cognitive skills that should delimit any poor writing performance. In relation to students of English for Specific Purposes, the way they present information as well as the way the content of their writings is put together should reflect correctness, precision, and truth. ESP has gained an acute place in the industry of English Language Teaching since the 1950s particularly through its interest in investigating learners' needs and dedication to designing courses which fulfill learners' demands.

1.2. Definition of Writing

Among the four skills of language learning, writing is the action of producing a text for the aim of exchanging information with others. In fact, the activity of writing is performed by all literate individuals every day and at any time. However, the way that people write depends on their occupation as well as their aim behind writing. For instance, the language used in a blog widely differs than that employed in writing a mid-term paper since the former falls under the category of personal writing and the latter under academic writing.

1.3. Types of Writing

Different settings dictate the type of writing. Two types of writing are distinguished: formal writing style and informal writing style.

1.3.1. Formal Writing Style

There exist situations which impose the choice of language. Such situations draw the attention of the writer towards taking notice of "particular choices of grammar and vocabulary" (Cambridge Dictionary "Formal and Informal Language"). Formal language, with the exception of instances such as oral presentations at conferences or presidents' speeches, is most of the time associated with writing. It is true that when writing, the style used is not necessarily restricted to a high degree of formality like

texting, talking to a friend, or in intimate discussions; however, this cannot be true in the scholarly world. This is the case of research students who constantly need to compose scientific articles.

Research students are expected to be aware of the difficulty of the task at hand; therefore, they are compelled to using and maintaining a scientific language which should be "accurate, precise and detached from individual impulse." (Ahmad, 2012, p. 47). To write academically means to communicate meaning and ideas specific to one's specialty in a clear language which is "direct, free from alternative and much less artistic than literary language" (ibid.) while always paying particular attention to the nature of data whether it is simple or complex. The aspect to which a research student should pay attention to while writing academically is to ensure the production of a cohesive, coherent and grammatical written text. The language of science and academia certifies that a "scientific text is precise, impersonal and objective" and "typically uses the third person, the passive tense, complex terminology" (Hartley, 2008, p. 3)

Away from the academic setting, the degree of formality noticeably decreases to include a more carefree and impulsive way of speaking.

1.3.2. Informal Writing Style

The informal style is a term which is usually associated with the spoken form of language. It is used in relaxed, spontaneous, and conversational situations. Informality is not always bound to speech; it can be a characteristic of writing, too, as in "*U dunno 'im?*"

An informal writing style is a style which does not require an accurate selection from the word-stock or any major precision when putting words together. The informal writing style "is less strictly grammatical and uses short, simple sentences and ordinary, familiar words" (Campbell et al., 2015, p. 172*)* Instances of informal writing would include text-messaging, Facebook posts, or letters to close ones.

Academically speaking, a composition is considered to be informal when it includes one or more of the followings:

- **First person pronouns**

In scientific writing, although lately allowed within specific cases, using first personal pronouns (I, we) indicates subjectivity which makes the results of a study unreliable and invalid. For example: "*I believe that most learners at university do not do research.*"

- **Contractions**

Using the contracted form of verbs is generally used when speaking as a way to save more time and effort. However, in academic writing, contractions like *can't, don't, won't, haven't,* and *we'll* should be avoided.

- **Colloquial language**

Reasons such as the extensive exposure to the language of social media and the lack of practicing academic writing have made the use of slang natural and frequent in formal writing situations. Such is the case of baby boomers (people born between 1946 and 1964); green (money); dat (that); cuz (because); props (respect, recognition); bamboozle (to deceive).

Idiomatic expressions are part of colloquialism, too. They help second or foreign English learners to sound like natives; however, idioms should not be adopted in professional writing. The overuse of these expressions resulted in the difficulty of recognizing whether or not they are accepted in Standard English. Instances of common English idioms include: a taste of your own medicine (someone having the same disagreeable experience as the one they caused to others); crying wolf (asking for help when not needed); draw the line (to stop), or, off the hinges (outstanding).

- **Acronyms**

An acronym is a capitalized abbreviation usually, but not always, formed with the initial letter of words and pronounced as one word. For instance: NASA (National Aeronautics and Space Administration), OPEC (Organization of Petroleum Exporting Countries), and RAM (Random Access Memory).

Part of acronyms exist initialism which only differ from the former in the way they are uttered; every letter is independent when pronounced. For example: FBI (Federal Bureau of Investigation), CIA (Central Intelligence Agency), and DVD (Digital Video Disk).

The employment of acronyms or initialisms does not make of a written text informal unless they are used for the first time without being fully explained. In formal writing, it is recommended to use an acronym or initialism in its full form before using the abbreviation.

1.4. Technical Writing Style

Writing technically involves an elaborate text drafted with the aim of explaining information in a detailed manner. Situations which demand this type of writing mostly include, but are not limited to, writing manuals which accompany cell phones, laptops, or any software. However, Dupuis (2018) sees that such definition is narrow especially with the advent of technology which helped in expanding the field. He suggests that "Any time technical information is conveyed in writing at work, it is, by definition, technical writing." Accordingly, this type of drafting also encompasses writing an article for a trade publication; or writing online informative articles about IT, Chemistry, or any technical field.

Away from the literary style, technicality in writing forms an important component in the fields of Science and Technology. Popular technical writing fields involve Computer Systems Design and related services, Management, Architecture, Engineering, Medicine, and automobile industry. With the exception of the discipline

of Business[1], the mentioned fields of study produce writings of this kind in a style which is "direct and utilitarian, emphasizing exactness and clarity rather than elegance or allusiveness." (Verma, 2015, p. 453)

1.5. Language Systems

In order to know the way language functions and is constructed, it is imperative to learn about the systems which contribute to the correct functioning and formation of the matter.

1.5.1. Grammar

World languages possess a system which describes its structure commonly composed of syntax and morphology. The Oxford English Dictionary defines grammar as "The whole system and structure of a language or of languages in general, usually taken as consisting of syntax and morphology (including inflections) and sometimes also phonology and semantics." This means that grammar is composed of many areas. Syntax and morphology have to do with the grammatical form. Huddleston and Pullum (2005) presented a lucid explanation of syntax and morphology:

> **syntax** is the study of the principles governing how words can be assembled into sentences (I found an unopened bottle of wine is admissible but *1 found a bottle unopened of wine is not); and **morphology** deals with the internal form of words (unopened has the parts un', open, and ·ed, and those parts cannot be combined in any other order) (p. 6)

In addition, they put forward that expressions combined together have meaning (semantics).

[1] Both business writing and technical writing are composed of "words and graphics" (Roberts, 2001, p. 43). The former is considered broader. They are different in the type of produced documents. Common business documents include: agendas, email messages, letters, proposals and reports while technical writings "are generally written by one person, often for a single reader or small, select group of readers." (*ibid.*)

Knowing the grammar of a given language happens to be very beneficial as it contributes to having a detailed vision about elements which structure that language, and it is for this reason that existing grammar textbooks are abundant. It should be mentioned that grammar was not created before learning to speak. In other words, native speakers have the ability to speak their language prior to learning its grammar. This phenomenon was explained by Chomsky by outlining the term Universal Grammar. At the same time, learning the grammar while studying a language can be an effective way that supplies learners with a firm mastery of the language. In addition to grammar, there are two other language systems which persistently contribute to establishing the unity of a text. These are: cohesion and coherence.

1.5.2. Cohesion

Elements establishing the link between the textual parts and creating a linear succession of ideas construct a cohesive text. Clearly, modifying the sequence of these ideas influences the meaning of the text and leads to its loss. Halliday and Hasan (1976, p. 4) declared that "The concept of cohesion is a semantic one; it refers to relations of meaning that exist within the text and that define it as a text." Cohesion is of two types; morphosyntactic and lexical. Morphosyntactic – or grammatical cohesion – comprises reference, substitution, ellipsis, and conjunction.[2]

- Reference is a cohesive device used to point at individual elements (generally nouns functioning as 'processes, participants, or circumstances'[3]). It is of two types:

a) endophoric: a pronoun or a linguistic unit which refers to a person, action, or situation existing in the same text (e.g. *My friend and I left for school early. **We** don't usually do **that**).*

b) exophoric: a pronoun or a linguistic unit which refers to a person, action, or situation outward from the text (e.g. *These shoes don't fit me. I will try **others**).*

[2] Introduced by Halliday and Hasan in Halliday, M.A.K and Hasan. R. 1976:4
[3] Martinez-Cabeza, M. A. 2017:132

- Substitution refers to the alternation of a linguistic unit using another one as in: *Doctors said that he had to have a surgery. I heard it's a hard* ***one*** (*surgery* replaced by *one*). Substitution is of three types: nominal (nouns replaced by 'one', 'ones', or 'same'); verbal (a verb replaced by an auxiliary verb like 'do', 'did'); and clausal (replacement of a clause by 'so' or 'not').
- Ellipsis is quite similar to substitution. It is different because the element substituted is omitted. Ellipsis is of the same three types as substitution: nominal: *We were exhausted but* ***(we)*** *didn't sleep*; verbal: '*Are you still exercising?' – 'Yes, I am' (still exercising)*; and clausal: '*I think that living in London is expensive!' – 'Yes' (living in London is expensive).*

Conjunction, unlike a coordinating or subordinating conjunction, is one or more units which create a logical and meaningful connection between sentences. Halliday and Hasan (1976, p. 238) classified types of conjunction into four categories: a) additive: *and, or, furthermore, in addition*; b) adversative: *yet, but, however, nevertheless*; c) causal: *so, for this reason, as a result, for, therefore*; and d) temporal: *then, finally, first, next day, up to now*.

While grammatical cohesion is achieved through reference, substitution, ellipsis, and/ or conjunction, lexical cohesion is achieved through the choice of lexical elements which relate to words in the text. It exists in two ways: reiteration and collocation. Reiteration is the repetition of the same word or the use of a synonym, an opposite, a hypernym[4], or a general word. A collocation is formed by putting together words which are generally found together and less likely to occur with other words. For instance: *take coffee* instead of *drink coffee*, and *tall man* instead of *high man*.

1.5.2.1. Writing Mechanics

Writing is governed by rules which should be respected in order to achieve a properly written script. Excluding grammar, the written text is supposed to be, to a great extent, error-free in spelling, punctuation, and capitalization. As these mechanics

[4] Also called 'hyperonym', a hypernym is an umbrella term covering a large category of words that falls under it. For instance, *plant* is a hypernym of *flower*.

are replaced in speech by factors like speed and intonation, it can be difficult to use them if not studied.

1.5.2.1.1. Spelling

How to write words correctly is important. Ignoring the way a word is written can place a manuscript, or any academic writing, to negative judgments. Wrongly spelled words are, most of the time, detected by Microsoft Office Word; however, they are not when writing a formal email, for instance. Although the advent of technology has facilitated the task (like the existing online applications which check grammar and writing mechanics), having a weak knowledge of how words are written will likely affect the level of the language user, especially when access to technology is impossible at that moment. In some instances, the issue does not lie in spelling itself but in the choice of the word. Said differently, there are some words which sound the same and, as a result, are frequently confused. Examples include: *affect* and *effect*; *breech* and *breach*; *they're*, *their*, and *there*; *except* and *accept*; *suppose to* and *supposed to*; and *should of* and *should've*. Clearly, a good command of spelling is required when writing academically.

1.5.2.1.2. Capitalization

To capitalize a word generally means to write its first letter only in uppercase (with the exception of acronyms which are wholly capitalized). This short process is crucial when writing in a formal setting. Many cases exist in regard to capitalization. The followings are adapted from englishgrammar.com, learnenglish.britishcouncil.org, and en.oxforddictionaries.com:

- Capitalize 'I'.
- Capitalize the first letter of the first word in a sentence or question.
- Capitalize proper nouns (i.e. the names of people). Examples: *John, Mary, Annie.*
- Do not capitalize common nouns. Examples*: boy, tree, flower, butterfly.*
- Capitalize the names of festivals. Examples: *Id, Diwali, Easter, Christmas.*

- The names of universities, organizations, institutions, mountains, deserts and rivers are capitalized. Example: *Oxford University, United Nations Organization, Ben Nevis.*
- We use capital letters for the days of the week but not for seasons: *One Saturday in autumn.*
- We use capital letters for planets – but not the earth, sun or moon: *Mercury is closer to the sun than the earth is.*
- We use capital letters for countries and for 'nationality' words: *David is from Germany but Jana is Slovak.*
- We use capital letters when we talk about languages as school subjects – but other subjects do not have a capital letter: *She's got exams in English, French, history and geography this year.*
- In the titles of books, films, organizations, special days, etc. but not for the connecting words such as a, an, the, or, and, etc. For example: *Pride and Prejudice, Christmas Day, the Houses of Parliament.*
- In abbreviations. For example: *BBC (British Broadcasting Corporation), MP (Member of Parliament).*

The list comprises most rules of capitalization set by official English institutions and used by native speakers. In case capitalization is not used, it will not affect the meaning; however, it breaks the rules, especially if used by non-natives, and will be taken as a lack of understanding of capitalization in English.

1.5.2.1.3. Punctuation

One major writing mechanic in language is punctuation. In English, there are fourteen (14) marks of punctuation: the full stop (period in American English), question mark, exclamation point, comma, semicolon, colon, dash, hyphen, brackets, braces, parentheses, apostrophe, quotation marks, and ellipsis. The appropriate usage of these marks helps to compose a clear and attractive work. Grammar.yourdictionary.com has elucidated the role of each as follows:

- The period (.) is placed at the end of declarative sentences as a sentence ender: *Jane and Jack went to the market*. And after an abbreviation: *Her son, John Jones Jr., was born on Dec. 6, 2008.*
- Use a question mark (?) to indicate a direct question when placed at the end of a sentence: *When did Jane leave for the market?*
- The exclamation point (!) is used when a person wants to express a sudden outcry or add emphasis: *My mother-in-law's rants make me furious!*
- The comma is used to show a separation of ideas or elements within the structure of a sentence. Additionally, it is used in numbers, dates and letter writing after the salutation and closing: *Thanks for all your help, John; We went to the movies, and then we went out to lunch; Suzi wanted the black, green, and blue dress.*
- The semicolon (;) is used to connect independent clauses. It shows a closer relationship between the clauses than a period would show: *John was hurt; he knew she only said it to upset him.*
- A colon (☺ has three main uses. The first is after a word introducing a quotation, an explanation, an example, or a series: *He was planning to study four subjects: politics, philosophy, sociology and economics*. The second is between independent clauses, when the second explains the first, similar to a semicolon: *I didn't have time to get changed: I was already late*. The third use of a colon is for emphasis: *There was one thing she loved more than any other: her dog.*
- A dash is used to separate words into statements. There are two common types of dashes: en dash and em dash. The en dash is a symbol (-) that is used in writing or printing to indicate a range or connections and differentiations, such as *1880-1945* or *Princeton-New York trains*. Twice as long as the en dash, the em dash can be used in place of a comma, parenthesis, or colon to enhance readability or emphasize the conclusion of a sentence. For example, *she gave him her answer – No!*
- A hyphen is used to join two or more words together into a compound term and is not separated by spaces. For example, *part-time, back-to-back, well-known.*

- Brackets are the squared off notations ([ ]) used for technical explanations or to clarify meaning. If you remove the information in the brackets, the sentence will still make sense. *He [Mr. Jones] was the last person seen at the house.*
- Braces ({}) are used to contain two or more lines of text or listed items to show that they are considered as a unit. They are not commonplace in most writing, but can be seen in computer programming to show what should be contained within the same lines. They can also be used in mathematical expressions. For example, *2{1+[23-3]}=x*.
- Parentheses (()) are curved notations used to contain further thoughts or qualifying remarks. However, parentheses can be replaced by commas without changing the meaning in most cases: *John and Jane (who were actually half brother and sister) both have red hair*.
- An apostrophe (‘) is used to indicate the omission of a letter or letters from a word, the possessive case, or the plurals of lowercase letters. Examples of the apostrophe in use include: *I’ve seen that movie several times; Sara’s dog bit the neighbor; Six people were told to mind their p’s and q’s.*
- Quotations marks (“ “) are a pair of punctuation marks used primarily to mark the beginning and end of a passage attributed to another and repeated word for word: *“Don’t go outside,” she said.* Single quotation marks (‘ ‘) are used most frequently for quotes within quotes: *Marie told the teacher, “I saw Marc at the playground, and he said to me ‘Bill started the fight,’ and I believed him.”*
- The ellipsis is most commonly represented by three periods (. . .) although it is occasionally demonstrated with three asterisks (***). The ellipsis is used in writing or printing to indicate an omission, especially of letters or words. Ellipses are frequently used within quotations to jump from one phrase to another, omitting unnecessary words that do not interfere with the meaning. Students writing research papers or newspapers quoting parts of speeches will often employ ellipsis to avoid copying lengthy text that is not needed. Examples: *She began to count, “One, two, three, four…” until she got to 10, then went to find him*; *When Newton stated, “An object at rest stays at rest and an object in motion stays in motion...” he developed the law of motion.*

1.5.3. Coherence

To attain coherence while producing a text (spoken or written) means to ensure that thoughts and ideas are stated in an unambiguous and structured way as this guarantees consistency and consonance. Any written text is composed to be read by a target group making of coherence an "outcome of a dialogue between the text and its listener or reader." (Tanskanen, 2006, p. 7) Therefore, one helpful technique to ascertain whether a text is coherent or not is by asking the question: "does the text make sense?" When coherence is not achieved, the reader is able to notice the discontinuity in meaning marked by the irrelevant ideas which cause the text to have an illogical progression of thoughts. Therefore, the concept of coherence is assumed to relate to the pertinence of the ideas of a text that make of it a meaningful one.

The fact that cohesion and coherence are different does not imply that one is more efficient than the other in making the text accurate. In fact, a text can only be complete if both its structure and meaning are functioning in harmony. In addition to these two, writing mechanics are equally important in the organization of a text (mostly written) used in academic settings.

Not being restricted to literary fields only, writing extends to include all existing subject areas including scientific ones. Such is the case of the academic community known as English for Specific Purposes.

1.6. English for Specific Purposes

English for Specific Purposes – also called English for Special[5] Purposes (ESP) is an approach[6] to the teaching of English dedicated to, most of the time, English as a Second Language (ESL) and English as a Foreign Language (EFL) adult learners. It is

[5] Although less commonly used, 'special' means the same as 'specific'. It refers to the specialized language, the special needs, and the special learning context.

[6] " Approach", for Hutchinson and Waters, indicates that ESP "does not involve a particular kind of language teaching material, or methodology" (p. 2)

a learner-centered approach[7] which focuses on meeting the needs of those learners who want to reach an aim whether it is academic, professional, or scientific, in areas such as: *accounting*, *aviation*, *engineering*, *law*, *IT*, *medicine*, *teaching*, and *tourism*. Prominent names in the subject matter tried to define it each from his or her perspective. It resulted in a large number of definitions; some showing similitude and others opposing views.

Mackay and Mountford (1978, p. 2) noted that the teaching of ESP serves for "clearly utilitarian purposes." This indicates that the learners' needs are the reason which makes of English a language that functions in certain settings and not in others.

Hutchinson and Waters (1987, p. 17) provided a tree which shows, in relation to English Language Teaching (ELT), the structure and branches composing the field of ESP. They aimed at providing a definition to ESP "not so much by showing what ESP is, but rather by showing what ESP isn't" (ibid. p. 18) They explained that the fact ESP is specific in purpose does not mean it refers to a 'special form of a language' but simply to the English language used in specialized contexts different than the ones of General English (GE). Also, they focused on the idea that the methodology used for learning in ESP is not distinct than the one used in GE. With this said, the two scholars claimed that 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." (ibid. p.19) They argued that the learner's motive to learn is the key to what ESP constitutes of in terms of both the core essence of the course as well as the process employed in teaching the same course.

Strevens (1988, p. 1-2) defined ESP in terms of absolute and variable characteristics.

1) Absolute Characteristics: ESP consists of English language teaching which is: designed to meet specified needs of the learner; related in content (i.e. in its

[7] "Learner-centered approach" is a concept which was introduced by Hutchinson and Waters because they assume that ESP instructors should develop ESP learners' "underlying competence" (Dudley-Evans and St. John, 1998 cf. Hutchinson and Waters,1987)

themes and topics) to particular disciplines, occupations and activities; centered on the language appropriate to those activities in syntax, lexis, discourse, semantics, etc., and analysis of this discourse; in contrast with General English.

2) Variable characteristics: ESP may be, but is not necessarily: restricted as to the language skills to be learned (e.g. reading only); not taught according to any pre-ordained methodology.

Strevens explained what ESP is by providing four absolute characteristics and two variable ones. The absolute characteristics refer to the categorical aspects which constitute this ELT branch. These aspects mainly focus on the learner's needs to engage in a particular course. This course includes a language related to the subject content, and which remains different from the one of General English. As far as the variable characteristics are concerned, they may – as they may not – occur in all instances. This means that the purpose of learning does not necessarily point at focusing only on one language skill but can include the three other skills if essential. Also, the methodology used in teaching English for specific purposes may rely on the one used in ELT in general.

Later in 1997, at a Japan Conference on ESP, Dudley-Evans proposed a new conceptualization, based on Strevens', which he revised with St. John. It was as follows:

1) Absolute Characteristics: ESP is defined to meet specific needs of the learner; ESP makes use of the underlying methodology and activities of the discipline it serves; ESP is centered on the language (grammar, lexis, register), skills, discourse and genres appropriate to these activities.
2) Variable Characteristics: ESP may be related to or designed for specific disciplines; ESP may use, in specific teaching situations, a different methodology from that of general English; 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 secondary school level; ESP is generally designed for intermediate or advanced students; most ESP courses

assume some basic knowledge of the language system, but it can be used with beginners.

Dudley-Evans and St. John reduced Strevens' four absolute characteristics into three by discarding the contrast with GE. Moreover, they extended the variable characteristics by assuming that ESP does not automatically relate with a specific discipline. In addition, the methodology employed in its teaching may be different than that of GE. Furthermore, learners' age is not always limited to adults but can also include secondary school learners as well as beginners in English. Bloor and Bloor (1986) confirmed this idea by declaring that teaching ESP is possible to be at all levels including beginners.

This field of study has received a large amount of attention since its emergence; linguists interested in ESP strive hard to give an agreed-upon definition which copes with all its characteristics. Nevertheless, "a definition of ESP that is both simple and watertight is not easy to produce" (Strevens, 1980 qtd. in Haddam, 2015, p. 18)

1.6.1. Origins

Every existing aspect was once subject to a number of reasons which led to its emergence and development till the current time and ESP is no exception. Howatt and Widdowson (1984) stated that the teaching of the English language outside its original place has inaugurated in the seventeenth century, and Netherlands and France were the first two European countries to issue textbooks on ELT. Factors like the foreign interest in English philosophy and literature, and the decline of the Latin Empire – which subsequently led to the decreased usage of the language – contributed to the spread of English in Europe. The two authors mention that this spread evolved quickly in the second half of the century when Denmark, Germany, and Russia in the end of the eighteenth century, produced ELT materials. They declared that the expansion of English language teaching exceeded the European borders and was marked by the appearance of the first non-European ELT textbook in Serampore, Bengal, in 1797. Howatt and Widdowson spoke about English textbooks such as Festeau's *Nouvelle Grammaire Angloise* (1672), Heldoran's *Een nieuwe en gemakkelijke Engelsche*

Spraakkonst (*A New and Easy English Grammar*, 1675*)*, and Miège's *Nouvelle Méthode* (1685).

These events show that English has received an overseas attention since the eighteenth century. However, most studies approve that ELT industry grew bigger in the post-World War II era which was characterized by the emergence of ESP as a discipline. When talking about the origins of ESP, Hutchinson and Waters (1987) argued that the USA was economically strong after WWII, and because technology and commerce were the two forces dominating that era, English was recognized as the international language resulting in "the increasing amount of overseas students in English-speaking countries" (González, 2015 cf. Hutchinson and Waters, 1987.) As a result, specific courses, which were target-oriented, started to be designed, especially that the focus of linguistics shifted from describing grammar rules of the language to how people use that language in specific discourse contexts. This was labeled, by Hutchinson and Waters, as 'a revolution in linguistics'. In agreement with what they said, the third factors responsible for the evolution of ESP are the developments made in the field of 'educational psychology' which devoted importance to "the learners and their attitudes to learning" (1987, p. 8). Thus, educational psychologists emphasized on the idea that when the learner is motivated, it serves in making the learning process more animate and fruitful.

Aspects responsible for the rise of ESP are many and every researcher has drawn a frame of reference giving a historical account of the subject of interest in accordance with his or her position. The visible feature on which most – if not all – ESP scholars agree upon is the rapid progress and success accomplished over the past twenty five years which was not reduced since then. This success can be assessed by the increased demand for ESP courses such as science and technology, and business and economics; the contributions and practices made; and ESP teacher training programs. Since its emergence, ESP received such a remarkably considerable attention that researchers in the field drew lines of distinction between GE and ESP.

1.6.2. General English vs. English for Specific Purposes

According to the ELT tree outlined by Hutchinson and Waters (1987), both ESP and GE constitute two branches of the teaching of ESL or EFL. These two are considered to be different from each other as they operate in distinct, yet not separate, manners.

GE is referred to as Teaching English for No Obvious Reason (TENOR) which refers to situations where the teacher or the learner does not have a defined objective for teaching or learning English. GE is mostly encountered in contexts such as schools where the students receive a learning which begins from the general and basic knowledge of English language skills needed in everyday settings, and reaches the advanced level in the language. With no clear final aim in mind, GE learners are taught the culture and literature of this language; this makes of GE a 'language-centered approach'. In fact, this learning does not imply emptiness as these students are likely to enter in conversations with the natives or travel to English native-speaking countries and become members able to run a successful discussion as a result of such learning. Hutchinson and Waters, too, argue that "There is always an identifiable need of some sort" (p. 53). One characteristic of GE teaching is that education does not have boundaries which demarcate the ending line; it is rather ongoing as long as the learner demonstrates a concern in it. Although this statement may allude to a positive aspect which is that of broad and boundless teaching and learning, Widdowson (1983) clarified that courses tend to be difficult to design in this case.

There has been much said about ESP characteristics mainly those in contrast to GE. ESP is considered to be purpose-oriented because it is concerned with focusing on learners' needs by conducting a needs analysis on which the organization of teaching materials is based. This way, the teacher is directed in the sense that he or she will be following the outlined course from the previous analysis. Even though ESP comprises two main sub-branches English for Academic Purposes (EAP) and English for Occupational Purposes (EOP), it is more associated with the latter since most of its

students are adults who need English to apply for a certain occupation, or to develop their workplace communication skills making ESP a focused and practical approach. Accordingly, Hutchinson and Waters (1987, p. 53) make the difference between ESP and GE by saying: "in theory nothing, in practice a great deal."

This ELT branch is a learning-centered approach due to its specificity which greatly influences the content of the course that lies on the wants and wishes of the learners. Contrary to GE course design, "the selection of the appropriate content is easier" in ESP (Widdowson, 1983 qtd. in Popescu, 2010, p. 51). However, the roles that an ESP 'practitioner'[8] has to embody differ from that of GE. When teaching English for specific purposes, these practitioners perform the functions of not only a teacher, but a course designer and material provider, collaborator, researcher, and evaluator (Dudley-Evans and St. John, 1998, p. 13).

Considerable and clear differences exist between ESP and GE, but these do not indicate the absence of similarities. The distance between these two ELT branches is linked by a continuum which shows that they hold a relationship. GE usually precedes ESP since it often targets beginners and provides basic language skills which will pave the way for advanced communication skills used in specific contexts such as work. Also, the teaching methodologies used for ESP are said to be similar to those of GE with the exception that ESP practitioners select the appropriate methodology in agreement with the needs analysis results as Kenny (2016, p. 260) put forward: "In ESP any method can be chosen to be used in the classroom according to the context, learners, and needs analysis, teaching standard and learning abilities."

1.6.3. Sub-branches of ESP

Many views have been proposed in regard to the sub-branches of ESP. In general, the field is divided into two main areas: EAP and EOP which is also referred to as English for Vocational Purposes (EVP), English for Professional Purposes (EPP) or Vocational English as a Second Language (VESL).

[8] A term outlined by Dudley-Evans and St. John (1998) given to the ESP teacher. They see "ESP teaching as extremely varied [...] and involves much more than teaching."

In their ELT classification, Hutchinson and Waters (1987) showed that both EAP and EOP apply to all ESP courses "according to whether the learner requires English for academic study or for work/ training" (ibid. p. 16). It includes three broad classes: English for Science and Technology (EST), English for Business and Economics (EBE), and English for Social Sciences (ESS). They also noted that even if the learner chooses one subcategory, the two remain linked as "people can work and study simultaneously" (ibid.)

Howard (1997, p. 41) stated that Master (1990) organized ESP sub-categories – chiefly on the basis of needs – in the USA into four: academic, professional, vocational (VESL), and sociocultural. Master related that the term 'academic' encompasses EAP (taught in academic settings like schools) and ITA training. The latter refers to International Teaching Assistant training by which recently named Tas (Teaching Assistants) receive further education and assistance in relation to teaching. 'Professional', as most scholars agree on, addresses the workers' communication abilities and concentrates on developing them to attain effective results. He divided 'VESL' into three parts: 'pre-vocational' which refers to preliminary training relevant to a particular job; 'cluster' which concerns a common class of adult learners from multiple career fields as opposed to the third part 'specific'. Regarding the 'sociocultural' aspect, it refers to the teaching of the social and cultural attributes specific to English native speakers in ESL classes.

Jordan (1997) first spoke about the four English language skills: listening, speaking, reading, and writing by adding interpreting and translation as two other skills. This is what he refers to as TENOR in which English is used 'for no particular purpose' (general purposes), and for social purposes such as conversations as in 'letter-writing' or 'telephoning'. He, then, derived ESP which he separated to EOP like airline pilots, and to EAP. For Jordan, both English for Specific Academic Purposes (ESAP) and English for General Academic Purposes (EGAP) exist. The former occurs in contexts as '*medicine, engineering, and economics*', and the latter depicted in, for example, '*listening, note-taking, academic writing, and seminars*'.

In the same way that Master classified ESP in the USA, Howard (1997) demonstrated the manner ESP is portrayed in the UK which happens to be very close to Master's. Howard classified ESP in the UK into three parts: a) 'academic': which refers to schools and extends to colleges and universities at both the undergraduate and postgraduate levels. He confirmed that "In Britain, there are, officially, no ITAs"; b) 'professional and vocational': such as ESL/ English for Speakers of Other Languages (ESOL) teachers who hold a certificate in education, or EFL teachers who have a degree in Arts and Humanities and work in private language schools; and c) 'sociocultural': where English is taught in ESOL classes for non-native bilingual adults who are permanent residents. It occurs either in colleges, community-based classes, or by home-tutoring for those incapable of being present in classes like disabled people.

The existing different ESP scholars' standpoints concerning the subject's areas contribute to the development and enrichment of ESP courses which are supposed to be developed in concordance with learners' needs in relation to their field of specialism.

1.6.4. ESP Course Deign

Designing a course is one principal feature when teaching ESP and general language teaching, too. As stated in Hutchinson and Waters's *English for Specific Purposes: A Learning-centered Approach* every course, although complex, needs to be decomposed into simplified elements to facilitate the learning process, and thus, the syllabus should be well designed because it is "the determiner of the entire course" (p. 90).

Mentioned by Romo (2006), age and motivation are two backbones of ESP course design because they aid curriculum developers to site the real needs of learners. This can be achieved on account of the advanced age of learners (adults) in the way that they are generally mentally mature; they are aware of what they want, what they need English for, and why they need it (principally for a resolute and profitable rationale). These components are what drive the students to be ready to learn and to be fully

engaged in the learning process; they will be motivated both intrinsically and extrinsically (p. 21-22) Romo added that course developers should take these elements into consideration and build their curriculum on this basis as this will "improve their motivation and commitment to fully participate in the course and improve their language proficiency" (p. 22).

Graves (1996, qtd. in Xenodohidis, 2002, para. 12) suggested a number of stages which are the main columns in course design. These are: needs assessment (or needs analysis), determination of goals and objectives, content conceptualization, selection and development of materials and activities, organization of content and activities, and evaluation.

1.6.5. Needs Analysis

The aim of any ESP practitioner is to respond to the needs of his students by designing the appropriate course. Inevitably, the design of an effective course is founded on the specific needs of the group of learners; the administration of a needs analysis is compulsory at this stage. Although not always specific to ESP, Romo stated, "Needs analysis drives the making of a curriculum," and hence, the importance of conducting this analysis is vital to the success of the course.

Originated by Michael Philip (in the 1920s), who considered the reasons and ways learners should learn English, it becomes clear now that needs analysis is central to ESP. Still, the way of administering it constitutes another key element to the efficiency of the course to be designed. Romo (2006) clarified that the value of needs analysis lies on collecting as much information as possible from the students (p. 18). He argued that many methods of gathering data exist; either by observing the informants in their workplaces, by administrating surveys and questionnaires preferably in the learners' native language, or by making tests which aim at evaluating their linguistic proficiency. An accurate and comprehensive approach to identifying learners' needs was introduced by Munby (1978) in his book *Communicative Syllabus Design*. Using a series of parameters called Communication Needs Processor (CNP) the needs can be accurately detected.

Hutchinson and Waters (1987) mentioned that two types of needs analysis are discerned. These are target needs and learning needs (p. 54).

1.6.5.1. Target Needs

Hutchinson and Waters considered the term 'target needs' to be broad, and so the concept is broken in terms of '*necessities, lacks,* and *wants'.*

1.6.5.1.1. Necessities

This refers to the features that the target situation requires and which are fundamental to its proper functioning. Hutchinson and Waters (1987) provided the example of a businessman or –woman who needs to know how to communicate effectively both verbally and by writing along with being aware of the linguistic features of 'the situations identified' (p. 55).

1.6.5.1.2. Lacks

Hutchinson and Waters saw that labeling the necessities of the learners was not enough; therefore, the ESP practitioner needs "to know what the learner knows already" in order to decide "which of the necessities the learner lacks." (p. 55-56).

1.6.5.1.3. Wants

At this phase, the task of identifying learners' needs falls on the teacher. Hutchinson and Waters thought that even though students were conscious about their needs, their views may "conflict with the perception of other interested parties: course designers, sponsors, teachers" (p. 56)

1.6.5.2. Learning Needs

Learning needs is the second type of needs that Hutchinson and Waters spoke about. They put forward that target needs analysis is compelled to be supplemented by a learning needs analysis because the latter looks into *how* the students learnt the language. These researchers emphasized on the significance of motivation during the teaching-learning process and advised to provide course materials which are "more

interesting or humorous in order to generate the motivation needed to learn English" (p. 61) For Hutchinson and Waters, the efficient way of designing a useful course to learners is by combining an analysis of both target needs and learning needs. In this way, the work of the ESP practitioner, when designing a course, is driven by the use of a 'learning-centered approach'.

To conclude, needs analysis represents a pillar in ESP without which the course fails to meet the learners' needs. When conducting a needs analysis, both the students and teacher are involved in order to create a balance and complete any absence of significant elements that one of them may have possible missed. The association of all previously mentioned criteria grants the teacher, as well as the students, a rewarding learning experience.

The successive step is to determine the goals and objectives of the subject course. Now that the needs are spotted, the course developer is involved in recognizing and presenting the aims to be achieved by the end of the course. Later, the third stage relies on building the course content on the basis of the two foregoing steps; the content is a syllabus comprising all necessary elements which fit learners' needs and assist in attaining the course goals and objectives. The fourth step is to select and develop materials and activities. Here, the teacher takes the devised syllabus to the next phase; every title in the syllabus should be fortified with materials such as 'textbooks, journals, magazines, or broadcasts' and activities which intrigue the attention and motivation of learners. Next is the organization of content and activities. Conforming to what Xenodohidis said, this step contributes in providing "the teacher and the students with a clear idea of what will be taught." The last stage, as said by Xenodohidis, is to evaluate the course design which means identifying its strengths and weaknesses and working on enhancing those weaknesses.

When dealing with ESP learners, the practitioner should be aware of the difficulty of the task at hands because this kind of teaching is special considering that it goes through many levels and demands great attention to details which make of it successful or lead to its failure.

1.7. Conclusion

The purpose of this chapter was to systematically outline what has already been said about the writing skill and ESP by providing a critical look at the key concepts related to the topic of interest. The aim was to define the three different writing styles: formal, informal, and technical writing along with giving a detailed explanation of language systems (grammar, cohesion, and coherence) responsible for writing academically. To sum up, English for Specific Purposes is a field which is novel yet affluent as a result of the increasing interest it received. Thus, devoting attention to learners' needs encourages them and teachers to collaborate for the sake of structuring the most suitable course.

CHAPTER TWO

Needs Analysis and Interpretation

Chapter Two: Needs Analysis and Interpretation

2.1. Introduction

2.2. Research Objectives

2.3. Research Methodology

2.4. Sample Population

2.5. Research Instruments

- 2.5.1. Students' Questionnaire
- 2.5.2. Scientific Articles Evaluation

2.6. Data Analysis

- 2.6.1. Students' Questionnaire Analysis
  - 2.6.1.1. Results
- 2.6.2. Students' Errors Analysis

2.7. Interpretation of the Results

2.8. Conclusion

2.1. Introduction

This second chapter devotes attention to ESP doctorate students' needs in written English. In order to accomplish this task, two research tools were employed and analyzed: the questionnaires and students' articles. Later, the data obtained was interpreted and linked to the research questions and hypotheses to verify to what degree the latter have turned to be true.

2.2. Research Objectives

This research work aims at investigating about ESP PhD students' obstacles confronted during the composition of scientific articles. This research study associates a number of objectives clarified as follows: first, the intention behind this research study is to explore Tlemcen University students' main language problems with their written English. Second, it attempts to collect enough information about the issue at hand with the purpose of analyzing that data to obtain accurate and reliable results. Further, based on the obtained results in this research work, the researcher tries to devise a series of sample lessons succeeded by a range of activities. The aim behind these is to better elucidate the language difficulties and provide the reader – mainly an ESP PhD student – with possible suggestions and recommendations which will encourage them to strengthen their areas of weaknesses.

2.3. Research Methodology

Research methodology is a systemic way of collecting and organizing information. Since this research work falls within the scope of social sciences, the method used is the case study. The aim of using a case study is to study a problem and present a number of solutions. Considering that the purpose of a research work varies, there exist three types of case study: descriptive, explanatory and exploratory case studies. The descriptive case study focuses on describing the subject matter and answering the question 'what?' The explanatory case study aims at identifying the causes responsible for a phenomenon to happen. As for the exploratory case study, it seeks to shed light on a specific issue and provide answers to that issue.

The present investigation is of an exploratory type as its purpose is meant to explore ESP PhD students' writing difficulties, and provide suggestions and recommendations to alleviate students' language problems in written English. In terms of the number of cases, this research uses a single instrumental case study focusing on a sole case which is the one of ESP PhD students at Tlemcen University with the intention to generalize the research findings. With regard to the unit of analysis, the embedded case study is used considering that various elements are studied and analyzed separately, and later an overall conclusion about the case is presented.

2.4. Sample Population

Unlike human sciences, the issue of sampling is essential in social sciences. It represents a crucial process in any research without which data remains impossible to collect. The chosen type of sampling in this research work is the representative sampling paradigm. Concerning the present study, the sample population consists of ESP PhD students at Tlemcen University. Before selecting this sample, the researcher had to make sure that it adheres to the three main characteristics of a good sample: representativeness, generalizability, and homogeneity. Representativeness refers to the sample's capacity to depict the same features as the ones of the target population. Generalizability stands for the sample's ability to permit the investigator to apply the results on the target population. Finally, homogeneity implies that the informants have more common points than differences.

2.5. Research Instruments

As part of any research work, gathering data plays a vital role in achieving reliable results. Considering the field of English for Specific Purposes, data collection is the pillar on which needs analysis is built. For this reason, choosing the right research instruments considerably supports gathering as much useful information as needed. In this research work, two research tools were used: a students' questionnaire and students' articles. In the present study, the period of data collection was largely open with the aim of giving as much time as needed to the respondents to answer and ultimately procure as much information as possible.

2.5.1. Students' Questionnaire

The questionnaire is a research instrument frequently used in different disciplines. It is useful as it helps to gather both types of data: qualitative and quantitative. A questionnaire composed of two sections was administered to ESP PhD students at Tlemcen University. These students are from several specialties including: biology, chemistry, computer science, economy, electronics and information engineering, mathematics, pharmacy, physics, and political science. The questionnaire was sent to students via Google Forms.

The questionnaire was composed of two sections: section one and section two (see appendix 1 and 2) The first section aimed at gathering information about students' background concerning English while the second intended to indentify students' lacks in written English in order to learn about the ways that best suit their needs to improve that skill. In addition to the two sections, information about the personal profile of informants was required at the beginning of the questionnaire as a way to learn about their age and specialty by establishing a friendly introduction to the topic.

The designed questionnaire aimed at gathering both quantitative as well as qualitative data. However, most questions were quantitative. The goal of using more quantitative than qualitative questions is to gather objective and reliable data for the sake of identifying students' language difficulties and subsequently designing a suitable course.

2.5.2. Scientific Articles Evaluation

Through written articles, the level of students in writing as well as the difficulties they face should be revealed. A research article is an academic work which treats a specific and original problem, discusses it, and is issued in a peer-reviewed journal. The questionnaire helps to provide answers from the informants' point of view while articles reinforce students' answers by confirming their responses and possibly revealing about new aspects. In this study, not all students who answered the questionnaire shared their rejected articles with the researcher. Only three of them did.

Possible reasons can include: the acceptance of the article, not having published one yet, or refusing to share the rejected article for personal reasons.

2.6. Data Analysis

In this part of the research work, collected data from students' questionnaire and their rejected articles is analyzed both quantitatively and qualitatively using Microsoft Office Excel 2007. The questionnaire is designed to retrieve essential information for a thorough study. By analyzing the quantitative data, the researcher aims at identifying the reasons behind students' writing difficulties via supplying numbers and statistics. The latter focuses on obtaining narrow and focused results displayed in tables and pie charts. Qualitative data analysis enhances the exploration of students' opinions and views concerning the subject matter. These are clarified through small paragraphs.

2.6.1. Students' Questionnaire Analysis

The questionnaire used in this study first includes a part where the respondents' personal information is required. The following are two sections with two different aims. The first section contains ten questions while the second is a series of eleven questions. All three types of questions found in research methodology are used in the present questionnaire: close-ended designed to motivate the students to answer easily and quickly; multiple choice questions included to allow students to choose from a variety of choices previously suggested by the researcher, with the possibility of adding answers of their own; and open-ended questions which grant the informants the opportunity to express their ideas freely.

Considering that the questionnaire is composed of a part for the student's personal profile and two sections, results are reported under three rubrics. Correspondingly, the first rubric analyzes students' personal information including their gender, age, department, and field of study. The second rubric addresses ten questions that revolve around labeling student's background knowledge about English at university while emphasizing on matters related to their academic writing skills. The third rubric accounts for the results of eleven questions which look at students' strengths and

weaknesses in written English by focusing on finding proper ways that rectify the major deficiencies they struggle with.

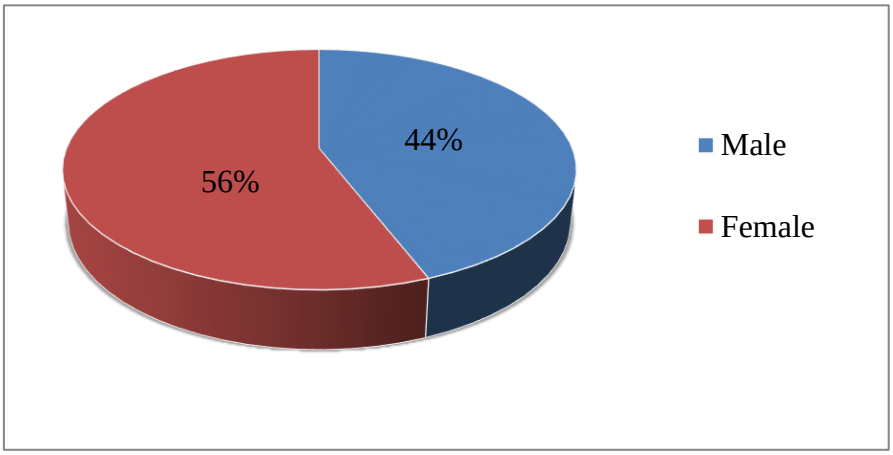
2.6.1.1. Results

The questionnaire was answered by sixty eight PhD students from Tlemcen University. Its different questions led to the following results:

Rubric One: Personal Profile

Question One: Informants' Gender.

ESP doctorate students were asked about their gender. Their answers are summarized in the following pie chart:

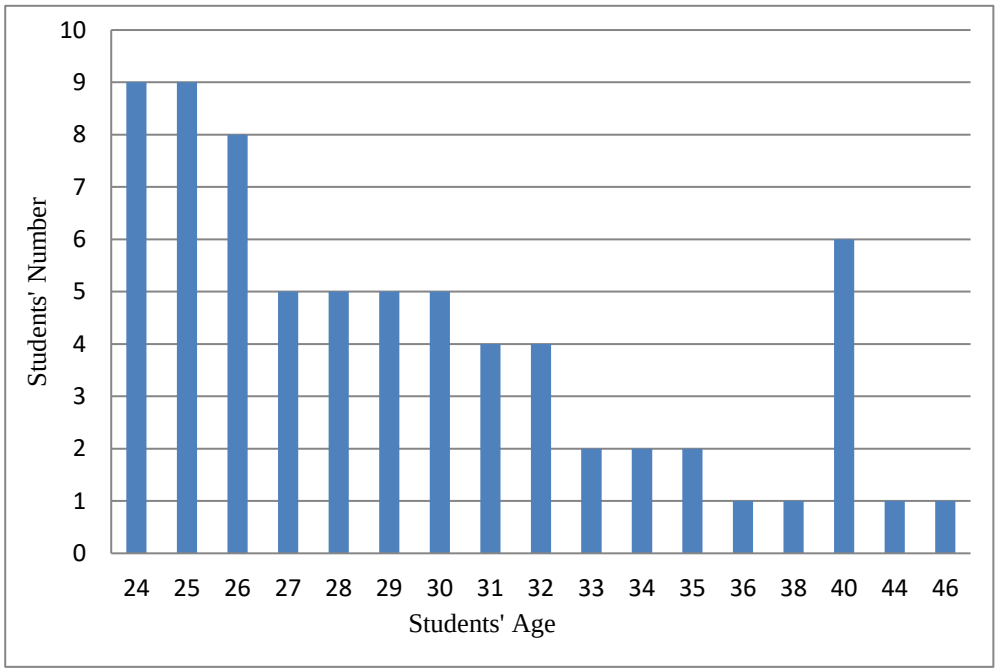


Pie Chart 2. 1 – Informants' Gender

From the above pie chart, it can be seen that the number of female informants (56%) exceeds the number of males (44%). Still, the difference is not distant.

Question Two: Informants' Age.

PhD students were also asked about their age. Their answers are the following:



Bar Graph 2. 1 – Informants' Age

From the bar graph above, it can be seen that students' age varies from 24 years old till 46. It can observed that most of them are 35 years old and below, and only a few are above that.

Question Three: Informants' Department.

In order to learn about the general field of study of every student, a question about informants' department was added. The respondents provided different replies. The departments were: Department of Physics, Department of Chemistry, Department of Computer Science, Department of Mathematics, Department of Biology, Department of Pharmacy, Department of Electrical Engineering and Electronics, Department of Political Sciences, and Department of Economy.

Question Four: Informants' Specific Field of Study.

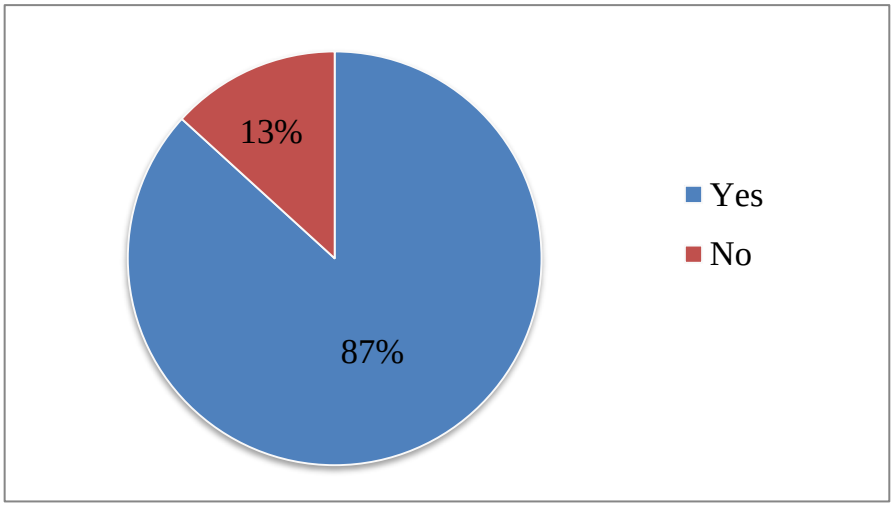
To obtain further information about the informants, they were asked to provide their specific fields of study which were the followings: Materials and Environmental Chemistry, Physical and Analytical Chemistry, Biochemistry, Catalysis and Green

Chemistry, Materials and Polymer Chemistry, Organic Chemistry, Applied Chemistry, Spectroscopic Methods of Analytics, Inorganic Chemistry, Polymer Chemistry, Polymer Physics, Plasma Physics, Solid State Physics, Theoretical Physics, Macromolecular Materials and Engineering, Condensed Matter Physics and Semiconductors, Renewable Energy, Biomedical Materials, Organic Synthesis, Microbiology, Materials Physics, Software Engineering, Artificial Intelligence, Communication and Development, Genetics, Remote Sensing Automatic Target Recognition, Cyber Security, Networks and Distributed Systems, Probability and Statistics, Partial Differential Equations and Their Applications, Machine Learning for Big Data Analytics, Applied Mathematics, Intelligent Transportation Systems, Cloud Computing and Wireless Sensor Networks Integration, Membrane Technology, Nanobiomaterial, Solar Energy, and Finance.

Section One: ESP PhD students' background in English.

Question One: Have you ever studied English at university?

To view if an English course formed part of their curriculum at university, PhD students were asked whether they have ever studied English at university or not. The students provided different answers. They are summarized in the following pie chart:



Pie Chart 2. 2 – English studies at university

From the above pie chart, it can be shown that most PhD students at Tlemcen University, numbered of 59 (87%), have had English courses while only 9 of them (13%) have not had.

Question Two: If yes, how many years of English language learning have you had at university?

This question relates to the previous one as it seeks to find out the number of years students answering 'yes' have had at university. The following table illustrates their answers:

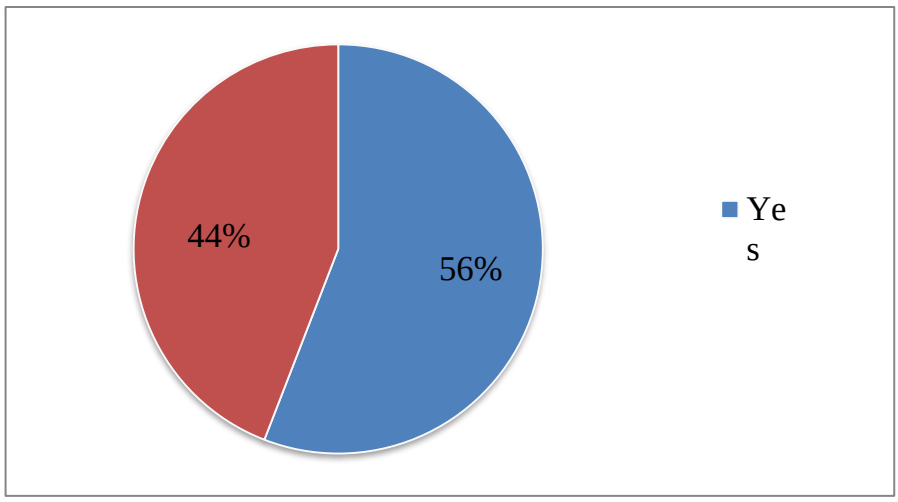
Table2. 1 – Duration of English studies at university

Number of Years	Number of Students
1	14
2	18
3	16
4	5
5	4
6	1
7	1

The above table reflects the answers provided by those PhD students who have received a course of English as part of their higher education studies. Results indicate that among 59 students, most of them have had two years of English studies while only two students have had it for six and seven years each.

Question Three: Is English language learning part of your PhD curriculum now?

To elicit whether PhD students are still studying English, they were asked if they receive English classes as part of their PhD curriculum. The following pie chart demonstrates their answers:

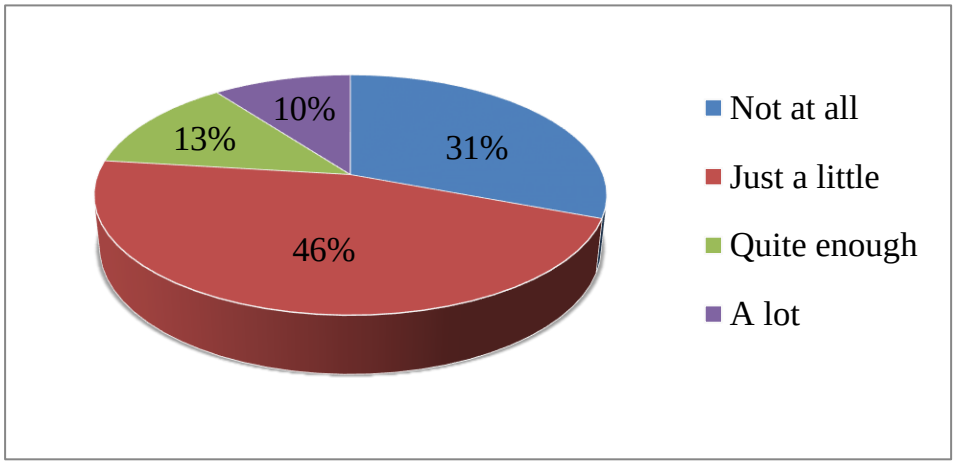


Pie Chart 2. 3 – The inclusion of English studies in the PhD curriculum

Results displayed in the pie chart reveal that 56%, representing (38) PhD students, agreed that they still attend classes of English even as doctorate students; however, 44%, being the percentage of (30) students, admitted that they no more study English.

Question Four: If yes, does the content of the course give importance to the writing skill?

This question was addressed to students whose answer to question three was 'yes'. To say if ever the content of the course of English pays attention to writing, PhD students provided the following responses:

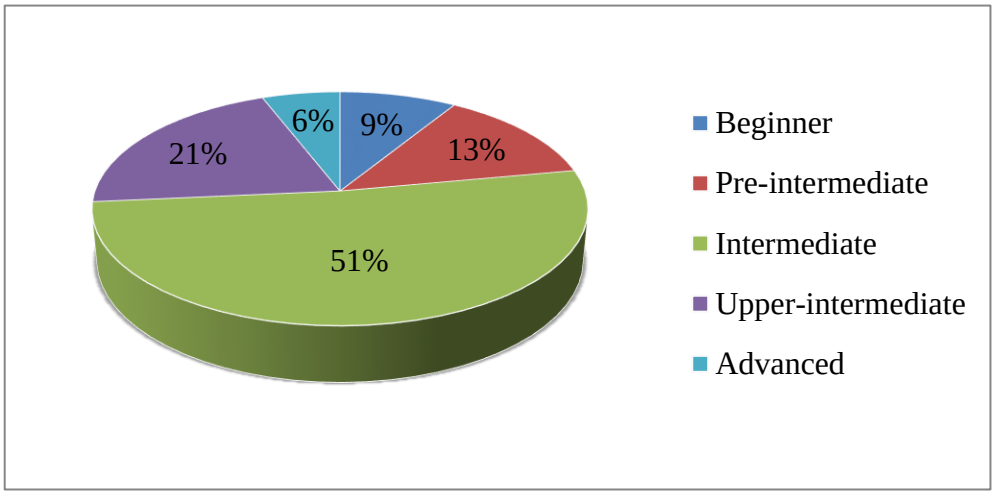


Pie Chart 2. 4 – The importance devoted for writing in English classes

According to their answers, 46%, representing 18 students, claimed that the English course gives just a little of importance to writing. Next, 12 of them who represent 32% selected that no attention is given to the writing skill. Additionally, 13%, being the percentage of 5 students, said that time devoted for written English is quite enough while only 10% (4 students) viewed that writing is given a lot of attention.

Question Five: How do you perceive your level in the English language in general?

Being aware of PhD students' level the English language in general is significant to be able to design the right course for the right level. Answers to this question are presented in the following pie chart:



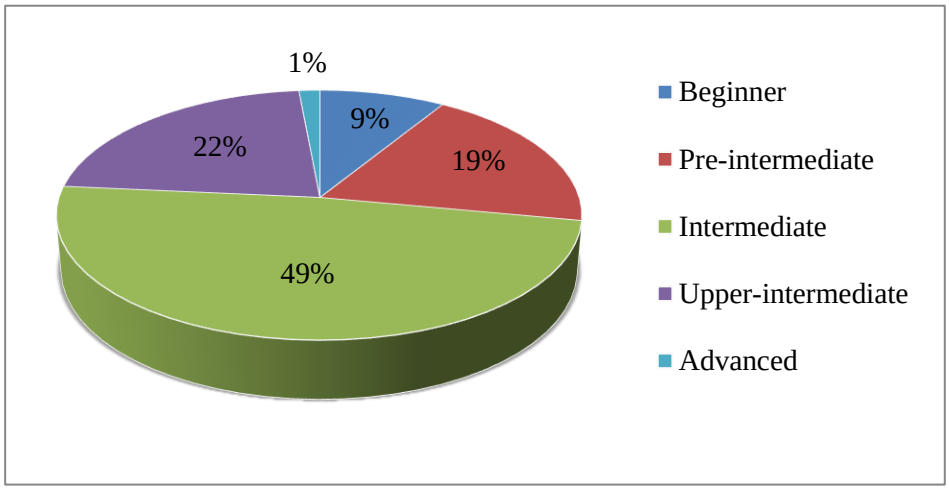
Pie Chart 2. 5 – ESP PhD students' level in English

The analysis of PhD students' level in English shows that half of them (51%) are at the intermediate level. The other half is divided on the remaining levels: 21% for upper-intermediate, 13% for pre-intermediate, 9% are beginners, and only 6% of them are advanced.

Question Six: How do you perceive your level of writing in English?

Asking PhD students about their level in written English helps the researcher to devise the appropriate learning content and activities intended to further improve the

quality of their written productions. Students' level in written English is shown as follow:

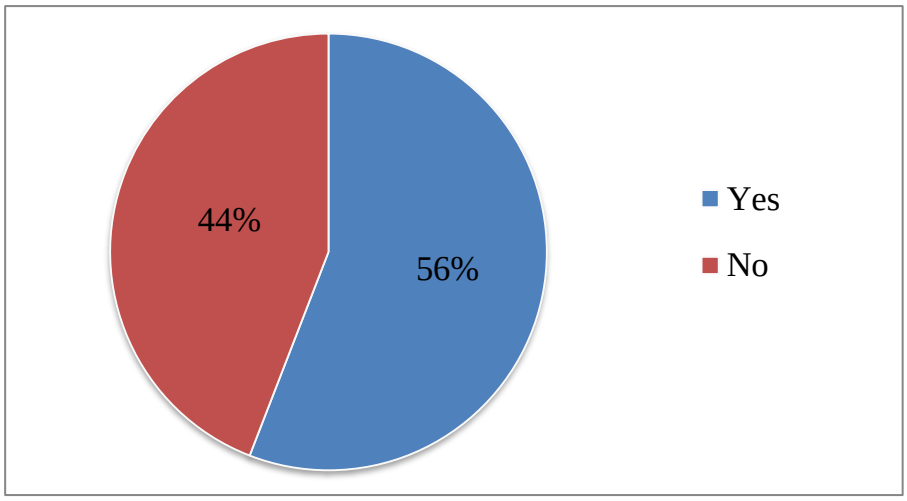


Pie Chart 2. 6 – ESP PhD students' level in written English

Approximately the same as responses in question five, the results displayed in the above pie chart show that practically half of the respondents (49%) see that their level in written English is intermediate. Others (22%) believe that they are at an upper-intermediate writing level while 19% think that it is pre-intermediate. The remaining 9% claim being beginners in English writing, and only 1% believe having an advanced level.

Question Seven: Have you ever submitted a research article to a scientific journal?

As part of the present work research problem, finding out whether PhD students have ever submitted an article to a scientific journal is vital. Their answers are summarized in the following pie chart:

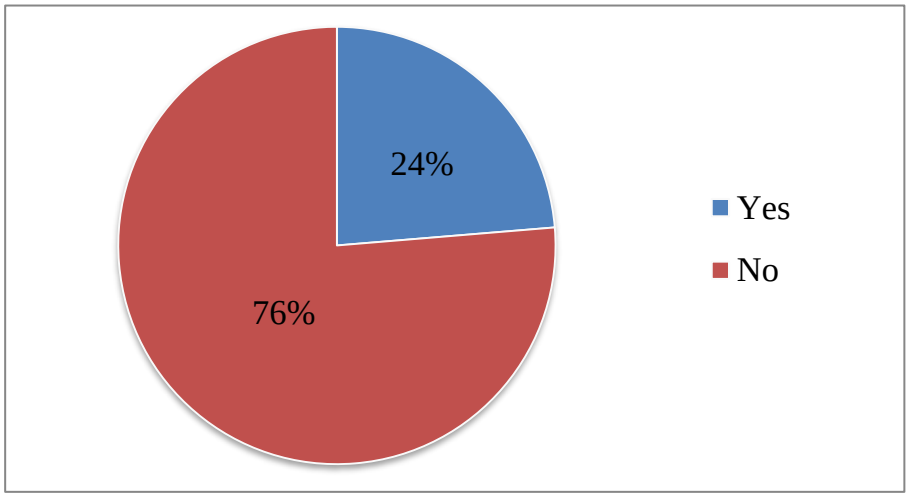


Pie Chart 2. 7 – Submission of research articles to scientific journals

From the above pie chart, it shows that 38 PhD students, represented by 56%, have submitted an article to a journal, and that the remaining 30, represented by 44%, have not.

Question Eight: Has your article ever been accepted at first attempt?

This question was directed only to PhD students who have already submitted articles to journals. The aim of this question was to know whether or not their submission was accepted from the first attempt. The following pie chart reveals their answers:

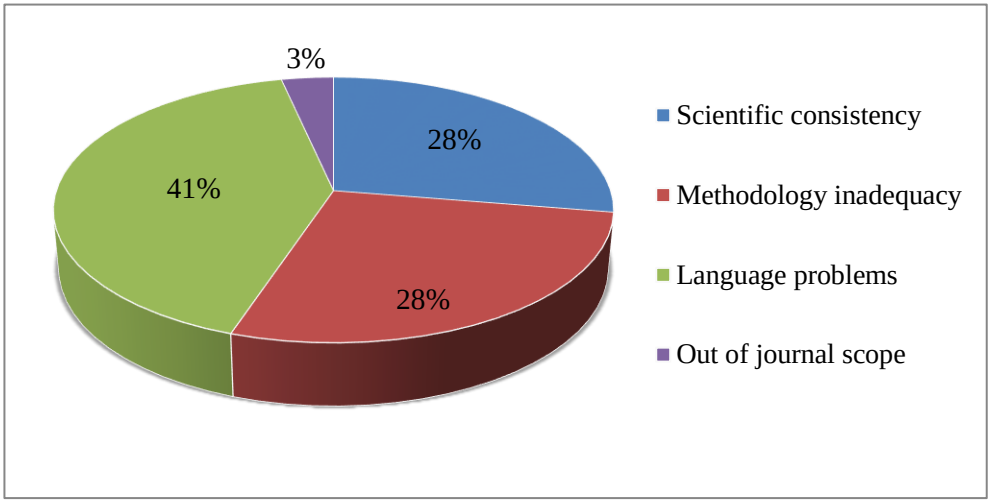


Pie Chart 2. 8 – Acceptance or rejection of the research article

From the above pie chart, it can be seen that the majority of students' articles (76%) were rejected while only 24% were accepted from the first submission.

Question Nine: If no, would you select the reasons behind this rejection?

This question's aim is to discover the reasons responsible for the high rate of articles rejection. Results are shown in the following pie chart:

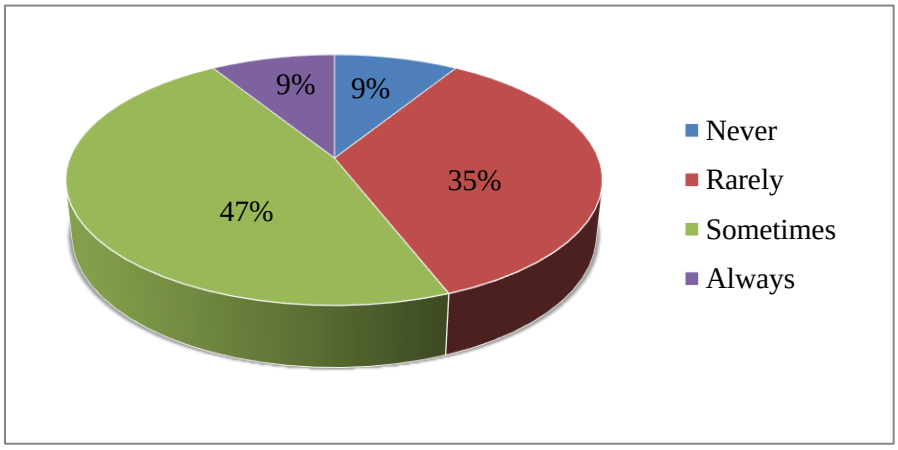


Pie Chart 2. 9 – **Reasons of article rejection**

The pie chart above shows that the major cause for rejecting PhD students' manuscripts is language problems (41%). The next reasons are methodology inadequacies and scientific consistency (28% both). Only 3% answered that the reason their article was rejected was because it was out of the journal's scope.

Question Ten: Away from writing scientific articles, how often do you write in English?

Far from writing articles, finding out more about PhD students' acquaintance with written English required asking them how often they practice this skill. The answers are summarized in the following pie chart:



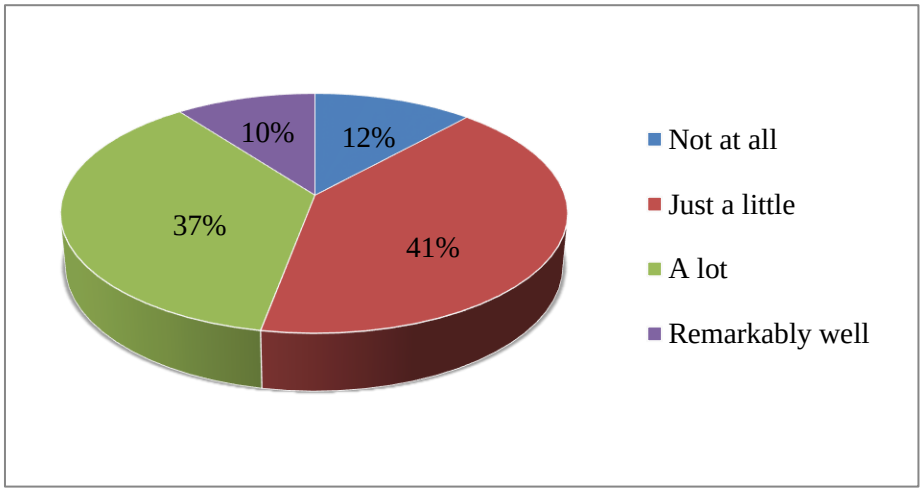
Pie Chart 2. 10 – Frequency to write in English

The results in the above pie chart reveal that 47% of PhD students sometimes write in English when another 35% of them claim to rarely write in English. While 9% of these students never write in English, the remaining 9% always do.

Section Two: ESP PhD students' needs in written English.

Question Eleven: Did your writing skill improve through time?

To know if PhD students have achieved writing improvements, they were asked whether they have noticed any progress by time. The informants' answers are summarized as follow:



Pie Chart 2. 11 – Degree of improvement in students' written English

From the above pie chart, it can be seen that only 10% of PhD students have noticed a remarkable improvement in their writing skill, and only 37% of them

reported that they have improved their writing a lot. As far as the other remaining students are concerned, 41% of them think that their written English has improved just a little, and only 12% claim that it has not at all.

Question Twelve: If it did, what measures did you take to improve it?

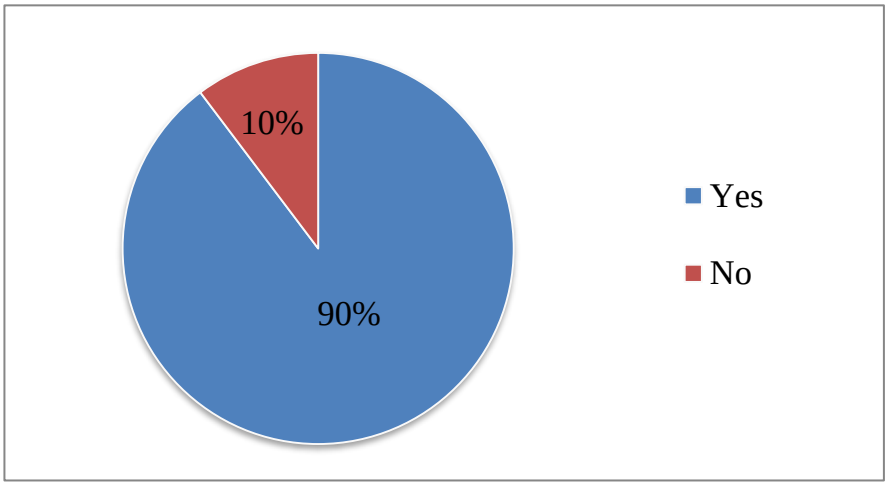
Excluding students whose writing has never ameliorated, this question is advanced to know about the measures students have taken to develop their written English. According to the different answers of the respondents, the thing which helped them the most was reading in general and more specifically reading scientific articles in their field of research. Students also stated that rewriting what they read in their own style also contributed to enhance their writing skill because the activity of writing again helped them reduce the number of errors, as many stated. Some of them said that summarizing and translating articles they read had a positive impact on their writing, too. A number of students stated that listening to academic English conversations was also useful. Others declared that they either seek for the help of the subject specialist or take online writing classes. One student added that he was able to develop his English skills as a result of being in close and frequent contact with foreign agencies in his workplace.

Question Thirteen: If not, what do you think are the reasons which prevented you from developing your writing?

Finding out about reasons which prevent PhD students from developing their written English is as important as knowing about the reasons for improvement. Most of students who have not noticed any progress reported that they never find the time to work on their English as they are occupied by other matters. Others stated that their written English has never improved because they never try to write. Some of them said that all their studies are done in French so they do not think of using English at all.

Question Fourteen: Is it interesting for you, as a PhD student, to receive a special course dedicated to improve your writing of scientific articles?

In order to assist PhD students with their writing, they were asked if they were interested in taking an English writing course. Their answers are summarized in the following pie chart:



Pie Chart 2. 12 – ESP PhD students' interest in an English writing course

From the above chart, it is clear that the majority of PhD students (90%) accepted to take an English writing course. Only 10% of them did not wish to have one.

Question Fifteen: How many sessions of English writing class per week do you think are necessary for you?

According the needs of each, students who agreed on taking a course dedicated to improve their writing answered that they need the following number of hours per week:

Table2. 2 – Number of English writing hours per week students need

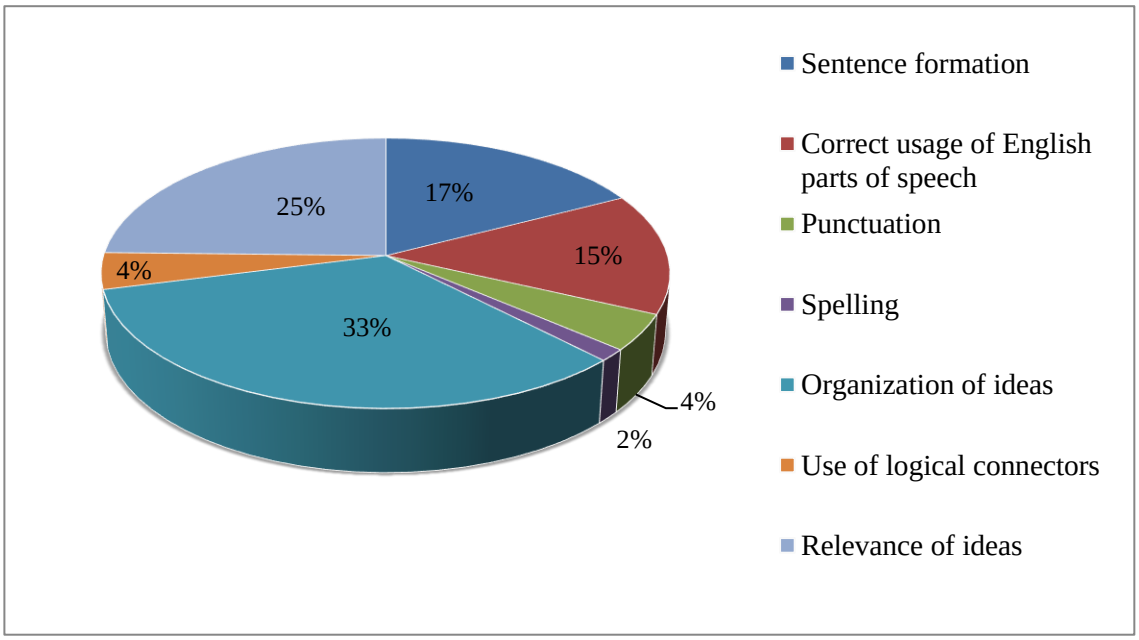
Number of Hours	Number of Students
1	25
2	27
3	5

4	2
5	1
8	2
Once a month	1

From the table above, it can be seen that different answers were given. 27 students thought that they need two hours of English writing class per week; 25 of them believed that they need only one hour. Only 5 PhD students saw that they need three hours a week; 2 of them suggested four hours while 2 others eight hours a week; 1 of them thought that five hours are needed while the remaining student believed that once a month is sufficient.

Question Sixteen: What are the difficulties you face while writing your articles in English?

In order to identify PhD students' lacks in writing, they were asked about the difficulties they face. Answers are illustrated in the following pie chart:



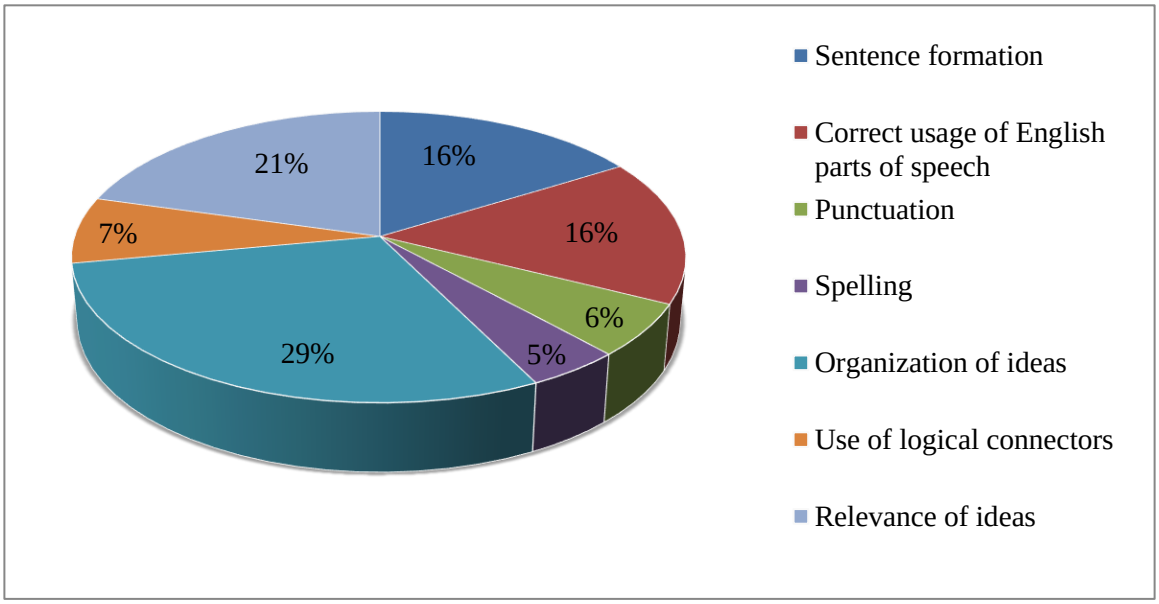
Pie Chart 2. 13 – ESP PhD students' articles writing difficulties

From the above pie chart, it can be understood that a large number of PhD students faced writing challenges related to coherence and cohesion since 33% had problems organizing their ideas and 25% were not sure about the relevance of the ideas they

used. Also, 17% of students claimed that they had difficulties forming grammatical sentences. Additionally, 15% of them stated that they did not know how to use the English parts of speech correctly. The remaining few percentages indicated that 4% faced challenges in punctuation, another 4% did not master the use of logical connectors, and only 2% did not know how to spell English words. PhD students were also provided with the option of 'capitalization'; however, no results have been obtained about that issue which indicates that PhD students had no problem with capitalization.

Question Seventeen: What language difficulties do you think you need to improve the most?

After being requested about the language difficulties they faced, ESP students were asked about the writing weaknesses they wished to develop. The answers are shown in the following pie chart:



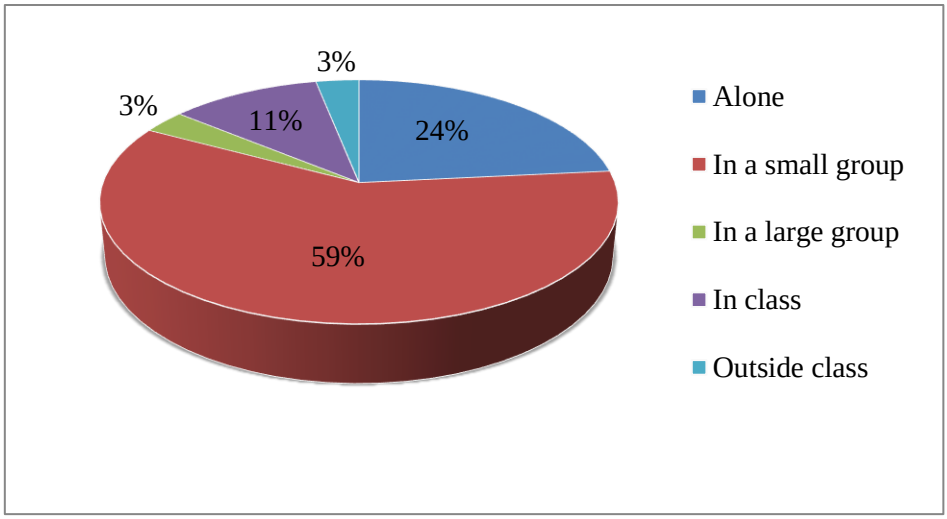
Pie Chart 2. 14 – ESP PhD students' areas of weaknesses they wish to develop

From the above pie chart, it can be seen that PhD students' first writing difficulty (29%) they liked to work on is how to organize the ideas of their research articles. Next, 21% of them asserted that they needed to learn which ideas deserve to be given more attention. Actually, 16% of them mentioned that they wished to form grammatical sentences while another 16% how to use English parts of speech

correctly. 7% of the students mentioned the need to know how to use logical connectors, 6% focused on punctuation, and the remaining 5% on spelling.

Question Eighteen: How do you learn best?

To know which conditions best suit PhD students when taking the English writing class, they were asked whether they like to learn on their own, within a small group, within a large group, in class, or outside class. The following pie chart reflects their answers:

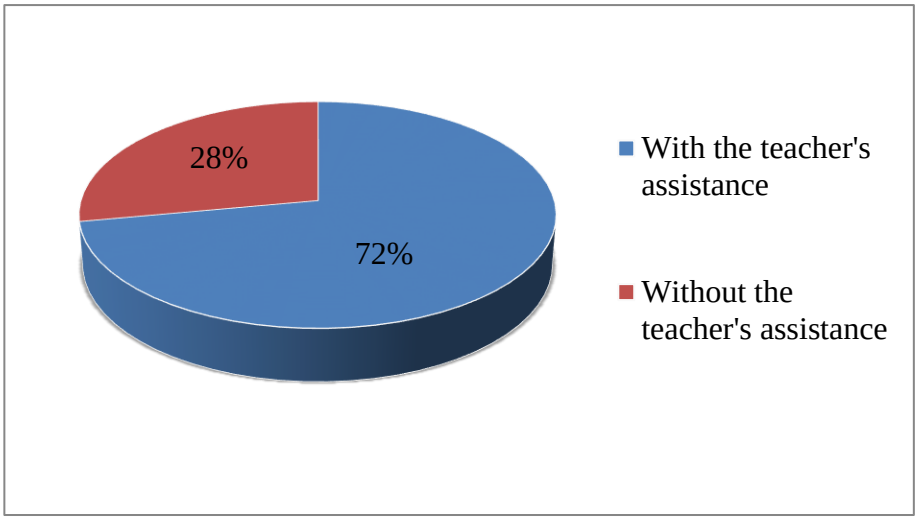


Pie Chart 2. 15 – Students' learning preferences in terms of members' number

From the above pie chart, it can be observed that most PhD students (59%) preferred studying within a small group of students as opposed to only 3% who accepted to study in a large group of people. 24% of them declared that they feel comfortable studying alone without the presence of any other student while 11% of them agreed on studying in class, and only 3% said that they liked to study outside class.

Question Nineteen: How do you prefer to improve your writing skill?

In addition to the previous question, PhD students were also asked whether they favored taking classes with the teacher's assistance or without it. The answers are displayed in the following pie chart:



Pie Chart 2. 16 – Students' learning preferences in terms of the teacher's assistance

According the results from the above pie chart, it can be understood that the majority of students (72%) chose to study while being supervised by the teacher. However, only 28% of them preferred the teacher not to be present while studying.

Question Twenty: In your opinion, what is the best way to teach/ learn English writing skills?

To have an idea about teaching or learning methods every PhD student favors, they were asked to give their opinions in regard to the best way of teaching or learning written English. Concerning teaching methods, the respondents suggested incorporating English language classes in the first stages of education by providing the learners with a solid foundation in all four skills. Also, they confirmed that taking a specialized course which combines between the student's field of research and the writing skill is important. PhD students suggested receiving writing assignments about subjects which motivate the learners and interest them. They indicated that the assignments ought to be followed by constructive feedback. As far as the learning methods are concerned, the majority of PhD students opted for an intensive reading of scientific articles and practicing writing translating scientific contents from Arabic to English and vice versa. One student suggested that learners learn best when they take part in a writing workshop. Another one saw that taking online specialized writing courses would be beneficial.

Question Twenty One: If you sign for a special course to help you improve writing scientific articles, how do you expect the course to benefit you?

PhD students who showed interest in taking an English writing course explained that the course should help them to learn how to write correctly, and to fix all writing difficulties they face such as sentence formation, the use of logical connectors, punctuation, and others. They also insisted on the fact that the course should shed light on how to write coherent and cohesive research articles with as minimal errors as possible. Others thought that it was important for the teacher to provide them with interesting and efficient classes both in terms of content and the short period of time. Students also expected the English writing course to be motivating and rich with regard to reading and writing activities.

2.6.2. Students' Errors Analysis

In addition to the questionnaire, three of PhD students' articles (see appendix 3) were utilized to retrieve some of the errors exhibited in their manuscripts. The writing issues were summarized in terms of the ones previously found in the questionnaire analysis. To specify, the selected errors mirror only few instances each related to a language problem. Hence, all writing deficiencies shall be found in appendix 3. The analysis of students' articles led to the following results:

- **Coherence**

Error Classification	Error Identification	Comment on Error
Coherence	In order to discuss ancestors, cults, and the relationship between the living and the dead that is because the world of the dead is the gate through which the souls of the ancestors relate to the living.	Incomplete and unclear sentence.
Coherence	The review of the figures 15 and 16, the good agreement of results with an average error is less than 4%.	Badly constructed sentence formed with sentence fragments only.

Table2. 3 – Coherence Errors

- **Cohesion**

Error Classification	Error Identification	Comment on Error
Cohesion	This process is done in 4 steps: the arrival of a dataset, which will be fragmented into a set of blocks (Split step). As soon as they are fragmented, the data will be transformed into pairs of <key, value> (Map step). The couples will be organized and put in groups them according to their keys (Shuffle step). Finally, an operation is performed on each set of couples (Reduce step).	Absence of cohesive devices indicating each step.
Cohesion	For more than a century, it has become clear to note the significant growth of energy demand that knows the global market where this demand was covered by the use of fossil energy sources arriving to their limits.	Long and ambiguous sentence because of the lack of cohesive devices.

Table2. 4 – Cohesion Errors

- **Sentence Formation**

Error Classification	Error Identification	Comment on Error
Sentence formation	It below this value the influence of H is dominant	Poor sentence structure lacking a clear subject and the main verb.
Sentence formation	The subject of ancestral worship **may be refers** to the origin of religion	The use of the modal verb 'may', the auxiliary 'be', and the

		verb 'refers' all at once resulting in a grammatical error.

Table2. 5 – Sentence Formation Errors

- **English Parts of Speech**

Error Classification	Error Identification	Error Correction
English parts of speech	**The worship** of the ancestors was an act of religious **worship**	**Worshiping ancestors** was **a religious act**
English parts of speech	Examination of the two figures highlighted that for a clear sky solar radiation varies during the day in a way Gaussian. **She** is weak […] and **she** reached […]	Examination of the two figures highlighted that for a clear sky solar radiation varies during the day in a way Gaussian. **It** is weak […] and **it** reached […]

Table2. 6 – English Parts of Speech Errors

- **Logical Connectors**

Error Classification	Error Identification	Comment on Error
Logical Connectors	**Although** the CIGS thin film solar cells have reached to maturity level that can go easily for mass production, **but** there is still some optimizations	Simultaneous use of two linking words expressing one meaning: concession.
Logical Connectors	Therefore, the question of the preservation of the environment held a growing place in developed countries. **Indeed**, in 1992 at the Rio conference and later, in 1997	'Indeed' does not establish the right connection between the previous and following sentence.

Table2. 7 – Logical Connectors Errors

- **Subject-verb Agreement**

Error Classification	Error Identification	Error Correction
Subject-verb agreement	The semiconductor **parameters** of CdS and CIGS **is** given by Table 1	The semiconductor **parameters** of CdS and CIGS **are** given by Table 1
Subject-verb agreement	**The SCAPS and Atlas SILVACO** simulators **requires** the input parameters	**The SCAPS and Atlas SILVACO** simulators **require** the input parameters

Table2. 8 – Subject-verb Agreement Errors

- **Noun-pronoun Agreement**

Error Classification	Error Identification	Error Correction
Noun-pronoun agreement	Nevertheless, the performances of **this algorithms** […]	Nevertheless, the performances of **these algorithms** […]

Table2. 9 – Noun-pronoun Agreement Error

- **Prepositions**

Error Classification	Error Identification	Error Correction
Prepositions	The present model, we consider the geometrical, electrical and optical and parameters	**In** the present model, we consider the geometrical, electrical and optical and parameters
Prepositions	A comparison of the results of solar irradiation obtained **by** this study	A comparison of the results of solar irradiation obtained **in** this study

Table2. 10 – Prepositions Errors

- **Punctuation**

Error Classification	Error Identification	Error Correction
Punctuation	Mr. Tingzhen et al. presented a method of numerical simulation for the system of the solar chimney with the turbine power plant**,** they have found […]	Mr. Tingzhen et al. presented a method of numerical simulation for the system of the solar chimney with the turbine power plant**. T**hey have found […]
Punctuation	"[…] during prehistoric period and early dynastic times**;** by showing many examples […]	"[…] during prehistoric period and early dynastic times by showing many examples […]

Table2. 11 – Punctuation Errors

- **Capitalization**

Error Classification	Error Identification	Error Correction
Capitalization	**at The** village of Mermdit Bani Salama which **Located** in North Delta […]	**At the** village of Mermdit Bani Salama which **located** in North Delta […]
Capitalization	[…] contact of **Aluminum**	[…] contact of **aluminum**

Table2. 12 – Capitalization Errors

- **Spelling**

Error Classification	Error Identification	Error Correction
Spelling	[…] most of **stats** have made commitments	[…] most of **states** have made commitments
Spelling	**solaire** cell technology	**solar** cell technology

Table2. 13 – Spelling Errors

The above analysis primarily focused on extracting writing errors PhD students performed in their articles. The analysis revealed identical results as the questionnaires'. In fact, reasons such as the absence of the connection between ideas and sentences, poorly formed sentences, the misuse of English parts of speech and logical connectors, punctuation issues, capitalization errors, and spelling mistakes proved their writing incomprehensible. Other results which emerged from the articles analysis were errors related to subject-verb agreement, noun-pronoun agreement, and mostly prepositions which were clearly exhibited in their research writing.

2.7. Interpretation of the Results

As stated in the research problem, the principal aim of this study was to explore and analyze ESP PhD students' language problems mainly those related to writing. Analyzing students' questionnaires and articles contributed in knowing more about their areas of weaknesses. Through their answers, students confessed that they find it hard to write correct English. This fact was supported once the content of students' research articles was analyzed. Although writing an article forms a part of their academic journey, doctorate students' articles are rarely accepted from the first attempt as they reflect many writing inadequacies. The first research question of this study aimed at finding out about the difficulties ESP doctorate students faced while composing a scientific article. The obtained results validated that the writing skill formed students' major problem. As a result, the first hypothesis was confirmed.

The second research question focused on exploring the type of writing errors common among students while writing. The results of the questionnaire revealed that most PhD students struggled with coherence and cohesion as they faced challenges selecting and organizing the right ideas for their articles. Additionally, students declared that they encountered problems related to the formation of grammatically correct sentences, and how to adequately use the English parts of speech. A very few number of them stated that they had problems with the use of logical connectors and spelling. While similar results were portrayed in the articles, other errors were discovered. These included subject-verb agreement, noun-pronoun agreement,

prepositions, punctuation, and capitalization. Consequently, the second hypothesis was also confirmed.

2.8. Conclusion

The goal of this chapter was to achieve a detailed and comprehensible image of ESP doctorate students' needs, lacks, and wants in writing in English. In order to depict the situation at hands, the researcher conducted a needs analysis from which the results obtained were analyzed both quantitatively and qualitatively, and displayed into tables, pie charts, and a bar graph. Finally, those answers were linked to the research questions and hypotheses and which were both confirmed. On the basis of what was mentioned in this chapter, a course, which adapts to PhD students' needs, ought to be designed for the sake of enhancing their writing skill in English.

CHAPTER THREE

Suggestions and Recommendations

Chapter Three: Suggestions and Recommendations

3.1. Introduction

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3.4. Links to Books Used in Lessons

3.5. List of Useful Self-Study Resources

3.6. Conclusion

3.1. Introduction

The present chapter focuses on designing a course which responds to ESP doctorate students' needs. Results obtained in the second chapter reveal students' lacks and demands. Based on this premise, the structure of this chapter is in accordance with defining the goals and objectives of the course, conceptualizing the course, selecting and developing materials and activities, and planning sample lessons and activities.

3.2. Course Design

The performed investigation is used to reveal about the exact needs of PhD students and to guide the researcher in outlining and arranging the convenient course which focuses on the language problems these informants confront. The aim of the conducted needs analysis is to detect the following elements:

1. Informants' personal profile
2. Informants' background of English at university
3. Informants' level of writing in English
4. Submission of research articles in scientific journals
5. Writing lacks in English
6. Interest in taking a course dedicated to writing articles
7. Difficulties faced in writing articles in English
8. Scientific articles writing needs
9. Information about the ways informants prefer to improve their writing skill

The present course is built on the basis of the needs analysis through which informants' age and motivation to taking the course is reported. It devotes importance to Graves' suggested stages in the design of an ESP course. The first step was achieved by the completion of the informants' needs assessment. The remaining stages involve the determination of goals and objectives, content conceptualization, and selection and development of materials and activities.

3.2.1. Goals and Objectives of the Course

As mentioned in Xenodohidis (2002, para. 41), although goals and objectives are used interchangeably, each carries a different meaning, yet complementary to the other.

Goals are a set of ideas represented in the form of targets that a person defines, decides upon, and determines to achieve. Goals can be organized according to the degree of importance of each; however, prioritizing one goal over the other may indicate that one is less important. Instead, all goals ought to be given the same importance to guarantee their successful accomplishment. Objectives accompany the previously established goals and complement them by formulating specific statements. These statements are concrete and help to arrive at a positive rewarding as a result of being precise (Giesen and Richter, 2010)

In their article "Writing Goals and Objectives", Giesen and Richter defined course goals as "a broad statement of intent or desired accomplishment," which "should be written from the instructor's point of view." They added, "Objectives are measurable and observable," and "should be written from the student's point of view."

Based on the research problem, the course focuses on increasing the probability of accepting ESP doctorate students' article by enhancing their language problems mainly the writing skill. For this reason, the needs analysis indicates that the course goals revolve around improving their writing skill and developing their reading skill.

The course objectives comprise:

- Having a good command of English grammar: proper sentence skills that reflect criteria of scientific writing, correct usage of English parts of speech, and accurate use of the appropriate logical connector to link sentences.
- Generating the relevant ideas to the topic and arranging them conveniently.
- Grasping the rules of the written language: capitalization, punctuation, and spelling.
- Reading scientific articles followed by writing activities.

- Writing articles with minimum errors.
- Translating passages from scientific articles (Arabic – English).
- Reading articles and writing their abstract.

3.2.2. Content Conceptualization

The needs analysis as well as the goals and objectives provide insights into the content of the course and mark the precise elements which deserve to be included in the syllabus.

As far as ESP doctorate students are concerned, the results of the needs analysis show their desire to receive a course which reinforces their knowledge about English grammar, cohesion, and coherence. On this basis, the syllabus will take all students' concerns into consideration by prioritizing the objectives according to the notion of learnability. Learnability is a key concept in language teaching which states that the learning content should be classified according to the complexity of information. Accordingly, the syllabus organization moves from simple to complex knowledge in a logical way. The course is arranged in the following order: English Parts of Speech, Spelling, Capital Letters, English Sentence Structure, Punctuation, English Sentence Connectors, An Introduction to Cohesion and Coherence, and Reading to Improve the Writing Skill. Another skill which is reading is introduced to the syllabus in order to meet the needs of these students.

3.2.3. Course Performance

In this course, the procedure of completing each lesson is as follows: at the beginning, the teacher gives the lesson within the assumed class duration first by going through the theoretical part. Baring in mind that ESP is a learner-centered approach, the teacher makes sure to procure a student-to-teacher interaction and a student-to-student interaction by engaging the learners in lesson-related discussions. Later, a large amount of time will be devoted to practice where students will be given activities moving from easy to more demanding exercises. Always keeping in mind the significance of involving students, the teacher organizes them in pairs or small groups to ensure that they build a comprehensive understanding of the elements studied. As

soon as the whole class duration is covered, every student will be provided with a checklist containing the seminar details to assess their understanding of the previously studied aspects. The form that the checklist takes is inspired from the third year textbook 'New Prospects' learning log which is found at the end of every unit.

3.2.4. Selection and Development of Materials and Activities

In order to respond to the needs of ESP doctorate students, the choice of appropriate materials should be made on the basis of their demands. Every student possesses a distinct level in English in general and writing in particular. Thus, the selected materials are expected to fit the different existing levels and to cover the necessary lacks, necessities, and wants. In addition to that, the selection of the materials mainly targets reaching the goals and objectives already established.

The chosen materials comprise those put forward by the researcher on the basis of the obtained results, and others suggested by a number of students. The materials are a combination of knowledge about academic writing and the language of scientific articles which are mandatory to reach the specified ends.

All used sources in the design of the current course are taken from the Internet, are legitimate, and take into account the factors of age and motivation of the respondents. They include books and articles extracted from websites. Many of them are used as a source of inspiration for the researcher when devising the activities.

The learning materials which should be used in the course include:

- *The Little, Brown Compact Handbook: With Exercises* by **Jane E. Aaron** (2014)
- *The Craft of Scientific Writing* by **Michael Alley** (2018)
- "Coherence in Writing" by **Daniel Kies**
- "Cohesive Devices" by **Christopher Pell**
- "List of Sentence Connectors in English with Examples (Transition Words)" by **Melinda Makkos**
- "IELTS Writing: How to Write a Complex Sentence" by **Christopher Pell**
- "The Eight Parts of Speech Are Awesome" by **Elizabeth O'Brien**

3.3. Sample Lesson Plans

3.3.1. SAMPLE LESSON PLAN ONE

Lesson Title: English Parts of Speech

Target Audience: ESP PhD Students

Levels: _Beginner _Pre-intermediate _Intermediate

Target Skill: Writing

Duration: 3 hours

DESCRIPTION OF THE CONTENT

1. The English Eight Parts of Speech
   1.1. Nouns
   1.2. Pronouns
   1.3. Verbs
   1.4. Adjectives
   1.5. Adverbs
   1.6. Prepositions
   1.7. Conjunctions
   1.8. Interjections

REFERENCES

1. “Parts of Speech”, “Adjectives and Adverbs” from *The Little, Brown Compact Handbook: With Exercises* by **Jane E. Aaron** (2014)
2. “The Eight Parts of Speech Are Awesome” by **Elizabeth O’Brien (66aven’t-grammar-revolution.com)**

ACTIVITIES ON ENGLISH PARTS OF SPEECH

1. Say if the following statements are true or false and correct the false ones.
   - Pronouns are of one type only: personal pronouns.
   - A verb can describe either an action or a state.
   - Adjectives describe verbs.
   - Adverbs describe nouns, adjectives, or other adverbs.
   - Prepositions and conjunctions are connecting words.
   - Conjunctions fall into two types: subordinating conjunctions and coordinating conjunctions.
2. Identify all parts of speech existing in the following passage.

4 Things We'll Learn from the First Closeup Image of a Black Hole

Astronomers know the objects are there because of a black hole's entourage. As a black hole's gravity pulls in gas and dust, matter settles into an orbiting disk, with atoms jostling one another at extreme speeds. All that activity heats the matter white-hot, so it emits X-rays and other high-energy radiation. The most voraciously feeding black holes in the universe have disks that outshine all the stars in their galaxies.

Sciencenews.org

3. Provide the comparative and superlative forms of the given adjectives. Later, use each one in a sentence of your own.

   Pure – exact – academic – genuine – scientific
4. The following are sentences containing wrong comparative and superlative forms. Identify and correct them.
   a. Babies have most bones than adults. They have about 300 bones at birth while adults have 206.
   b. There are some metals like potassium and lithium which are reactiver than others that they immediately explode when thrown in water.
   c. Tigers are largest and heaviest than cheetahs.
   d. The Philippine Eagle is one of the larger and more powerful eagles.
   e. Earth is the more interesting planet.

LANGUAGE ASSESSMENT

- Using the following checklist, tick next to each statement the degree to which you master every item of the previous lesson.

I can	Very well	Fairly well	Not well
A. identify nouns in English. B. recognize the different types of pronouns. C. conjugate verbs in the different tenses and the different modes. D. identify adjectives in English. E. correctly place adjectives in a sentence. F. identify adverbs in English. G. correctly place adverbs in a sentence. H. use the right preposition. I. recognize the types of conjunctions. J. recognize the function of every conjunction. K. name the function of each English part of speech.			

3.3.2. SAMPLE LESSON PLAN TWO

Lesson Title: Spelling

Target Audience: ESP PhD Students

Levels: _Beginner _Pre-intermediate _Intermediate

Target Skill: Writing

Duration: 1 hour 30 minutes

DESCRIPTION OF THE CONTENT

1. Common Misspelled Words
2. British vs. American Spelling

REFERENCES

1. "Spelling and the Hyphen" from *The Little, Brown Compact Handbook: With Exercises* by **Jane E. Aaron** (2014)
2. "Common Misspellings" from **en.oxforddictionaries.com**
3. "British and American Spelling" from **en.oxforddictionaries.com**

SELF-STUDY RESOURCES

1. "Why is English Spelling so Confusing?" from **howtospell.co.uk**
2. "Learning to Spell for Adult" by **Meredith Cicerchia**

ACTIVITIES ON SPELLING

1. Identify any spelling mistakes in the following sentences and correct them.
   a. I usually travel buy plane.
   b. Smoking has many side affects on health.
   c. He excepted the job offer.
   d. How should I cite a book in APA?
   e. He was abandoned in the dessert.
   f. Principle things to remember while writing.
   g. For some, its hard to remember people's names.
   h. Researchers 70aven't that origins of human beings are from Africa.
   i. The Algerian martyrs are heros who sacrificed their lives for their country.
2. Choose the appropriate word according to the context.
   a. They were given a good _____ of advice. *(peace – piece)*
   b. He works 15 hours per _____. *(week – weak)*
   c. _____ means not firmly positioned in place. *(lose – loose)*
   d. Traveling allows discovering new cultures and _____ new people. (meeting – meating)
   e. J. R. R. Tolkien, _____ books are best sellers, is the writer of *The Lord of the Rings*. *(who's – whose)*
3. Indicate the British spelling and the American spelling in the following words.
   a. Center – centre
   b. Litre – liter
   c. Neighborhood – neighbourhood
   d. Analyze – analyse
   e. Paralyse – paralyze

LANGUAGE ASSESSMENT

- Using the following checklist, tick next to each statement the degree to which you master every item of the previous lesson.

I can	Very well	Fairly well	Not well
A. spell most English words correctly. B. identify misspelled words. C. correct misspelled words I read. D. differentiate between false friends. E. identify British spelling and American spelling.			

3.3.3. SAMPLE LESSON PLAN THREE

Lesson Title: Capital Letters

Target Audience: ESP PhD Students

Levels: _Beginner _Pre-intermediate _Intermediate

Target Skill: Writing

Duration: 1 hour 30 minutes

DESCRIPTION OF THE CONTENT

1. Cases of Capitalization

REFERENCE

1. “Capital Letters” from *The Little, Brown Compact Handbook: With Exercises* by **Jane E. Aaron** (2014)

ACTIVITIES ON CAPITAL LETTERS

1. Review the following paragraph, identify errors in capitalization and correct them.

Physicists create world's first laser-cooled neutral plasma

plasmas are naturally formed at high temperatures, such as those reached in the interiors of Stars. Neutral Plasmas consist of equal numbers of positive ions and electrons. In recent experiments, A team of Physicists at rice university worked with a cold neutral Plasma created out of atoms of strontium that were ionized by laser light. The team used lasers to cool the ions down to about 50 mK (millikelvin), a breakthrough that could lead to simulators for exotic States of matter that occur at the center of jupiter or white dwarf Stars.

2. Revise the following words to see if capitalization is respected or not.
   a. i (personal pronoun)
   b. "By […]" (beginning of a quote)
   c. The Scientists studying the problem could finally find a solution.
   d. University of 73aven't7373.
   e. Massachusetts institute of technology.
   f. mathematics (field of study)
   g. mathematics (subject)
   h. Sunday – on Sundays
   i. September
   j. National Aeronautics And Space Administration
   k. A University Diploma
   l. An 73aven't73
   m. north – Southern

LANGUAGE ASSESSMENT

- Using the following checklist, tick next to each statement the degree to which you master every item of the previous lesson.

I can	Very well	Fairly well	Not well
A. identify the cases where capitalization should be used. B. identify the cases where capitalization is not needed.			

3.3.4. SAMPLE LESSON PLAN FOUR

Lesson Title: English Sentence Structure

Target Audience: ESP PhD Students

Levels: _Beginner _Pre-intermediate _Intermediate

Target Skill: Writing

Duration: 4 hours 30 minutes

DESCRIPTION OF THE CONTENT

1. Phrases and Subordinate Clauses
   1.1. Types of Phrases
   1.2. Types of Subordinate Clauses
2. Sentence Types
   2.1. Simple Sentences
   2.2. Compound Sentences
   2.3. Complex Sentences
   2.4. Compound/ Complex Sentences
3. Sentence Fragments
4. Mixed Sentences

REFERENCES

1. "The Sentence", "Phrases and Subordinate Clauses", "Sentence Types", "Mixed Sentences", "Sentence Fragments" from *The Little, Brown Compact Handbook: With Exercises* by **Jane E. Aaron** (2014)
2. "IELTS Writing: How to Write a Complex Sentence" by **Christopher Pell (ieltsadvantage.com)**

ACTIVITIES ON ENGLISH SENTENCE STRUCTURE

1. Say if the following statements are true or false and correct the false ones.
   - A propositional phrase consists of a preposition and a verb.
   - One sentence can include two or more prepositional phrases.
   - The clause has to contain both a subject and predicate.
   - There are many types of clauses.
   - The subordinate clause is independent.
2. *Subject and predicate*. Identify the subject and predicate in the followings.
   a. Sea level is rising.
   b. Scientists may have found the reason after which some icebergs are green.
   c. Tony Walsh, the writer of *Machines That Think*, discusses the impact Artificial Intelligence will have on our lives in the future.
   d. Rain on the sun was found where unexpected.
   e. A new study reveals that being in contact with nature for 20 minutes only lowers stress hormones.
3. *Subject and predicate*. In the following paragraph, identify the subject and predicate in each sentence.

> A new Northwestern University study challenges prevailing understandings of genes as immutable features of biology that are fixed at conception. Previous research has shown that socioeconomic status (SES) is a powerful determinant of human health and disease, and social inequality is a ubiquitous stressor for human populations globally. Lower educational attainment and/or income predict increased risk for heart disease, diabetes, many cancers and infectious diseases, for example. Furthermore, lower SES is associated with physiological processes that contribute to the development of disease, including chronic inflammation, insulin resistance and cortisol dysregulation.
>
> "Poverty Leaves a Mark on Our Genes" from ScienceDaily.com

4. *Phrases.* Read the following text and identify the different prepositional phrases.

> In the future, it could be possible to remove oil spills on the surface of the ocean by using magnets. An interdisciplinary group of researchers has developed functionalized iron oxide particles that can attract any types of hydrocarbons. The magnetic particles and their shells can then be removed from the water relatively simply and in an environmentally friendly manner and can even be reused after being cleaned. The researchers have now published their study in the journal Advanced Functional Materials. In the study, they describe how functionalised iron oxide particles can be modified with a self-assembled monolayer so that they only adsorb hydrocarbons.
>
> "Cleaning Up Oil Using Magnets" from ScienceDaily.com

5. *Subordinate clauses.* Identify any subordinate clauses in the following paragraph.

> **Do Chemicals that Disperse Oil Spills Make the Problem Worse? Probably Not, New Study Finds.**
>
> When the Deepwater Horizon oil well spewed at least 518 million liters of oil into the Gulf of Mexico in 2010, responders added an additional 7 million liters of chemicals, known as dispersants, to try to control the oil. Dispersants, which can break slicks and clumps of oil into smaller droplets that sink, have long been dogged by questions about safety and effectiveness.
>
> Sciencemag.com

6. *Sentence types*. Identify the types of sentences in the examples below.
   a. Our planet was a giant snowball.
   b. Sydney Brenner is the pioneer of molecular biology.
   c. Brenner entered medical school at 15 and moved to the University of Cambridge soon after.

d. Researchers suggest a new quantum-based procedure to protect from hackers, but it does not guarantee full security.
e. SpiNNaker is a computer that mimics the human's brain.
f. Physicists predict that charging particles through an electromagnetic field is capable of generating light from the vacuum of empty space.
g. The Greeks called some of the brightest stars "wanderers" when they saw them moving regularly.

LANGUAGE ASSESSMENT

- Using the following checklist, tick next to each statement the degree to which you master every item of the previous lesson.

I can	Very well	Fairly well	Not well
A. make the difference between a phrase and a sentence. B. make the difference between a phrase and a clause. C. make the difference between a clause and a sentence. D. construct a grammatical simple sentence. E. construct a grammatical compound sentence. F. construct a grammatical complex sentence. G. identify the types of clauses. H. identify the types of phrases. I. identify the different types of sentences.			

3.3.5. SAMPLE LESSON PLAN FIVE

Lesson Title: Punctuation

Target Audience: ESP PhD Students

Levels: _Beginner _Pre-intermediate _Intermediate

Target Skill: Writing

Duration: 3 hours

DESCRIPTION OF THE CONTENT

1. The Fourteen Punctuation Marks and Their Usage
    1.1. End Punctuation
        1.1.1. The Full Stop (Period)
        1.1.2. The Question Mark
        1.1.3. The Exclamation Mark
    1.2. The Comma
    1.3. The Semicolon
    1.4. The Colon
    1.5. The Apostrophe
    1.6. Quotation Marks
    1.7. Other Marks
        1.7.1. The Dash
        1.7.2. Parentheses
        1.7.3. The Ellipsis Mark
        1.7.4. Brackets
        1.7.5. The Slash
        1.7.6. Braces
2. Punctuation in British and American English

REFERENCES

1. “End Punctuation”, “Comma”, “Semicolon”, “Colon”, “Apostrophe”, “Quotation Marks”, “Other Marks” from *The Little, Brown Compact Handbook: With Exercises* by **Jane E. Aaron** (2014)
2. “What Are the 14 Punctuation Marks in English Grammar?” from **Grammar.yourdictionary.com**

SELF-STUDY RESOURCES

- “Punctuation” from *The Handbook of Good English: Revised and Updated* by **Edward D. Johnson** (1991)
- *Collins Good Punctuation* by **Graham King** (2004)

ACTIVITIES ON PUNCTUATION

1. Say if the following statements are true or false and correct the false ones.
   a. The dash is used when an idea in interrupted for extra information.
   b. Using many dashes enhances the quality of meaning.
   c. Parentheses include important information without which the meaning is affected.
   d. Ellipsis is used to mean etc.
   e. The main function of brackets is to explain, clarify, or correct a quotation.
   f. The slash is used to indicate another option.
   g. Braces are used more often in mathematical expressions and computer programming than in writing to show unity of items.
2. Replace or insert the missing full stops in the following sentences.
   a. Researchers found out what hyaluronic acid is?
   b. Hyaluronic acid is a long polymer molecule
   c. The US army is working on developing artificial intelligence AI will be used to help soldiers
   d. Waking up at five am helps to get more things done
   e. Dr Thomas Harvey removed Einstein's brain for an autopsy and never put it back
3. Verify if the question mark is used correctly in the following sentences. Correct false ones.
   a. Have you ever seen a black leopard?
   b. It is interesting to know what the difference between a leopard, a cheetah, and a jaguar is?
   c. Do you know what happens when lava meets ice?
   d. In Coober Pedy, Australia, people live underground in order to avoid the harsh climate? It would be fun to live underground? Wouldn't it
   e. Sugar found in lemons is more than in strawberries?
4. Revise the use of the exclamation mark in the following sentences.
   a. They received the pilot's call: "Mayday mayday mayday."
   b. Rabbits like to eat licorice! That's surprising

c. Is it safe to live in Australia!
d. All insects have six legs!
e. She yelled at her son, “Stay away from fire”

5. Check if the comma is used correctly in the followings. Correct any errors.
   a. In order to help old people remember, scientists suggest that using electric shocks help.
   b. SpaceX launched the most powerful rocket in the world and successfully managed to land it back.
   c. Third of adults in UK are against Brexit and, say that it affected their mental health.
   d. Although Theresa May faced pressure from everyone she insisted on exiting the EU.
   e. Coordinating conjunctions are and but or nor for some and yet.
6. Place, delete or replace the colon and comma when needed.
   a. Here are some inventions, which make life a bit easier. A smart toothbrush a lifesaver drone a smart trash bin a mug with customizable temperature, and a backpack with a USB charger.
   b. The National Museum of American History opens at: 10.00 a.m.
   c. *Developments in English for Specific Purposes. A Multi-Disciplinary Approach* is a book written by Maggie-Jo St. John, and Tony Dudley-Evans.
   d. The rise in temperature, forces some animal species such as: lobsters to move toward the pole.
   e. In her speech about climate change Bernie Sanders says “You are never too small to make a difference.”
7. Identify then correct the sentences where the apostrophe is incorrectly used.
   a. *A Brief History of Time* is written by Stephen Hawkings’.
   b. The Law of Conservation of Electric Charge was Benjamin Franklin’s discovery.
   c. Wilhelm Röntgen was a physics’ professor.
   d. Scientists 83aven’t confirmed the evidence of water on Mars, yet.
   e. One of Sir’s Isaac Newton inventions was the reflecting telescope.

8. Check if quotation marks are used correctly in the following sentences.
   a. Dr. Peter Liu says that "You wouldn't say to someone, 'You need to be on a good diet from Monday to Friday, but on the weekend you can eat whatever you want'."
   b. The Milky Way, says the teacher, is the galaxy in which Earth's solar system resides.
   c. The Wisconsin engineers said about their electrical bandage 'Our device is very simple.'
   d. "Sailing to Byzantium is a poem by William Butler Yeats"
   e. "Scientific Presentations" is a research paper published in *"Scientific Papers and Presentations"*
9. *Punctuation in British and American English.* Provide the missing information.

British English	**American English**
Full stop	……
……..	Exclamation point
……..	Parentheses
Square brackets	……
……..	He said "Challenge accepted."
Dr, Mr, Mrs, St	……

LANGUAGE ASSESSMENT

- Using the following checklist, tick next to each statement the degree to which you master every item of the previous lesson.

I can	Very well	Fairly well	Not well
A. use the full stop correctly. B. use the question mark correctly. C. use the exclamation mark correctly. D. place the comma in its right position. E. place the semicolon in its right position. F. place the colon in its right position. G. insert the apostrophe in the right place. H. insert the quotation marks in the right place. I. recognize and use the dash and the slash appropriately. J. identify the difference between the parentheses, brackets, and braces. K. use and place the ellipsis mark correctly.			

3.3.6. SAMPLE LESSON PLAN SIX

Lesson Title: English Sentence Connectors

Target Audience: ESP PhD Students

Levels: _Beginner _Pre-intermediate _Intermediate

Target Skill: Writing

Duration: 4 hours 30 minutes

DESCRIPTION OF THE CONTENT

1. Expressing Contrast
2. Expressing Similarity
3. Expressing Result
4. Expressing Sequencing
5. Expressing Order of Importance
6. Expressing Particularization
7. Exemplification
8. Explanation
9. Emphasis
10. Focusing and Linking
11. Conclusion
12. Correction
13. Time

REFERENCES

1. "Cohesive Devices" by **Christopher Pell**
2. "List of Sentence Connectors in English with Examples (Transition Words)" by **Melinda Makkos**

ACTIVITIES ON ENGLISH SENTENCE CONNECTORS

1. Identify what each transition word expresses. Use each in your own sentence.
   Yet – also – similarly – accordingly – therefore – first – furthermore – primarily – for example – in other words – to illustrate – with respect to – in brief – to sum up – anyhow.
2. Fill in the blank with the given transition word. The sentences containing two connectors should be used consecutively.
   a. Earth orbits the Sun _____ Jupiter does not. *(contrast)*
   b. Jellyfish and crayfish contain the word "fish" _____ they are not fish. *(contrast)*
   c. Mercury, Venus, and Mars are inner planets. _____ Earth is, too. *(similarity)*
   d. _____, an inner planet is one which is close to the Sun _____ an outer planet is one far from the Sun. *(emphasis – contrast)*
   e. Not all names exactly depict their nouns. _____, black holes are not black. _____, they are very dark. *(exemplifying – emphasis)*
   f. _____, all letters exist in the U.S. state names except the letter Q. *(emphasizing)*
   g. _____, McDonald used to make bubblegum-flavored broccoli. *(time)*
   h. To create hydrogen bubbles, _____, start by putting an iron nail into vinegar. _____, dissolve the calcium from an eggshell by soaking it into vinegar. _____, put chalk into vinegar to create carbon dioxide bubbles […] _____, you get hydrogen bubbles. *(sequencing)*
3. Join the two sentences with the provided connector. Avoid any unnecessary repetitions.
   a. Scientists wanted to take a picture of a black hole. They gathered data from eight radio telescopes in different parts of the world. *(therefore)*

b. A new Japanese study shows that cats can recognize their names when their owner calls them. Only cats who are adopted can recognize their names when their owner calls them. *(however)*
c. Mass shooting severely affects humans' mental health. Survivors of the shooting are likely to commit suicide especially teenagers. *(in fact)*
d. Many recent discoveries have been made in anthropology. A fossil of a Denisovan skull was found in a Siberian cave. *(talking of)*
e. Many scholars have realized works both on language and science. Thomas Young was a linguist and a physicist. *(to illustrate)*
f. Machines do not possess human brain. Researchers are developing artificial intelligence to read between the lines. *(but)*
g. Killer whales are not whales. Killer whales are the largest species of the dolphin family. *(actually)*
h. Both humans' and grasshoppers' sound detector is the eardrum. Grasshoppers' ears are found in their bellies. *(yet)*

LANGUAGE ASSESSMENT

- Using the following checklist, tick next to each statement the degree to which you master every item of the previous lesson.

I can	Very well	Fairly well	Not well
A. express contrast using the different relevant sentence connectors. B. express similarity using the different relevant sentence connectors. C. express result using the different relevant sentence connectors. D. express sequencing using the different relevant sentence connectors. E. express the order of importance using the different relevant sentence connectors. F. express particularization using the different relevant sentence connectors. G. express exemplification using the different relevant sentence connectors. H. express explanation using the different relevant sentence connectors. I. express emphasis using the different relevant sentence connectors. J. express focus and linking using the different relevant sentence connectors. K. express conclusion using the different relevant sentence connectors. L. express correction using the different relevant sentence connectors. M. express time using the different relevant sentence			

connectors. N. identify the function of every logical connector. O. correctly place any logical connector in sentences.			

3.3.7. SAMPLE LESSON PLAN SEVEN

Lesson Title: An Introduction to Cohesion and Coherence

Target Audience: ESP PhD Students

Levels: _Beginner _Pre-intermediate _Intermediate

Target Skill: Writing

Duration: 6 hours

DESCRIPTION OF THE CONTENT

1. Definition of Cohesion
2. How to Achieve Cohesion?
   - 1.2.1. Lexical Cohesion
     - 1.2.1.1. Reiteration
     - 1.2.1.2. Collocation
   - 1.2.2. Grammatical Cohesion
     - 1.2.2.1. Reference
     - 1.2.2.2. Substitution
     - 1.2.2.3. Ellipsis
     - 1.2.2.4. Conjunction
   - 1.2.3. Cohesive Devices
3. Definition of Coherence?

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- "Avoiding Ambiguity", "Sustaining Energy", "Connecting Your Ideas" from *The Craft of Scientific Writing* by **Michael Alley** (2018)
- "Paragraphs", "Presenting Writing", "Joining the Academic Community", and "Academic Writing" from *The Little, Brown Compact Handbook: With Exercises* by **Jane E. Aaron** (2014)
- "Coherence in Writing" by **Daniel Kies**
- "Cohesive Devices" by **Christopher Pell**

SELF-STUDY RESOURCES

- Eastwood, J. (2005). *Oxford Guide to English Grammar*. Oxford: Oxford Univ. Press.
- Katz, M. J. (2009). *From Research to Manuscript: A Guide to Scientific Writing*. New York: Springer.
- Taboada, M. T. (2004). *Building Coherence and Cohesion: Task-oriented Dialogue in English and Spanish*. Amsterdam: John Benjamins Publishing Company.
- Ryan, N., & Ryan, N. (n.d.). How to Effectively Organize and Present Your Ideas Through Your Writing. Retrieved from https://writingcooperative.com/how-i-structure-every-piece-of-content-i-create-46c3e78c38ec

ACTIVITIES ON COHESION AND COHERENCE

1. *Cohesion*. Analyze cohesion in the following paragraph by indicating all possibly existing cohesive devices.

> Science text books and science texts are complicated documents for the native speaking student quite apart from the student studying in a second language. The article is mainly concerned with establishing this complexity. It does so by an analysis of English scientific texts which considers their complexity as a product of three separate yet closely connected variables: the linguistic, the rhetorical and the conceptual variables. Each of these variables is analysed in detail. After outlining the nature of scientific texts from this viewpoint, the article then goes on to examine some of the problems which can arise in an ESP reading programme.

2. *Coherence*. Spot the coherence problems in the following passage then reformulate it to get a meaningful text.

> *Who is this book for?*
> This book is designed to help non-native speakers of English write science research papers for publication in English. However, it can also be used as a guide for native English speakers who would like support with their science writing, and by science students who need to write a Master's dissertation or PhD thesis. Herein, we report a new and intuitive design strategy for tuning and enhancing the kinetic activity of a single Fe-N4 site. It is a practical, rather than a theoretical book, and is intended as a fast do-it-yourself manual for researchers and scientists. Finally, the introduction of oxidized sulfur functionality decreases the d-band center of iron by withdrawing electrons.

3. *Cohesion and coherence*. Organize these sentences in the appropriate order to have a well-structured paragraph. Omit any irrelevant idea.

___Peter Grünberg,

___who discovered how to store vast amounts of data by manipulating the magnetic and electrical fields of thin layers of atoms,

___making possible devices like the iPad and the smartphone,

___The north magnetic pole is moving eastward at an accelerating pace.

___a Nobel-Prize-winning physicist

___has died at 78

4. *Cohesive devices*. Combine each set of the following sentences using the appropriate cohesive device that expresses the given idea. Omit any unnecessary repetition.
   a. *Contrast*

      Mathematicians are trying to find a fast way to multiply big numbers.

      Mathematicians have not yet found an exact fast way to multiply big numbers.
   b. *Consequence*

      Emus and ostriches underwent changes in DNA.

      Emus and ostriches lost their ability to fly.
   c. *Reformulation*

      Climate change is changing the chemistry of the ocean.

      Ocean acidification is killing sea animals.
   d. *Addition*

      Eating food rich in fiber may improve cancer treatment.

      High-fiber foods may help reduce blood pressure and inflammation.
   e. *Comparison*

      There exist programs which alter the real voice of a person.

      A new computer program generates realistic fake videos.

LANGUAGE ASSESSMENT

- Using the following checklist, tick next to each statement the degree to which you master every item of the previous lesson.

I can	Very well	Fairly well	Not well
A. provide a thorough organization to the ideas of my text. B. link between the ideas I write using the appropriate cohesive devices. C. express cohesion in the different possible ways. C. identify the irrelevant ideas in a text.			

3.3.8. SAMPLE LESSON PLAN EIGHT

Lesson Title: Reading to Improve the Writing Skill

Target Audience: ESP PhD Students

Levels: _Beginner _Pre-intermediate _Intermediate

Target Skills: Reading and Writing

Duration: 6 hours

DESCRIPTION OF THE CONTENT

The aim of this class is to enhance students' level of writing through reading. In order to bring this into successful conclusion, it should be associated with proper reading methods which target students' main areas of interest.

Reading is a receptive skill while writing is a productive one. For these reasons, the organization of this class focuses on implementing a content which pushes students to recognize the what, how, and how much information should be extracted while reading in order to enhance the writing skill.

Elements to be covered include:

1. Efficient Reading Strategies
    1.1. Previewing the Text to Get an Overview
    1.2. Skimming
    1.3. Scanning
    1.4. Intensive Reading
    1.5. Summarizing
2. More Reading Strategies
3. Reading Difficult Material

REFERENCES

1. "Effective Reading" by **University of New South Wales**

2. "Critical Thinking and Reading" from *The Little, Brown Compact Handbook: With Exercises by Jane E. Aaron* (2014)

SELF-STUDY RESOURCES

1. "How to Read a Scientific Paper in 5 Steps" from **curiosity.com**
2. "How to Read a Scientific Paper" from **sciencebuddies.org**
3. "9 Ways Proper Reading Can Improve Your Writing" from **justpublishingadvice.com**
4. "Want to Be a Better Writer? Read more." From **huffpost.com**

ACTIVITIES ON READING AND WRITING

1. Skim through the following passage and take notes on the main ideas presented in the passage.

A 2014 Meteor May Have Come from Another Solar System

Earth may already have been visited by an object from outside our solar system — a meteor that burned up in the planet's atmosphere in 2014, astronomers claim. If confirmed, it would be the first known interstellar object to have entered the atmosphere.

The first interstellar visitor known to have come close to Earth was the roughly 400-meter-wide asteroid named 'Oumuamua. It swooped within about 24 million kilometers of the planet in October 2017 (SN: 11/25/17, p. 14). Its sharp-angled approach to the solar system and equally strange departure led astronomers to suggest that 'Oumuamua could have been anything from a fluffy skeleton of a comet to an alien spaceship (SN Online: 2/27/19).

If there was one interstellar interloper, astronomers reasoned, there would likely have been more, including some that collided with Earth.

Sciencenews.org

2. The following passage contains errors in cohesion, coherence, sentence structure, and some parts of speech. Read the passage carefully, identify those errors, and comment on them in a paragraph.

Newly Translated Cherokee Cave Writings Reveal Sacred Messages

Now researchers have translated some of those messages from long ago. Shortly before being forced out of his homeland at the 1830s, Cherokee people of the southeastern United States left written accounts in cave walls of secretively rituals. Fossil and genetic studies in 2017 suggested a reason why: No clear starting time or location ever existed for our species.

Cherokee inscriptions in Alabama's Manitou Cave, now a popular tourist destination, describes ceremonies religious and beliefs using symbols written for 85 syllables — enough sounds to replicate the Cherokee spoken language. Cherokee scholar Sequoyah devised this writing system not long before his tribe's banishment down the Trail of Tears, a series of forced relocations of Native Americans to the west.

An historian and a cave photographer first recognized the inscriptions, some of which are written in charcoal, in 2006. A team led by archaeologist Beau Duke Carroll of the Tribal Historic Preservation Office of the Eastern Band of Cherokee Indians in Cherokee, N.C., describe what the writing says in the April Antiquity.

3. Provide definitions to the following terms in your own style. Use the Internet to check for terms you do not know, and reformulate their definition in your own words.
   a. *Physics*: acceleration – energy – collision – gravity – mass – molecule – potential energy – scalar – vector – weight.
   b. *Chemistry*: acid – adsorption – alloy – atom – biochemistry – catalyst – elasticity – Graham's Law – holmium – plasma – real gas.
   c. *Computer science*: application – application programming interface – BIOS – BUS – byte – hardware – kernel – software.
   d. *Mathematics*: algorithm – common factors – diameter – improper fraction – logarithm – multiple – pentagon.
   e. *Biology*: abdomen – alpha diversity – beta diversity – biota – birth rate – carnivore – egg dumping – fauna – food web.
   f. *Medicine*: aphasia – bacteremia – biopsy – ectopic – epidemiology – metaplasia – stroma.

g. *Pharmacy*: attrition – batch – cytotoxic – discharge – formulary – investigational medicine – medicine shortages – point of care – unit dose.
h. *Political science:* adjournment – abdication – allegiance – bureaucracy – détente – liberty – lobbying.
i. *Economy:* absolute advantage – aid – agency costs – advertisement – auction.

4. The followings are topics from different disciplines. Choose one of them, develop the idea then write the abstract. Add necessary information to form a complete abstract.
   a. Composite materials.
   b. Molecular biology.
   c. Artificial intelligence.
   d. 5G wireless system.
   e. Mathematical physics.
   f. Big bang theory.
   g. Bohr radius.
5. Scan the following passage then summarize it in your own words. Mention the main ideas only.

Smiling really can make people feel happier, according to a new paper published in Psychological Bulletin. Coauthored by researchers at the University of Tennessee, Knoxville and Texas A&M, the paper looked at nearly 50 years of data testing whether facial expressions can lead people to feel the emotions related to those expressions.

"Conventional wisdom tells us that we can feel a little happier if we simply smile. Or that we can get ourselves in a more serious mood if we scowl," said Nicholas Coles, UT PhD student in social psychology and lead researcher on the paper. "But psychologists have actually disagreed about this idea for over 100 years." These disagreements became more pronounced in 2016, when 17 teams of researchers failed to replicate a well-known experiment demonstrating that the physical act of smiling can make people feel happier.

"Some studies have not found evidence that facial expressions can influence emotional feelings," Coles said. "But we can't focus on the results of any one study. Psychologists have been testing this idea since the early 1970s, so we wanted to look at all the evidence."

"Psychologists Find Smiling Really Can Make People Happier" from Sciencedaily.com

6. Translate the following abstract into English.

ذوبان مبكر للأنهار الجليدية في ألاسكا

تتدفق مياه نهرين رئيسيين في ولاية ألاسكا الأميركية –عادة ما تكون متجمدة في هذا الوقت من العام– بسلاسة بعد ذوبان جاء قبل موعده بكثير، بسبب ارتفاع قياسي في درجات الحرارة خلال الشتاء والربيع. ففي مدينة "نينانا" بألاسكا، انكسرت طبقة الجليد فوق نهر "تانانا" بعد منتصف ليل يوم الأحد بقليل. ويمثل هذا أبكر موعد لتفكك الجليد حتى الآن في التاريخ الممتد منذ 102 عام لـ "بركة نينانا آيس كلاسيك" الشهيرة، التي تجرى عندها مسابقة يحاول فيها المشاركون التنبؤ بموعد سقوط هيكل خشبي موضوع على الجليد بسبب الذوبان.

المصدر: مجلة National Geographic العربية.

نينانا آيس كلاسيك: Nenana Ice Classic

7. You constantly read about scientific news and discoveries whether in your domain or another. Write a composition in which you talk about the one that mostly caught your attention.

LANGUAGE ASSESSMENT

- Using the following checklist, tick next to each statement the degree to which you master every item of the previous lesson.

I can	Very well	Fairly well	Not well
A. efficiently read any text. B. perform a skimming of a text. C. perform a scanning of a text. C. do an intensive reading of a text. D. summarize a text. E. critically read a scientific article. F. use reading strategies I learnt to extract the information I need. G. use the reading strategies I learnt to improve my written English.			

3.4. Links to Books Used in Lessons

All books used as references in the lessons and self-study resources, and which are not available on Google, are extracted from Library Genesis (http://gen.lib.rus.ec/). For instance:

- *The Little, Brown Compact Handbook: With Exercises* by Jane Aaron: http://gen.lib.rus.ec/search.php?req=the+little+brown+compact+handbook+with+exercises&lg_topic=libgen&open=0&view=simple&res=25&phrase=1&column=def

3.5. List of Useful Self-Study Resources

In this part, the researcher suggests a list of some helpful and easy-to-access-to references which share the same purpose: improve written English.

1. **Grammarly** is a free tool which assists you while writing. It enhances the quality of your sentence structure, corrects spelling mistakes, and adds to your vocabulary. Grammarly can also be used as a web browser application which works on Gmail, LinkedIn, Google Docs, Facebook, and others.
2. **Grammar and Spelling Checker by Ginger** is a browser application similar to Grammarly. In addition to the services Grammarly offers, Grammar and Spelling Checker by Ginger suggests the option of translating between more than forty languages.
3. **Hemingway App** is both a website and a desktop application. It allows to you write or paste a text then indicates the writing problems by using colors. Each color refers to a writing error. For example, orange highlights the sentences hard to read.
4. **Quick and Dirty Tips**, previously known as Grammar Girl, is a website which helps you to improve your writing skills. It explains all complex grammar questions in an easy and fun way. It also provides podcasts Spotify, Google Podcasts, Apple Podcasts, and Stitcher; a good opportunity to learn grammar, pronunciation, and develop your listening skills, too.

5. **BBC Learning English** is both a website and a mobile phone application. It offers short grammar, vocabulary, and pronunciation courses for different levels. In addition, they propose a series named English at Work.
6. **IELTS Prep** is a mobile phone application by the British Council designed for students preparing for the IELTS. In addition to grammar and vocabulary lessons, it deals with the four skills: listening, speaking, reading, and writing, and offers practice tests.
7. **Writing, Presenting, and Submitting Scientific Papers in English** is an online self-paced course lectured by the Center for Intelligent and Networked Systems, Tsinghua Univeristy. This course can be found at edX, a website which provides online courses in all domains.
8. **Academic and Business Writing** is an online self-paced course also available on edX which is introduced by University of California. It provides help with English grammar, vocabulary, structure, editing, and publication.

3.6. Conclusion

In this chapter, imperative elements for the design of an ESP course have been covered. In addition to students' needs analysis, the goals and objectives of the course have been introduced from the researcher's and students' standpoints, respectively. Later, a detailed vision of course has been provided. The latter includes an overall idea about the course content chiefly grammar, cohesion, and coherence. Adding to that, a course on reading, as indicated by students, has been included. Following the content conceptualization, the list of materials presents the main references used for teaching and learning. Last, every sample lesson plan is followed by a number of activities and is concerned with a particular language problem that students confront. Since most respondents advocate reading as the best way to improve writing, a comprehensible and interesting sample lesson and activities have been devised.

General Conclusion

General Conclusion

It is generally agreed upon that writing is an arduous and challenging activity to undertake. Indeed, this skill is usually best learnt when it results from a sequence of other competences mainly speaking and reading. Usually, the activity of composing texts commences once the child officially starts formal education. From that moment on, learners are expected to receive all-encompassing syllabi regarding this skill. It is common knowledge that writing is an ongoing practice which becomes complicated as the learner progresses in his academic training. Such is the case of writing in higher education. It should be recalled that, in their instance, and part of their curriculum, ESP doctorate students at Tlemcen University receive considerably few hours of English classes offering little, and maybe no, consideration to writing. It is important for ESP PhD students to publish research articles in English; however, rampant writing including poorly formulated sentences, inappropriately linked ideas, and weak grammar hinder articles acceptance.

The goal of this research work was to investigate the causes accountable for the writing difficulties these students struggle with. Accordingly, the first chapter was devoted to the theoretical part of the study where writing and ESP-related concepts were explained. The following chapter was dedicated for data collection and interpretation in which doctorate students' needs were assessed. The last chapter represented the final step of this research study where a course, which appealed most to students, was designed to answer their ever-increasing needs to write effective English.

The previously mentioned chapters aimed at resolving the research problem mostly through the process of data collection in which the two different research instruments used – doctorate students' questionnaire and an analysis of their rejected articles –resulted in confirming the two research hypotheses. Regarding the first hypothesis, articles could reveal that most students' English writing abilities were below the expected level as they failed at conveying the central and complex ideas in a clear and terse way. Confirming this saying empowered the second hypothesis. Indeed, students' compositions showed a lack of linking between the sentences suggesting an

ineffective manner of organization. Furthermore, they were clearly deficient in regard to the use of English writing mechanics. Difficulties including the bad mastery of grammar, punctuation, spelling, and capitalization were other parameters of writing problems students suffered from.

This research work embraced the objective of examining ESP doctorate students' writing difficulties where maintaining a connection between their areas of weaknesses, strengths, and their needs was necessary. The present investigation focused on transcending students' errors exploration as it aspired to gather as much information as possible from a large sample population. Doing so could allow generalizing the obtained results on a larger number of ESP doctorate students who are considered to share similar writing obstacles. Further, this study was particularly allocated to ESP doctorate students at Tlemcen University to aid them realize their writing weaknesses as a means to reinforce their understanding of the importance of the studied issue. Subsequently, and due to the large number of respondents, this research work would address ESP PhD students across the different Algerian universities especially that the majority of students at the University of Tlemcen admitted struggling with some writing problems in particular.

Almost every study is subject to a number of constraints which can emerge at any point during the research process. This can either be related to the researcher's inattention to certain details or to external factors such as issues with the research methodology. This investigation did show some weaknesses, too. The limitations of this study started to become evident once the process of data collection was launched. Considering that the research work problem is connected to English for Specific Purposes, the first limitation, which can be considered as primary, was represented by the absence of the participation of PhD students from all existing scientific specialties at Tlemcen University. Data were collected from doctorate students mainly specialized in Physics, Chemistry, Computer Science, Mathematics, Biology, Pharmacy, Electrical Engineering and Electronics, Political Sciences, archeology, and Economy. However, there exist others such as Accounting, Business, Finance, and Medicine. Getting in touch with them could permit having access to additional and new information capable

of enhancing the quality of the present research. Second, this research was a humble and initial attempt towards exploring doctorate students' writing problems. For this reason, the designed course was not applied in class. In reality, the efficiency of the course would be better revealed when the teacher introduces the lessons while being in direct contact with the students. The last limitation which could be found is related to students' needs. Although it is major in ESP to consider all the sample's needs without exception, in this research, some students' suggestions such as taking the course online could not be accomplished. Indeed, ensuring a study free of limitations would leave a beneficial impact on the results. However, the aforementioned constraints faced in this study did not generate any major unfortunate outcomes which could influence the research findings.

Possible weaknesses encountered in a study are a source for further research ideas. Hence, including PhD students from all existing specialties will establish an ethical representation of the sample; the one of ESP doctorate students. Additionally, it is recommended to create an online version of the designed course as a way to achieve all pre-set research goals. Last, devoting weekly hours of real-time classes will help the researcher explore PhD students' English writing needs in depth. Accordingly, all necessary changes will be introduced to the course in order to increase their effectiveness in English writing.

Generally speaking, identifying problems and solving them is always beneficial. In this regard, and by recognizing the importance of having their research articles published, dedicating attention to ESP PhD students' needs and wants in English writing remains crucial. It can be argued that the writing skill is complex, and that ESP doctorate students need to have a mastery of, at least, its basics. Therefore, their collaboration with the instructors is compulsory to help them overcome their difficulties in a profitable manner and short time.

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Appendices

Appendix 1 : ESP Doctorate Students' Questionnaire (English Version)

Questionnaire

Dear PhD student,

This questionnaire is meant for a scientific research about the difficulties PhD students face while writing scientific articles in English. I beg you take all your time and provide as far objective answers as possible. All the information you provide will remain confidential as you do not have to write your names.

You can answer in English, Arabic, or French.

Thank you very much for your collaboration and help.

Personal profile

Gender: □ Male □Female

Age: ……

Department: ……

Specific field of study: ……

Section 1: This section aims at gathering information about your background concerning the English language.

1. Have you ever studied English at university?
   □ Yes □ No
2. If yes, how many years of English language learning have you had at university?
   □ 1 □ 2 □ 3 □ 4 □ 5
   Other: ……....
3. Is English language learning part of your PhD curriculum now?
   □ Yes □ No
4. If yes, does the content of the course give importance to the writing skill?
   □ Not at all □ Just a little □ Quite enough □ A lot
5. How do you perceive your level in the English language in general?

□ Beginner □ Pre-intermediate □ Intermediate □ Upper-intermediate □Advanced

6. How do you perceive your level of writing in English?

   □ Beginner □ Pre-intermediate □ Intermediate □ Upper-intermediate □ Advanced

7. Have you ever submitted a research article to a scientific journal?

   □ Yes □ No

8. Has your article ever been accepted at first attempt?

   □ Yes □ No

9. If no, would you select the reasons behind this rejection?

   □ Scientific consistency

   □ Methodology inadequacy

   □ Language problems

   Others: ……...

10. Away from writing scientific articles, how often do you write in English?

    □ Never □ Rarely □ Sometimes □ Always

Section 2: The goal of this section is to identify your lacks concerning writing scientific articles in English, and to learn about the ways that best suit your needs to improve that skill.

11. Did your writing skill improve through time?

    □ Not at all □ Just a little □ A lot □ Remarkably well

12. If it did, what measures did you take to improve it?

    ……

13. If not, what do you think are the reasons which prevented you from developing your writing?

    ……

14. Is it interesting for you, as a PhD student, to receive a special course dedicated to improve your writing of scientific articles?

    □ Yes □ No

15. How many sessions of English writing class per week do you think are necessary for you?

□ 1 □ 2

Other: ……

16. What are the difficulties you face while writing your articles in English?

□ Sentence formation

□ Correct usage of English parts of speech (adverbs, prepositions, conjunctions …)

□ Capitalization

□ Punctuation

□ Spelling

□ Organization of ideas

□ The use of logical connectors to link sentences (while, therefore, however, unless …)

□ Relevance of ideas

Other: …….

17. What language difficulties do you think you need to improve the most?

□ Sentence formation

□ Correct usage of English parts of speech (adverbs, prepositions, conjunctions …)

□ Capitalization

□ Punctuation

□ Spelling

□ Organization of ideas

□ The use of logical connectors to link sentences (while, therefore, however, unless …)

□ Relevance of ideas

Other: …….

18. How do you learn best?

□ Alone □ In a small group □ In a large group □ In class □ Outside class

Other: ……..

19. How do you prefer to improve your writing skill?

 With the assistance of the teacher

 Without the assistance of the teacher

20. In your opinion, what is the best way to teach/ learn English writing skills?

……

……

…….....….

21. If you sign for a special course to help you improve writing scientific articles, how do you expect the course to benefit you?

……

……

…….....

THANK YOU VERY MUCH FOR YOUR COLLABORATION AND TIME

Appendix 2 : ESP Doctorate Students' Questionnaire (Arabic Version)

استبيان استطلاعي

عزيزي طالب(ة) الدكتوراه،

يهدف هذا الاستبيان إلى إجراء بحث علمي حول الصعوبات التي يواجهها طلاب الدكتوراه أثناء كتابة المقالات العلمية باللغة الإنجليزية. الرجاء منكم أخذ الوقت اللازم لتقديم إجابات بموضوعية قدر الإمكان.

ستبقى جميع المعلومات التي تقدمونها سرية.

يمكنكم الإجابة باللغة الإنجليزية، العربية أو الفرنسية.

شكرا جزيلا على حسن تعاونكم معنا.

المعلومات الشخصية

الجنس: □ ذكر □ أنثى

العمر: .....

القسم: .....

مجال الدراسة بالتحديد: .....

الجزء الأول: يهدف هذا الجزء إلى جمع معلومات حول خلفيتك المتعلقة باللغة الإنجليزية.

1. هل سبق لك أن درست اللغة الإنجليزية في الجامعة؟

□ نعم □ لا

2. إن كان كذلك، فكم هو عدد تلك السنوات؟

□1 □ 2 □3 □ 4 □ 5

أخرى: .....

3. هل دراسة اللغة الإنجليزية جزء من دراسات الدكتوراه الخاصة بك حاليا؟

□ نعم □ لا

4. إن كان كذلك، هل يقدم محتوى المقرر أهمية للكتابة في اللغة الإنجليزية؟

□ أبدا □ قليلا □ بما فيه الكفاية □ كثيرا

5. ما تقييمك لمستواك في اللغة الانجليزية بشكل عام؟

□ مبتدئ □ دون المتوسط □ متوسط □ فوق المتوسط □ متقدم

6. ما تقييمك لمستواك الكتابي في اللغة الإنجليزية؟

□ مبتدئ □ دون المتوسط □ متوسط □ فوق المتوسط □ متقدم

7. هل سبق لك أن قدمت مقالا لمجلة علمية؟

□ نعم □ لا

8. هل تم قبول مقالك في محاولتك الأولى؟

□ نعم □ لا

9. إن لم يكن كذلك، ما هي أسباب رفض مقالك؟

□ الاتساق العلمي

□ نقص المنهجية

□ أخطاء لغوية

أخرى: .....

10. بعيدًا عن كتابة المقالات العلمية، كم مرة تكتب بالإنجليزية؟

□ أبدا □ نادرا □ أحيانا □ دائما

الجزء الثاني: الهدف من هذا الجزء هو تحديد نقائصك في كتابة المقالات العلمية باللغة الإنجليزية، والتعرف على الطرق التي تناسب احتياجاتك لتحسين تلك المهارة.

11. هل لاحظت تطورا في مهارة الكتابة خاصتك في اللغة الإنجليزية بمرور الوقت؟

□ أبدا □ قليلا □ كثيرا □ بشكل ملحوظ جدا

12. إن كان الأمر كذلك ، فما هي التدابير التي اتخذتها لتحسينها؟

.....

13. إن لم يكن الأمر كذلك، ما هي الأسباب التي منعتك من تطويرها في رأيك؟

.....

14. بصفتك طالب(ة) دكتوراه، هل تلقّي دورة خاصة لتطوير مهاراتك الكتابية للمقالات العلمية باللغة الإنجليزية أمر يثير اهتمامك؟

□ نعم □ لا

15. كم ساعة في الأسبوع تعتقد أنك تحتاج لتطوير كتاباتك في الانجليزية؟

□ 1 □ 2

أخرى: .....

16. ما هي الصعوبات التي تواجهها أثناء كتابة مقالاتك باللغة الإنجليزية؟

□ تركيب الجمل

□ الاستعمال الصحيح لأقسام الكلام في الإنجليزية (conjunctions, prepositions, adverbs...)

□ الحروف الكبيرة Capital letters

□ علامات الترقيم Punctuation

□ تهجئة الكلمات

□ ترتيب الأفكار

□ استعمال أدوات الربط (while, therefore, however, unless…)

□ اختيار الأفكار المناسبة

أخرى: .....

17. ما هي الصعوبات اللغوية في الإنجليزية التي تحتاج لتحسينها على وجه الخصوص؟

□ تركيب الجمل

□ الاستعمال الصحيح لأقسام الكلام في الإنجليزية (conjunctions, prepositions, adverbs...)

□ الحروف الكبيرة Capital letters

□ علامات الترقيم Punctuation

□ تهجئة الكلمات

□ ترتيب الأفكار

□ استعمال أدوات الربط (while, therefore, however, unless…)

□ اختيار الأفكار المناسبة

أخرى: .....

18. ما هي طريقة التعلم التي تناسبك الأكثر؟

□ بمفردك □ وسط مجموعة صغيرة □ وسط مجموعة كبيرة □ داخل القسم □ خارج القسم

أخرى: .....

19. كيف تفضل تحسين مهاراتك في الكتابة بالإنجليزية؟

□ بمساعدة من الأستاذ

□ من دون مساعدة من الأستاذ

20. ما هي أفضل طريقة لتعليم / تعلم مهارات الكتابة باللغة الإنجليزية في رأيك؟

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21. إذا قمت بالتسجيل في دورة خاصة لمساعدتك على تحسين كتابة المقالات العلمية بالإنجليزية، فكيف تتوقع أن تفيدك هذه الدورة التدريبية؟

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شكرا جزيلا على حسن تعاونكم معنا

Appendix 3 : ESP Doctorate Students' Articles

Article 1 :

Exploring the performance and the limiting parameters of new ultra-thin CIGS solar cells using SCAPS simulation program

Abstract:

$CuIn_{1-x}Ga_xSe_2$(CIGS) based solar cell are known to produce high efficiency at low cost. In the present work, p-CIGS/n-CdS solar cells have been analyzed through two numerical approaches: Solar Cell Capacitance Simulator (SCAPS) and Atlas SILVACO simulator. Effects of absorber layer as well as the CIGS layer thickness were investigated to show which approach leads to optimized characteristics. SCAPS approach is the best choice to reproduce results of literature and also to produce an efficiency of 17 % at 5 μm of absorber thickness. Indeed, the cell's efficiency can be controlled by the changes in open circuit voltage (V_{oc}), short circuit current density (J_{sc}) and the fill factor (FF) that have been shown when CIGS and CdSthickness varied. In order to enhance the efficiency, we added aGaAs layer. Our predictions, show that we can reach 26 % of efficiency for CIGS-GaAsp-layer of 5 μm.

Mots clefs : *solar cells, CIGS, SILVACO, SCAPS*

1. Introduction

Midst the evolution of the second generation thin films solar cells, CIGS chalcopyrite semiconductors have emerged as promising nontoxic, low-cost and high efficiency materials for thin film solar cell applications (Chirila et al., 2013; Chopra et al., 2004). Recently, CIGS thin-film photovoltaic cell technologies, which act as the absorber layer, achieved a record solar efficiency of 22.6%, establishing a new world record for the thin-film devices (Jackson et al., 2016) and outperforming polycrystalline silicon cells by 1.3% points. This shows that the CIGS based photovoltaic cells have become a real alternative to the Si-based technologies that still dominate the market (Siebentritt et al., 2010).CIGS based on $CuIn_{1-x}Ga_xSe_2$ alloys, which is obtained by alloying $CuInSe_2$ (CIS) with $CuGaSe_2$ (CGS), have a direct band gap varying from 1.04 to 1.68 Ev (T. Tinoco et al., 1991) by adding the gallium content. The goal of the alloying is to tune the band gap

of the alloy and thus optimize the efficiency of the PV cell. Although the CIGS thin film solar cells have reached to maturity level that can go easily for mass production, but there is still some optimizations that need to be done for further increasing in efficiency and reducing in cost. These optimizations can be done on different constituent cell's layers.

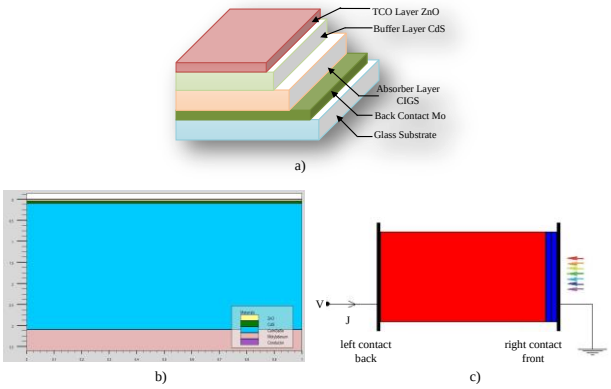

Figure 1: CIGS Solar cell configuration.

2. Theoretical approach and computational model

In this paper, the Solar Cell Capacitance Simulator structures (SCAPS-1D) and SILVACO T-CAD (Chirila et al., 2013) packages were employed to analyze Solar cells based on CIGS absorber(Fig. 1). A CIGS solar cell is built up of a substrate of Glass, a back contact of Molybdenum a light absorbing layer consisting of copper indium gallium diselenide (Cu(In; Ga)Se_2), a buffer layer of cadmium sulphide (CdS), and a finger front contact of Aluminum. The present model, we consider the geometrical, electrical and optical and parameters. When light is absorbed in the solar cell, a current is generated following the diode equation. There is an absorption of light in the transparent front contact which leads to optical losses. In fact, when solar radiation passes through the atmosphere of the Earth, it is attenuated. The most important parameter that determines the solar irradiance under clear sky conditions is the distance that the sunlight has to travel through the atmosphere. The ratio of an actual path length of the sunlight to this minimal distance is known as the *optical air mass*. When the Sun is at its zenith the optical air mass is unity and the spectrum is called the air mass 1 (AM1) spectrum. When the Sun is at an angle $\theta$with the zenith, the air mass is given by (Jackson et al., 2016)

$$AM = \frac{1}{\cos\theta} \qquad (1)$$

The absorption profile in the material depends on the absorption coefficient of the material, which is wavelength dependent, the two materials' absorption coefficient (CIGS, CdS) are giving by (Siebentritt et al., 2010)

$$\alpha_{CdS}(\lambda) = \frac{A}{B}(E - Eg_{CdS})^{1/2} \quad (2)$$

$$\alpha_{CIGS}(\lambda) = B(h\nu - Eg_{CIGS})^{1/2} \quad (3)$$

the most important part of the junction's current is the photocurrent wich is related directly to the generation rate presented by the rate G(λ,x) given by

$$G(\lambda, x) = \alpha(\lambda)F(\lambda)\big(1 - R(\lambda)\big)e^{-\alpha(\lambda)x} \quad (4)$$

Where, *R(λ)* is the fraction of the photons reflected from the front surface, and *F (λ)* is the solarflow. Here we formulate it with the *photon flux density* Φ(*x*, *λ*), which decreases exponentially with the distance *x* that it travelled through the absorber,

$$\phi(x, \lambda) = \phi_0(\lambda)e^{[-\alpha(\lambda)x]} \quad (5)$$

whereΦ_0 is the incident photon flux density, It is related to the solar flow *F*(*λ*) associated with the solar irradiation irs(λ) via

$$F(\lambda) = \frac{irs(\lambda)}{h\nu} \quad (6)$$

The following equation shows The current-voltage *(J-V)* characteristic of the cell (Vermang et al., 2014):

$$J = J_{ph} - J_0\left(e^{\frac{V}{QU_t}} - 1\right) \quad (7)$$

WhereJ_0 is the saturation current density, *Q* is the diode ideality factorandJ_{ph} is the photo-current density given by

$$J_{ph} = eG\big(L_n + W + L_p\big) \quad (8)$$

where*LN* and *LP* is the minority-carrier-diffusion length for electrons and holes, respectively, and *W* is the width of the depletion region.

These numerical model consist on their solving of the Poisson's and continuity carrier equations for semi-conductor in one dimension. The hole and electron equation is given by **((1)-(3))** (Amin et al., 2012; T. Tinoco et al., 1991):

$$\frac{d^2}{dx^2}\Psi(x) = \frac{q}{\varepsilon_0 \varepsilon_r}\left[p(x0 - n(x) + N_D - N_A + \rho_p - \rho_n\right] \quad (9)$$

where

Ψ : Electrostatic potential.

q: Electrical charge.

$\varepsilon_0, \varepsilon_r$: Vacuum and relative permittivity.

p, n : Hole and electron concentration.

N_D: charge impurities of donor.

N_A: charge impurities of Acceptor.

ρ_p, ρ_n: Holes and electrons distribution.

The electrons and holes continuity equations are given by

$$\frac{dJ_n}{dx} = G - R \quad (10)$$

$$\frac{dJ_p}{dx} = G - R \quad (11)$$

J_n, J_n: Current densities of electron and hole respectively.

R : Recombination rate.

G : Generation rate.

The Drift-diffusion transport is based on the Boltzmann transport theory have shown the current densities in continuity equations. In this case the current densities of quasi-Fermi levels ∅as:

$$J_n = D_n \frac{dn}{dx} + \mu_n n \frac{d\emptyset}{dx} \quad (12)$$

$$J_p = D_p \frac{dp}{dx} + \mu_p p \frac{d\emptyset}{dx} \quad (13)$$

μ_n, μ_p: Electron and hole motilities.

The recombination in deep bulk levels and their occupation is described by Shockley-Read-Hall (SRH) formalism.

From the *J-V* characteristic and by taking P_i as a solar incident power, we can easily deduce the short-circuit density J_{sc}, the open circuit voltage $V_{co}$and the maximum power $P_m$given respectively by:

$$J_{sc} = J_{ph} \ , \qquad V_{co} = QU_t ln\left(\frac{J_{ph}}{J_0}\right)$$

$$P_m = J_{max}\ V_{max}, \qquad FF = \frac{P_m}{J_{sc}V_{co}}, \qquad \eta = \frac{P_m}{P_i}$$

We employed the computational modeling as implemented throughsoftwares SCAPS (Heriche et al., 2016), and SILVACO (Chirila et al., 2013), the CIGS thin film solar cell output characteristic were numerically modeled. To proceed with the simulations, the material parameters used as the inputs file were selected based on the reported literature values or limited to reasonable ranges. The SCAPS and Atlas SILVACO simulators requires the input parameters of materials of each layers in structures of solar cells. The semiconductor parameters of CdS and CIGS is given by Table 1.

Table 1: Physical parameters used in the simulation.

Layer Properties	**ZnO**	**n-CdS**	**p-CIGS**
Band gap E_g(Ev)	3.40	2.40	1,16
Electron affinity χ_e (Ev)	4.55	4.50	4,80
Relative permittivity $\boldsymbol{\varepsilon_r}$(F.cm^{-1})	10	10	13.60
Electron mobility $\boldsymbol{\mu_n}$ (cm^2/V.s)	50	100	100
Hole mobility $\boldsymbol{\mu_p}$ (cm^2/V.s)	20	25	25
Conduction band effective density state$\boldsymbol{N_C}$ (cm^{-3})	4×10^{18}	2.2×10^{18}	2.2×10^{18}
Valance band effective density state $\boldsymbol{N_V}$ (cm^{-3})	9×10^{18}	1.8×10^{19}	1.8×10^{19}
Charge impurities of	1×10^{17}	2.0×10^{18}	-

donorN_D (cm^{-3})			
Charge impurities of AcceptorN_A (cm^{-3})	-	-	8.0×10^{16}
Thickness (µm)	0.05	0.05	1
Defectdensity **(**cm^3**)**	1×10^{14}	1×10^{14}	1×10^{14}

3. Results and discussion

The main object of several research groups working on PV industry is to find the cheaper way to enhance the efficiency of CIGS based solar cells, one of the main constraint is the production's impact of these devices according to the conventional single and poly crystalline silicon solar cells. So the key of resolving this constraint is to find the optimizing thickness of CIGS device layers. As first part, we have compared the results obtained by SCAPS and SILVACO as it is important to see which software will be helpful and exact to show a produce between them. This step was performed by comparing the CIGS device performance as function of the absorber and buffer layers thickness.

3. 1. SCAPS vs. SILVACO

The buffer layer thickness is one of geometrical parameters that may affect the functioning and performance of the CIGS based cell. We displayed in Fig.2, the influence of the thickness of the CdS on the open circuit voltage (V_{oc}) and the fill factor (FF) is less or negligible, but it is important on the current density of short circuit J_{sc} and consequently the efficiency η when the thickness increases the short circuit current density decreases due to its large band-gap which plays a large role in the transmission of photons through the CIGS layer, several photon-generator carriers will be created in the CIGS layer which improves the short-circuit current density, thus increasing its thickness these photon-generator carriers will be decreased which will affect the current density. For the variation of the CdS thickness from 10 nm to 160 m as illustrated in Fig. 2, the best result was for the thinnest CdS layer, the short circuit current density increases when the thickness of CdS decreases. The simulation shows that the optimization of the short-circuit current density can be achieved by reducing the thickness of the CdS layer. Also it shows that the results obtained by SCAPS on J_{sc} and FF are closer to the experiment data

compared to those obtained by SILVACO. On the other hand, for V_{oc} and η, SILVACO lead to results close to the experiment, but both softwares provide the same qualitative description of the performance as calculated for different configurations.

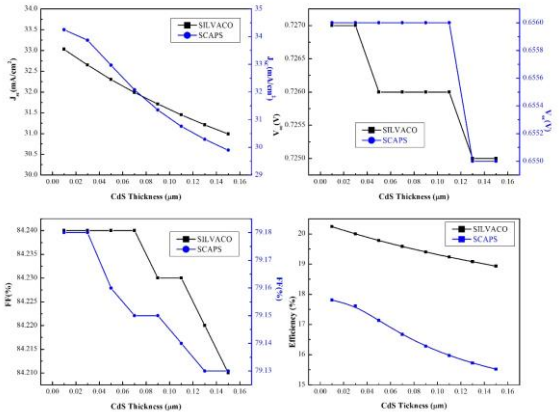

Figure 2: CdS Thickness effect.

The second important parameter that can affect the performance of the CIGS-based cell is the thickness of the absorber layer because it is directly related to the use and the production cost to find an optimum for the thickness of the CIGS absorption layer, the latter will be varied from 0.5 µm to 5 µm during the simulation, Fig.3, show that the yield increases when the thickness of the CIGS layer increases but beyond 2500 nm There is a strong rate of slowdown for the SCAPS simulation and a slow rate of slowing down for the SILVACO simulation, the most optimum value for the thickness of the CIGS absorption layer is 4000 nm as obtained from SCAPS and 5000 nm as calculated by SILVACO. Furthermore, the thickest structure shows a fall in the shape actor shape FF illustrated in Fig 3a due to the series resistances R_s or possibly due to the intrinsic resistance of CIGS itself, when the absorber's layer thickness decrease, the open circuit voltage (V_{oc}) and the short circuit current density (J_{sc}) of CIGS solar cells decrease which is due to the recombination process who is induced by the back contact when it is very near to the depletion region and the majority of electrons' generation will be captured easily.

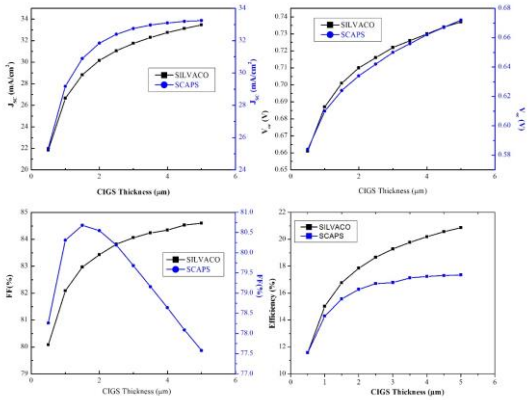

Figure 3: CIGS thckness effect.

Furthermore, in Fig. 4, we displayed the same physical quantities versus the changes in dopant concentration, N_D. It is obvious that both SCAPS and SILVACO lead to the same behavior. Mainly, when the dopant concentration increases the value of the physical quantities (including the efficiency) remain almost constant. We can conclude, that the doping of the CdS buffer layer does not affect significantly the efficiency of the solar cell. In the present case, a value of $N_D = 10^{17}$ cm^{-3} has demonstrated to lead to the highest efficiency for both numerical approaches.

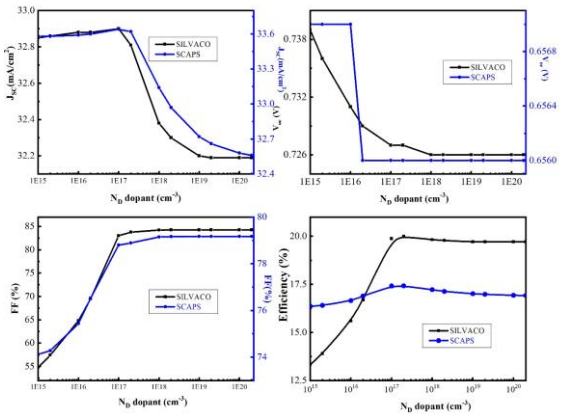

Figure 4: Dopants Concentration effect.

Finally in Fig. 4, we focus on the MoS_2 layer effect on the CIGS cell's parameters with different Band Gap, generally the Molybdenum (Mo) is used as back-cotact in CIGS solaire cell technology, however the interface between Molybdenum and CIGS is fairly a Schottky (Jayachandran et al., 1993) contact which can decrease the Open-circuit

Voltage V_{oc} and the Fill Factor FF by the deference between the two work function (Mo and CIGS), the presence of MoS_2 layer can transform the contact between CIGS and Mo from a Schottky contact into an Ohmic Contact (Keszler and Wager, 2008), we note that the optimum Thickness of MoS_2 is from 40 nm to 50 nm to get an optimum in solar cell Efficiency.

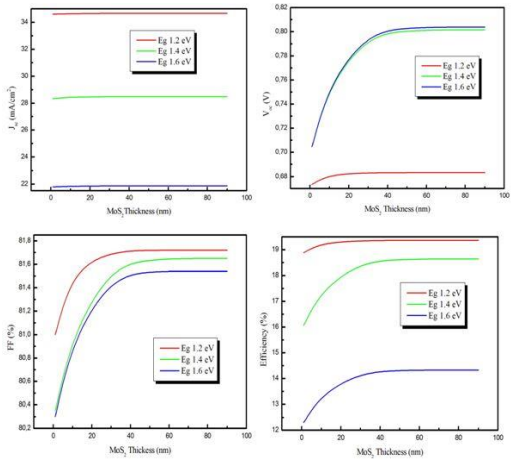

Figure 5: MoS_2 thickness effect.

4. Conclusion

In the present study, we investigated the performance and limits of solar cell device based on CIGS by using two computational approaches: SCAPS and SILVACO. Whereas both of approaches were successful in modeling solar cells based CIGS, SCAPS has better reproduced results of literature. This difference might be attributed to recombination types, where in SCAPS, all the three types (Auger, radiative and Shockley-Read-Hall) were taken into account compared to SILVACO that emphasized on SRH recombination only.

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www.nrel.gov/pv/assets/images/efficiency-chart.png - Recherche Google.

Article 2:

Study and analysis of an eventuel implantation in the algerian high-plateaus of a solar chimney power plant

This work is devoted under investigation feasibility of a possible establishment of a solar chimney power station (SCPS) intended for the production of electrical energy at the level of the Algerian high plateaus. The locality in question is to 865 m of altitude, 35,36° of latitude and 1,81° of longitude. A mathematical modeling of the SCPS based on the model of PERRIN Brichambaut for the calculation of the solar radiation was carried out. The results have been presented and interpreted for two periods: summer (July 15) and winter (December 15). A comparison of the results obtained from the solar irradiation with those of the Development Centre of Renewable Energies DCRE has been performed.

Key words: solar power plant. Solar Tower; electrical power; diameter of the collector; height of chimney.

1. INTRODUCTION

For more than a century, it has become clear to note the significant growth of energy demand that knows the global market where this demand was covered by the use of fossil energy sources arriving to their limits. Most of the electrical energy consumed comes from fossil fuels (oil, natural gas, coal,... etc) which massive use may lead to the depletion of these reserves and threatens really the environment . This threat was manifested through global climate change related to carbon dioxide emissions coming from the combustion of fossil energies which is the principal gas responsible for the reinforcement of the greenhouse effect, which opens the doors to a race to new sources of energy or new processes to achieve more energy. Therefore, the question of the preservation of the environment held a growing place in developed countries. Indeed, in 1992 at the Rio conference and later, in 1997, while the Kyoto Protocol, most of stats have made commitments to combat greenhouse gas emissions in order to contribute to the preservation of the environment and the climate equilibrium. In this context, the

development of renewable energies has emerged an answer to bring and support in particular solar energy. In addition, Algeria is one of the countries of the Mediterranean which has a very high solar energy potential. According to the data of sunning, Algeria is counted one of the sunniest countries in the world. The potential of the solar resources of this country is optimal for the execution of solar projects.

The solar tower at chimney effect is one of the means for the production of electrical energy, it is a power station with renewable energy, constructed so as to channel the air heated by the Sun to drive turbines to generate electricity using solar radiation. The concept was initially proposed by German engineer Jörg Schlaich in 1968. The performances of this algorithms have become increasingly limited in the current context [1-4].

From 1980 to 1989, a prototype in Manzanres was developed, built, and tested the chimney height is 195 m and 10 m of diameter. The surface of the collector (greenhouse effect) is 46 m^2. The maximum generated power is 50 KW, this last could deliver a power of 50 KW. According to Padki and Sheriff [6] and Schlaich [5], desert areas and subtropical areas are of primordial interest for medium and large SC. The solar power stations of chimney can also be used under exceptional conditions [7-8-9].

B. Mebarki et al. [10] had carried out an analytical study of a solar chimney in the South-West of the Algeria. The results obtained show that the solar Tower can produce 100 to 200 kilowatts of electricity and it can reach 1.8 MW for 3000 m in diameter and a height of 200 m.

S. Larbi et al. [11] had presented an analysis of the energy performance of a CCS to provide electricity to isolated villages in the region of Southwest Algeria. Solar energy and the psychometric condition of the air in the South of the Algeria are important to fully promote the development of solar chimneys for either the production of thermal or electrical energy for various uses. The authors are interested in the town of Adrar where solar radiation is important. The results obtained show that the CCS can produce from 140 to 200 Kw of electricity on a site such as Adrar throughout the year, according to an assessment made on the monthly average of sunshine.

Mr. Tingzhen et al. [12] presented a method of numerical simulation for the system of the solar chimney with the turbine power plant, they have found to a solar chimney with a fireplace of 400 m high and 30 m radius, a manifold 1500 m radius and a turbine 5-blade maximum power and efficiency of turbine is 10MW and 50%, respectively.

E. Bilgen and J. Rheault [13] presented studies on solar chimneys in high latitudes. . To assess, they developed a mathematical model calculated under MATLAB, based on average monthly weather data and a thermodynamic cycle, the thermal performance of the nominal production of a 5 MW at three locations in the Canada plant, has been studied. The results showed that complete thermal performance of solar chimneys in high latitudes is about 0.48%, which is slightly better than that with horizontal collectors at the location of the South with the climate.

A. Koonsrisuk, T. Chitsomboon [13] have proposed a study of a variable of simple similarity without dimensions for the solar chimney which has proved to be valid for a completely similar cases and a partially similar cases. This should make the experimental study of a solar chimney simpler and more economical.

The available literature concerning the numerical study of natural convection itself in the solar chimney is rare, because research focuses mainly on the assessment of the overall performance of these systems.

The objective of this present work is devoted to the study of the influence of some geometrical and physical parameters, namely the diameter of the collector, the height of the chimney and solar radiation on the electric power output as well as the feasibility of establishing a CCS at the level of the locality of Tissemsilt.

2. MATHEMATICAL MODELING

The studied SAB is composed of three essential elements: a solar collector (collector), the fireplace located in the center of the manifold and (PKU) power conversion unit that includes one or more turbines [1: 15]. The turbines are driven by the air produced by the buoyancy as a result of global warming inside the collector (figure 1).

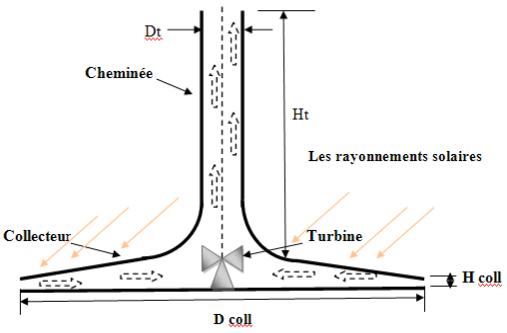


Fig. Schéma représentatif d'une centrale à cheminée solaire

Figure 1. Representative Schematic of a solar chimney power plant

2.1. THERMODYNAMIC CYCLE OF SOLAR CHIMNEY

The functioning of the solar chimney requires the presence of air, which transports the heat obtained in the collector from the Sun's rays to the set of devices that are able to exploit this thermal energy into kinetic energy. Air comes out of the chimney, which allows to introduce fresh air to the collector for the cycle (figure 2).

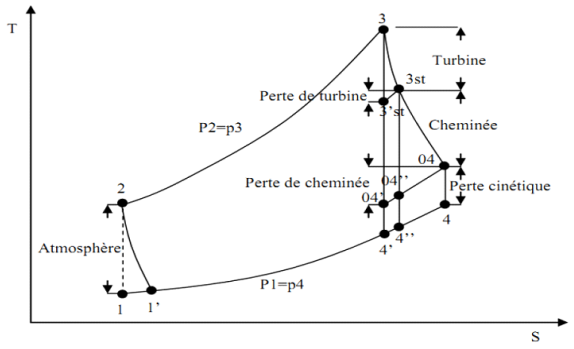


Figure 2. Real cycle of the solar chimney [16]

2.2. CHIMNEY

The efficiency of the fireplace is defined by:

$$\eta_c = \frac{P_{utile}}{P_{solaire}} \quad (1)$$

$$P_{solaire} = m.Cp.(T_3 - T_2) = m.Cp.\Delta T_{23} \quad (2)$$

The output power is given by the following equation:

$$P_{utile} = \frac{g.H_c}{Cp\ T_2} \cdot \rho_{coll} \cdot A_c.V_c.\Delta T_{23} \quad (3)$$

and the total pressure difference that occurred between the entrance and the exit of the chimney is:

$$\Delta P_{tot} = \rho_{coll}.g.H_c.\frac{\Delta T_{23}}{T_2} \quad (4)$$

2.3. COLLECTOR

The efficiency of the collector is expressed by the report:

$$\eta_{coll} = \alpha^* - k\ \frac{\Delta T_a}{E} \quad (5)$$

2.4. THE TURBINE

The maximum mechanical power given by the turbine is:

$$\Delta P_{tur,max} = \frac{2}{3}\ \frac{\eta_{coll}.A_{coll}.E.H_c}{Cp.T_a} \quad (5)$$

The electric power delivered by the fireplace is:

$$P_{elc} = \frac{2}{3}\frac{g.\eta_{coll}.A_{coll}.\eta_{tur}.E.H_c}{Cp.T_a} \quad (6)$$

3. RESULTS AND DISCUSSION

To see the influence of the solar irradiance, the diameter of the collector and the height of the chimney on the power delivered by the solar Tower during the days December 15th, (winter period) and July 15th (summer period), curves were plotted translating the following variations:

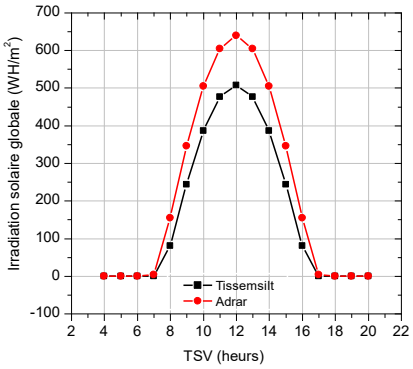
-The daily solar irradiance time variation,

-The daily power output based on time,

-The daily power output depending on the diameter of the collector,

-The daily power output depending on the height of the tower.

3.1. THE CHANGE IN THE ANGLE OF THE SUN EVERY DAY DEPENDING ON



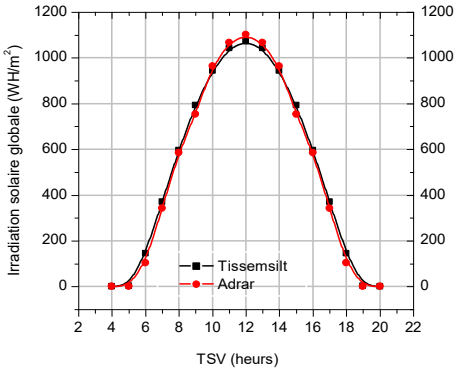


FIGURE 3 variation of I = f (TSV) for the month of December

The variation of I = f (TSV) for the month of July

THE TIME

Figures 3 and 4 represent the evolution of the daily solar irradiance for the two selected periods. Examination of the two figures highlighted that for a clear sky solar radiation varies during the day in a way Gaussian. She is weak in the vicinity of the sunrise and the sunset which is at a height of Sun zero and she reached the maximum in the middle of the day that is at solar noon when the height of the Sun is at its maximum.

3.2. THE CHANGE OF POWER PRODUCED OVER TIME DAILY

Figures 5 and 6 illustrate the power output according to the solar time for the two localities Adrar and Tissemsilt. We note that the power output is much higher during the month of July compared to the month of December, as the solar irradiance received at the level of the collector is very high in this month. In July, the city of Tissemsilt receives a considerable amount of solar radiation, radiation appears at noon peak, approximately it is of the order of 1074Wh/m2, corresponding to a power of 94365.88W while in December the peak of illumination is of the order of 508Wh/m2, representing half of the output in the month of July which is of the order of 44634.88W for the locality of

Tissemsilt. It can be concluded that the effectiveness of the system is important during the summer. It is to emphasize that the power produced at the level of the locality of Adrar is superior to that produced at Tissemsilt due to solar irradiation of each locality.

3.3. THE CHANGE OF POWER DAILY PRODUCED DEPENDING ON THE DIAMETER OF THE COLLECTOR

Figures 7, 8, 9 and 10 show the evolution of the daily power produced by the solar Tower for different diameters of the collector. The reading of these figures to show that the power generated increases with the increase in the diameter of the collector.

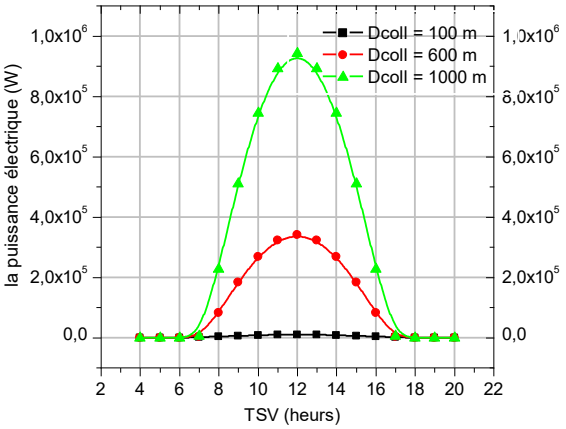


FIGURE 7. DAILY POWER OUTPUT FOR DIFFERENT DIAMETERS OF THE COLLECTOR FOR THE MONTH OF DECEMBER FOR THE LOCALITY OF ADRAR

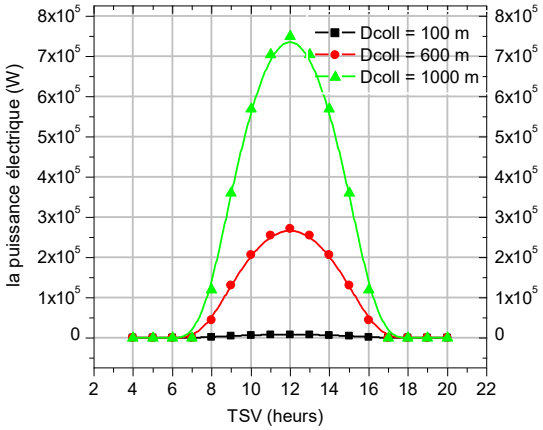
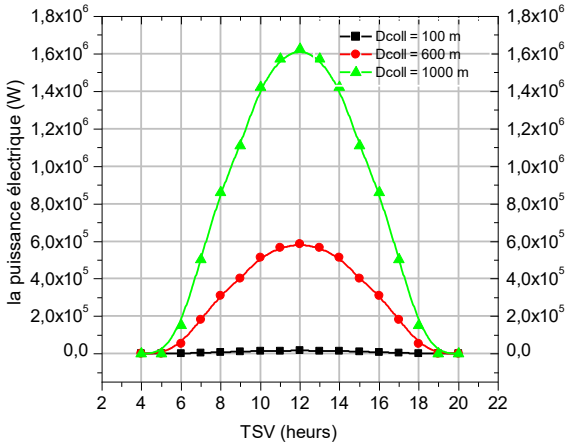


FIGURE 8. Daily power output for different diameters of the collector for the month of December for the locality of Tissemsilt



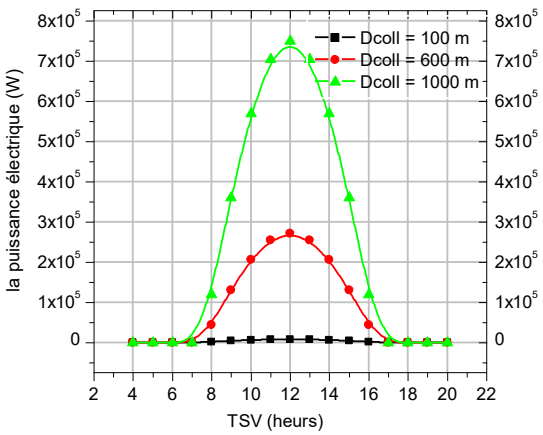


FIGURE 9. DAILY POWER OUTPUT FOR DIFFERENT DIAMETERS OF THE COLLECTOR FOR THE MONTH OF JULY FOR THE LOCALITY OF ADRAR

FIGURE 10. Daily power output for different diameters of the collector for the month of December for the locality of Tissemsilt

Figure 10 shows that for a height of 195 m, almost 1.58 MW of electricity can be produced by a tower with a diameter of collector of 1,000 m for the locality of Tissemsilt.

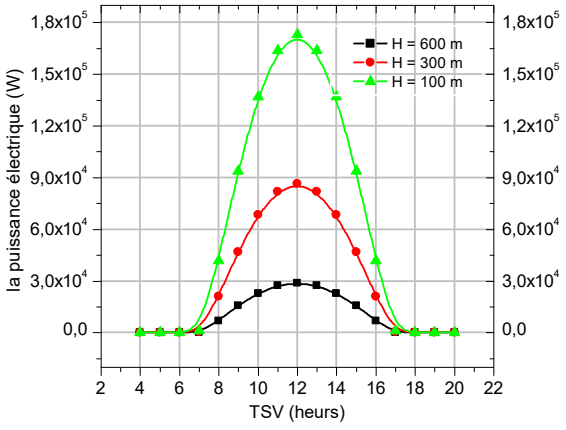
3.4. THE CHANGE OF POWER DAILY PRODUCED DEPENDING ON THE HEIGHT OF THE TOWER

Figures 11 to 14 show the variation of the daily power output for different heights for the months of July and December. Examination of these figures shows that the increase of the height of the solar Tower led to an increase of the electric power produced. We see from figure 14 with a constant collector (245 m) diameter for the summer period, we can produce a maximum power to the locality of Tissemsilt of:

-290953.40W with a 600 m high chimney,

-145476.7 W with a 300 m high chimney.

-48492.23 W with a 100 m high chimney.



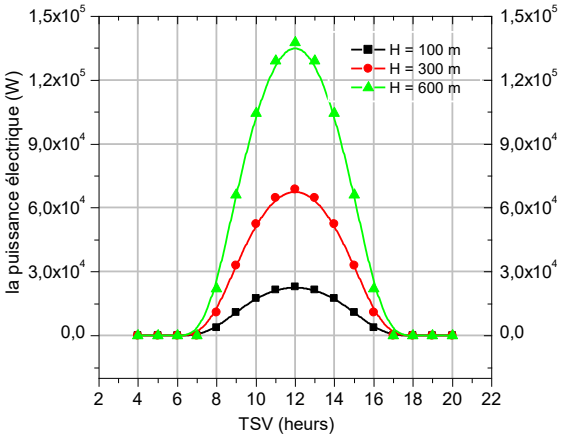


FIGURE 11. DAILY POWER OUTPUT FOR

FIGURE 12. Daily power output for different

DIFFERENT HEIGHTS OF THE CHIMNEY FOR THE MONTH OF DECEMBER FOR THE LOCALITY OF ADRAR

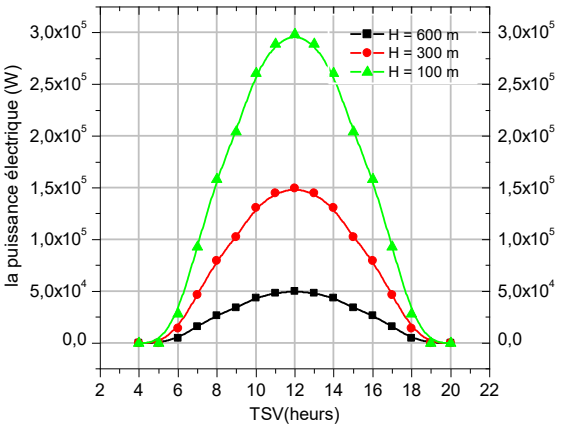


FIGURE 13. Daily power output for different heights of the chimney for the month of July for the locality of Adrar

heights of the chimney for the month of December for the locality of Tissemsilt

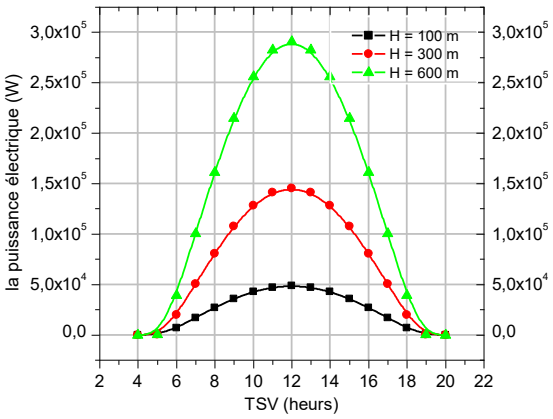


FIGURE 14. Daily power output for different heights of the chimney for the month of July for the locality of Tissemsilt

3.5 COMPARISON OF THE RESULTS OF THE SOLAR IRRADIATION

A comparison of the results of solar irradiation obtained by this study and development center of renewable energy CDER in summer.

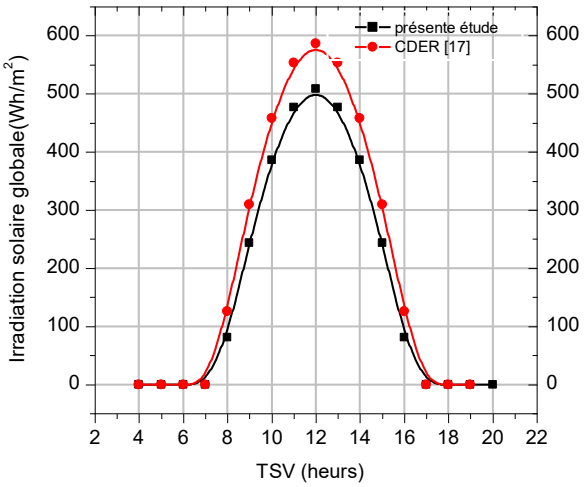


FIGURE 15. The comparison of the results of solar irradiation for December 15 – Tissemsilt

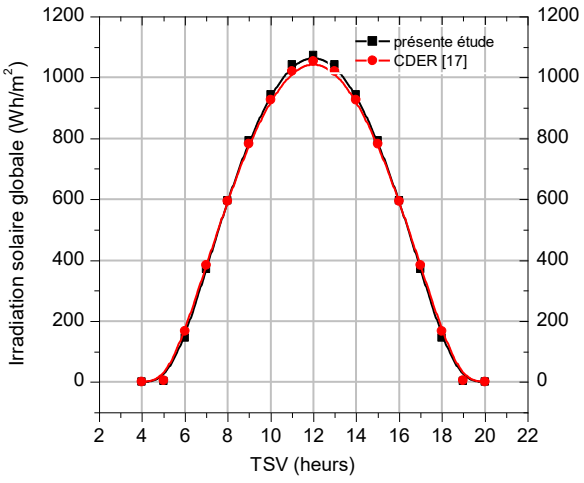


FIGURE 16. The comparison of the results of solar irradiation for July 15 – Tissemsilt

The review of the figures 15 and 16, the good agreement of results with an average error is less than 4%.

3.6. THE FEASIBILITY OF ESTABLISHING A SOLAR POWER STATION'S CHIMNEY EFFECT AT THE LEVEL OF THE LOCALITY OF TISSEMSILT

For best operation, a solar chimney must be built in a very sunny area. The Algeria is among the most favorable in the world places. Moreover, the average sunshine is estimated at 1944 kWh/m2 over a period annual 2999 h at Tissemsilt level either favorable for a possible study of the solar tower to stack to the locality in question.

Electric power (KW)	50 KW	100 KW	500 KW
Chimney height (m)	154.89	309.78	1548.92
Collector diameter (m)	217.51	307.61	687.85

TABLE 1. The variation in the diameter and height of the chimney according to the electric power delivered to the locality of Tissemsilt.

Table 1 shows the variants of the feasibility of establishing a solar greenhouse of chimney to the locality of Tissemsilt. Three powers are available in 50, 100 and 500 KW to determine the height and diameter. The feasibility study shows that for a diameter and a height equal to 280 m, the power output is the same. It below this value the influence of H is dominant. To the of there this value the influence of the diameter is dominant and the power output may reach 1000 KW for a height of 1000 m, while for the same diameter of 1000 m the power output value is only 300 KW. It can be concluded that to increase the electric power delivered by the fireplace just play on the diameter of the collector.

4. CONCLUSIONS

At the end of the work, the following conclusions can be established:

-a program in FORTRAN environment based on the determination of the solar radiation according to the model of PERRIN Brichambaut has been developed,

-solar radiation varies during day in a way Gaussian. She is weak in the vicinity of the sunrise and the sunset which is at a height of Sun zero and she reached the maximum in the middle of the day i.e. at solar noon when the height of the Sun is at its maximum.

-the power output is much higher in July than the month of December, as the solar irradiance received at the level of the collector is very high in this month.

-the increase of the height of the solar Tower as well as the diameter of the collector led to an increase of the electric power produced.

Article 3:

Spiritual and Ancestral worship in Egypt during Pre and early dynastic

Abstract

The ancient Egyptians had an extremely religious culture and they were strong believers in the Afterlife, they lived in a religious community with multiple Gods, meaning that instead of worshipping just one god, they worshipped many different gods and goddesses and also knew the ancestor worship.

Evidence for the existence of ancestor worship is varied and abundant; some of the ancestral spirits are regarded as good, some as evil. The role of ancestors is also obscured in many societies whose religions are based on Spirituality, an example of this is the hunters and gatherers who living in Egypt during the prehistoric period.

The article tries to clear the meaning of "ancestor worship" in ancient Egypt during prehistoric period and early dynastic times; by showing many examples and Evidence which emphasized the role of ancestor worship in Egypt.

ملخص

كان الدين هو اللبنة الأولى التى قامت عليها الحضارة المصرية القديمة، وكان اعتقاد المصرى القديم بالعالم الآخر هو المحرك الأول للمصرى القديم منذ عصور ما قبل التاريخ، وكانت التعددية الإلهية من أهم سمات المجتمع المصرى: تلك التعددية التى اتسعت لتشمل العديد من الألهة والألهات بل وأرواح الأسلاف التى تنوعت ما بين الخير والشرير.

وهناك العديد من الأدلة التى تؤكد على وجود عبادة أو تقديس أرواح الأسلاف فى مصر خلال عصور ما قبل التاريخ حيث المجتمعات الأولى التى اعتمدت على الصيد والجمع والالتقاط والتى عاشت آنذاك، وكان الجد أو السلف هو سندهم ودعامتهم سواء فى حياته أو بعد موته.

تحاول الدراسة توضيح معنى عبادة الأسلاف فى مصر خلال عصور ما قبل التاريخ وبداية الأسرات؛ من خلال القاء الضوء على العديد من الأمثلة والأحداث التى تؤكد على دور وأهمية تلك العبادة فى مصر آنذاك.

Introduction

The worship of the ancestors was an act of religious worship that was present in a number of primitive societies and was based on the belief in the extension of the influence of the

lives of the dead ancestors in the course of the life of the human community. This worship seeks to appease the ancestors and seek their protection and aid individually and collectively.

The subject of ancestral worship may be refers to the origin of religion; it is an expression of the sacramental virtues and of social organization based on the divisional structure of the body.

There are many examples point to the ancestors' worship in prehistoric Egypt, such as: the terracotta head of the Mermdit Bani Salama and the masks of Hierakonpolis, All are considered examples for a type of religious rite in Egypt during Predynastic period.

The Souls of Buto and Nekhen also consider one of the most important evidence on proving the role of ancestor worship at this time onward.

That is beside the human sacrifice which has known in Egypt during the pre and early dynastic period. And which proves the existence of ancestor worship of in Egypt during Predynastic and early dynastic periods.

Key words

(Buto, Nekhen, ancestor worship, Symbol, masks, the souls)

Ancestral worship

According to Harrington, Death had a great importance to ancient Egyptians, and it is important to study the meaning of death In order to discuss ancestors, cults, and the relationship between the living and the dead that is because the world of the dead is the gate through which the souls of the ancestors relate to the living.

Sometimes Egyptologists refuse existence of ancestor worship in Egypt that is because in their opinion; the Egyptian society has not been recognized it as universal, so many scholars as Lehmann and Myers contact between a society and its thoughts saying that; ancestor worship is often reserved for those societies where the dead are explicitly called by a term that is translated as ancestor, thus excluding societies whose religious practices concern ghosts, shades, spirits, souls, totemic plants and animals, or merely the dead.

WILLIAM pointed out that Dreams where the first perception of the worship of ancestors and Ancestors renders their valuable services to the living, by advice or prophesy through dreams.

Harrington suggests that; there is a strong relation between Living and dead in ancient Egypt; that is emphasized by the cults which practiced to individual ancestors.

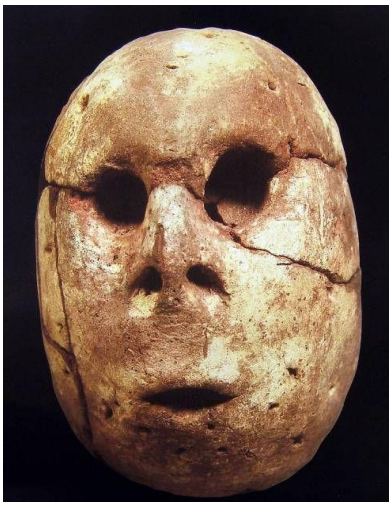
With regard to the dead in ancient Egypt Bommas mentioned that; the dead were not really dead, but living a life in the hereafter made death negotiable and opened possibilities for social connection between the living (in this world) and the dead. The concept of living alongside the dead was made possible by accepting the Fact that the dead were alive.

Perhaps the village of Mermdit Bani Salama is the best witness to it; the people of the village buried their dead inside their homes or between their homes as a kind of respect for their dead.

According to POYIL and TAYLOR the worship of the Manes, or ancestors, is one of the great branches of the religion of mankind. Its principles are not difficult to understand, for they plainly keep up the social relations of the living world. The dead ancestor now passed into a deity, simply goes on protecting his own family and receiving suit and service from them as of old; the dead chief still watches over his own tribe, still holds his authority by helping friends and harming enemies, still rewards the right and sharply punishes the wrong.

Merimde Beni Salaam's head

The interested in the dead and the ancestors worship be shared in prehistoric times by burial customs, at The village of Mermdit Bani Salama which Located in North Delta, there were combination between houses and tombs together , The village dates back to the Neolithic period, There were found The famous head (fig.1) which may consider the first evidence of The existence of ancestral worship in Egypt.



(Fig.1) –Terracotta idol's head- Merimde Beni-Salam, Neolithic period.

The head was dated from 4800 to 4500 BC, and is made of terracotta, it is considered One of the oldest artistic sculptures in the ancient Egyptian civilization, the head took an oval shape, The eyes are two deep cavities and nose prominent and graceful and mouth half open as we found the presence of traces of red color on the top of the head.

On the other hand, many of the holes were distributed in the skull and around the face, perhaps for the purpose of fixing hair and beard. Despite the simplicity of the head, it carries some artistic expression. It shows us that there is a prominent and wide hole at the bottom of the chin probably to fix the head in a stick or flag.

The head May be refers to Religious purpose; the appearance of the holy religious figure with the human head probably confirms that: this head is one of the Symbols of the ancestors or the leaders of the village.

And it can be considered a sacred Symbol, based on what Pinch was said; Objects which has discovered in situ provide us with a certain amount of information about mortuary cults or surviving parts of an act of worship.

Nekhen Masks

Hierakonpolis is the city of the hawk, it is located in southern Upper Egypt on the western bank of the Nile, And it is one of the most important early archaeological sites in

Egypt, The settlement and building of the city spans the time from 4000 B.C when the elements of Egyptian society were first formed to the opening of the historic era. It provides substantial evidence for understanding the foundations of that ancient civilization, a century of archaeological research has shown this vast site's central role in the transition from prehistory to history of the rise of early Egyptian civilization.

In Hierakonpolis at Locality HK6, the elite Pre- and Protodynastic cemetery, there are many evidences of interest in the dead have been found. Barbara Adams has been found In Hierakonpolis two unique but incomplete straw-tempered pottery, masks, The masks with cut-out eyes and mouths Only a small (but evocative) portion was found on one of them, featuring cut-out, feline-looking slanted eyes and an aquiline nose. Found with it at the south end of the trench was a tuft of twisted human hair, perhaps once part of a headdress. (Fig.2-3)

(Fig.2) –Egypt's earliest funerary masks, dating to 3500 B.C

(Fig.3) –Cast of the Hierakonpolis mask on display in The Gallery of Early Egypt, British Museum

The other mask according to Barbara Adams is larger and more complete. It also has sloped, cut-out eyes and an aquiline nose, with brows, eye line, mouth and a beard in plum red paint with white strap details. The brakes on the top corners of this bearded mask seem to be in the wrong position for the human ears and may indicate that it once had bovine horns or animal ears attached. This mask is essentially life-sized and curves to fit over a human face, whether in life or in death.

The mask takes a long oval shape, the forehead is wide and the chain is narrow. It is also noticed that a hole was made on both sides of the mask behind the ears at the lower back edge; It is therefore possible to imagine that the mask was mounted on a human face and attached to the back.

The mask is the embodiment of the human head who has been assigned a special function (Part expresses about each)

The Mask's date

ADAMS confirmed that Nekhen masks back to the Predynastic period. Also she discussed the appearance of these masks and showed up the details of the faces and she compared between these masks and the figurines of the Naqada II and Naqada III periods, she stressed that these masks show us that one of them was humanoid, the other was feline.

The funerary Role of Nekhen masks

Wolinski argued the funerary mask's role in historical times in ancient Egypt saying that; the funerary Masks were placed on the mummified bodies of the dead served to transform them into spirits born again in the afterlife, and he confirmed that; the use of human-faced masks is well documented and dates back to the Fourth Dynasty.

BOLSHAKOY explained the funerary role of masks, saying that; wearing the dead for masks is part of a tradition in many countries. This mask was believed to strengthen the spirit of the dead and guard the soul from evil spirits on its way to the afterworld.

So we can say that; the funerary role of Nekhen masks is confirmed by finding it in one of the tombs of HK6 cemetery.

May be there is a connection between this burial and the Shamanic thought, perhaps this tomb was belonging to one of the shamans and this mask was one of his possessions.

The religious Role of Nekhen masks

Masks are one of the most important themes of art that express the existence of "religious thought" In prehistoric times.

An early example of the use of masks comes from Hierakonpolis, in the form of this remarkable pottery face-mask.

Perhaps these masks were peace of personal funerary Content of a priest or a diviner man, it indicates to the Religious rituals. Or May be these masks refers to what has been known in historical times as "spirits of Nekhen" Who appeared with animal masks since the beginning of the historical ages and were referring to their leaders of the ancestors who ruled Upper Egypt and took from Nekhen the legendary capital of the high pre-dynastic times.

Some researcher was believed that the animal shape masks had an important role in Egyptian thoughts, and maybe Nekhen masks point to this kind of animal masks that is because of its shape, Wolinski mentioned that; The importance of bringing the mask in ancient Egyptian religion is back into the function of animal masks, the Egyptian deities as animal-headed gods played important role in Egyptian rituals by priests who wearing animal masks that appeared artistically to be their heads.

Also Poyil said that the faith in rebirth inspires many tribes to respect certain species of animals and birds which are believed to be creatures carrying the spirits of the ancestors

So we can say that there is a strong relation between both of animal figures, Totems, wearing masks and ancestor worship in prehistoric Egypt.

MILLER confirmed that the Research into cross-cultural burial practices and propitiatory rituals, including sacrificial death, has been interpreted to indicate beliefs in a netherworld existence, populated by nature spirits and ancestors.

According to RICE Masks were always to be important in Egyptian rituals, as they were in many ancient cultures. By adopting them, the priest or other participant in the temple ceremonies could suppress his own personality and thus is ready to be united with the god. In the later periods there is little doubt that the priests, when impersonating the gods in the great ceremonies in the temples and around the king, assumed masks appropriate to the divinity they represented.

Souls of Nekhen and Buto.

The souls of Buto and Nekhen are played an important role in the rituals and scenes as depicted on the walls of the ancient Egyptian temples since ancient times, These souls are the embodiment of the ancestral spirits of the rulers Who ruled the cities of Buto (in north) and Nekhen (in south) since the Predynastic Egypt.

The Souls of Nekhen, mentioned first in the pyramid texts, refer to the ancestors of the ancient Egyptian kings. Nekhen was the Upper Egyptian center of the worship of the god Horus, whose successors the Egyptian pharaohs were thought to be.

Friedman argued that the early kings of Hierakonpolis, called the Souls of Nekhen, were honored guests at the coronations and funerals of all pharaohs. Friedman also confirmed the religious and the funerary role of Hierakonpolis says that: Taken together, the evidence of industrial production, temples, masks, mummies, and funerary architecture as early as 3500 B.C. is placing Hierakonpolis at the forefront of traditions and practices that would come to typify Egyptian culture centuries later. These discoveries may have knocked Narmer and his palette off their historical pedestal, but they confirm the central role the city played in the long development of Egyptian civilization. It is little wonder

that for millennia the deified early kings of Hierakonpolis, called the Souls of Nekhen, were honored guests at the coronations and funerals of all pharaohs.

Hence the kings of historical times may have linked themselves to these legendary leaders and these two cities and their gods in an attempt to appear as the rightful successors of their ancestors who ruled these two cities.

The kings of Egypt were always keen to emphasize that they came from the souls of Nekhen and the souls of Buto.

The souls of "Nekhen" and the souls of Buto weren't of human flesh and blood But like the ancient Egyptians thoughts in connecting their daily life with the events of The emergence of the earth, so this term was a projection of the Eternal.

Spirit had an important role in the ancient Egyptian thoughts, Rapoport pointed to the Components of human parts saying that; each human consisted of the physical body, the 'Ka', the 'Ba', and the 'Akh'. The Name and Shadow were also living entities, to enjoy the afterlife, all these elements had to be sustained and protected from harm. (fig.4)

(Fig.4) – the souls of Nekhen (jackal) and Pe (falcon)

The ancient Egyptian artist depicted the shapes of Nekhen's and Buto's souls placing the left hand fist over the heart and raising the right hand in the air. This situation is known as Henu. One of the most beautiful scenes depicting the status of the "Hanu" is the scene of King Ramses I in his tomb at the Valley of the Kings. He sits in the position of "Hanu"

between Anubis (symbol of the souls of Nakhan) and Horus (symbol of the souls of Buto). Celebrate the renewal of the King's "Ba" and Renewing spiritual power.

Human sacrifice and worship of ancestors

Many scholars refuse the admission of existence human sacrifice in ancient Egypt, In contrast there are many others convinced of the opposite; that is because of the multiple individual burials which has been found in pre and early dynastic cemeteries especially in Abydos and Saqqara. (Fig.5-6)

RICE discusses The Egyptians beliefs, saying that; The Egyptians beliefs centered on the need to extend life beyond the frontiers of death. To this end also was directed their love of and identification with the living world they saw around them. In apparent contradiction of this principle, there are the companies of retainers that the kings of the First Dynasty took with them, who were sacrificed and buried with their royal master or sometimes mysterious. There is something cruelly matter-of-fact about the neat rows (their very neatness is disturbing) of subsidiary burials which surround most of the great burials at Saqqara and many at Abydos and other royal centers.

The ancient Egyptians believed that the king is the symbol of God on earth, and he is the ancestor of the predecessor; they wished to be with him in the other world as they were with him in the life, so they buried around his tomb as kind of the desire to stay with him. Semple and Emery are suggested that; the tombs of early dynastic Kings as Djer and Aha were filled with servants who were sacrificed by being buried alive with their tools.

In the Cemetery of Abydos... the archaeologist found some evidence may prove the existence of human sacrifice at that time, such as what has been found of many subsidiary tombs were near the Tombs of the early dynastic Kings.

VAN DIJK Illustrates Two main forms of human sacrifice were identified. On the one hand, there is the ritual killing of a human being, either as a regular or as an exceptional form of the offering cult. In this case human beings usually, though not always, convicted criminals or prisoners of war, sacrifice to the gods in order to maintain or re-establish cosmic order and to emphasize the role of the King as its main guarantor. In some cases

this type of human sacrifice may be no more than a ritualized form of the legal death penalty. On the other hand VAN DIJK Confirmed that there is the practice of retainer sacrifice, where the death of the king is followed by the killing of people who are supposed to accompany him to the hereafter. It is on this latter custom that we shall focus here, although it is possible that the two forms of human sacrifice may sometimes overlap.

This habit did not last long, According to Morris these retainer sacrifices were eventually phased out and replaced with symbolic human figure.

THAYER noted that the ancestor worship engaged in some civilizations with providing offerings and animal sacrifices that is emphasized by the animal burials which were found in early dynastic cemeteries in Egypt.

SPENCER Confirmed that ancestor-worship is the root of every religion in prehistoric times.

Conclusion

Ancestral worship is deeply dependent on the perception which believes that the souls of the dead may return to the living and influence their lives; Prehistoric man imagine it And keen on the happiness of the dead.

- The cult of ancestor worship was confirmed in Mermdit Bani Salama through burial the dead between the living homes; they were part of their own life.

- The worship of ancestors was associated with the idea of offering human sacrifices in ancient Egypt especially during Predynastic period.

- Perhaps there is a connection between some burials of Hierakonpolis and the Shamanic cult.

- Masks were an essential component in many of the rites conducted in Egyptian temples in historic times, worn by priests impersonating the gods whom they served. The earliest example of the use of masks comes from Hierakonpolis, in the form of this remarkable pottery face-mask. Naqada I period.

- The souls of Buto and Nekhen are the embodiment of the ancestral spirits of the rulers who ruled the cities of Buto (in north) and Nekhen (in south) since the Predynastic Egypt.

- The ancestor worship engaged in some civilizations with providing human sacrifices. That is cleared in Egypt by the inhabitants of the subsidiary graves in the Royal Tombs at Abydos and Saqqara.

الملخص

يهدف هذا العمل إلى البحث عن الصعوبات اللغوية التي يواجهها طلاب الدكتوراه عند إعداد مقال بحثي عبر استكشاف نوع أخطاء الكتابة التي يرتكبها هؤلاء الطلاب. من أجل تحقيق هذا الهدف استخدم الباحث آليتان استبيان استطلاعي موجه للطلاب وتحليل محتوى المقالات المرفوضة. أظهرت النتائج أن الصعوبات كانت كثيرة. تضمنت عسر اختيار الأفكار الصحيحة و طريقة تنظيمها، تكوين جمل سليمة، الاستخدام الصحيح لأقسام والروابط المنطقية، الأخطاء الإملائية، توافق الفعل مع الفاعل، توافق الاسم و الضمير، حروف الجر ،علامات الترقيم والحروف الكبيرة. كوسيلة للتغلب على أوجه القصور اللغوية هذه ، تم تصميم وتنظيم عدد من التوصيات التي تتناول جميع الأخطاء المذكورة سابقًا وفقًا لمعايير قابلية التعلم
الكلمات المفتاحية: الكتابة الأكاديمية، مقالة، طالب دكتوراه، اللغة الإنجليزية لأغراض معينة.

Résumé

Ce travail de recherche consiste à explorer et à analyser les difficultés linguistiques rencontrées par les doctorants en spécialités scientifiques lors de la rédaction d'un article de recherche. Cette recherche avait pour objectif de déterminer le type d'erreurs commises par ces doctorants. Pour atteindre cet objectif, la chercheuse s'est servie de deux instruments de recherche: un questionnaire destiné aux étudiants ainsi qu'une analyse du contenu des articles rejetés. Les résultats obtenus ont montré que les difficultés étaient les suivantes : la sélection et organisation des bonnes adéquates, la formation de phrases correctes, l'utilisation correctes des connecteurs logiques, les fautes d'orthographe, l'accord du sujet et verbe, l'accord nom / pronom, les prépositions, la ponctuation et la capitalisation. Afin de remédier à cette situation, des recommandations ont été conçues et organisées en fonction des critères de capacité d'apprentissage.
Mots clefs : rédaction académique, article de recherche, doctorant, l'anglais pour des objectifs spécifiques.

Summary

This research work consists of exploring and analyzing the language difficulties doctorate students in hard science face when composing a research article. The researcher's aim was to find out about the type of writing errors these students made. In order to achieve this objective, the researcher used two research instruments: a students' questionnaire and

a content analysis of students' rejected articles. The obtained results showed that the writing difficulties were many. They included selecting and organizing the right ideas, forming grammatically correct sentences, adequately using the English parts of speech and logical connectors, spelling mistakes, subject-verb agreement, noun-pronoun agreement, prepositions, punctuation, and capitalization. As a way to overcome these language inadequacies, a number of recommendations addressing all the previously-mentioned errors were designed and organized according to the criteria of learnability.
Key words : academic writing, research article, doctorate student, rejection, English for Specific Purposes.