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Challenges and Opportunities in Utilizing AI Tools for the Assessment of Critical Thinking and Problem-Solving Skills: The Case Study of LMD 3 EFL Students at the University of Tlemcen

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DECLARATION OF ORIGINALITY

I declare that this dissertation is entirely my own work except where otherwise indicated. I did not receive any unauthorized assistance in its preparation. All sources of information and materials used have been duly acknowledged and cited. This work has not been submitted for any other degree or examination at any university.

Name: TERKI HADIL

Date : 12th May , 2024

Signature :

DEDICATION

To my beloved parents

Dad, your strength, determination, and unwavering belief in me have empowered me to face every challenge with courage and perseverance.

Mom, your nurturing presence and gentle wisdom have shaped my character and instilled in me the values of kindness and resilience.

To my cherished sisters, Fatima Zohra, and Amina, whose laughter and camaraderie have filled my life with joy and warmth. To my brother Imran, whose encouragement and companionship have been a source of strength in times of need.

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ABSTRACT

Critical thinking and problem-solving abilities are the two fundamental skills that are sought out in the field of education, especially in the world of English as a Foreign Language. Although they are crucial, the measurement of these skills has traditionally been tough. Nevertheless, the advent of artificial intelligence opens up new opportunities for the reorganization of assessment procedures. This research focuses on the use of artificial intelligence technology to evaluate the critical thinking and problem-solving abilities of third-year EFL students at the University of Tlemcen. This research was an exploratory case study design, using a mixed-methods approach for data gathering. Students' questionnaires, teachers' interviews and classroom observations were the main data collection tools. The findings suggest that although there is a general positive view of AI tools for assessment, their implementation is faced with major issues. The participants acknowledge the advantages of artificial intelligence tools like enhanced efficiencyand standardized testing, but they raise the issue of the limitations of artificial intelligence in dealing with the complexity of these skills. In conclusion, artificial intelligence tools can be a great option to evaluate critical thinking and problem- solving skills, but their limitations must be dealt with to ensure their full integration into English as a Foreign Language education.

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AI : Artificial Intelligence .

EFL : English as a Foreign Language.

NLP : Natural Language Processing.

GENERAL INTRODUCTION

General Introduction

Critical thinking and problem-solving skills are essential for English as a Foreign Language (henceforth EFL) novices as they navigate the complexities of language acquisition and cultural know-how. These abilities permit learners to analyze, compare, and synthesize records correctly, leading to stronger language talent and intercultural competence. In an ultra-modern globalized world where communication across borders is more and more vital, EFL newcomers have to increase those skills to be triumphant academically and professionally.

The rapid development of generations has furnished new equipment and methods for assessing and developing important thinking and problem-solving abilities. One of those gears is artificial intelligence, which can convey a revolution within the assessment process. The Artificial Intelligence (henceforth AI) equipment is able to research massive datasets, pick out styles, and supply personalized remarks, opening up new possibilities for EFL educators and learners.

While AI equipment preserves promise for revolutionizing the evaluation of critical thinking and problem-solving skills in EFL students, a complete understanding of the challenges and possibilities associated with their usage is missing. This research aims to pick out the primary limitations faced in implementing AI evaluation tools for EFL essential questioning and hassle-solving while simultaneously exploring the potential blessings and areas in which AI can decorate present-day assessment practices.

There are many reasons why researching the obstacles and chances of using AI tools for assessing the critical thinking and problem-solving proficiency of Tlemcen University's 3rd year EFL students is important. To start with, incorporating these tools into learning enhances the existing ineffective means of g auging those crucial talents by means of common

assessment methods so that they become effective and comprehensive. Secondly, uncovering the obstacles faced by learners and instructors would play a crucial role in creating ways to get rid of impediments stopping them from using these technologies. Thirdly, examining the prospects offered by AI software may point to inventive systems of teaching that foster better performance in schools. Lastly, this study contributes to the broader conversation about how technology affects education, especially in terms of cultivating cognitive skills such as reasoning power and problem-solving skills that are vital for students' holistic development into adults who can cope with the complexity characterizing our world today.

This study is important because it could help improve EFL teaching. There are issues to discover as well as things to utilize among AI tools meant for the evaluation of cognitive and non-routine task performance. Insights gained could enable instructors and policymakers to plan on other applicable teaching assignments and proposals for examinations that would enhance the general performance of students undertaking EFL programmes. This research can also pave the way for more studies in this area through an increase in the theoretical body of knowledge, hence contributing to the current discussions and debates on EFL education as well as AI integration.

This study seeks to determine how well AI tools can be used for evaluating critical thinking and problem-solving abilities among 3rd year EFL students at the University of Tlemcen. The purpose of this research is therefore to identify the difficulties that can be faced as well as an analysis of the opportunities inherent in using such an approach so as to shed more light on how assessment can be improved when it comes to these important areas. Furthermore, the research tries to find solutions that could surmount challenges as well as tap into the possible advantages of AI tools, thus leading to the advancement of students' results in the education sector.

To achieve the goals of the research, two main questions were formulated as follows:

1. What are the primary challenges faced in the utilization of AI tools for the assessment of critical thinking and problem-solving skills in EFL learners?
2. What opportunities do AI tools offer for enhancing the assessment of critical thinking and problem-solving skills in EFL learners?

The subsequent hypotheses have been put forward as possible answers to these questions:

1. AI tools will excel at assessing only the surface-level aspects of critical thinking and problem-solving, such as information processing and basic logic, while struggling to accurately capture the deeper, more nuanced elements like creativity, judgment and metacognition.
2. AI-powered personalized learning environments can provide EFL learners with adaptive and engaging assessments that foster deeper understanding, encourage divergent thinking, and offer individualized feedback, leading to improved critical thinking and problem-solving skills.

In order to achieve the research objectives, they implemented an exploratory case study design, with the research focusing on third-year EFL students. In this study, a mixed-methods approach is used where quantitative and qualitative data collection techniques are combined. In addition, the student's questionnaire, teacher's interview and classroom observation serve as the main research instruments. This comprehensive approach enables an exhaustive exploration of the challenges and chances of using AI tools in assessment. So, it gives a whole picture of the topic.

This thesis is structured into two main chapters: the first chapter encompasses the Literature Review, while the second chapter comprises the Research Methodology, Data Analysis and Interpretation.

The literature review starts with an introduction that sets up the discussion. It then looks at where critical thinking and problem-solving assessment stand today, defining them and looking at conventional ways of assessing such essays and portfolios. It also critiques the limitations of traditional methods and investigates the present condition of critical thinking and problem-solving assessment in Algeria. Also, this investigates how AI tools can be used as other alternatives with respect to their potential benefits and different types of assessment areas. A resume also follows on how AI tools can be utilized for evaluation purposes by summarizing the different challenges and opportunities in this field.

The research methodology chapter begins with an introductory part where it offers an outline of the research method used in the study. Mainly, it talks about the study setting, which concentrates on third-year EFL students. The chapter proceeds to present how the research is designed; sampling methods as well as tools were employed, such as student questionnaires, teacher interviews, and classroom observation. It explains how the data is analyzed for each tool and how to interpret it. Eventually, it concludes with recommendations and limitations of research.

To conclude, this study examines the integration of AI tools to evaluate critical thinking and problem-solving skills among third-year EFL students using a mixed-methods methodology. The study explores whether AI can be applied in traditional evaluation systems with cross-sectional data collection techniques such as students' questionnair, teacher's interview and classroom observations.

LITERATURE REVIEW

1.1 Introduction

Given the fluidity of the modern educational context, critical thinking and problem-solving skills are essential for the 21st century learner to understand and interpret valuable information, solve problems faced with it and make judgments based on the acquired knowledge. The assessment of critical thinking and problem-solving skills is essential, and recent studies argue that the way these cognitive abilities are conventionally assessed has limitations in terms of providing objective, scalable and timely information. Interest in critical thinking and problem-solving skills assessment has revived since the appearance of AI tools. The following literature review considers the current state of critical thinking and problem-solving assessment, explores the potential of the possible AI impact on the revolution of assessment methods, and discusses associated challenges and opportunities.

1.2 Current State of Critical Thinking and Problem-Solving Assessment

When it comes to any field, critical thinking and problem solving are very important. However, accurately measuring these skills is a difficult task. Within critical thinking and problem-solving evaluation, there exist both standard and unconventional strategies, all of which come with some shortcomings.

1.2.1 Critical Thinking and Problem-Solving Defined

Analyzing information critically, evaluating evidence, and making informed decisions constitute cognitive skills of critical thinking and problem-solving. Assessing or analyzing information objectively describes critical thinking, while solving challenges effectively is termed problem-solving.

Critical thinking is a self-guided, self-disciplined thinking process that attempts to reason at the highest level of quality in a fair-minded way. It is the intellectually disciplined process of actively and skillfully applying analyzing, synthesizing, and/or evaluating information gathered from or generated by, observation, experience, reflection, reasoning or communication as a guide to belief and action. Critical thinking is based on universal intellectual values that transcend subject matter divisions: clarity, accuracy, precision, consistency, relevance, sound evidence, good reasons, depth, breadth, and fairness. Perhaps the simplest definition is offered by Beyer (1995): "Critical thinking... means making reasoned judgments" (p. 8). Basically, Beyer sees critical thinking as using criteria to judge the quality of something, from cooking to the conclusion of a research paper. In essence, critical thinking is a disciplined manner of thought that a person uses to assess the validity of something (statements, news stories, arguments, research, etc.).

According to the American Psychological Association, problem-solving entails recognizing and understanding a problem as well as developing and putting in place certain courses of action for its resolution. It requires the use of observation and critical thinking, together with other systematic ways of doing things, to produce a plausible answer corresponding with one's objective if done properly. In other words, it is the process of looking for a solution to a difficult and complex issue. Problem-solving is the systematic process and effort of solving a problem. It includes the identification of a problem, analysis of the difficulty expansion of possible solution capacity, and optimal selection for implementation to tackle the particular challenge. In most instances, problem-solving utilizes critical and creative thinking and the application of basic cognitions to make precise resolutions. In other words, it is a critical skill in diverse fields and disciplines, such as situations that require an aspect to figure out barriers and prosper. People who have solved their problems are well-versed in their degree

of obstacles, advisability, and strategy. In summary, problem-solving skills involve identifying the problem, brainstorming and analyzing answers and implementing the most suitable solution.

1.2.2 Traditional Methods of Assessing Critical thinking and Problem-Solving skills

Evaluating students' critical thinking and problem-solving skills using traditional means has usually involved numerous evaluation instruments, focusing mainly on assignments that demonstrate these mental processes. The most popular assessments are essays and portfolios. They give individuals an opportunity to show how they can analyze data, choose well, make decisions, and handle difficult tasks.

1.2.2.1 Essays

Writing an essay is one way of determining a student's critical thinking and problem-solving skills. Essays have longer responses to express critical thinking and argumentation. Critical thinking is the objective analysis of facts to form a judgment, whereas problem-solving is the process from understanding the problem to evaluating the possible pathways. Essays are one of the ways that students get a chance to showcase these skills. Through essays, students can present well-reasoned arguments, assess evidence critically, and offer solutions to problems. Writing an essay to evaluate problem-solving and critical thinking abilities may require performing several tasks. Some of them may include analyzing a provided situation and assessing available information. The act of doing so gives evidence to the students' understanding of the subject matter and the way they can manipulate data to argue their points.

Finding out if your critical thinking power and problem-solving capacity are good is not easy, and it requires some detail. One method is described by Ennis (2011) , citing the depth of inquiry. This extends much

further than just condensing data; rather, it calls for verification by studying proofs, noticing presumptions, or regarding other standpoints. An example in which an essay assesses how well social networking site content control works would be if the essay looked at the material that users are exposed to, looked at the possible inaccuracies that could exist within the code used by programs, or evaluated the long-term consequences arising out of distinct methods utilized in censoring information when developing it. If teachers use such frameworks as Bloom's Taxonomy as outlined by Anderson and Krathwohl (2001) , for evaluating levels of analysis and argument, they may get an understanding of the students' critical thinking and problem-solving abilities.

1.2.2.2 Portfolios

Portfolios provide a way to measure critical thinking skills and problem-solving abilities without the drawbacks of traditional methods. Portfolios, according to Darling-Hammond (2010), are where a student may show his or her 'increase over time, capacity for self-reflection and capability to join knowledge and skills in varied fields' (p. 199). Portfolios offer a more dynamic way of measuring students than either standardized tests that remain the same or forced performances, which take place in various contexts. These portfolios track a student's progress and development over time, thereby showing an organized set of different kinds of his or her materials, according to Campbell (2015), that range from essays to projects, from presentations to reflections or even multimedia works. With this technique, students can develop into information analyzers, problem solvers, and reasoners of their own judgment.

It is important to know that there is more to portfolios than just showing improvement; they support development. Arteaga (2018) argues that this type of self-assessment is essential for learners sinceit helps them to explain their reasoning processes, recognize what they need to work on, and indicate their knowledge about themselves as aware

thinkers an essential ingredient for being critical thinkers. Dweck (2006) reiterates that , by attaining self-reflection, students can become more intentional and methodical, especially in handling challenges, thereby fostering a growth mindset as well as a long-term love for learning. Moreover, according to Brookfield (1995), portfolios are helpful in that they provide room for feedback from fellow students and facilitate group work, leading to an improved learning process. This also enables critical reflection through constructive dialogue and multiple viewpoints.

In conclusion, portfolios are an effective and flexible way of assessing analytical reasoning together with creative imagination skills that give a broader understanding of a student's capabilities than customary evaluations. By tracking how a student's performance has changed throughout time and encouraging thinking about thinking as well as teamwork, they help prepare young people for success in today's intricate and rapidly transforming environment.

1.2.2.3 Limitations of Traditional Methods

As older means of evaluation such as essays and portfolios are still used, there are challenges in determining fundamental abilities like thinking critically or solving complex problems through them. For instance, Popham (2001) , points out that essays mostly concern themselves with rote-learned materials or eloquence without engaging deeply in a real understanding of issues. Darling-Hammond et al. (2008) , further argue that the artificiality of pre-defined essay prompts can further limit the scope of critical thinking, failing to capture the nuances of real-world problem-solving. Wiggins and McTighe (2005) , emphasize the comparable issue in portfolios. They narrate that portfolios can be made up of 'best works,' which may conceal deviations in critical thinking skills and problem-solving talent at distinct times. According to Brookfield and Stevens (2003), both approaches have some difficulty scrutinizing the collaborative aspect of critical thinking and problem solving because they frequently fail

to consider the constant interchange of ideas in teams. According to Messick (1994), grading essays or portfolios subjectively may introduce biases and hence affect what certain students know, most specifically those from different backgrounds or learning styles. This implies that using standard techniques only offers an inadequate evaluation of their abilities in critical thinking or other cognitive competences necessary for life success in today's world, which demands these abilities.

1.2.2.4 Current state of Critical Thinking and Problem-Solving Assessment In Algeria

Assessing critical reflection and problem-solving abilities in Algeria is complicated, with a complex situation revealed by the Ministry of National Education in 2018. Although there are programs and policies that encourage these abilities at the national level (Ministry of National Education of Algeria, 2018), Baghoussi's work carried out in 2021 points out an existing rift between educational theory and the practical application of this theory. According to Bacha and Guerroui (2013), traditional standardized tests usually dominate assessment strategies, whereby they majorly appraise memorization and fail to consider major elements such as critical analysis and problem-solving.

But now things are beginning to change. According to Benazzouz et al. (2020), there has been increased attention paid towards integrating technology-aided assessment tools such as adaptive testing that modify the level of difficulty and format of questions based on learners' replies. This individualized approach has great potential, as identified by Chang et al. (2023), because it can present more detailed information on learners' critical thinking skills than traditional tests, which do not change depending on who is taking them.

Despite these promising developments, as highlighted by Belkacem and Chettih (2018) , challenges remain. Implementing these new tools

requires careful consideration of the Algerian context. Cultural factors influencing student learning styles and teacher-student interactions need to be accounted for. Additionally, as emphasized by Ferguson (2021) , ensuring adequate teacher training in utilizing these innovative assessment methods is crucial for successful implementation.

There are still some challenges in spite of all these exciting advances. Therefore, as articulated by Belkacem and Chettih (2018), when using these new technologies in education, one should be aware of Algerian society. Such things as the role played by culture in shaping how students learn or how they relate to their teachers must also be considered. Moreover, according to a recent study conducted by Ferguson (2021), training teachers well so that they can use these new forms of evaluation is very important.

Another important aspect is the ethics that surround AI algorithms in assessment. Wachter et al. (2020) argue that it is important to ensure fairness and reduce the chances of bias. Being included in the algorithms so as to prevent long-term disparities in society.

To sum up, the assessment of critical thinking in Algeria has been continually evolving. Higher-technology-aided tools and alternative approaches are increasingly becoming attractive, even though customary methods are still prevalent. However, it is important that these new developments are fully understood when viewed against a backdrop of teacher competence building, conscious reflection on ethics and the implementation of cultural conformity measures. With the continuing advancement in research and clever use of tools, Algeria should expect enhanced robustness and efficiency in critically assessing critical thinking skills.

1.2.2.5 Artificial Intelligence Tools as Alternative methods

In history, opposition has occurred to traditional portfolios and essays as established evaluative tools for thinking critically and problem solving due to the rise of AI, which offers riveting options. According to Chen and Ng (2019), AI-infused applications, especially deep learning-based automatic essay scoring, have the potential to sift through a huge student corpus, uncovering subtle patterns and relations beyond human assessment. Such an example is analyzing the complexity of argumentation structure as reflected through the evidence presented along with the non-sequiturs involved. On top of this, Shute and Lane (2019) emphasized that, for the same reason, educators have noticed AI simulations engage learners in emergent situations where they are required to make complex decisions and negotiate their way around intricate challenges better than when static essays are used. Concurrently Wang and Liu (2023, p. 210) assert that :

> *"Artificial intelligence (AI) tools are revolutionizing the assessment of critical thinking and problem-solving skills in education. These tools can analyze complex datasets to identify patterns and trends in students' thinking processes, providing educators with valuable insights into their cognitive abilities. By leveraging AI, educators can design more effective learning experiences that target students' individual needs and promote the development of these essential skills"*

However, Ng (2018) also states that it is important to acknowledge the limitations of AI in recognizing biases that could occur due to a lack of empathy when interpreting data. In order to understand what critical thinking and problem solving entail, people have to use their thinking and problem-solving skills even though they use these tools together with AI, which they cannot replace.

Moving forward from this basis, Strange and Cardamone (2023)

anticipate that, in addition to analyzing portfolios for content, AI tools will also scrutinize the sublimated reasoning and argumentation patterns. Similarly, Saeed and DeSteno (2023) , recommend that AI simulations should introduce students to hard ethical questions and see how they solve them on the spot to evaluate their capacity for critical thinking in action. To ensure equality and openness in evaluations, it is important that problems connected with bias and algorithm "black-boxing" malfunctions are addressed. In the end, the secret is in harnessing AI skills to enhance human judgment, combining the advantages of old methods with new AI potential for an all-around review of critical thinking and problem- solving abilities.

1.3 The Potential of Artificial Intelligence in Assessing Critical Thinking and Problem-Solving Skills

The Potential of AI in Assessing Critical Thinking and Problem-Solving Skills AI holds immense potential for revolutionizing the assessment of critical thinking and problem-solving skills, traditionally challenging areas due to their multifaceted nature.

1.3.1 Emergence of AI-Based Assessment

A transition to a new era of appraised capability emerged with the advent of intelligent systems that determine how well people can think through problems. Rather than being evaluated using portfolios or essays like they used to be, critical thinking and problem-solving skills can now be easily examined by just interacting with AI platforms, whose offer changes constantly. Both excitement and fear herald the time when AI-based evaluation of critical and problem-solving capacities is emerging. Adopters see a model with dynamism and sophistication that matchesa given learner while yielding detailed intelligence about their cognitive sequences as well as delivering customized assessments. Liu et al. (2023) , suggested that AI algorithms can be used to evaluate the quality of arguments as well as gauge creative problem-solving approaches within

complicated answers. Ericsson et al. (1993) , have pointed out a sharp distinction between the latter and former techniques which are usually viewed as linear-based because they entail pure repetition.as pointed out in Zhang and Li (2023, p. 210):

> *"In recent years, there has been a significant emergence of artificial intelligence (AI) in the field of education, particularly in the assessment of critical thinking and problem-solving skills. AI-based assessment tools are revolutionizing traditional methods by offering more personalized, adaptive, and efficient ways to evaluate students' cognitive abilities. These tools use advanced algorithms to analyze vast amounts of data, including student responses, behavior patterns, and learning outcomes, to provide educators with deep insights into students' thinking processes. By leveraging AI, educators can design assessments that are more closely aligned with real-world challenges, offering students a more engaging and authentic learning experience. The emergence of AI-based assessment represents a fundamental shift in how we evaluate and promote critical thinking and problem-solving skills in education, with the potential to significantly enhance teaching and learning outcomes"*

Nonetheless, worries remain. Have Chen and Cheng (2019) , posed this question? Is it possible for the AI to really apprehend the subtle shades of humanity in thinking independently beyond all limits—being rational or critically reflective (or both), Moss and Attuquayefio (2023) , Also mentioned in their findings is that, according to Moss and Attuquayefio (2023), there may be inherent biases within this training set; such biases may eventually result in unfair judgments, thus maintaining existing disparities. Besides, Cambridge University Press and Assessment (2023) warns that critical thinking skills could be impaired if students overrely on AI. This could happen when they get used to assigning intricate analysis to computers.

Hence, one may reasonably accept the use of AI-aided appraisals. Even when tapping its capabilities for unique remarks as well as broad-based data examination, algorithm creation can only succeed if everyone

who partakes in it is open and welcomes others aboard. Still, Peregrine Global Services (2023) has underscored that the relevance of man's competence to interpret AI results would never be overemphasized as it promotes justness in its operations, among other things, like enhancing firm reflective thoughts and literacy in technology. Only through a balanced method can we harness the power of AI to elevate assessment without diminishing the irreplaceable human capacity for critical ideas.

1.3.2 Artificial Intelligence-based Assessment and Its Potential Benefits

AI-based assessment of critical thinking and problem-solving skills involves using AI technologies to evaluate an individual's ability to analyze information, think critically, and solve complex problems. This approach has several potential benefits in educational, professional and other settings, including objectivity, scalability and personalized feedback. as noted by Chen et al. (2022, p. 76).

> *"The use of AI tools for assessing critical thinking and problem-solving skills offers numerous advantages, including increased efficiency, objectivity, and scalability. These tools can process large amounts of data quickly and provide detailed, personalized feedback to students. Moreover, AI-based assessments can adapt to students' abilities, offering challenges that are appropriate to their skill level and promoting continuous improvement"*

1.3.2. 1 Objectivity

When it comes to critical thinking and problem-solving skills, AI might be unbiased. The use of AI may be done to detect patterns in data and analyze them in terms of predefined criteria or guidelines so that their strengths and weaknesses can be identified. The delivery of fair and dependable assessments should not be influenced by individual views and biases anymore; this is because judgments are not made based on what someone feels or thinks but rather according to what the software program says.

For example, according to Porro et al. (2020), AI-fueled essay graders fed with vast collections of good-quality essays accurately assess independence in argument and writing aptitude equitably, evading unfairness and being more reliable than men when it comes to such issues. Similarly, Bakhsha et al. (2023) , showed that AI techniques can assess problem- solving strategies applied during simulating any programming tasks; here such aspects as: effectiveness; originality in solving tasks or compliance with propriety may be objectively assessed while complaints about some individuals' emotions and interests are minimized.

Nevertheless, it is worth considering that AI objectivity largely depends on the excellence of the information it is trained with and its neutrality. Though if the data for learning is not neutral, biases may be introduced, hence the need for consistent supervision of AI evaluation platforms in order to safeguard legal compliance and correctness.

1.3..2.2 Scalability

According to Ferguson (2016), one of the key benefits of using AI to evaluate critical thinking and problem-solving abilities is its ability to scale up. This is in contrast with the argument presented by Siemens and Baker (2012) that traditional approaches are ineffective because they require personal interaction with a single person at a time or small group assessments; however, AI-driven evaluation tests can be simultaneously presented to many people, therefore being more effective and cheaper. This gives more people the ability to take quality tests, especially when they have few resources or are working on many education projects.

For example, in a nation where there are millions of students so many pupils across all parts of the country are taking AI-based assessments of critical thinking. In Ferguson's (2016) , illustration individuals' areas of weakness and strength and even wider education patterns can be unveiled. This implies that the testing process can help leaders determine how they should update their current educational plans in relation to what teachers must be taught or where money should go for providing good quality training at any level. Similarly, AI algorithms could be employed for an automatic evaluation of problem-solving capabilities on online programming platforms or job recruitment procedures, thus removing physical and cost barriers and getting rid of physical and location issues in favor of hiring qualified personnel very quickly.

AI scalability has its potential challenges, as noted by Casanave and Evans (2022) , it is vital to be aware of them. To be efficient in large-scale assessments, it is necessary to have powerful AI systems that are durable and adaptable for different learning styles and cultures, as well as possible technical restrictions. Moreover, dealing with huge amounts of personal data, concerns regarding data privacy and its protection become central. Careful consideration for ethics and technicalities is cruciallyessential for the implementation of AI-enabled assessments on a large scale due to the responses they will bring about.

1.3.2.1 Personalized Feedback

A very important thing about AI as highlighted by Porro and Murgia (2020) , is its the capability to provide tailored feedback in our critical thinking and problem-solving endeavors. Unlike conventional standardized tests, AI can examine single students' scores and provide them with personal ideas as well as suggestions that are founded on their strong areas, weak areas and preferred method of learning. This personalized approach holds

the power to enhance student engagement and accelerate learning in several ways:

- **Targeted Interventions:** Bakhsha et al. (2023) , believe that AI-powered assessments can tell which students need extra assistance or encouragement. This way, they are able to improve their interventions by considering those particular needs in their teaching methods. Targeted remarks are used instead of general ones so that learners feel less demotivated, thus not getting worn out without speeding up the learning process.

- **Adaptive learning Pathways:** By continuously analyzing performance data, Ferguson (2016) , outlines methods AI can use an individual's data that relates to their performance to take students through particular paths for learning that best suit them. He also mentions the fact that the dynamic nature of this kind of personalized approach makes sure that stagnation is avoided while at the same time pushing students to maximize their potential by keeping them on their toes.

- **Self-directed Learning:** Siemens and Baker (2012) assert that students can take control of their learning journey through individualized comments from machines. This will enable the student to understand the areas in which they are strong and weak, thereby guiding their choices concerning their targets in learning as well as how best to pursue them, leading thereby to independence and self-motivation.

1.3.3 Different Types of AI Tools Used in Assessment

Leveraging some technologies for analyzing and evaluating people's critical thinking abilities as well as problem-solving skills should consist of evaluating critical thinking and problem-solving skills by means of AI tools. Moreover, these devices offer individualized advice

and recommendations aimed at improving one's critical thinking ability or problem-solving skills. Below are some examples of AI tools that can be used for these purposes.

1.3.3.1 Adaptive Testing

The utilization of AI allows AI-based tools to modify queries' format and difficulty depending on students' input. Such adaptation paves the way for personalized evaluation systems, which can be compared to how individuals solve problems in the real world. In Chang et al. (2023) , pioneering research project, they developed an individualized evaluation methodology wherein dynamic testing is used in research studies rather than static methods employed traditionally. At certain stages of inquiry, an individual might be posed with probing queries, which would then elicit feedback upon which he or she would be asked even more questions so as to delve further into examining his or her arguments probably by disputing them through contradicting proof or requiring some alternative procedures by which the study could be conducted. Contrary to conventional tests that are rigid in nature and rely heavily on memorizing, this open method captures the evolving phenomenon of opponent thoughts during debates.

The work by Wu et al. (2022) , was presented, where they underpinned that feedback and navigation through the adaptation of tests have the potential to develop nuanced feedback for students, which encourages them while at the same time aidingin dealing with uncertain times. Through this way of doing things, it is argued that there is the possibility of obtaining accurate problem-solving capabilities in people, regardless of how complex they may be.On the other hand, Ferguson (2009) questions whether AI algorithms are trustworthy, and adaptive testing can sometimes be biased. Before they are fully accepted, according to what Ferguson (2009) has emphasized, it isimportant to think carefully about them and make sure they are ethical. Nonetheless, the potential of adaptive testing

for the revolution of assessments and fostering critical minds, making it an interesting area for further research.

1.3.3. Natural Language Processing

Zuo et al. (2023) explain that Natural Language Processing (henceforth NLP) possesses peculiar abilities in evaluating critical thinking as well as problem-solving abilities, especially based on written response analysis and open-ended task analysis. AI models, through the use of different NLP techniques, for instance, sentiment analysis, discourse analysis, and semantic reasoning, can delve deeper into the structure arguments, and log that individuals use as they explain through writing. Zhang (2022) , continues by arguing that NLP may assist in determining whether one person is giving varied perspectives, looking at counterarguments, or drawing reasonable conclusions from facts that show insights into his or her critical reasoning skills. This strategy is potentially better than traditional test types in terms of overcoming the constraints attached to multiple-choice evaluations because they rarely reflect the various angles from which thinkers address their problems. According to Wachter et al. (2020), it is still difficult to accurately interpret a sophisticated language and to control bias inside natural language processing algorithms, so developers should be cautious here while keeping in mind that it is essential for human beings to supervise the whole development process. Nevertheless, natural language processing gives us a chance to see how smart assessment systems can be some time later, challenging our knowledge about such significant cognitive abilities.

1.3.3.2 AI Tools with Potential Applications in Critical Thinking and Problem Solving Assessment.

Besides NLP and adaptive testing, there are other AI tools with potential applications in critical thinking and problem-solving assessment. These might include:

- Educational Games: Games, including AI, can give gamers challenges that make them solve problems, appraise evidence, and come up with strategies enabling them to acquire data about their critical thinking abilities.
- Virtual Reality Simulations: The virtual reality simulations have made people feel completely absorbed in difficult situations. Thus, the simulations make people think more openly and respond more cautiously.
- Machine Learning: In Pattern Recognition: By finding these patterns, AI can help educators identify students who exhibit weak critical thinking skills and might require intervention. Past assessment scores, participation in online discussion amongst students, or clickstream data on educational resources are some examples of such data. All these descriptions show why it is important for ML algorithms to scrutinize large amounts of student performance data for patterns associated with profound critical thinking skills.
- AI-powered Tutors and Chatbots: These contribute to a conversation between students that involves speaking on different issues and making students say why they say so. Detailed scrutiny of a learner's responsestogether with the processes they undergo to tackle problems, informs the response and maintenance of effective strategies. For example : **Cogstate**: In clinical trials academic research, and healthcare settings, the computerized cognitive assessments by Cogstate measure memory attention and executive function. The second instance is **CogniFit**: Using AI algorithms to analyze user performance and provide feedback tailored to individual needs, CogniFit offers cognitive assessment alongside training tools. The platform offers different cognitive skills assessments, for example memory, attention span, or visual processing.

However, it is important to take into account the potential difficulties implicated in tailored feedback from AI. Casanave and Evans (2022) , warn that errors in the data or algorithms may result in misinterpretation as well as unjust support, and thus underscore the value of ethical deliberations and careful application. Moreover, the excessive usage of AI feedback devoid of any human contact may obstruct the building up of essential self-appraisal and standalone teaching abilities, calling for fair treatment that combines both AI ideas and human knowledge.

Many difficulties are still present there, but AI, the ability to provide personalized feedback, bears extraordinary promise in the sphere of fortunes for changing the method for how we assess and promote the growth of critical thinking and problem-solving skills. Through offering specific recommendations and enhancing autonomous learning, AI can make people competent students and solve problems at any time.

1.4 Challenges of Utilizing AI Tools for Assessment

The use of solutions driven by AI in the evaluation of thinking critically and solving problems has without doubt resulted in significant changes in education as well as professional evaluation, although not without its own challenges. In this regard, it is pertinent to delve into four key challenges that could reveal how AI might not be applicable for evaluating fundamental cognitive capabilities.

1.4.1. Surface-level Analysis and Nuanced Understanding Lacking

AI has the potential to revolutionize education; one of its major problems is evaluating critical thinking and problem-solving skills. As notably pointed out by Liu and Linn (2020), the major problem is that it tends to do shallow analysis, mostly concentrating on key phrases and patterns in answers as opposed to understanding the intricate nature

of thought itself. According to the study by Bhardwaj et al. (2023), this can result in misinterpretations, missing major components such as the rationale for a decision or the capability for detecting implicit assumptions and as also noted by Eflita et al. (2023), AI tools have especially tough times grasping the nuanced meaning in things when it comes to ambiguous interrogative forms or mixed cultural standpoints. Their capacity to assess creativity and adaptability, typified by strong critical thinking and problem-solving skills, can be hampered by this restriction.

Therefore, trusting AI exclusively for these appraisals is foolish. What is needed in this case is the middle ground: AI should come to help but it cannot work on its own without humans. Bhardwaj et al. (2023) published a recent study that elucidated how teachers can leverage AI to make sense of huge data sets and, at the same time, provide immediate feedback while strictly falling short of exceeding one's personal judgment. By focusing on the generation of all-encompassing instructional AI material that engages diverse perspectives and equips students as individual critical thinkers possessing the skills to use technology judiciously, teachers have the potential to harness AI's strengths in assessment while minimizing its limitations.

1.4.2 Creativity Deficit

According to Zhang et al. (2023), the creative aspect of measuring critical thinking and problem-solving skills using AI tools is one of the main issues that have been identified. Benevolent AI Report (2020) also notes that it is very hard for many AI models now to use divergent thinking since they find it much more difficult for their systems to come up with new ways of solving problems. As a result, Azevedo et al. (2021) warn that through the use of AI on tests, perhaps it may tend to have a bias towards thinking in a single direction, trying to come up with an accurate response according to the set guidelines, thus possibly ignoring creative but unconventional methods of solving problems adopted by some people

and raising doubts as to whether or not critical thinking can be properly gauged in such instances.

Liu et al. (2022) suggested that to deal with such a challenge, they should consider integrating human experience and open-ended problem-solving tasks into the AI-assisted assessments. Through the use of both human judgment, which will go a long way in determining how original or creative an answer has been, and the efficiency of AI when dealing with extensive amounts of data, it would be possible to make an all-rounded overview of critical thinking and problem solving. Moreover, Sternberg and Grigorenko (2000) argue that test designs that prompt inquiry or trial- and-error processes are more informative regarding the cognitive processes underlying creative problem solving than mere item-choice types of tests.

In conclusion, although AI provides useful methods for evaluation, the contingencies of creativity require careful attention when considering its utility. In such cases, it is necessary to use both human construction and non-deterministic AI algorithms together if we want to make use of its full potential within grading processes without distorting this aspect with regard to some of the critical and issue-solving abilities that are connected to it.

1.4.3 Judgment Blindspot

According to Selbst et al. (2023), AI can present exciting opportunities for the improvement of educational assessment, but its subjectivity to judgmental blind spots could pose substantial risks in evaluating critical thinking and problem-solving abilities. Zhao et al. (2023) ,pointed out that such blind spots are due to incomplete data for training AI models in addition to maintaining already existing prejudices, hence causing unjust or wrong evaluations. For example, Azevedo et al. (2021) , note a situation where an AI model that has been taught to favor convergent thinking in its assessment may fail

to correctly assess maladaptive people when they present alternative but equally useful answers. This may lower their actual potential and discriminate against different learners whose goal is to fight against it.

Furthermore, according to Liu et al. (2022), the complexity of human thinking in certain subjective elements (e.g., assessing how good or bad an argument is experienced; furthermore, creative strategies used when resolving problems) makes it difficult for these algorithms. The end effect could be judgments based on pre-set standards rather than reasoning based upon unknown quantities, which may be more difficult to understand, hence neglecting certain valuable components in the thought processes of individuals.

Dealing with these judgment blind spots requires many ways. The first point of view in Selbst et al. (2023) suggests that making a provision for varied as well as representative data while training AI helps reduce bias and ensure fair judgments. Secondly, Liu et al. (2022) argue that when human expertise gets included in evaluation, it enables people to explore some terrains that could otherwise be impenetrable to AI for example, the originality of ideas and context awareness in answering questions. In conclusion, the possibility that there could exist inclinations within AI models towards transparency and understandability which subsequently help in fixing probable prejudices by building confidence and enhancing justice in evaluations that depend on AI , is a very real one.

1.4.4 Metacognition Gap

In educational assessment, AI tools present exciting possibilities. A significant barrier that challenges critical thinking and problem-solving skills, such as the “metacognition gap,” was highlighted by Azevedo et al. In his definition of metacognition, McMillan (2017) , states that understanding and control of one’s thinking are what make

it metacognitive. Moreover, because of individuals' ability to monitor their understanding, evaluate their strategies, and adjust to difficulties metacognition plays an important role in these kinds of skills. However, Liu et al. (2022) observe that contemporary AI models face a great deal of difficulty as regards the immediate grasp understanding, and appraisal of this complex form of self-consciousness. Thus, Azevedo et al. (2021) argue that in assessing AI the end result might sometimes be given more importance, like achieving the "right" answer, than the mode of reasoning leading to it, thus leaving out people who have good metacognitive abilities, although with unconventional methods. This raises concerns regarding the underestimation of real critical thinking capabilities and the inadequate provision of valuable insights into students' learning paths. Concerning the bridging of this gap, Liu and peers suggest that this should be done through enhancing artificial intelligence models that will not only analyze 'what' but also 'how' someone thinks, including constructs like self-reflection triggers or open-ended tasks aimed at promoting metacognition utilization. Until then, AI assessments will truly capture diverse critical thinking and problem-solving aspects by facilitating deeper learning and personalized feedback for everyone.

1.5 Opportunities In Utilizing AI Tools for Assessment

There are numerous opportunities when AI tools are incorporated into education to assess students' performance, which goes beyond conventional ones. Still, a lot can be done to evaluate learning and improve it while at the same time considering other non-traditional methods for evaluation.

1.5.1 Adaptive and Engaging Assessments

Although there are apprehensions with respect to recognizing AI restrictions in evaluating critical thinking and problem-solving abilities there are significant prospects for optimistic assessments of being adjusted

and stimulating that can assist in coping with these problems. Utilize the strengths of the AI models to offer more direct and individualized learning experiences as well as promote more thorough skill development.

- **Adaptivity:** According to Azevedo et al. (2021), as opposed to the conventional static version, the AI-controlled adaptive version fits a level and style of question formation according to a student's proficiency right there in time. Resultantly, a review of works by Liu et al. (2022) , recommends that it has to be this way in order to stave off feelings of annoyance, promote competitive curiosity, and make sure that there is a true reflection of an individual's strengths. Imagine if a trainee program could identify when a student was having problems. And then provide more practice or other methods of doing that. This will lead to more imagination engagement and deeper understanding through thinking critically.
- **Engagement :** Frequent assessments, however, are unable to catch deeper forms of cognition, notwithstanding their boring nature. Nevertheless, according to Clark et al. (2020), AI-driven captivating assessments can incorporate gamification elements, including simulations and interactive scenarios, with the aim of arousing interest as well as motivating critical thinking. The research by Azevedo and Alejandre (2019) , suggests that such characteristics are not only encouraging to achieve motivation but also richer in collecting student cognitive data, thus offering deep insights beyond simple answer choices. Picture a student joining a simulated historical debate, engaging in critical thinking as he formulates persuasive claims and makes his way through complicated situations.

AI assessments fueled by adaptability as well as engagement produce a dynamic and personalized learning session that transcends conventional ways of assessment, thus paving the way towards critical thinking ability or problem-solving skills because they are designed

on an individually specific trail or path. Furthermore, these assessments track personal learning paths, which help teachers know more about how students are faring, thus enabling them to modify their instructions and offer necessary help towards progression.

1.5.2 Deeper Understanding and Divergent Thinking

AI limitations in evaluating critical thinking and problem solving may cause concerns. However, these areas can be interesting as well. Thanks to the capability of vast data analysis by AI as well as deeper understanding, which can foster divergent thought because of AI's ability to look into large data files and stimulate innovative ideas' generation poeple are able to open up skill evaluation to different heights.

- **Deeper Understanding:** Many times, surface-level knowledge and the right answers are considered in the usual kinds of appraisals. Nonetheless, in a study by Liu et al. (2022), it was suggested that AI-based evaluations may go into further depth by looking at how learners respond, reason out their responses, and how they come to learn. In a recent study, Wang et al. (2021) outlined a new kind of AI. This AI is able to examine not only the answer given to a difficult question but also how the answer was arrived at in a more sophisticated manner. In doing so, it would also make possible more meaningful feedback that is based on specific user needs as well as stereotypes typical of humans rather than machines.
- **Divergent Thinking:** Critical thinking and problem-solving require open-minded thinking. Zhang et al. (2023) ,argue that beyond just identifying "right" answers, artificial intelligence (AI) should explore unexplored paths such as creativity, originality, and unconventional solving strategies. According to Azevedo et al. (2021), good assessments should make students think in various ways while theyuse open-ended queries, simulations, or situations that require

investigation and trials. Divergent thinking is developed by this process, which is marked by the identification of people with innovative ideas, unlike the usual analytical tests.

Nevertheless, Selbst et al. (2023) warn that in order for these opportunities to be exploited, one has to deal with problems like ensuring that there is diverse training data and incorporating human expertise in evaluating things that are abstract, such as artistic talent. By recognizing these constraints and proactively seeking answers, it can unlock the potential of artificial intelligence to develop evaluations that, instead of only examining critical thought together with analytical abilities, also assist in developing them, thus leading us into a situation where students prosper at creativity as well as thorough comprehension.

1.5.3 Individualized Feedback and Improvement

AI-powered assessments offer much more than just testing people's abilities; they also provide useful information and suggestions for advancing in logical reasoning and facing difficulties. By using these tools, anyone can get tailor-made learning experiences that not only evaluate their progress but also give them a chance to develop their minds.

- **Individualized Feedback:** Frequently, traditional assessments give general feedback, usually just telling students whether their answer is "correct" or "incorrect." Yet, Liu et al. (2022) , assert that individual answers can be analyzed in depth by artificial intelligence in order to identify particular strong points and weak points, as well as possible areas where progress may best be made. Wang et al. (2021) , have seen an AI system that not only gives feedback about the selected answer but also feedback on how it was selected, identifies mistakes made during reasoning, and recommends customized educational materials. As a learner receives such specific

responses, he or she acquires the ability to discover the reason for their learning deficiency and can therefore set the pace for self-improvement.

- **Continuous Improvement:** AI evaluations can extend beyond unchanging photos while extending an uninterrupted response with respect to diverse duties and hurdles. As Azevedo et al. (2021) , point out, AI may observe trends in the improvement of skills and customize future learning experiences via response patterns and learning path analysis. This type of responsive mechanism ensures that the learners find a chance to put into practice different contexts to which they can apply their skills. They do it better each time. In doing so, critical thinking and problem-solving abilities are improved regularly.

According to Selbst et al. (2023), opening up the complete potential with personalized feedback necessitates addressing considerations of ethics such as data confidentiality while ensuring that this feedback aligns itself with the expertness of human beings. AI can be leveraged to create individualized learning experiences on vital thinking and problem-solving abilities, as well as continuously grow grounds by cultivating responsible practices in developing AI models supplemented by human oversight too.

1.6 Conclusion

The assessment of critical thinking and problem-solving skills has evolved from traditional methods to incorporating AI tools. While scalability, objectivity, and individualized feedback are advantages of AI technologies, they also come with drawbacks, such as shallo analysis, a lack of inventiveness, blind spots in judgment, and a metacognition gap. A higher burstiness pattern will have less perplexity. The areas in which a machine can grow in understanding include deeper comprehension, flexible evaluation-like responses, and divergent thinking to handle biases that influence it. Moreover, a machine can learn to assess itself accurately by considering its metacognitive dissonance without any external help or human intervention. However, part of this requires ensuring that we strike a balance between deep learning algorithms on the one hand and big data processors that are human-controlled and operated on the other, both of which, when combined, will certainly enable us to realize impartial, clear and efficient evaluations in the AI arena. It is very promising to incorporate artificial intelligence strategies when it comes to enhancing the evaluation of critical thinking and problem-solving skills in the fast-changing field of education. The best path to following through on this while ensuring that human rights are respected and upheld is by taking careful and moral steps.

RESEARCH METHODOLOGY DATA ANALYSIS AND INTERPRETATION

2.1 Introduction

The employment of AI devices in education can go a long way in streamlining how critical thinking skills and socializing abilities are assessed, specifically with EFL learners. Through the study described in this chapter, a case study is made at the University of Tlemcen to develop why AI tools may be considered convenient and, at the same time a hallmark for further scope for consideration in the assessment of critical thinking and problem-solving skills.

This chapter covered the practical portion of the dissertation at hand. It is divided into two sections. The first section provides a detailed overview of the research methods used to complete this piece of work. It demonstrates the research approach and tools. It also provides information about the intended audience. The second part focuses on the examination and discussion of data acquired from three separate tools.

2.2 Description Of The Study Setting

The research was developed at Abou Bakr Belkaid University which is located in Tlemcen, Algeria. The Department of English at the College was formed in 1989, and it was the largest department with over 60 professors and more than a thousand students. This was its main site for practice. The language teaching department turned out to be very famous and created favorable conditions for scientific investigations in language learning and testing. The Abou Bakr Belkaid University Department of English was the perfect platform for this study due to its dedication to academic standards and its concern for modern approaches to teaching in the field of language education.

2.3 Research Design

The research focuses on investigating the challenges and opportunities of using AI techniques in evaluating students' critical thinking and problem-solving proficiency among 3rd-year EFL students majoring in English at Tlemcen University in Algeria. In a sense this case study methodology, as laid out by Yin (2018), was apt for such an exploration as it provided an in-depth analysis of the specific group within a confined context. Through the case study method, it was possible to investigate in depth the pros and cons of the use of AI resources with students in a practical environment without leaving out the challenges and opportunities for both teaching methods and learning. Participants in the study were 3rd-year EFL students of the Department of English. Such students were selected on the principle that their base should be firm in English language learning and that they fortunately used technology in language education.

The study combined both qualitative and quantitative data collection techniques with a mixed-methods approach in order to investigate the challenges and opportunities of adopting different AI tools that are intended to assess critical thinking and problem-solving competences. Therefore, this method was the best one because it had its own benefits. Creswell and Plano Clark (2018) argue, however, that the combined methods approach provides a more comprehensive understanding than the single methods. It involved an exhaustive knowledge base with the assistance of participants’s viewpoints and experiences through the use of interviews and questionnaires. Moreover, Greene (2007), in his argument, said observations could provide us with information about current assessment methodologies. It helped a lot in establishing what was lacking in AI

assessment tools and were the functions educators need most, while at the same time discovering aspects of critical thinking and problem-solving that were very hard to rate with the previous methods. According to Charmaz and Glaser (2017) The employment of AI devices in education can go a long way in streamlining how critical thinking skills and socializing abilities are assessed, specifically with EFL learners. Through the study described in this chapter, a case study is made at the University of Tlemcen to develop why AI tools may be considered convenient and, at the same time, a hallmark for further scope for consideration in the assessment of critical thinking and problem-solving skills.

2.4 Sample Design

The study used a non-probability sampling method called convenience sampling. This choice was made because it was simple and easy during the research. Convenience sampling lets us choose individuals who may be available and willing to take part in our study. Besides, convenience sampling is ideal for exploratory studies, as was the case here. Instead of generalizing findings to a larger population, this research concentrated on insights and understanding the phenomena under investigation. Through convenience sampling, a variety of students were quickly gathered by the researcher.

2.4.1 Student's Profile

334 third-year EFL students were sampled from the University of Tlemcen for this study. Being in their third year of their programme and studying EFL were some of the criteria used to select participants. The sample had students of different backgrounds who were at different proficiency levels in English. The researchers looked into the age, gender and previous achievement of the learners, as this would give a general picture of the learners selected for this research work.

2.4.2 Teacher's Profile

Apart from the students, there were eight teachers involved in this research from the Department of English at the University of Tlemcen. The criteria for selecting these instructors were their experience ranks and the skills they possessed. All the instructors participated in the teaching of 3rd year EFL students and were familiar with educational technology at the time of research. The teachers' profiles included their years of teaching experience, educational qualifications, and familiarity with AI tools for educational purposes. The insights of these teachers were very important as we consider how AI can best be used in evaluating critical thinking and problem-solving skills while at the same time fighting against the forcesthat would limit its development.

2.5 Research Instruments

In accordance with the principle of triangulation, this study basically uses multiple techniques to get extensive information. Denzin (1970) defined triangulation, as the application of different data collection methods for purposes of increasing trustworthiness and validity of research findings. With respect to this particular project, an approach will involve administration questionnaires from students, interviewing educators and looking at how events unfold within school premises.

- **Students' Questionnaire :** A large sample of students took part in surveys in order to collect quantitative information about their views on the AI tools for evaluation. This helped make the findings applicable to more people.
- **Teachers' interviews :** A structured interview explored their views on the importance of critical thinking and problem-solving skills for students' future success, as well as their current methods

of assessing these skills in EFL classes. They were also asked about their familiarity with and perceptions of AI tools for this assessment including potential benefits, challenges, and drawbacks.

- **Observations :** Classroom observations were conducted to understand the current teaching and learning process without the use of AI tools for assessment.

2.6 Data Analysis

Following data collection, various results were available for analysis and measurement to answer the research questions and verify the hypotheses. These findings were organized into three parts based on the research instruments: student questionnaires, teacher interviews and observations.

2.6.1 Student's Questionnaire Analysis

In the study conducted, a questionnaire was prepared so that it was given to 334 third-year students of English Foreign Language (EFL) at the University of Tlemcen. Students being a major percentage of the population under survey, their views on AI tools being applied for constructing critical thinking and reasoning skills are very important. The questionnaire was prepared in a mixed-type manner, which means both qualitative and quantitative questions are used to gather all-rounded statistics. However, it provided clarification and simplification of very complex and difficult material.

Wray and Bloomer (2006, p. 146–150) argue that a questionnaire is a very useful tool in research because of its ease of design, analysis, and statistical applicability. Such surveys also give respondents enough time to offer them in-depth answers, allowing them to be independent and take part in the process of making their decisions.

The survey consisted of 15 questions, which were formed into rubrics to make completely different ideas clearer. Each rubric concentrated on an individual dimension associated with the research; thus, the exploration of the topic's implications was sufficient. (See Appendix A.).

❖ ***Rubric 01: Participant Information***

The following section of the survey (questions 1–2) was used to collect demographic data and had inquiries on gender and age group that would help the researcher make sense to the study participants.

Question 01: Could you please specify your gender?

This question that sought to obtain the respondent's gender identity the options intend to use the most common terms that are linked to gender.

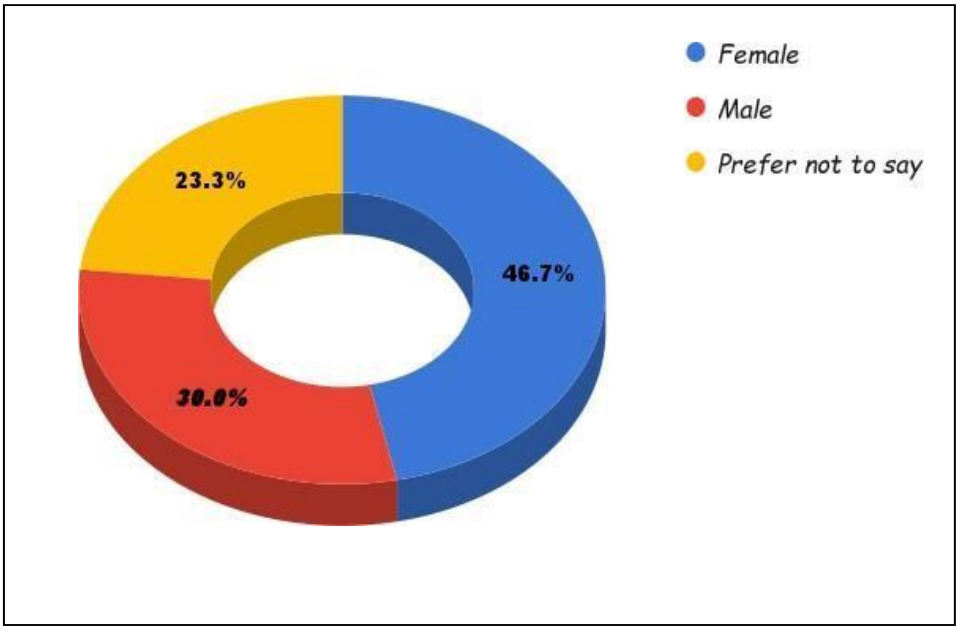

Figure 2.1: Gender Distribution of Respondents

The pie chart shows that most of the respondents identified themselves as female (46.7%). Following this, 30% of the respondents were men, while 23.3% preferred not to say anything about themselves.

Question 02 : Which age group do you belong to?

The question aimed to categorize respondents by their age group by offering two broad choices.

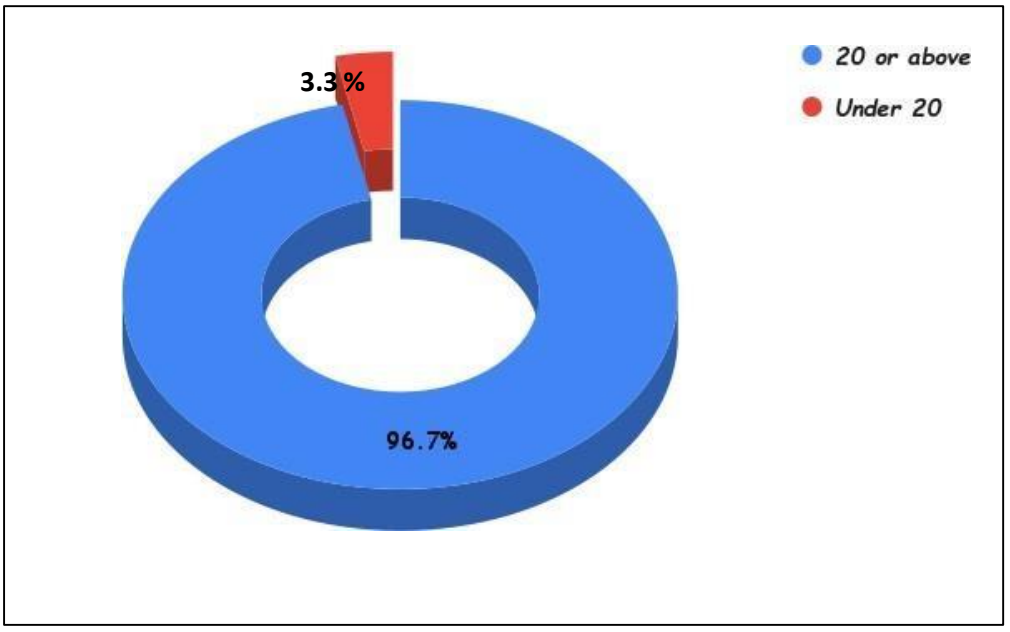

Figure 2.2 : Age Distribution of Students

The students' age distribution was described by the accompanying pie chart and showed that most 96.7% were already over the age of 20 while people between zero and nineteen accounted for only 3.3% of them.

- ***Rubric 02 : Perception of Critical Thinking and Problem-Solving Skills***

The reason for creating the second section of the questionnaire (questions 3–4) was to gauge participants' ideas on what they think about critical and problem-solving skills. It focused on soliciting their opinions regarding these skills' significance and how good they are at them.

Table 2.1 : Perceived Importance of Critical Thinking and Problem-Solving Skills.

Rating	Percentage
Extremely Important	73.3%
Moderately Important	13.3%
Neutral/Mildly Important	13.3%
Somewhat Important	0%
Not Important	0%

The data in the table shows that most of the respondents 73.3% think that critical thinking and problem-solving skills are extremely important in present-day society. A lower fraction thought the skills were moderately or neutrally important 13.3% each , and none of them rated them as not important or somewhat important. The unanimous agreement for their high significance implied by this implied a general acknowledgement that they were worth considering in dealing with the present day's issues.

Question 04: How do you rate your own critical thinking and problem-solving skills?

The aim of this question was to check at how well respondents rated their own states of critical thinking and problem-solving skills.

Table 2.2: Student' Self-Assessment of Critical Thinking and Problem-Solving Skills

Rating	**Percentage**
Excellent	30%
Good	46.67%
Average	20%
Very Poor	3.33%

The distribution of respondents' self-assessment of their critical thinking and problem-solving skills was shown in these percentages. Most of the respondents rated their skills either as good 46.67% or excellent 30%, which means that they had high confidence levels in what they were capable of doing. In addition, there was a considerable number who considered themselves to have average abilities 20%, which implies that it's possible to get better at them even when one has knowledge. A smaller percentage of respondents rated their skills as very poor 3.33%, showing that not everybody was happy about their skills. In general, these self-evaluations gave us a deep look at how people felt about their level of cognitive skills as well as their ability to solve problems.

❖ ***Rubric 03 : Awareness and Experience with AI Tools***

Awareness and experience with AI tools were explored in the third section of the questionnaire (questions 5–6). It focused on their level of familiarity with AI and their practical experience with it.

Question 05 : Have you heard of AI tools used for assessing critical thinking and problem-solving skills?

The objective of this question is to identify if the respondents have knowledge about AI tools for evaluating their reasoning and problem-solving abilities.

All participants (100%) said that they heard about the AI tools used for evaluating critical thinking and problem-solving abilities. This unanimous knowledge among attendees showed a high degree of familiarity with the topic and, in general, an inclination towards engagement with or discussions about AI tools in this setting.

Question 06: Have you ever used AI tools for assessing critical thinking and problem-solving skills?

The aim of this question was to find out if users have used AI tools in evaluating critical thinking and problem solving abilities and their interest in using them.

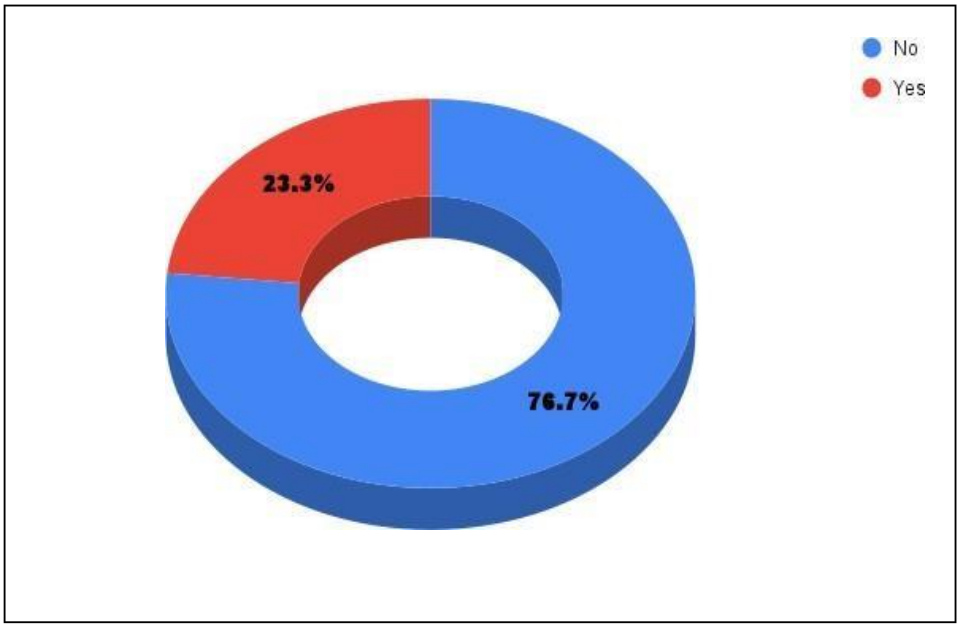

Figure 2.3: AI Tools for Assessing Critical Thinking: Perceptions and Usage

The analysis of the responses showed that AI tools were utilized by 23.3% of the respondents for this reason. They reported satisfaction with them at many different levels due to the fact that they can give different types of feedback effectively. On the other hand, 76.7% of the respondents had never used AI tools so far but were willing to try them out someday. Their motivations ranged from mere curiosity about what these tools could do for them to simply the use of other appraisal methods outside conventional norms. The data revealed that there was a pronounced willingness by participants to use AI systems for evaluating their own abilities for critical thought as well as decision-making, indicating an intention to inculcate them within teaching systems.

❖ ***Rubric 04 : Perception of AI Tools***

In section four of the survey (questions 7 to 9), participants' views of AI tools were explored. Furthermore, it included questions about the perceived fairness and accuracy of AI tools, including the advantages that could come with the incorporation of such tools in education.

Question 07: Do you think AI tools provide a fair assessment of your skills compared to traditional methods (Essays and Portfolios)?

The purpose of this question was to give people the chance to make their views known about whether AI tools are fairer than conventional measures for assessing abilities or not.

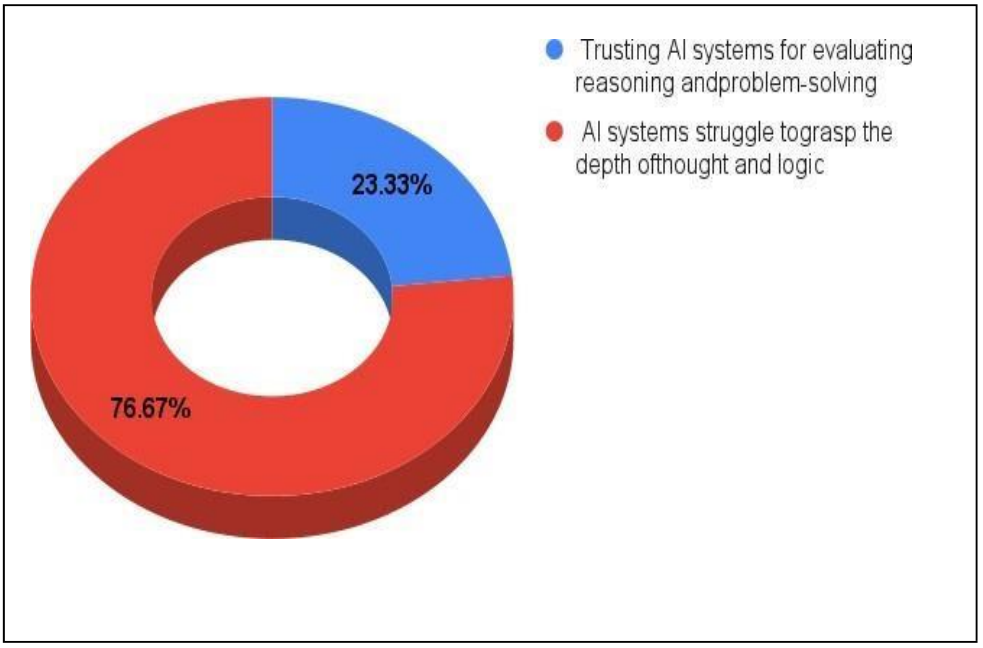

Figure 2.4 : Perspectives on AI systems' capabilities in assessing essays and portfolios.

In the view of a great number of the respondents 76.67% , AI systems are not capable of grasping the thought and logic depth that is embraced in essays and portfolios. They stressed that essays must give more thoughtful input on ideas and critical arguments, raising a concern for the traditional approach in some cases. As a combined outcome, a lot of interviewees held the point of view that AI systems lead to fair assessment through their objectivity and efficiency. Other interviewees had an opinion about the possible drawbacks of computer systems when it comes to the recognition of the qualitative side of the competences expressed by the

applicants in essays and portfolios. Though some respondents 23.33% insisted on AI systems' trustworthiness when evaluating reasoning and problem solving, others doubted it. They illustrated the capacity of AI to process large amounts of data in short order and objectively distinguished it from the human mind.

Question 08: Do you think AI tools can accurately assess critical thinking and problem-solving skills?

This question specifically was aimed at knowing whether respondents believe in the accuracy of AI tools or not in assessing critical thinking and problem-solving skills.

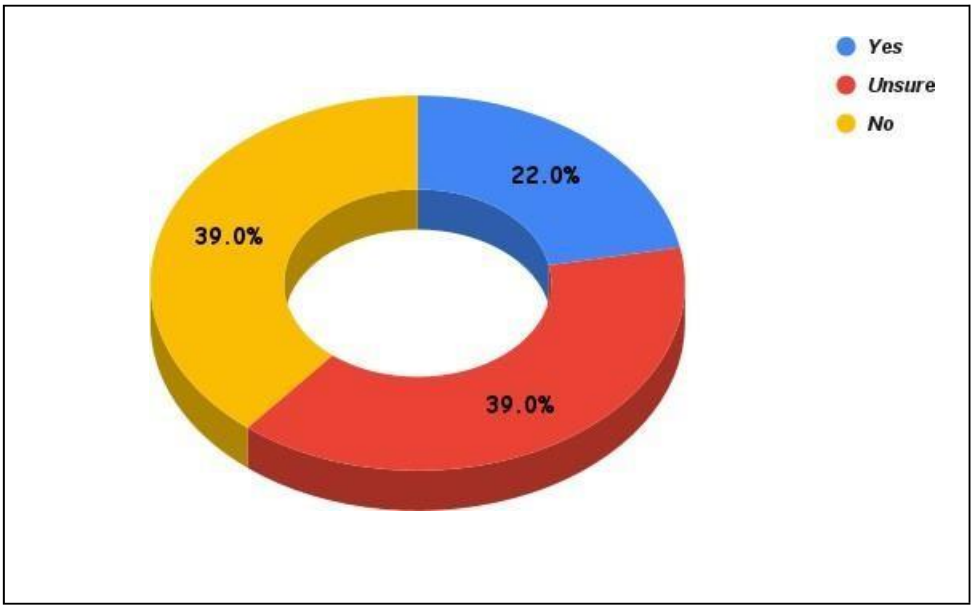

Figure 2.5: Respondents' Views Regarding the Accuracy of AI Tools in Assessing Critical Thinking and Problem-Solving Skills.

Opinions on the ability of artificial intelligence to accurately evaluate critical thinking and problem-solving skills differ greatly. 30% of survey takers believed that these two attributes could be assessed due to their ability to effectively analyze patterns and trends, so they could be accurately tested, but still, about 53.3% expressed reservations. The ones who identified with the other cluster put forward a case for the

impossibilities that AI tools present in capturing the entire depth of human thought and creativity, both essential elements of problem-solving and critical thinking. They pointed out that creativity, metacognition or decision-making together are very complex for AI to measure with precision. Other respondents 16.67% were unsure regarding the accuracy of AI tools in that, whereas they felt the technology was promising, there may still be a need for more work on it, especially with regards to EFL learners. However, the comments show that people have hope in AI capability, thereby being careful because there were issues raised about whether they could completely mimic all aspects of human perception and thought.

Question 09 :To what extent do you believe that integrating AI tools into assessments can benefit EFL learners in their academic and professional development?

The objective of this question was to investigate how many respondents think the process of adapting AI devices to assessments may be advantageous for EFL learners.

Table 2.3: Extent of Belief in Benefits of AI Tools for EFL Learners' Development.

Description	**Percentage**
Not at all	6.7%
Limited	3.3%
Moderate	30.3%
Strong	43.3%
Extremely	16.7%

The responses demonstrate a range of opinions on the potential benefits. A small proportion of the participants 6.7% did not think integrating AI tools could have any benefit for EFL learners at all. On the other hand, 3.3% of those respondents identified the advantages as limited. Nonetheless, approximately the same percentage of participants 30.3% have found it moderate, thus expressing cautious optimism. The most numerous respondents 43.3% evaluated the benefit as strong, pointing to a strong belief in the effectiveness of AI instruments in the development of EFL learners' academic and occupational performance. Only a small portion of respondents 16.7% predicted an extremely high benefit level which implies a strong opinion concerning excellent AI applications. In the end, the responses showed a wide range of optimism. It resulted in recognizing a huge opportunity for AI in EFL learners' assessments.

❖ ***Rubric 05 : Challenges and Opportunities of AI Tools***

The fifth section of the questionnaire (questions 10–13) was aimed at discovering the advantages and disadvantages of artificial intelligence tools. It consists of questions relating to the difficulties experienced when utilizing AI tools, the quality of the evaluation given, and the particular problems encountered. It also focuses on how AI tools can be used to assess critical thinking and problem-solving skills.

Question 10 :What do you see as the biggest challenges in utilizing AI tools for assessing critical thinking and problem-solving skills?

This question was designed to capture respondents' perceptions of the greatest challenge of applying AI systems to evaluating critical thinking and problem-solving skills.

The responses were focused on how the AI tools could be useful for the assessment of critical thinking and problem-solving abilities. The most critical problem was with how one could reliably measure such delicate skills as creativity, judgment, and metacognition, which form an integral part of critical thinking. Another obstacle is the development of tests that are relevant and interesting for students, as losing interest will result in inappropriate assessment. Last but not least, there was the question of AI algorithm bias that could lead to evaluations with bias against students especially from diverse backgrounds. Furthermore, AI systems are not able to understand subtleties that might be found in critical thinking or complex responses often present in assessments. These lay the case for meticulous construction and deployment of AI tools so that evaluations of these very important skills will not be biased and accurate.

Question 11 : Do you think AI tools adequately capture the deeper elements of critical thinking and problem-solving, such as creativity, judgment, and metacognition?

The aim of this question was to know whether or not AI systems can capture deeper elements that make critical thinking and problem-solving unique to human beings.

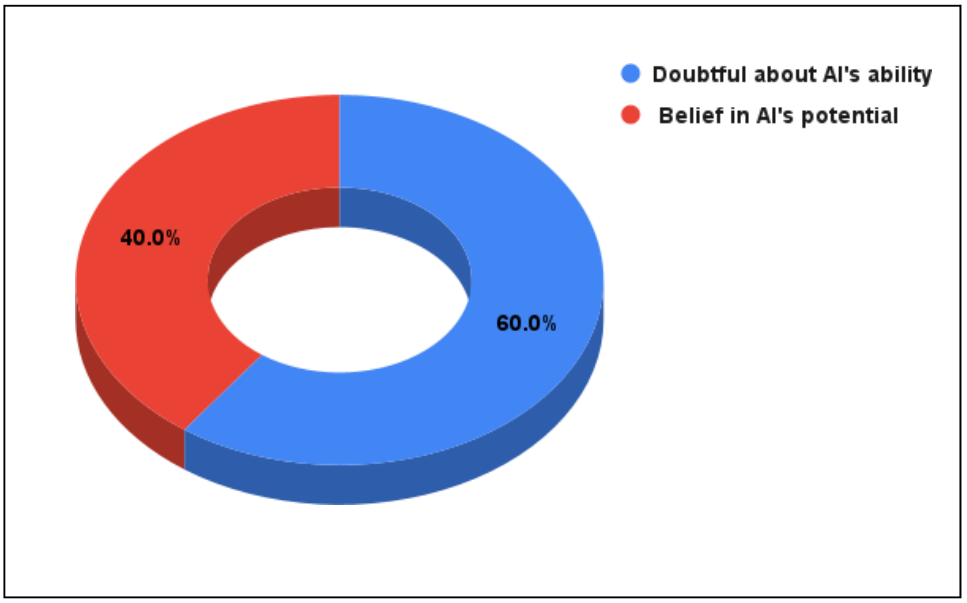

Figure 2.6 : Students' Perspectives on AI's Adequacy in Capturing Deeper Elements of Critical Thinking and Problem-Solving.

In light of the replies, 60% of the respondents were convinced that the AI is incapable of fully emulating critical thinking as well as problem solving, particularly creativity, judgment, and metacognition. The researchers pointed out the problem of AI's understanding of human thought processes and the questionable nature of such skills, such as intuition, experience, and the ability to adjust to various scenarios. To the contrary, only 40% of the respondents said that AI might capture these elements in some way or another. They admitted difficulties but remained confident about AI, especially with the implementation of technological solutions. These people were of the opinion that AI could alter and improve

its judgment of these intricate tasks. To sum up, these contrasting views reflect a complex position concerning AI's ability to carry out deep analytical thinking and critical problem solving. Although some skepticism is there, there is also an optimistic feeling about AI's capacity for evaluating these aspects, culminating in the need for an upgrade of the AI tools for the accurate assessment of those skills.

Question 12: Have you experienced any specific challenges when using AI tools for this purpose?

In particular, this question attempts to collect data on what specific problems respondents have faced while applying AI tools of critical thinking and problem-solving.

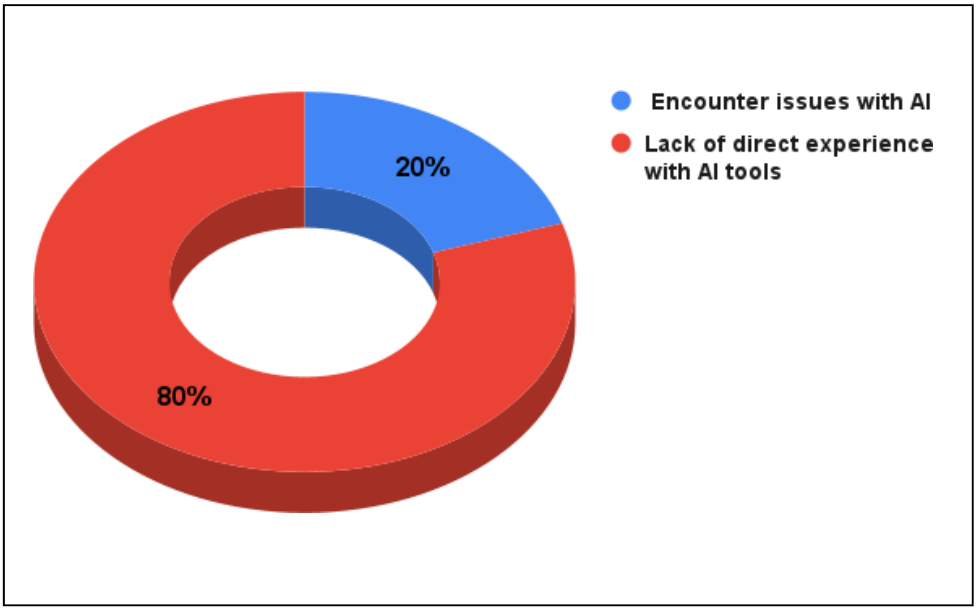

Figure 2.7 : Students' Experience and Challenges with AI Tools for Assessing Critical Thinking and Problem-Solving.

The replies showed that there was a lack of direct experience with AI tools for the specified purpose, and around 80% of respondents reported that they had not experienced any particular challenges. A percentage of the

respondents, say 20% or so, pointed out problems associated with the feedback provided by AI tools, saying that at times a lack of context would make it hard to understand where one went wrong. Some of the respondents indicated a desire to get more information from those who have used these tools already, despite their limited experience. Apart from that the responses demonstrated the lack of information in AI tools for this purpose showing a potential difficulty that can be solved with more exposure and education.

Question 13: In your opinion, what opportunities do AI tools offer in assessing critical thinking and problem-solving skills?

This question aimed at acquainting the respondents with their impressions on AI tools opportunities in the evaluation of critical thinking and problem- solving abilities.

The results suggest that AI tools open up many opportunities for assessing critical thinking and problem-solving skills. One such opportunity is to provide an objective and precise evaluation by evaluating a great deal of information and discovering unobvious connections. At the same time AI tools offer personalized assessments that correspond to various levels of learning targets, as well as personalized learning paths and feedback on students' strengths and weaknesses. They could give out immediate comments and suggestions, directing learners' attention to issues that demand additional effort. AI also appears to be showing the future possibility of easily and consistently assessing students, providing immediate feedback, and having the power to analyze big data to identify trends and patterns in thinking and problem-solving approaches. Total, AI tools led to advances in the assessment method through aiding in the development of personalized and adaptive assessments, immediate feedback, and insights that may help improve decision-making and problem-solving skills.

❖ **Rubric 06 : Future of AI Tools in Education**

The sixth section (questions 14–15), which examined subjects' opinions on the future role of AI-based tools in teaching. It was conducted in the form of questions that concerned the possible uptake of AI tools in the future and suggestions for making them better.

Question 14: Would you like to see more AI tools used for assessment in your English learning in the future?

This question was about whether respondents are in favor of see more AI tools utilized for assessing their English learning in the future.

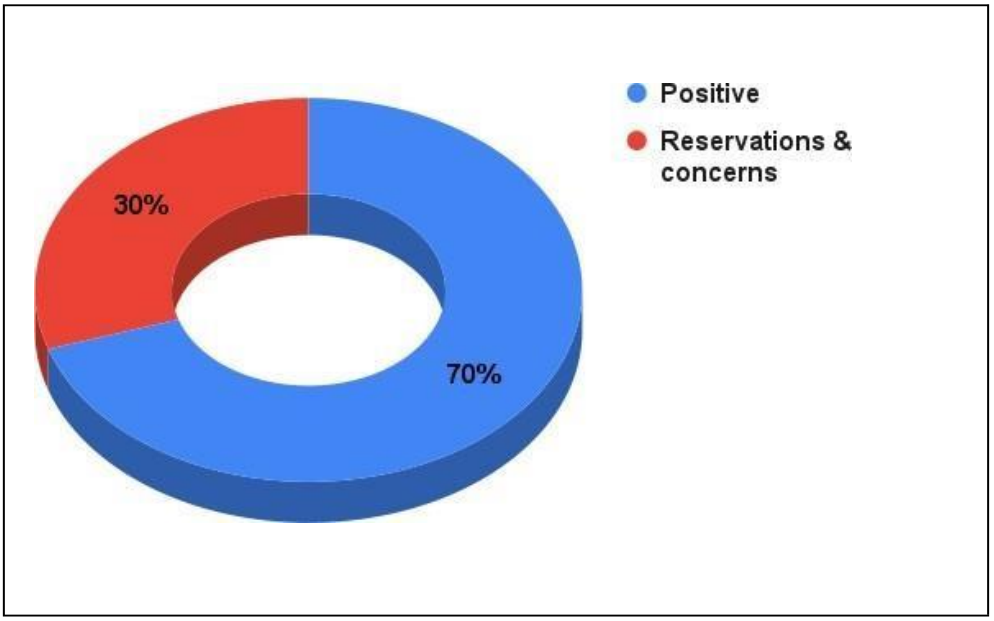

Figure 2.8 : Student Attitudes Towards AI Tools for Assessment in English Learning.

The responses indicated a generally positive attitude towards the use of AI tools for assessment in English learning, with the majority of respondents expressing interest in the potential benefits. Approximately 70% of respondents cited benefits such as providing instant feedback, personalized recommendations, and helping track progress, which could

enhance learning experiences and outcomes. However, around 30% of respondents also expressed reservations, noting that AI tools may not provide a holistic assessment of skills or that they preferred traditional assessment methods. Overall, there was a willingness to embrace AI tools if they could complement traditional methods and provide valuable insights suggesting a preference for a balanced approach that combined AI tools with human guidance for effective English learning.

Question 15: What improvements or changes would you suggest to make AI-powered assessment tools more useful and effective for students like yourself ?

The aim of this question was to solicit suggestions from respondents on improvements or changes to make AI-powered assessment tools more useful and effective.

Improving AI-powered assessment tools for students involves a number of key focal points. One of the first improvements that is being called for is a better understanding of language nuances that entail context and cultural reference aspects to facilitate more accurate assessments. There is another factor that contributes to providing more detailed feedback. Specifically, it includes open-ended questions that require analysis and justification, along with qualitative assessment components to capture subjective aspects of critical thinking and problem-solving. Furthermore, ideas include making assessments more interactive through simulations or scenarios from the real world to ensure that they're more authentic and pertinent to students' learning goals. AI tools need training data and algorithms, but the way they work should be understandable to make it possible to properly identify complicated critical thinking and problems. So, these AI tools should not only test students' knowledge; they should also give useful information on how they can improve it.

2.6.2 Teachers Interview Analysis

As it was suggested by Merriam (2009), interviews are very significant as they enable a closer examination of research subjects; they make participants expose their own experiences, personal opinions and unexpected insights that do not fit into prepared reply choices. In terms of information complexity and individual standpoints, interviews prove to be quite pertinent because this technique helps investigate different aspects of life while addressing diverse issues related to identity formation.

In the study, the interview was conducted to acquire a detailed understanding of the potentials and barriers of AI tools, which assess critical thinking and problem-solving skills. The interview was attended by eight EFL teachers, who instruct third-year students at the University of Tlemcen. The job interview was constructed in such a way a way that it was regimented and consisted of questions intended to gather ample data. There were seven questions in all, which were divided according to different themes in an orderly and coherent manner. Each question focused on a specific matter concerning the study, ensuring that the area of concern was fully covered. (See Appendix B)

- ***Theme 01: Perceived Impartance of Critical Thinking and Problem Solving Skills***

This section (question 01) investigates how important EFL teachers regard critical thinking and problem solving skills as far as future academic and professional success is concerned.

Question 1: In your experience. How important are these skills for your students' future success, both academically and professionally?

This question seeks to determine how important English teachers think critical thinking and problem-solving are for the future academic and professional selves of students.

All teachers seem to agree that good problem-solving and critical thinking skills are vital for the success of students in future life because they affect academic performance, career progression, and social life but they are worried by the way they see these abilities underdeveloped in many university students, showing a great mismatch between their significance and presence.

❖ ***Theme 02: Traditional Assessment Methods***

This section (question 02) explores the particular manners in which EFL teachers traditionally assess critical thinking and also problem-solving capabilities among their students.

Question02:Can you describe some of the traditional methods you use to assess these skills in your EFL classes?

The purpose of this question is to obtain information about the conventional techniques EFL teachers employ in the evaluation of critical thinking as well as problem-solving skills within the classroom context provided by themselves.

To evaluate critical thinking and problem-solving skills in EFL classes, instructors utilize various conventional means such as class debates, essay writing, group projects, quizzes, or exams in real-life settings or test scenarios alongside reading books. Consequently, learners participate in analyzing information, collaboration, handling real-world problems using their knowledge, and convincing opinions they hold true among other things.

❖ ***Theme 03: AI Tools for Assessment***

The objective of this section (question 3–4) is to find out the perceptions and acquaintance levels of AI tools among English foreign language teachers related to the evaluation of critical and problem-solving abilities.

Question 03: How familiar are you with the concept of AI tools for the assessment of critical thinking and problem-solving skills?

This question aims to gauge the level of familiarity EFL teachers have with AI tools designed for assessing critical thinking and problem-solving skills.

The responses indicate varying levels of awareness and eagerness among the teachers to explore and incorporate AI tools for assessing critical thinking and problem-solving skills into their teaching practices. While some teachers have a basic understanding and are open to exploring how these tools could improve their assessment methods, others are more familiar with and excited about the potential benefits these tools could bring to their teaching. Overall, the responses reflect a curiosity and willingness among the teachers to learn more about AI tools and how they can enhance their teaching and benefit their students, despite not yet having had the opportunity to use them in their classrooms.

Question 04: Imagine there were AI tools available to assist in assessing critical thinking and problem-solving skills in EFL learners. How do you think such tools could be beneficial?

This inquiry aims at investigating the probable benefits of using AI instruments for the assessment of critical thought and solving problems among EFL learners through the eyes of the teachers.

It is believed by the teachers that using AI tools to evaluate critical thinking as well as problem-solving capabilities is advantageous, especially in this digital era. They view it as a means of saving time and, more so, involving students in learning, as they are largely attracted to virtual set-ups due to being digital natives. Moreover, it is their contention that AI tools may facilitate standardized assessments, thereby ensuring fairness and keeping evaluations consistent. They note that these tools could offer

valuable insights into students' thinking processes, helping teachers identify areas of struggle and provide targeted support. By automating assessments AI tools could reduce the administrative workload on teachers, allowing for more focus on teaching and personalized feedback. They also highlight the potential for AI-generated reports to inform instructional planning and create a more dynamic learning environment. Overall, the teachers see AI tools as a promising way to bridge the gap between formal assessments and real-world application, enhancing students' critical thinking and problem-solving skills in practical contexts.

- ***Theme 04: Challenges and Limitations of AI Tools***

The intention of this segment (questions 05–06) is to look into English as a Foreign Language teacher's thoughts on the hurdles and restrictions connected with the employment of AI instruments in measuring critical thinking and problem-solving abilities.

Question 05: Based on what you know, what do you perceive as potential challenges in utilizing AI tools for the assessment of critical thinking and problem-solving skills in EFL learners?

The goal is to determine what issues may arise when AI-based tools are used by teachers to evaluate EFL students' abilities in thinking critically and solving problems.

Teachers' answers emphasize that AI instruments meanwhile demonstrate particular difficulties of AI tools for scrutiny of critical thinking and problem solving in EFL learners. The other challenge is the "gap" perceived between critical thinking, which is qualitative and emotional, and the AI's machine-type, algorithmic approach. There is a doubt regarding whether AI is paying enough attention to these skills. A second major difficulty is the fact that AI tools are not widely available like in Algerian universities, and consequently, their use is not assured.

Along with this, one ought not forget about the limitations of AI associated with simply shallow analysis, creativity problems, judgment blind spots and the inability to reveal such high-level skills needed for learning as metacognition. Any changes that incorporate AI-based tools into the current assessment practices may lead to teachers embracing training and starting the tumultuous process of change. These challenges will principally require proper tackling if AI tools are to find their place in the EFL assessment.

Question 06 :what potential drawbacks or limitations do you see with using AI for this purpose?

This question is aimed at exposing potential shortcomings or constraints in making use of AI tools to evaluate these skills, offering up reflections into probable concerns that require resolution.

Among responses, potential inhibitions and constraints in tasking AI to evaluate students abilities in critical thinking and problem solving are indicated. One of the major pitfalls that are brought to attention is the application of possible bias in the algorithm, where the AI tools may come with unequal assessments, especially for students from diverse backgrounds. On the other hand, transparency is emphasized as a matter, as the fast sequence of inputs and outputs of AI tools may not be obvious to teachers and students, leading to a loss of trust in their results. Contextual examination is another difficulty in which AI may not process these skills in an ambivalent way from one context to another. It is also worth mentioning the privacy and security of student data; AI-based tools store and collect potentially sensitive information. Then we state that the software doesn't give individualized feedback; it's vital to handling each student's needs in a personal way. Last but not least, there is a concern that the AI could be overtrusted or that the authorities of teachers might even be less thorough in their evaluation. It goes to show that proper execution

(and its supervision) is key when dealing with AI in such a field because it is supposed to assist rather than totally replace human judgment and expertise.

❖ ***Theme 05: Integration of AI with Teacher Evaluation***

This section (question 07) aims to investigate EFL teachers' perspectives on the integration of AI into the assessment process to complement, rather than replace, teacher evaluation.

Question 07: In your opinion, how could AI be best integrated into the assessment process to complement, rather than replace, teacher evaluation?

This question is intended to probe EFL teachers' opinions on the incorporation of AI in assessment in order to supplement teacher evaluation rather than substitute for it, underscoring what AI may contribute to enhancing current assessment systems.

The responses from the teachers given here also give different ways that could be used to bring AI into the evaluation process of critical thinking and problem-solving skills rather than just replace the teachers. First, AI will enable the analysis and feedback on students' open-ended questions and their replies. This will help instructors see the thinking patterns of students clearly. Another thing is adaptive assessment generated by AI, which will be used to adjust question difficulty based on students's feedback so it tests them better. Besides, AI tools may also conduct peer assessment, where students will be able to appraise each other's work and thereby enhance their skills. Last but not least, AI would be able to study students' engagement and responses, whatever they meant to teachers. Among other things, AI can provide a rapid appraisal of practical skills. At number six, AI could offer personalized learning recommendations on the

basis of renditions. To conclude, AI would simplify the assessment process, which helps teachers spend more time thinking through meaningful feedback. These ideas can be seen as AI features that can be outsourced to teachers to evaluate more accurately and, in the end, can be beneficial to developing student skills.

2.6.3 Classroom Observation Analysis

In observing a third-year English as a Foreign Language (EFL) class at the University of Tlemcen, focusing on the challenges and opportunities of utilizing AI tools (e.g., automated essay scoring tools, chatbots for open-ended questioning). for the assessment of critical thinking and problem-solving skills (see Appendix C). The professor used various interactive techniques and asked questions to stretch the students minds. Students' ability to see the practical application through engaging with real-world examples not only added understanding but also made them aware of the theory as well. Teachers gestures and clear voice made the communication of the lesson effective, moreover, they held the students' attention as they moved around the class and watched all the students.

Furthermore, the teacher employed a variety of questioning techniques, including reference and inference questions, encouraging students to think critically and provide reasoned answers. The use of an Arabic idiomatic expression to manage disruptions demonstrated classroom management skills and cultural sensitivity. The teacher even encouraged discussion amongst students while promoting a collaborative learning environment. When a few children became unfocused, he used various strategies to refocus their minds by stressing the importance of being an active listener. So as to encourage critical thinking a conversation was encouraged between learners, who were asked to suggest possible solutions and offer more examples from life. He suggested a movie related to the lecture for further understanding. The

teacher demonstrated thorough preparation by reading English books relevant to the topic and using storytelling to clarify concepts. He also asked them to answer 22 questions about the memory measurement test on the website.

Regarding assessment methods, the observed place indicated the use of open-ended questions, discussions, and debates, which could easily identify critical thinking and problem-solving skills. The use of short stories with problem-solving scenarios and memory measurement tests was also part of this practice.

2.7 Data Interpretation and Discussions

In this study, the results from a questionnaire, interviews with EFL teachers, and classroom observation provide comprehensive insights about the challenges and opportunities of using AI tools for determining critical thinking and solving problems of third-year students at the University of Tlemcen. In most cases, the people who were interviewed felt these skills were extremely significant in the process of assessment, although a very small percentage of respondents actually used AI for evaluation reflecting a gap between thoughts and actions. On one hand, it is questioned whether machine learning is capable of capturing the subtleties of these skills but on the other hand, there is a huge ambition to implement this technique in the assessment, aiming for instant feedback and progress following.

EFL teachers addressed this and expressed how essential these skills are to their students' futures and their different levels of familiarity and willingness to try AI tools. They pointed out the advantages of the AI methods in the following areas: saving time, involving students and making tests standard. On the one hand, they raised issues

of mechanical execution of AI in place of qualitative reasoning and those of biases transparency, and confidentiality on the other.

An EFL class observation revealed an active and interactive teaching method that included questioning for the stimulation of critical thinking vocabulary enrichment using real-life examples, and differing ways to assess students' progress, combining to create an all encompassing teaching approach. Generally, the attitude is positive towards using the machines for this assessment. However, if the machine-based assessment can complement the traditional methods and provide extra information, they will embrace it. Nevertheless, the challenges and limitations must be addressed.

In support of the first hypothesis, which states that AI tools will be superb at examining the shallow aspects of critical thinking and a problem-solving process such as information processing and basic logic, but will take time to become accurate while defining complex domains like genius astuteness, and metacognition, The findings led to the conclusion that AI systems could be better than human experts in determining the strength of critical thinking and problem-solving skills by examining surface-level issues, yet there is almost no way that they will be superior when the issues are deep and narrow. Different from the previous caution made apparent in the survey, distrust was found in the interview among participants about attributing complex skills such as imagination and judgment to AI systems. On the other hand, this was properly illustrated through the observation which demonstrated the student's struggle in taking decisions and making mistakes, which might be a limitation of AI tools in accurately evaluating these skills.

As for the second hypothesis, which states that AI-powered learning environments can give EFL learners an interactive and manageable assessment that promotes better understanding, diverse

thinking, and personalized feedback, hence higher thinking skills and problem-solving capabilities, Therefore, this research is optimistic about the possibility of AI-enabled learning systems that achieve these goals. Notwithstanding that the participants in the survey have not interacted with AI tools directly, they still see the potential of using these tools in their assessments. Moreover, the teachers acknowledged that the use of AI applications could help them by substituting some of their tasks, stimulating students, and conducting the same assessments. The observation highlighted the importance of effective teaching methods in fostering these skills, suggesting that AI tools can complement traditional teaching practices to improve student learning outcomes.

The data trend in the present study matches up with previous studies that assert the possible approach of AI tools in education but at the same time recognize the barriers to the implementation of such tools. In conclusion, it seems that AI engagement in evaluating such skills for EFL education could be beneficial; however, its application should be done carefully, taking into consideration both the benefits and its limitations.

2.8 Recomondations

This study has valuable insight as to the use of AI tools in appraising critical thinking and problem-solving abilities of third year EFL students. Despite being promising in so far, there are still a number of recommendations meant to guide both researches and practitioners.

- In future research, one must think about incorporating a larger sample size so that these results can be applied more broadly; a larger, more varied sample would offer a wider view on how well machine learning systems work here.

- Conduct studies that focus on the implementation process of introducing AI tools for assessment in universities that have not used them before. This could include examining the challenges faced, the strategies used for adoption, and the outcomes of the implementation.
- Discern the best strategies on how to execute the introduction and implementation of AI systems into exams for universities that have never used them. This could be comprised of the tactics for overcoming the resistance, communication with the stakeholders, and the assessment of the usefulness of the identified tools.
- Specify and look into the main obstacles to the implementation of AI technologies in the assessment in universities where they have not been used before. Thus, it could mean things like insufficient knowledge, opposition from social institutions, and technological issues.
- It is essential to continue exploring the attitudes and perceptions of both students and teachers towards the use of AI tools. Understanding these perspectives can help in developing more effective strategies for implementing AI tools in educational settings.

2.9 Conclusion

This chapter unfolds the research methodology of the study, which argues the purpose of the study and the different strategies used to address the questions and hypotheses. The chapter elaborated on the population sample, settings procedures, and research resources applied in the process of data acquisition. Besides, the chapter highlighted the data analysis which involved both quantitative and qualitative analysis tools. As a final point, the chapter was supplied with a detailed description of findings based on the questionnaires, interviews of students and teachers, and classroom observations, which showed many opinions and experiences in using AI tools to test critical thinking and problem-solving capacities.

GENERAL CONCLUSION

General Conclusion

In the 21st century, critical thinking and problem-solving skills are highly valued, as they are vital for students to succeed in their academic career and have a bright future in their career. Nevertheless, the way these skills are assessed is a highly complex process for teachers. The usual assessment methods often fail to capture the many complexities of thinking and problem-solving processes through standardized tests or subjective evaluations. In recent years, AI tools have become a significant question in the educational context for their capability to transform the traditional approaches to teaching and assessment methods. AI will usually be a key area of use in critical thinking and problem-solving skills evaluation, which are currently regarded as critical to solving the problems of our complex and constantly changing world. This research is aimed at investigating the difficulties and possibilities that the use of AI tools for the assessment of critical thinking and problem-solving skills among third-year EFL students at the University of Tlemcen will be faced with.

The thesis began with a comprehensive review of the literature, followed by an introduction that provides the basis for the discussion. Next, it highlights the current state of critical thinking and problem-solving assessment, clarifying these concepts and considering older methods of assessment such as essays and portfolios. It also identifies the shortcomings of traditional testing methods and provides a modern approach to critical thinking and problem-solving assessment in Algeria. Furthermore, it reflects the potential advantages of alternative evaluation methods via AI tools and gives an overview of the different AI tools that can be used in this process, including challenges and opportunities. The research methodology chapter begins with an introductory section that describes the research method used in the study. It concentrates on the research environment, which is a group of third-year EFL students. The next chapter talks about the research design, stating the sampling methods used, for instance, student's

questionnaires, teachers' interviews, and classroom observations. It talks about the way in which the data from each tool is analyzed and interpreted. In the end, recommendations from the study.

According to the exploration of the difficulties in using such tools, the study concluded that although AI tools are capable of applying surface characteristics of critical thinking and problem-solving like information processing and basic logic, they lack depth to complex and subtle traits like creativity, judgment, and metacognition. It is coherent with the first hypothesis, which states that AI instruments can handle some assessment tasks very well, but they may have some limitations in evaluating students' metacognitive skills. The study concluded that the limitations come from the built-in nature of AI algorithms, which are usually designed to process and analyze data according to predefined criteria.

In contrast, the study showed that the personalized learning environments enabled by AI can indeed offer EFL learners adaptive and engaging assessments. These evaluations have the ability to develop more profound knowledge, stimulate creative thinking, and provide personalized feedback. This second hypothesis Which stipulates that AI tools will excel at assessing only the surface-level aspects of critical thinking and problem-solving, such as information processing and basic logic, while struggling to accurately capture the deeper, more nuanced elements like creativity, judgment and metacognition. is thus supported, showing that such tools can be useful in improving critical thinking and problem-solving skills by providing individualized learning experiences. The research revealed that the AI systems can process a lot of data in order to recognize patterns in student learning behavior, and thus, they can adjust the assessments accordingly. The personalized way of teaching can enable students to delve deeper into the concepts and also improve their problem-solving skills by providing them with tasks that are difficult yet achievable enough.

Indirectly, the study not only shares its findings with the current debate about the use of AI in school settings, but it also adds to the very topic. They illustrate that the introduction of AI tools is not a simple process; rather, it is an intricate one that requires the adoption of a steady approach that takes into account the particular needs and problems of each educational context. Besides, the study highlights the importance of setting up relevant research and development projects to upgrade and employ AI tools in the education world.

This study has been useful, but nonetheless, it is not without its limitations. The size of the sample was small, and the research was done in a particular context, which may limit the generalizability of the findings. Besides, the study was based on the data that people gave themselves, which could be biased. Further investigation in this field is needed and should be focused on drawing a more diverse and larger sample.

Finally, this research has shown the difficulty and chances that are around the AI tools for the assessment of critical thinking and problem-solving abilities. Thus, the considerations of cognitive load and working memory overload by the educators will help them decide whether to incorporate certain AI tools in their teaching or not with a view to enhancing the learning outcomes of their students. However, the issue is in how AI is being utilized in education, which should be done with explain ability and should be focused on a case-by-case basis where AI both might create additional challenges and be an opportunity.

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APPENDICES

APPENDIX A

Student Questionnaire :

1. Would you please specify your gender :

○ Male ○ Female ○ Prefer not to say

2. Which age group do you belong to?

○ Under 20 ○ 20 or above

3. How important do you think critical thinking and problem-solving skills are in today's world?

Not important at all

○1

○2

○3

○4

○5

Extremely important

4. How do you rate your own critical thinking and problem-solving skills?

○ Very poor

○ Poor

○ Average

○ Good

○ Excellent

5. Have you heard of AI tools used for assessing critical thinking and problem-solving skills?

○ Yes ○ No

6. Have you ever used AI tools for assessing critical thinking and problem-solving skills?

Yes / No If yes, please describe your experience. If no, would you be interested in using AI tools for this purpose?

7. Do you think AI tools provide a fair assessment of your skills compared to traditional methods (Essays and Portfolios)? Please explain your answer.
8. Do you think AI tools can accurately assess critical thinking and problem-solving skills? Why or why not?

9. To what extent do you believe that integrating AI tools into assessments can benefit EFL learners in their academic and professional development?

Limitedly

○ 1
○ 2
○ 3
○ 4
○ 5

Extremely

10. What do you see as the biggest challenges in utilizing AI tools for assessing critical thinking and problem-solving skills?
11. Do you think AI tools adequately capture the deeper elements of critical thinking and problem-solving, such as creativity, judgment, and metacognition? Why or why not?
12. Have you experienced any specific challenges when using AI tools for this purpose? If yes, please describe.
13. In your opinion, what opportunities do AI tools offer in assessing critical thinking and problem-solving skills?
14. Would you like to see more AI tools used for assessment in your English learning in the future? Why or why not?
15. What improvements or changes would you suggest to make AI-powered assessment tools more useful and effective for students like yourself?

APPENDIX B

Teachers' Interview :

1. In your experience. How important are these skills for your students' future success, both academically and professionally?
2. Can you describe some of the traditional methods you use to assess these skills in your EFL classes?
3. Imagine there were AI tools available to assist in assessing critical thinking and problem-solving skills in EFL learners. How do you think such tools could be beneficial?
4. How familiar are you with the concept of AI tools for the assessment of critical thinking and problem-solving skills?
5. Based on what you know, what do you perceive as potential challenges in utilizing AI tools for the assessment of critical thinking and problem-solving skills in EFL learners?
6. what potential drawbacks or limitations do you see with using AI for this purpose?
7. In your opinion, how could AI be best integrated into the assessment process to complement, rather than replace, teacher evaluation?

APPENDIX C

Observation Grid :

Date: May 6th , 2024

Observer: TERKI HADIL

The purpose of the observation : Understand the current teaching and learning process without the use of AI tools for assessment.

Setting: University of Tlemcen

Place of observation: L3 EFL class

Duration of the session: 1 hour and 30 minutes

Observation Point	**Description**
Teaching Methods	
Student Engagement	
Assessment Practices	
Technological Infrastructure	
Teacher-Student Interaction	
Student Collaboration	
Feedback Mechanisms	
Resource Utilization	
Classroom Environment	
Teacher Perspectives	
Critical Thinking Skills	Observe how the class encourages critical thinking. Look for activities or discussions that promote analysis, evaluation, and creative problem-solving.
Problem-Solving Skills	Note how the class approaches problem-solving. Look for instances where students are required to identify issues, develop solutions, and implement them effectively.