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Exploring Critical Thinking through AI Educational Tools:

The Case Study of Third Year Students at Sadek Talbi Secondary School -
Laghouat

*A Dissertation Submitted in Partial Fulfilment of the Requirements for the Degree of
Master's in ELT*

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DEDICATION

- I dedicate this humble effort, first and foremost, to my family, whose constant encouragement has always inspired me to strive for greater achievements.
- I express my sincere gratitude to my parents for their moral and material support throughout this journey. Their faith in me has been a constant source of strength.
- I also express my appreciation to my beloved husband and his family, and to all my relatives, friends, and classmates, whose companionship and encouragement have shaped my experience since my early days in school. Their presence has been instrumental in my growth and success.

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Abstract

With the wider application of Artificial Intelligence (AI) in education, there are increasing concerns over its impact on students' critical thinking. This study investigates how third-year EFL students at SADEK TALBI Secondary School in Laghouat use AI tools, and to which this encourages or hinders their independent thinking. As students more and more rely on AI for writing, translation, and research, the question is then asked about whether they can still analyze, question, and generate ideas without the use of technology. A mixed-methods design was used, combining a survey given to 20 purposively selected students and 03 teacher interviews to determine the perceived impact of AI on learning behavior and classroom participation. Main findings reflect a dual impact: as students largely attribute AI to assist them in grasping intricate concepts and enhancing writing—aspects of critical thinking—others manifest evidence of passivity, using AI-generated work without question or validation. The study concludes that AI can only be helped with critical thinking if it is put into practice with intention and trained guidance. It recommends that teachers incorporate AI into lessons with well-stated analytical goals, and both students and teachers must be trained to use AI ethically.

Abbreviations

CT	Critical Thinking
AI	Artificial Intelligence
EFL	English as Foreign Language
ANI	Artificial Narrow Intelligence
ASI	Artificial Super Intelligence
AGI	Artificial General Intelligence
ML	Machine Learning
ANN	Artificial Neuron Networks

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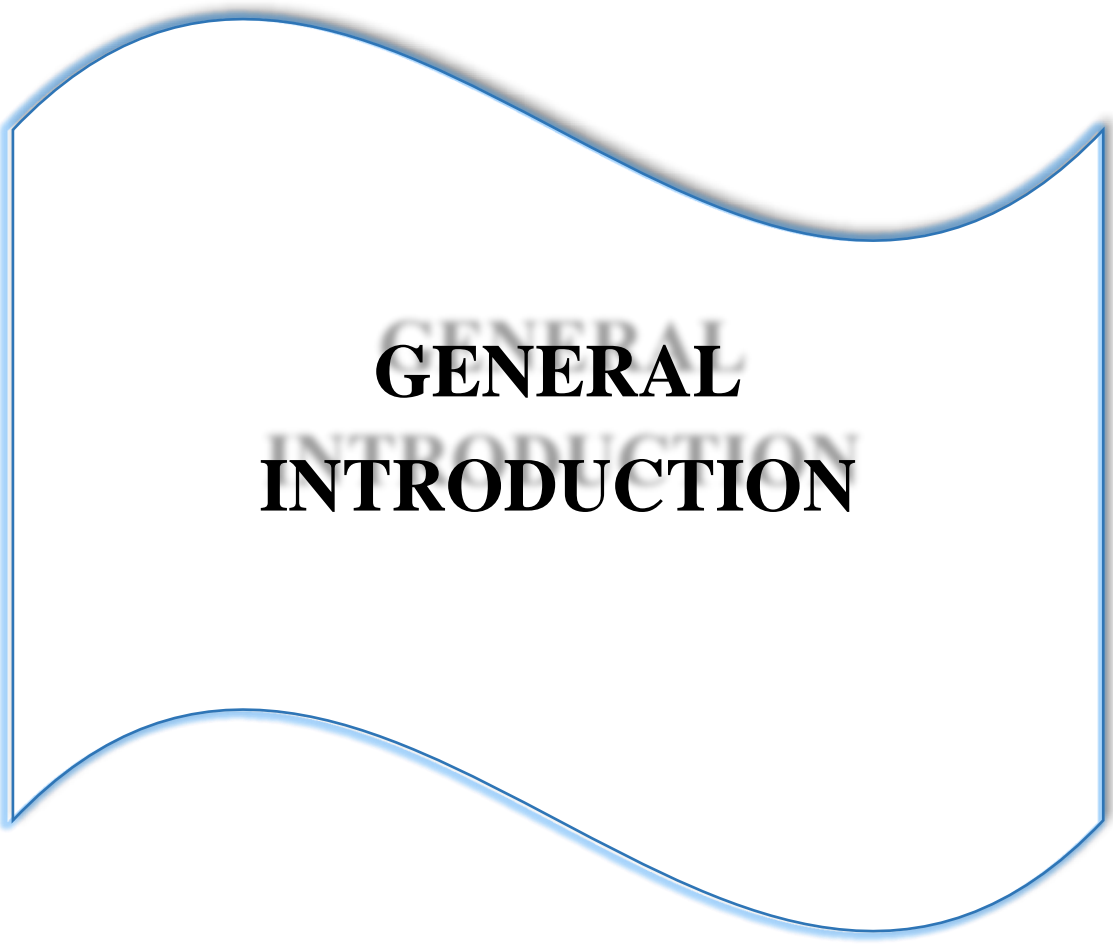
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**GENERAL
INTRODUCTION**

Background of the Study

Critical thinking is widely recognized as a crucial skill of effective education, enabling individuals to navigate complex problems, make informed decisions, and engage in reflective and analytical thought. Facione (1990) defines critical thinking as a "self-regulatory judgment" that encompasses interpretation, analysis, inference, explanation, and evaluation. In an increasingly complex and information-rich world, cultivating such cognitive competencies is not only essential for academic achievement but also vital for professional and societal engagement (Paul & Elder, 2014; Halpern, 2013). Recent developments in Artificial Intelligence (AI) have introduced new avenues for enhancing critical thinking in educational settings. AI-driven educational tools offer personalized, adaptive learning experiences that adjust content based on individual learner profiles and cognitive progress (Luckin et al., 2016). These technologies allow students to progress at their own pace while receiving targeted feedback and scaffolded instruction that promotes higher-order thinking (Holmes et al., 2019). Moreover, AI facilitates the development of interactive simulations and intelligent tutoring systems, which immerse learners in problem-solving environments. Such environments require evidence-based reasoning, analytical thinking, and real-time decision-making, thereby fostering active engagement and critical thought (Chen et al., 2020). Importantly, the integration of AI in education also introduces challenges. Teachers must be adequately trained to incorporate these tools pedagogically and ethically (Zawacki-Richter et al., 2019). Concerns related to data privacy, algorithmic transparency, and equitable access to AI resources remain significant, as they can reinforce existing educational inequalities if not addressed (Williamson & Eynon, 2020). While AI holds great promise for supporting critical thinking development, its effectiveness depends on thoughtful implementation, inclusive policies, and ongoing teacher professional development.

Literature Review

The integration of Artificial Intelligence (AI) into English as a Foreign Language (EFL) instruction has gained significant momentum, particularly regarding its potential to foster students' critical thinking skills. A growing body of research suggests that AI tools can play a pivotal role in enhancing learners' cognitive development when effectively embedded in

pedagogical practices. Liu and Wang (2024), in a study involving 90 EFL learners, demonstrated that AI-powered platforms such as ChatGPT and Bodo Udou had a more pronounced impact on students' critical thinking skills compared to traditional instructional methods. Their findings affirm that AI tools can effectively support the development of analytical and evaluative capacities, particularly in literature-based learning contexts. Despite these promising outcomes, several concerns have emerged regarding the integration of AI into educational contexts. Susanto et al. (2023) highlighted potential drawbacks, including the dissemination of inaccurate feedback by AI systems and a growing dependence on AI-generated content. Such tendencies may inhibit the development of learners' independent reasoning and diminish their capacity for self-directed critical inquiry. These findings underscore the importance of responsible and structured implementation of AI tools, with a clear focus on preserving students' autonomy and cognitive engagement. The review supports the view that AI can significantly enhance critical thinking in EFL instruction when thoughtfully integrated into classroom practices. However, the successful adoption of AI hinges on its role as a supportive pedagogical tool rather than a replacement for conventional instructional strategies. Educators must therefore ensure that AI is employed to complement, not supplant, the human-led processes that are essential for authentic academic growth.

Rationale

Developing students' critical thinking skills has become a central objective of modern education, particularly in English as a Foreign Language (EFL) context where learners are expected to move beyond linguistic proficiency toward deeper textual interpretation and analytical response. However, traditional teacher-centered methods still dominate, often limiting students' engagement in meaningful, cognitively demanding activities. In light of these challenges, Artificial Intelligence (AI) technologies are emerging as transformative tools that offer personalized learning pathways and promote independent critical thinking. AI-enabled platforms can support students in evaluating information, generating questions, and drawing reasoned conclusions—core components of higher-order thinking. This study arises from the observed difficulty among third-year students at Sadek Talbi Secondary School in applying critical thinking within English studies, where rote memorization still prevails and AI tools remain underutilized. By exploring the impact of AI-assisted learning on students' higher-order thinking skills, the study aims to contribute to a pedagogical shift toward more active, reflective, and learner-centered instruction. Its relevance is underscored by the growing integration of AI

in global classrooms and the urgent need for localized research to inform effective implementation.

Statement of the Problem

Many third-year students at Sadek Talbi Secondary School struggle to develop the critical thinking skills essential for effective learning in English as a Foreign Language (EFL) and other subjects. This issue is largely attributed to the continued reliance on traditional, rote-based teaching methods that limit student engagement in higher-order cognitive activities. Although AI-powered learning tools have gained global recognition for fostering personalized, interactive, and reflective learning experiences, their adoption within local school contexts remains minimal. A lack of access to appropriate technologies and insufficient teacher training has further hindered the effective integration of AI into classroom practice. As a result, students are deprived of valuable opportunities to develop reasoning, analytical, and problem-solving abilities. This study seeks to address these challenges by investigating the potential of AI-based tools to enhance critical thinking among secondary school EFL learners, offering an alternative to conventional instructional methods and promoting more meaningful academic growth.

Purpose of the Study

The purpose of this study is to analyse the impact of educational tools on the development of critical thinking in third-year students at Laghouat High School. A case study approach was adopted with both descriptive and analytical methods. Descriptive research describes current classroom practices, while qualitative analysis digs deeper to investigate patterns in student and teacher responses.

Research Questions

To carry out the research on the effectiveness of Enhancing Critical Thinking through Educational Tools, the following questions have been developed.

- What role do AI educational tools play in developing critical thinking among third-year high-school students?

- What is the view of students on the usage of interactive tools in their learning environments?
- What is the stance of the teachers on how the AI educational tools impact on student engagement and cognitive skills?

Research Hypotheses

- **Hypothesis 1:** The integration of AI-based teaching and learning tools is likely to enhance the development of critical thinking skills more effectively than traditional teaching methods.
- **Hypothesis 2 :**The use of interactive and student-centered learning tools may lead to greater student participation and the application of advanced problem-solving strategies
- **Hypothesis 3:** Teachers may notice significant improvements in students' ability to work independently, construct arguments, and apply analytical thinking when AI educational tools are utilized.

Research Methodology and Tools

This study adopts a descriptive-analytical research design to investigate the influence of AI-assisted learning tools on the development of critical thinking skills among EFL students. This approach is appropriate as it allows for the integration of both quantitative and qualitative data to measure learning outcomes, identify patterns, and assess learner perceptions within a specific educational context. A qualitative case study framework was selected, focusing on third-year English as a Foreign Language (EFL) students at Sadek Talbi Secondary School. The study employs two primary data collection instruments:

A purposive sample of third-year EFL students will complete a statistically validated questionnaire designed to gather data on:

- Their use of AI-based learning tools
- Attitudes toward these technologies

- Perceived impact on their development of critical thinking skills in an EFL context

The questionnaire will include both closed and open-ended items to allow for the collection of measurable trends and individual insights. And the Semi-structured interview will be conducted with two EFL teachers from the same school. This interview aims to:

- Explore how AI technologies are currently implemented in the classroom
- Understand teachers' perceptions of the impact on student engagement and thinking.
- Identify opportunities and challenges in using AI to enhance cognitive development

This qualitative component provides a deeper perspective on instructional practices and contextual challenges. Together, these instruments offer a comprehensive view of how AI-supported learning environments influence students' critical thinking within an authentic educational setting.

Structure of the Dissertation:

This dissertation is structured into three main chapters, preceded by a general introduction and followed by a general conclusion. The General Introduction presents the research background, problem, objectives, and questions, focusing on the role of Artificial Intelligence (AI) in enhancing critical thinking among EFL learners. Chapter One provides the theoretical framework, discussing the concept of critical thinking, traditional teaching methods, and the integration of AI in education, along with its potential benefits and challenges. Chapter Two outlines the methodology, detailing the descriptive-analytical design, data collection tools (student questionnaire and teacher interviews), and analysis procedures. Chapter Three presents and discusses the findings, highlighting the impact of AI on students' and teachers' critical thinking, and identifying key obstacles to effective implementation. The General Conclusion summarizes the main insights, reflects on their implications for EFL teaching, and offers recommendations for practice and future research.

Limitations of the Study

This study was conducted with a limited sample of third-year students at Sadek Talbi Secondary School in Laghouat, where English is taught as a foreign language. The small sample size and

localized context restricts the generalizability of the findings to broader educational settings. Moreover, the lack of access to advanced AI tools and instructional resources constrained the scope of AI integration within the classroom. Variations in students' and teachers' familiarity with AI technologies may also have influenced the effectiveness and perception of the tools used. Additionally, time constraints prevented the exploration of longterm impacts on critical thinking development.

Part one: Critical Thinking

Introduction

Chapter One:
Chapter One:

*Approaches to Critical Thinking and
Artificial Intelligence*

This chapter initiates a broad-minded view of the aspects that make up critical thinking to help develop a clear perception of such an extensive subject. It starts with some simplistic overviews and key definitions related to critical thinking. From there, it takes the major components of critical thinking and the importance of applying it in learning English as a Foreign Language (EFL), along with its basic ideas

I.1.1. History And Background

It was in ancient Greece, when the philosophers had just begun to develop, that critical thinking received its birth. The importance of reasoning and reflective inquiry was gradually gaining acceptance. Socrates, one of the key protagonists of this intellectual tradition, developed and imported the "Socratic Method", which relies on mindful questioning for the purpose of challenging assumptions to reveal greater truths. This approach is essentially the basis for any modern versions of critical thinking that emphasize reasoning based on evidence and cautious examination of ideas.

Socrates' student, Plato, elaborated these principles in his writings, addressing such matters as truth, reasoning and knowledge. In his dialogues, Plato offered the contention that for people to know anything, they must question whether their presuppositions about it are true, so as to free themselves for an understanding of complex matters. This foundation was further raised by Aristotle, even more illustrious than Plato among his students, who demanded a formalized study of reasoning. Aristotle's works on the deductive and inductive logic now form the core of critical thinking properly so-called, with those concerned with evaluating arguments in terms of their soundness.

In the Middle Ages, thinking moved more in a theological direction; for example, Thomas Aquinas applied logic to religious and philosophical questions. The dominant mode of intellectual discussion at the time was scholasticism which structured the reasonings and analyses of ideas to respond to such deep questions. The Renaissance reopened humanism and individual reasoning which challenged old doctrines and encouraged empirical exploration. Thinkers like Erasmus and More opened the value of inquiry that is open-minded and skepticism, to the extent that they now form the ideal basis for critical thinking practiced in modern education. This change would later evolve further to support reasoning and intellectual independence. During the Enlightenment, critical thinking was like the secret sauce of scientific and philosophical advancement. Philosophers like Descartes, Locke, and Kant pushed forward

logical inquiry, logical reasoning, and the rejection of unquestioned authority. They pushed reason as the only key to knowledge about the world. These concepts greatly influenced the intellectual climate and helped to set critical thinking as a necessary condition for both personal and social progress.

Beyond Western traditions, the Holy Qur'an also calls for the use of reflection and reasoning as pathways to knowledge and understanding. For instance, in Surah Az-Zumar (39:18) Allah praises the people of mind and logic, by stating, “[They are] those who listen to speech and follow the best of it. 11 “Those are the ones whom Allah has guided, and those are people of reason. This final verse strongly personalizes the imperative that all students must learn to critically evaluate all forms of information and draw accurate, evidence-based conclusions, a sentiment repeated the world over by the practitioners of modern critical pedagogy.

A hundred years later, this was far from the sole paradigm for education—even within American public education. More than half a century later, at the dawn of the 20th century, progressive educational theorists such as John Dewey would soon find themselves front and centre at the vanguard of a radical educational movement that would empower students to think critically and creatively innovate by actively engaging them through a project-based, experiential curriculum. Dewey’s conception of critical thinking turned out to be critical not only to recognizing and solving the right problems, but to meaningful engagement in a democratic society. His perspectives have deeply influenced contemporary approaches to teaching and learning, highlighting the role of critical thinking in preparing individuals to navigate modern complexities.

Perhaps at a moment when misinformation can jump out from behind any swipe like a digital bogeyman, being able to critically evaluate information might just be the very essential, core, discipline-neutral, life-altering, game changing, keystone competency that everyone’s been looking for. It stands on the shoulders of an intellectual tradition hundreds of years in the making, one that celebrates reason, scepticisms and rigorous examination of problems to come up with solutions and create deep rich meaningful educational experiences.

1.2. Definitions Of Critical Thinking

Maybe more than any other, critical thinking is a word that has come to be associated with the liberal arts and a core intellectual skill, the capacity to cross-examine information, weigh arguments and evidence, and reach reasoned judgments. Others might describe it as the required

mix of skills and processes that enable you to question deeply, reason clearly, and solve problems innovatively.

For Dewey (1933), critical thinking was the active, persistent, and careful consideration of any belief or supposed form of knowledge that guides actions. Dewey's insistence that we do not shy away from careful, reflective consideration is a good reminder that there is great value in coupling thought with action and application to complex real-world contexts. Ennis (1985) views critical thinking as a systematic and reflective way of deciding what to believe or how to act. This definition underscores its pragmatic application about wide-ranging problemsolving, where logical assessment of every evidence is main-to-centre to forming conclusions.

According to Lipman (1988), critical thinking is the reflective and responsible disposition toward anxiety and judgment that is cultivated by, and during, the use of well-defined criteria. This definition adds an ethical layer, underscoring the duty to make judgments that are equitable, informed, and logical. Facione (1990) describes critical thinking as an autonomous, self-correcting process of judgment that is intentional to the point of being systematic. Embedded within this process are the 4 central skills of interpretation, analysis, evaluation, and inference, as well as an overarching focus on the reflective explanation and justification of one's reasoning. This definition foregrounds the importance of both experiential reflection and reasoned logical inquiry in critical thinking.

As Halpern (1998) articulated, critical thinking is nothing short of a goal directed, reasoned, and purposive cognitive process that educators should strive to cultivate. A collaborative, consensus driven problem-solving process, evidence-based decision-making, the prioritized critical thinking and evaluation of information all form the foundation of 21st century definition of college and career readiness. Paul and Elder (2006) set our sights on the improvement of thought through critique, describing critical thinking as "the intellectually disciplined process of actively and skilfully conceptualizing, applying, analysing, synthesizing, and evaluating information collected from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action." Their public-facing approach emphasizes intellectual values like clarity, accuracy, precision—invaluable qualities that promote the reflective and critical pursuit of knowledge and ideas.

Together, these three lenses converge to provide a collectively synthesized, rich, and nuanced affirmation that critical thinking is most widely understood as a deeply disciplined, reflective, and systematic thought process. Each of these definitions does a great deal to shape

a robust picture of what computational thinking is meant to be within education and why it is so important to traverse a complex academic and corollary world.

1.3. Types of Critical Thinking

1.3.1. Analytical Thinking

Analytical thinking is really the capacity to take a step back from something and critically assess information and data, analyze it, break it down into its component parts, sift through it in black and white and see the colour, see the patterns, the relationships. It acknowledges visionary creative thinking in the humanities and social sciences, and in recent years increasingly illuminates the arts. So, what you're seeing in a world of sport is not just that huge emphasis on the spotlight on detail but their capacity to tackle these huge complex challenges. It's all this giant bonanza, which is like gold in science, data science, epidemiology, strategic planning. Analytical thinking doubles our capacity to weigh evidence from competing factors against one another and rule in/rule out causal connections to arrive at what is truly the case

1.3.2. Creative Thinking

Creative creativity is the art of producing a new idea, way of doing things, envisioning things or a new solution to something with a result of imaginative and original thinking. Typically seen only in the rearview mirror, it includes visionary, big picture, out-of-the-box, double-back flip conceptualization and risk-taking to address macro and micro-opportunities and challenges. Creative concepts are the heart of design, creative advertising, strategic communications and the musical and graphic arts – every field with creativity and innovation at their base.

1.3.3. Reflective Thinking

Reflective thinking is the type of self-directed, introspective, meta-cognitive process that requires a daunting, almost impossible, examination of one's own ways of thinking—which, as we know, aren't exactly processes. Since they first must learn to anticipate the impact of what they've designed, students begin to understand the causal relationships created by their choices and train themselves to be more effective problem-solvers. Yet this singular one is key, critical and foundational to self-exploration, schooling and advocacy.

1.4. Implications for teaching

Critical thinking is fast being recognized as an essential skill in education-higher education. We have been saying for years now-devoid of any sophisticated understanding of how to approach it-teaching in STEAM is a truly essential, must-have core curriculum that all students need, and need right now. STEAM prepares our children not just to succeed in life but also helps them to see their own potential in making the world a better place in the first place. Well, that seems fair. Probably there is no explanation as to why critical thinking fails. This pretty much raises another question of a deeper order: Can one really teach critical thinking? If so, how? The question has generated much scholarly controversy.

Some would say teaching critical thinking is complex by nature. Simpson and Courtney (2002) and McPeck (1990) argue critical thinking might be too intricate for explicit teaching. Adding, it is through social interaction that Atkinson (1997) says critical thinking is often acquired unconsciously rather than formally taught. Despite such views, there is common agreement among scholars that critical thinking skills can, and should, be systematically taught. Many view the nurturing of critical thinking as one of the main goals of formal education. Supporting this concern, a Wall Street Journal analysis (Belkin, 2017) revealed that many college students make minimal progress in developing critical thinking.

A staunch advocate for the teachability of critical thinking, Halpern (1998) presented an all-encompassing, four-part model to support its development. The components of the model include:

1. A dispositional component to prepare learners for the cognitive effort required in critical thinking.
2. Instruction in critical thinking skills based on analysis, evaluation, and synthesis.
3. Training in the structural aspects of problems and arguments to facilitate the transfer of critical thinking to various contexts.
4. A metacognitive component that focuses on monitoring the correctness and progress toward goals.

An approach to fostering critical thinking must also be multidimensional in nature. McTighe and Wiggins (2005) observe that inquiry-based learning environments with open questions provide opportunities to challenge students' assumptions and enhance deeper analysis. Kurland (2018) refers to information literacy, which creates an environment for students to evaluate sources, contexts, and potential biases of information, thus ensuring that they are

thinkers, not simply consumers of knowledge. Paul and Elder (2008) have given vital guidance on developing students' ability to assess evidence properly, on its reliability and significance. Exposure to different perspectives is equally important, because, as Bailin (1992) points out, it broadens students' outlook in support of the consideration of alternative views. Together, educators using these methodologies might put learners in a position to build their critical-thinking skills that will allow them to analyse and synthesize complex information, write soundly structured arguments, and engage in constructive dialogue. All of them guarantee that the centrality of critical thinking in modern education is preserved.

1.5. Assessing Critical Thinking

Critical thinking assessment is an essential aspect of education that requires assessment techniques that go beyond rote memory and standardized assessments. Performance-based assessments are an effective method of assessing students' reasoning abilities in real-world contexts. Tasks like essays, case studies, and projects require students to develop arguments, critique evidence, and develop solutions. Brookhart (2010) stated performance-based assessments give instructors a fuller account of students' critical thinking abilities than one's typical tests do. Rubrics are helpful to instructors because it allows for structured and transparent criteria for assessing critical thinking. It allows an instructor to assess key characteristics of critical thinking such as clarity, depth, logic, and creativity in students' work. Paul and Elder (2008) point out that if the rubric is developed well, this is consistent assessment as well as guidance for students to improve their reasoning skills and decision-making process. Formative assessments such as reflective journals or peer review are also an important method for encouraging students to be critically thinking across a student's entire learning through promoting developmental learning and engaging self-reflection while providing constructive feedback to peers. Black and Wiliam (1998) stated that formative assessments engage the gradual development of critical reasoning abilities while focusing on a student's process rather than final output. Problem-solving tasks are another effective approach to investigating critical thinking. Such tasks require students to respond to real-life situations that are unfamiliar, analyse the situation, recognize a problem, and generate essential responses or solutions. Halpern (1998) supports the use of problem-solving tasks, because they place the learner at the centre of engagement in critical thinking and expand the student's ability to transfer skills to other areas. There are challenges to be aware of in assessment of critical thinking including bias in evaluation and the varied approaches to assessment across disciplines, as well as integration into the existing course syllabus. However, the challenges can be examined using tools such as

rubrics and assessments as an essential step to assist in de biasing problems. There are several instances where educators can identify assessment tasks, whether performancebased tasks, formative assessment or problem-solving tasks that can create opportunities to assess critical thinking to be an ongoing part of contemporary education.

1.6. Impact of technology

The advent of technology in education has dislocated traditional teaching methods and provided new opportunities to increase learning and and engage students, [it denotes four roles in education: as support for teaching, as a tool for improving learning, as part of the curriculum, and as a means of instruction]. In education, technology has transformed it from, passive and reactive, to active and provocative. The democratization of education is made tangible by technology due to available quality digital and online content accessible to all learners at anytime and anywhere. Warschauer (2004) states that technology acts as a bridge that is needed to fill the cracks in traditional education, encouraging lifelong learning and inclusion, and is like technology in evaluating the traditional education domain. Unfortunately, issues such as unequal access to technology- aka, offered as the digital divide- and therefore continuing challenges to educational inequity remain and can very often compound inequities that already exist in society (Selwyn, 2011). Therefore, policies to achieve digital inclusion into schools must be considered. Technology has changed the way we teach, presenting new ways for teachers to provide learning experiences that are both engaging and immersive through, for example, video content, interactive simulations, and barriers to engage their students in creative and collaborative learning experiences. Mishra and Koehler (2006) informally talk about a framework called TPACK (Technological Pedagogical Content Knowledge) that encourages educators to consider the effect technology can have on adjusting pedagogies along with how educators can combine content knowledge with pedagogical knowledge and technological knowledge. The possibilities for students consists of more freedoms representing the content and an opportunity to express their voice through new technologies that also allows for reaching students with a variety of diverse learning styles, as well as, contextualizing ideas that may help them understand the content at a deeper level and ultimately an opportunity to demonstrate their understanding in a way that they may find interesting and compelling. In addition, assessment practices have changed when technology is considered to design, develop, or adjust adaptive, personalized and performance-based assessments. Brookhart (2010) discusses the purpose of alternative assessments originally defined by Grant Wiggins is to evaluate student learning higher order thinking skills, as an example: analysis, creativity, reasoning based, etc.

Technology also provides ways for immediate feedback to students, improving their ability to assess, refine and develop their understanding and skills. In conclusion, technology provides the most impact on encouraging critical thinking and creativity, students construct their learning through exploration of interactive ways to engage in their learnings and problem solve contemporary real-world problems as they integrate their learning with variety of viewpoints within their learning (Paul & Elder, 2008). Technology offers students creative tools to explore ideas in collaboration with their peers providing opportunities for creativity as well as the ability to share information in a world that required

100% of our adaption on a continual basis in an environment characterized by constant change.

1.7. Theories and Models

There are many conditions that require one to have critical thinking skills to assess the information, reason through arguments, and arrive at reasoned judgments. Various models and frameworks have been developed to systematize the teaching of and practice in critical thinking. Bloom's Taxonomy, the Paul-Elder Critical Thinking Model, and Socratic Questioning are among the most important. Each model emphasizes different areas of the critical thinking process, offering various tools for educationalists and learners.

1.7.1. Bloom's Taxonomy

Bloom's Taxonomy offers a set of cognitive skills that are classified into levels that were originally developed by Benjamin Bloom in 1956 and revised by Anderson and Krathwohl in 2001. The Taxonomy primarily serves the purpose of facilitating critical reasoning and higher order thinking in education.

The original level (1956):

- **Knowledge:** The act of remembering and recalling facts and concepts.
- **Comprehension:** Understanding and interpreting the information.
- **Application:** Using knowledge in new conditions.
- **Analysis:** Taking apart information to establish relationships.
- **Synthesis:** Compiling parts into whole new constructs.
- **Evaluation:** Making judgments according to some criteria and standards.

Revised level (2001):

- **Remembering:** Retaining and retrieving material.
- **Understanding:** Explaining concepts and ideas.
- **Applying:** Putting knowledge to practice in real-life situations.
- **Analyzing:** Breaking up information into parts to determine how they relate to one another.
- **Evaluating:** Appraising according to evidence and criteria.
- **Creating:** Bringing forth new ideas, products, or viewpoints.

1.7.2. The Paul-Elder Framework

The Paul-Elder Framework, created by Richard Paul and Linda Elder, is a complete and recognizable framework for critical thinking. The goal of the framework is to develop reasoning ability and intellectual rigor as well as disposition necessary for thoughtful and reflective judgement. The complete framework has three components: the Elements of Thought; Intellectual Standards; and Intellectual Traits. Elements of Thought: the Elements of Thought are the basic components of reasoning. The eight elements are used to assist reasoning about the structure of thought: Point of View: Every thinker has a point of view on an issue that is influenced by their experiences, beliefs and culture; recognizing other points of view on an issue develops intellectual humility to construct a deeper understanding of a complex problem. Questions: Thoughtful questioning is a fundamental component of critical thinking; questioning helps clarify the issue, identify the purpose, and identify hidden assumptions that influence thinking.

Data/Information/Evidence: Effective reasoning relies on a strong basis of reliable information and evidence. Evaluating the quality of that evidence (and its relevance) is an important step to take to make sure you draw good conclusions. Concepts and Ideas: Concepts are mental building blocks through which we can structure information systematically. Examining the concepts lying behind an argument allows us to identify confusion, biases, and limitations of understanding. Assumptions: All reasoning entails unstated premises or assumptions. Thinkers gain understanding by recognizing and critically reflecting on the unstated ones. Inferences and Interpretations: Making conclusions (or reasoning) is about interpreting information and making logical inferences. A good thinker must assess the accuracy and potential biases in those

interpretations to avoid improper reasoning. Implications and Consequences: Good reasoning requires considerations of the greater implications and potential outcomes of a specific thinking pathway (or line of reasoning). A responsible thinker considers those consequences so that they reason ethically and responsibly. Aside from the components of reasoning, Paul emphasized the value of intellectual standards as an objective measure for assessing the quality of thinking. In this case, the standards consist of clarity, accuracy, logic, relevance, depth, breadth, and fairness. For example, the clarity standard is concerned with using precise language, thereby minimizing confusion on the part of the reader. The fairness standard promotes open-mindedness and respect for alternative views. If thinkers apply these standards to their reasoning to improve the quality of their thinking.

1.7.3. The Argumentation Model

Developing critical thinking and intellectual growth are generally believed to be grounded in the ability to analyse information and arguments. The Argumentation Model represents a new and innovative way to promote critical thinking in English as a Foreign Language (EFL) setting. Academics such as Stephen Toulmin and the van Ameren brothers have closely studied the Argumentation Model. Unlike other models that highlight the isolated breakdown of arguments and reasoning skills, the Argumentation Model emphasizes the collaborative construction and analysis of arguments to develop critical thinking skill for learners of English as a Foreign Language.

At the core of this model is the notion that critical thinking is dialogical. Rather than requiring students to individually traverse complex reasoning processes, this model advocates learning environments where students interact with a variety of positions. Students tune their critical thinking skills collectively by examining opposing views and creating rebuttals and come away with more meaningful content knowledge. The Argumentation model gives EFL residents basic skills to deal with arguments written in English:

Argument Analysis: Learners are guided to search for and consider the various components of arguments, including claims, claim support, reasons, evidence, justification, and modality (the degree of certainty attached to a claim), as outlined by Toulmin (1958). This removes personal interpretation in either supporting information that could be taken in opposing ways, and/or to evaluate the relevance and strength of supporting information.

1. Fallacy Recognition: The model supports learners' awareness of common logical fallacy in support of other

arguments. Thusly, people fallacies such as ad hominem attacks or straw man arguments serve to weaken the credibility of an argument. Being able to recognize weaknesses in arguments that they encounter in English will allow EFL students to evaluate arguments when reading and avoid making those pathways in their written English (van Ameren et al., 1996). 2. Counterargument Construction: Building counterarguments from opposing viewpoints fosters critical thinking systematizing attractive paths to open-mindedness. Exposing learners to contrasting perspectives or stance allows learners to have informed discussions as they work through anticipated dialogue, yet scholars contend these interactions contribute to conversational competence when using English (van Ameren et al., 1996).

The emphasis on argumentation and counter argumentation as well as the dialogical nature of the model also fits in well with more current collaborative trends in EFL instruction. Language learning is integrated with critical thinking through class activities of developing arguments, defending ideas, and debating issues in English in a respectful manner. Plus, the Argumentation Model can be utilized for subjects other than EFL, as its principles can be adapted when teaching literature, science, history, etc. These applications clarify for students how they must use critical skills to deal with arguments when they go onto debates in schools and life, as well as development of intellectual and linguistic skills.

Conclusion

As mentioned earlier, the critical reasoning in science is the backbone of social and intellectual evolution, which dates to the Socratic Method. It has increasingly become a necessary skill for synthesis, evaluation, and analysis of information. "Critical thinking" is how we learn to deal with the world and its challenges, offering reasoned choices and enabling open discussions. It asks people to question hidden assumptions, bias, and engage with alternative perspectives skills relevant for science, democracy..... This raises pertinent discussions about what education can do toward producing critical thinkers who do not just respond to existing problems. In the context of information overload and misinformation, it is critical in enabling people to know real sources, make thought-out decisions, and participate actively in their communities.

PART TWO: Approaches to Artificial Intelligence (AI)

II.1. Overview

1.1. History

The origins of artificial intelligence go as far back as ancient history when, according to the writings of many philosophers, the idea of intelligent machines was conceived. The formal establishment of AI as a field but began only in the mid-20 century. The 1956 Dartmouth Conference is considered a watershed moment because it was the event that introduced the term “artificial intelligence” as well as the foundations for inspiring research into machine learning, problem solving, and symbol manipulation. This included, for example, programs for playing chess as well as rule-based systems. Eventually, the field advanced considerably with the development of neural networks, natural language processing, and deep learning. These advances made AI research go from, well, research, to actual work in various fields, science, and life in general.

1.2. Definition

Artificial intelligence or AI “is a field of computer science that focuses on designing systems that can perform tasks that normally require human intelligence”. These include reasoning, problem solving, learning, perception, natural language processing, and decision making. AI refers to a set of algorithms and computational models that can make machines mimic mental processes and learn to some extent. AI has also been divided into two major forms: narrow AI, which is created to perform a specific function, and general AI, which attempts to achieve human-level capability generally in many human functions. This area of research adopts interdisciplinary studies utilizing mathematics, neuroscience, linguistics, psychology, etc. to create technologies that can learn, adapt, and perform without human intervention in a variety of situations.

II.1.2. Types of Artificial Intelligence

2.1. Narrow AI (Weak AI)

Narrow AI describes AI that is applied to solving a very narrow problem or set of problems. They are programmed for a specific purpose and cannot generalize what they know or their functions beyond the area for which they were programmed.

- **Virtual Assistants:** In the same way that answering questions, providing reminders, or controlling smart devices, Siri, Alexa, or Google Assistant offshoots of natural language processing.

- **Recommendation Systems:** Narrow AI on platforms such as Netflix and Amazon is used to analyse user preferences and recommend movies, products, or content according to individual tastes.
- **Fraud Detection:** Artificial intelligence plays a very important role in this type of enterprise data protection, as it detects potentially illegal activities.
- **Autonomous Vehicles:** These systems create what we call Narrow AI, which nowadays accounts for self-driving vehicles that can make split-second decisions while navigating through obstacles and traffic rules in real-time.

2.2. General AI (Strong AI)

General AI is a theoretical type of artificial intelligence which aims at duplicating human level intelligence and reasoning. General AI is unlike Narrow AI in that it learns, adapts, and even uses knowledge from various domains without being explicitly programmed for a specific task.

From revolutionizing scientific inquiry through computational analysis of massive quantities of data to hypothesis generation and even experimental design, AGI can prove itself beneficial in a variety of fields because of simple general intelligence capabilities- cognitive architectures, whatever. In medicine, AGI-assisted systems can promise to push the envelope on diagnosis, treatment planning, and drug development. AGI will bring personalized education experiences for individual students, thereby defining their needs and preferences. Advanced robots capable of performing complex tasks while interacting with their environment like humans will be other derived advantages of AGI. Still, one important observation should be made: AGI is only a notion and not a reality.

2.3. Super AI

Super AI refers to an ideal condition in which an artificial intelligence would surpass the human intelligence in every possible way such as creativity, problem solving, and even decision making. It would ideally be an intelligence that can outperform even the most skilled human on almost any cognitive task.

- **Speculative Applications:** In other words, Super AI has the potential to transform medical research, climate change mitigation, oceanic governance, and global economy.
- **No Current Examples:** Super AI naturally remains nothing more than an elaborated hypothesis, and thus it is indeed a subject of lively philosophical and ethical debates.

2.4. Reactive Machines

One of the most basic forms of AIs is the reactive machine that responds to a stimulus at any given time without any backward or forward memory or learning capabilities. These systems operate on predefined rules, which drive their mostly real-time decision-making. A classic example is IBM's Deep Blue, the chess-playing programme that beat a world champion by calculating optimal moves in an extensive library of possibilities. Reactive machines are also found in basic diagnostic systems in healthcare, through which reaction analysis of patient symptoms suggests probable conditions.

2.5 Summary

AI embodies a mixed bag of technologies, where each is characterized by a peculiar working mechanism and a variety of possible applications. Narrow AI (weak AI) is programmatically designed to perform allocated tasks, for instance, voice assistance and recommendation applications. General AI (strong AI) is an abstract approach aimed at achieving artificial intelligence that resembles human intelligence, while Superintelligent AI counters the very idea of human intelligence, whereby the AI is above human capabilities. From that, Reactive AI functions under a set instruction while Limited Memory AI can work with short memories that allow it to make decisions based on previous experience. In light of that, Theory of Mind AI is supposed to bring emotion and intention-like understanding to machines. All these different types indicate the degree of development of AI, conveying the duality of application and theory.

II.1.3. Machine Learning

3.1. Overview Of Machine Learning

AI embodies a mixed bag of technologies, where each is characterized by a peculiar working mechanism and a variety of possible applications. Narrow AI (weak AI) is programmatically designed to perform allocated tasks, for instance, voice assistance and recommendation applications. General AI (strong AI) is an abstract approach aimed at achieving artificial intelligence that resembles human intelligence, while Superintelligent AI counters the very idea of human intelligence, whereby the AI is above human capabilities. From that, Reactive AI functions under a set instruction while Limited Memory AI can work with short memories that allow it to make decisions based on previous experience. In light of that, Theory of Mind AI is

supposed to bring emotion and intention-like understanding to machines. All these different types indicate the degree of development of AI, conveying the duality of application and theory. In other words, the challenges presented by rapid development and deployment of AI technologies manifest in the wide domain of technical concerns, social endeavors, and legal matters. From the technical vantage point, problems of scalability, easy integration, and reliability have been glaring. Issues of conscience, such as fairness, accountability, and transparency, with emphasis on the mitigation of biases, must be treated with utmost consideration to protect human values and rights. Safety and security parameters necessitate that systems be rigorously developed to avert accidental deployment, malicious use, cybersecurity break ins, and unauthorized access to sensitive data. Moreover, the societal impact of the human labor force being displaced and inequality increasing should weigh heavily in dialog. Legal and regulatory regimes have to be conversant with the rapid mutations in AI, thus requiring a multi-disciplinary approach to hammer an agreement on standards and guidelines. Handling the above-mentioned issues will involve anticipate action and a concerted effort to enjoy the full benefit of AI while minimizing potential damages. The continued progress of machine learning really does show enhancements made in the ability to access and utilize data, the increase in computational power, and the advances in algorithms. However, as Ian Goodfellow, one of the scholars in the field, would emphasize in his work on adversarial examples, issues regarding bias, fairness, and security still need to be resolved by interdisciplinary studies to implement it well and ethically.

3.2. Types of Machine Learning Models

Machine learning is a scientific framework that underpins systems' capabilities to analyse data, recognize patterns, and predict or decide outcomes. Predictors such as regression models, as discussed by Trevor Hastie and Robert Tibshirani in their treatises on statistical learning, predict continuous outcomes by mapping relationships among variables, for example, stock prices or weather. Classification models, which Tom Mitchell has probably written most about, categorize data into defined segments for projects such as spam detection and medical diagnosis. Clustering models, according to Judea Pearl in his studies on probabilistic reasoning, assign data points to clusters based on common properties and create applications such as customer segmentation and anomaly detection. Reinforcement learning models trained by Richard Sutton and Andrew Barto allow a system to learn to act within an environment that is changing continuously using rewards and penalties. One of its uses is in robotics and selfdriving cars. All these advances are cut across by various industries and, at the same time, pose serious ethical and technical challenges as well as require careful supervision.

Machine learning is really an artificial framework of computation, which can include systems that can analyze the data to find a certain pattern and learn to make predictions or even decisions. Regression models, like the ones Trevor Hastie and Robert Tibshirani have in their books on statistical learning, predict things continuously such as stock prices or weather conditions using a relationship among variables. Classification models such as that Mitchell has probably researched most heavily apply data to defined categories where projects such as spam detection and medical diagnosis are common. As Judea Pearl has put in his research on probabilistic reasoning, clustering models cluster data points based on commonalities and make applications such as customer segmentation and anomaly detection. Reinforcement learning model trained under Richard Sutton and Andrew Barto trains a system to work in a changing environment through rewards and penalties. An application of such systems is in robotics and self-driving cars. These models cut across many industries and at the same time pose serious ethical and technical dilemmas needing very careful scrutiny.

3.3. Algorithms

Machine learning algorithms serve as the basic means for data processing and knowledge extraction in machine learning systems. Such algorithms act as learning engines capable of interpreting data patterns and improving their performances through time. They range from simplistic linear regression models predicting by studying the relationship between the variables themselves to deep and advanced neural networks that upon understanding mimic the architecture of the human brain to tackle complex and high-dimensional problems. The decision of which algorithm to choose should depend on the task at hand and the structure of the data being analysed so that the algorithm suits the particular needs of the problem, which may range from very simple regression to extremely complex classification tasks. These algorithms form the basis of the adaptability, efficiency, and success of a machine-learning application.

II.1.4. Deep Learning

The deep learning is concerned mainly with the artificial neural networks that use a composition of several layers of neurons. Thus, deep learning is a specific kind of machine learning that largely relies on structures like those of the human brain. Traditional models rely heavily on the external expert knowledge imbued into them to correctly generalize performance, whereas deep learning gives an enormous advantage of automatic learning complex patterns brought about from the data; thus, such effectiveness is additional with respect to the unstructured information types it can process-images, audio and text. The convolutional neural networks are specific for image recognition from the perspective of deep learning, while

recurrent neural networks target sequence-based actions such as language processing. Deep learning makes a lot of innovations across autonomous systems, health, robotics, etc., but it requires a lot of data and a lot of computational power to carry out the training.

4.1. Artificial Neuron Networks

Artificial neural networks (ANNs) are those models whose inspiration comes from the human brain in terms of structure and working. Using a set of interconnected nodes, or "neurons," it forms layers. Whereas the process of data is achieved by passing signals through specific connections with weights. There are many architectures of ANNs, such as an input layer that accepts data and hidden layers that perform the computations. Finally, there is an output layer which gives predictions or classifications. The ANNs modify the weights for interconnections during trains, using more techniques like backpropagation and gradient descent in reducing errors. When trained, they are evaluated on different data using outside resources to assess their generalization capacity and performance as compared to real-world situations. Yet, ANNs are also popular in application areas like image recognition, speech processing, and understanding natural images because they can correctly learn complex patterns over data. Computational demand, overfitting, and low interpretability remain challenges that can become areas of improvement.

The signals received are transformed into calculations randomly distributed across a multilayer network. The multilayer scheme uses three layers: the input layer typically receives the data to be processed; the hidden layer calculates according to predetermined methods; and the output layer expresses a prediction or classification.

Practice train modifying weights for connections using by some optimization techniques such as backpropagation associated with gradient descent to minimize bias factors. Data also provided for performance evaluation based on generalization and prediction abilities in a realworld data scenario. ANNs are mostly utilized in pattern recognition fields such as image processing, voice recognition, and the comprehension of human languages since they can learn complex patterns from a data set. The main issues that remain areas of further improvement include hardware resource requirements, overfitting, and low interpretability. These signals are transformed irreversibly into multiple calculations through the layered network. There are three layers to multilayer-protection input, and the input layer usually gets information to process; the hidden layer performs the calculation through programmed methods; and the output layer provides a prediction or classification.

Practice train modifies weights for connections using by some optimization techniques such as backpropagation associated with gradient descent to minimize bias factors. Data also provided for performance evaluation based on generalization and prediction abilities in a real-world data scenario. ANNs are mostly utilized in pattern recognition fields such as image processing, voice recognition, and the comprehension of human languages since they can learn complex patterns from a data set. The main issues that remain areas of further improvement include hardware resource requirements, overfitting, and low interpretability.

4.2. Deep Learning Models Training

Training a deep learning model is a procedure wherein data is propagated through a neural network to allow the model to learn and offer precise predictions or decisions. It is defined as a sequence of procedures that continuously enhance the parameters of a model, weights, and biases, to identify complex patterns and relationships spanning the data. Deep learning training requires a huge amount of data and significant computing resources since the model typically has many layers of neurons that require internal calculation concerning their corresponding computation.

The division of the dataset into training, validation, and testing subsets marks the start of the process. The actual training dataset is meant to drive the model forward in learning while adjusting parameters using techniques of optimization like stochastic gradient descent (SGD). Some loss functions measure differences like mean squared error or cross-entropy between predicted and actual outcomes. In this regard, it can give direction on how improvements will be made. Backpropagation algorithm in deep learning is part of propagating the error to be retrained back through the network so that weights will be updated efficiently.

Fine-tuning modelling hyperparameters such as learning rate, batch size, and epoch number during training also helps model performance. Regularization techniques like dropout and L2 regularization are employed to combat overfitting, whereby the model becomes too fitted to the training data. The validation data will be engaged continuously throughout training to observe how well the model generalizes and potentially adjust parameters.

When training ends, evaluation happens using a testing dataset to estimate possible generalization of the model in the real world. In this context, accuracy, precision, recall, and F1 score measures are quantified for its effectiveness. Training deep learning models may thus require computations, high-performance machines, such as GPUs or TPUs. However, deep

learning has the potential; it underpins the successful working of rubrics: image recognition, natural language processing, autonomous systems, and medical diagnostics applications.

4.3. Deep Learning Applications

One of these fields which allow the maximum freedom to innovations and technologies to redefine industries. Broadly, the main popular applications for deep learning lie in:

- **Computer Vision:** Deep learning improves the areas further than simply image recognition into object detection and facial recognition. They can be applied in medical imaging for diagnosis, in self-driving cars for visual perception, and in security systems for identity verification.
- **Natural Language Processing:** NLP deals with speech recognition, which enables applications such as translation, sentiment extraction, chatbots, and voice assistants, whereby machines understand and generate human-like text and speech.
- **Autonomous Systems:** deep learning systems develop self-driving cars, with drones, more and more, and robotic systems for navigation and control and dynamic environment decision-making.

That was where deep learning technology could achieve excellent breakthroughs in all these fields. Such can handle very well with unstructured data and where it can navigate patterns that are very complex.

II.1.5. Future Directions of AI

5.1. Advancements in AI Research

No future Machine Learning technology will emerge better from the development of evermore complex algorithms and the gathering of ever-larger datasets. Such advances may one day allow artificial intelligence systems to learn and reprogram at the speed of light from new experiences, far beyond anything that today's models typically exhibit. Experts believe that a bright prospect awaits AGI-an abbreviation for artificial general intelligence-much closer to the day when improved technological advancement will realize AGI-that is, machines that mimic human intelligence-rich functions, such as performing and apprehending diverse intellectual tasks.

5.2. Emerging Technologies

Simultaneously, while quantum technologies serve an exceptional function, neuromorphic computing empowers adaptive AI systems. Thus, quantum computing is one such area that utilizes special properties of particles called qubits. It uses principles such as superposition and entanglement to deliver exceptional computational power that can potentially give answers to problems presently intractable by classical systems. Quantum speed-ups in optimization, drug discovery, material science, or machine learning are expected benefiting from rapid, fault-tolerant quantum computation.

Neuromorphic computing adds another level of efficiency and adaptability to AI systems, based on the biological architecture of the human brain. Here, neuromorphic chips using parallel processing with minimal energy are very effective in pattern recognition and sensory processing and find applications in robotics or healthcare. The integration of quantum computing and neuromorphic computing will unlock a new volume of AI applications, resulting in intelligent systems with unmatched effectiveness and speed in solving important issues.

5.3. Potential Societal Impacts and Ethical Considerations

Bringing forth marvels of advanced AI technologies like quantum and neuromorphic computing has societal implications and ethical challenges. These technologies hold exclusive remedies in some of the world's biggest problems, such as: Healthcare, Climate Change, and Transportation, with breakthrough and optimizing implementations. These are interesting innovations of AI systems that could increase efficiency and productivity and facilitate better decisions across diverse industrial segments.

On the flip side, these innovations pose more grave issues. As major issues include workplace chaos induced by greater automation phenomena, sharpening social inequalities, potential appropriation of AI systems in mass vigilance or totalitarian control, ethical question marks relating to data privacy matters are among the most vital ones. AI biases need to be addressed with priority, as well as accountability assignment for AI-generated decision-making.

The design of systems ought to be built on a foundation of fairness, transparency, and a human-centred approach to achieve the potential benefits of AI and to try to minimize the associated risks. Policy and regulation development that considers prudent and ethical uses of AI would need interdisciplinary involvement and ensuring contributions from diverse perspectives. Ultimately, the conundrum of societal impact by AI needs to be addressed on a balanced front, thus fostering innovation without compromising ethical principles and societal welfare.

II.1.6. AI In Education

Indeed, the entire scenario of ESL teaching is undergoing a significant change because of the developing trends in AI. AI as technology and application opens doors for countless possibilities to change the way ESL is taught and learnt.

6.1. Personalized Learning Experiences

Personalized learning for ESL students does not only account for their different goals, preferences, and skill levels; it also creates much better engagement with the students as well as proficiency in their lessons. AI-infused tools provide personalized individualized lessons through performance, while custom content bears the learners' interests and contexts. These multisensory and goal-oriented ways would enhance the sense of learning, providing flexibility and good tracking of progress. The above approaches instill confidence and lower barriers while supporting quick learning. Therefore, education becomes inclusive and adaptive to indirectly strengthen the language of ESL learners.

6.2. Enhanced Engagement and Motivation

Engagement and motivation are vital components in the successful learning of a language. With an inspiring set of tools and strategies designed to keep the advertisers interested and encourage them to exercise some degree of effort, teachers can create a very rich and meaningful environment. Interactivity such as gamification, where elements of games are injected into the instructional activities, promotes fun as well as engagement through rewards and challenges. Immersive technologies such as virtual and augmented reality heighten engagement by offering simulations of relevant real-world context for the learners to practice safely and in a controlled environment.

Enhancing motivation with materials linked to learners' interests, cultural contexts, and future ambitions evokes relevance attached to dedication to the learning process. Also, perhaps the acknowledgment of the accomplishments of learners, with positive reinforcement and generous meaningful feedback, sustains motivation. Working hand in hand, these strategies offer a supportive and effective setting in which learners can now realize their goals.

6.3. Improved Feedback Mechanism

AI provides instant and highly detailed feedback on pronunciation, grammatical problems, and even writing mechanics errors to language learners. Such tools are geared toward speech assessment in which pronunciation problems are identified while AI more related to writing support would provide remedial advice on sentence structure, word choice, and uncovering possible plagiarism. This, thus, allows learners to develop an immediate correction mechanism for their mistakes, which consequently improves their English proficiency. For instance, a student in Brazil sits down to write a class essay and makes use of Grammarly for Education an AI writing tool. The system will then score the paper, apply grammar, and stimulate vocabulary improvements. It will elaborate on sentence clarity. It will also include any indications of possible plagiarism and rewrite suggestions for very much improving the coherence and quality of the essay. Such feedback is instant in order to create the confidence of a writer and in becoming a better polished writer.

6.4. Challenges

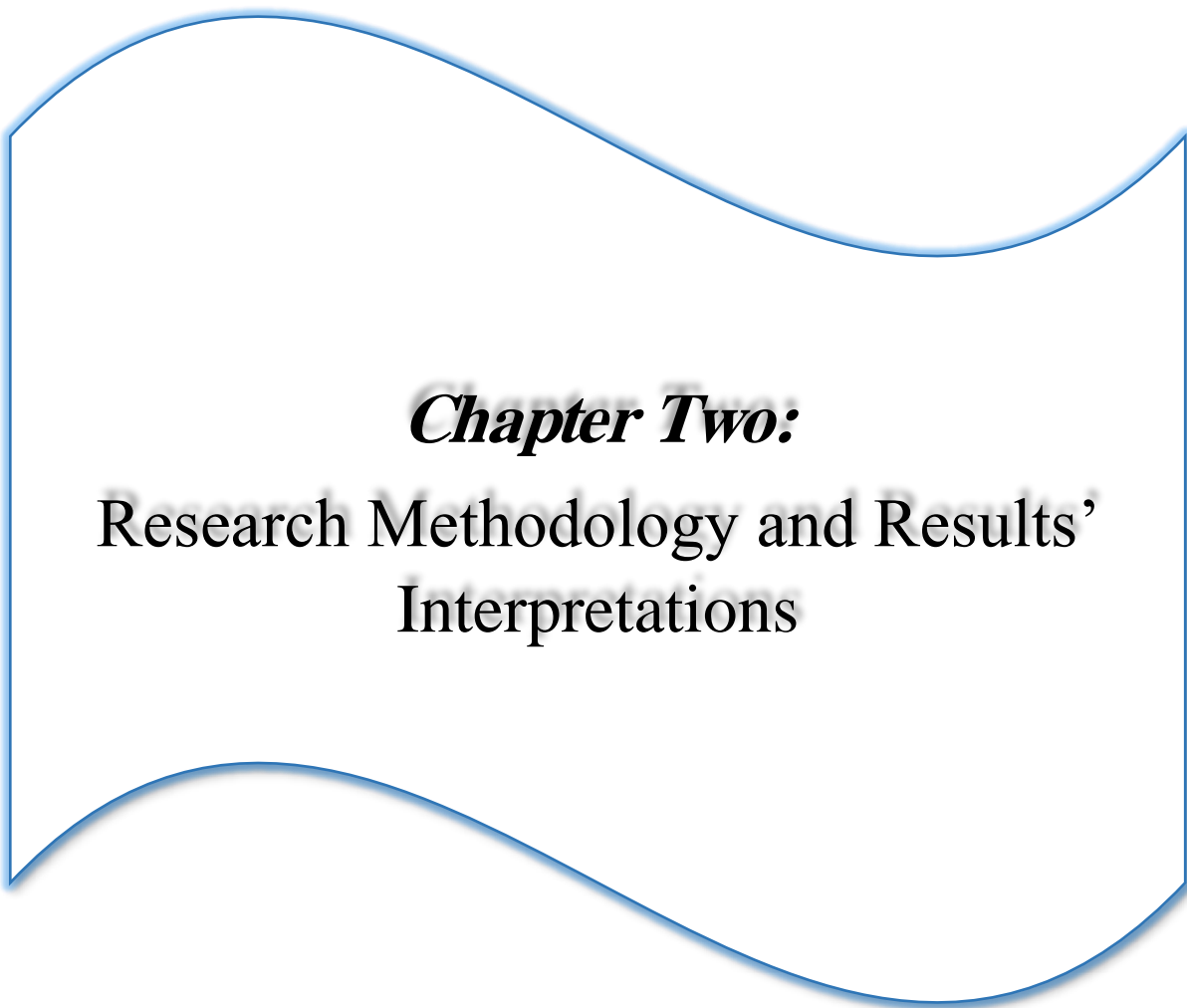
There is no doubt that important challenges confront the incorporation of ESL education practices using AI-enabled instruments. The most notable problem is that of over-reliance on the use of AI, which will lessen the contribution of human instructors in overlooking an essential aspect, socialization, and culture. Besides, biases in AI can also pose challenge. A case in point is that when such technologies are not sensitively created, they contribute to reinforcing stereotypes or simply become inadequate to capture the variance of linguistic backgrounds. It comes from the digital divide: access to technology required for learning in an AI-based system is not equally distributed among students; thus, the disparities are brought in education.

Conclusion

AI is often called the transformational technology and is centred on computational models and ML algorithms that illegally disrupt many areas. Some of the technologies that enable machines to carry out activities that conventionally call for human intelligence-picturizing visual inputs, recognizing speech, arriving at decisions, and translating languages-are natural language processing, neural networks, and deep learning. AI is industry-agnostic innovation improving efficiency across numerous sectors, including healthcare, finance, and transportation.

AI has immense prospective abilities for the enhancement of the educational experience. Customized teaching to meet every learner's actual needs raises engagement and efficiency. AI-based resources may also provide feedback in real time, identify challenges learners face, and recommend individualized resources to address those challenges.

Conversely, the application of AI on the school premises brings other ethical practices to the landscape, such as protection of data privacy, countering algorithmic bias, and ensuring fair access of technology to everyone. Some of these concerns must be dealt with if opportunities for the humane and inclusive development of AI are to be entertained.



Chapter Two:
Research Methodology and Results'
Interpretations

Introduction

2.1. An Overview on Research Methodology

2.2-Research Design

2.3. Variables

2.4. Research Plan

2.5. Sample Of the Research

2.6. Tools of The Research

2.7. Questionnaire And Semi-Structured Interview Analyses

2.8. Interpretations of the Questionnaire Results

2.9. Interpretations of the Semi-Structured Interview Answers

2.10. Results of the Hypotheses

Conclusion

General Conclusion

Introduction

Right from the outset, this chapter presents the methodological framework developed for use in this study about effecting the development of critical thinking skills among third-year high school students through AI tools. The main research question guiding this study is, "How effective are AI tools in enhancing critical thinking skills among third-year high school students?" This chapter describes the research design, with the variables under consideration, the specific research plan undertaken, characteristics of the sample population, and the tools for data collection and analysis so the reader can have confidence that the research process lends itself to credible and replicable findings.

2.1. An Overview on Research Methodology

The methodology that the current research is adopting regarding the present study is, in this chapter, a guiding principle on the tools, design, and techniques used to study the educational tools that enhance the students' critical thinking at Laghouat High School for Grade 3 high school students. The case of the research methodology chapter is to guide the study as well as provide a model for future research in a similar educational context.

According to Creswell (2014), a well-organized methodology chapter not only adds to the credibility and reliability of the study but also makes it easier for readers to assess the findings critically. In this sense, this chapter has an important role in validating research outcomes. In accordance with Saunders, Lewis, and Thornhill (2019), the method section sets the tone for the proceeding activities that include data collection, data analysis, and finally addressing the research questions. The study designs, participants, methods, and application of data analysis procedures have been brought forth by justifying each choice with appropriate references.

Ethical considerations such as informed consents, confidentiality, and protection of participants form another crucial aspect of the chapter. Ethical research practices safeguard participants and ensure credibility of the findings, Breman (2016) says. Ethical codes and guidelines help researchers to comply with legal and institutional regulations and help them overcome biases that could threaten the integrity of the study.

This part also provides the context under which the research could be undertaken, including the education and cultural background of the participants, which is crucial so the audience knows what influence these may have on the results. The limitations of the study are also presented here so as to try and contextualize the findings and highlight potential biases or constraints that could have affected the research outcomes.

2.2. The Research Design

A qualitative case study is conducted to investigate how educational tools influence the development of critical thinking for the third-year students of Laghouat High School. A qualitative approach allows the in-depth study of student behaviors, perceptions, and cognitive engagement within the natural classroom environment, which provides understanding of the whole topic.

The first reason for opting for this approach is its exploratory stance: critical thinking is a complicated skill that is more an interpretive analysis than a numerical measurement. Qualitative methods thus provide a detailed account of how students interact with their education tools and how they perceive their advantages. Secondly, the case study is actually the instrument to study specific groups within their real-world context: a sort of Yin (2009) states that case studies would be ideal for the analysis of classroom-based learning as a phenomenon that is associated most closely with its environment. Thirdly, qualitative methodologies are suited to obtain students' accounts, attitudes, and reflections relevant to the critical thinking abilities being developed among them, allowing researchers to investigate and interpret how and how well their students approach problem-solving and collaborative learning through interviews, video-recorded classroom observations, and student feedback. Fourthly, it is flexible enough to allow researchers to refine the methodology as themes emerge or on the basis of participant responses. This improves the relevance of the study. Lastly, the qualitative approach addresses the theory that would lead to other studies in educational settings. Merriam (2009) states that the case study can help generate new perspectives in such uncharted fields as the role of educational tools in enhancing the development of critical thinking.

Qualitative methods provide thorough and detailed data that further unpack student learning, going beyond what any standardized test or survey can infer. This directly relates to the aims of this study; namely, to understand not only what works, but how and why it works in the classroom.

2.3. Variables

In educational research, clear definition of variables becomes necessary for any investigation and interpretation of outcomes. Variables furnish the cause-effect relationship with respect to the educational setting. This research looks into two main types of variables: the independent, which is manipulated to observe its effect, and the dependent, which is responsive to the manipulation.

2.3.1 Independent Variable: Educational Tools

In this study, the independent variable is educational tools used in the classroom. These include interactive and student-centred activities such as group activities, problem-solving tasks, visual tools such as mind maps and graphic organizers, digital media in the form of short video clips, educational software, and reflective questioning techniques. For a period of six weeks, the

educational tools will be integrated into classroom instruction to engage active participation from students. The environment is required to change from a teacher-centred one to more of student-directed in order to foster engagement and independent learning. This is theorized through Vygotsky's (1978) social constructivism which states that learning tools are agents of mediation that help students to internalize concepts and expand their understanding. Thus, learning tools here are predicted to enhance critical thinking by getting students to analyse and evaluate information better. Furthermore, these tools also map into educational theories that support higher-order thinking skills. Structured learning interventions, as Paul and Elder (2006) argue, have a huge potential for promoting and improving students' critical thinking concerning evaluating evidence and creating solutions to problems-what are fundamentally the skills of critical thinking.

2.3.2 Dependent Variable

The dependent variable in this study is the students' level of critical thinking, which is presumed to improve with the use of educational tools. Critical thinking refers to the ability to objectively analyze information, consider different perspectives, assess arguments, and make judgments based on the considered information. Several qualitative indicators have been employed in the study to measure the change in critical thinking:

- The depth and complexity of students' responses to open-ended questions.
- Recognition of logical connections and assessment of different viewpoints during group discussions.
- Engagement in problem-solving tasks.
- Reflections recorded in classroom journals or gathered through interviews.

2.4. Research Plan

The purpose of this study is to analyse the impact of educational tools on the development of critical thinking in third-year students at Laghouat High School. A case study approach was adopted with both descriptive and analytical methods. Descriptive research describes current classroom practices, while qualitative analysis digs deeper to investigate patterns in student and teacher responses.

2.4.1. Research Questions

To carry out the research on the effectiveness of Enhancing Critical Thinking through Educational Tools, the following questions have been developed.

- What role do educational tools play in developing critical thinking among third-year high-school students?
- What is the view of students on the usage of interactive tools in their learning environments?
- What is the stance of the teachers on how the educational tools impact on student engagement and cognitive skills?

2.4.2. Study Hypotheses

- **Hypothesis 1:** The improvement of critical thinking may be more successful with the integration of teaching-learning tools for education compared to the regular way of teaching.
- **Hypothesis 2:** Students that partake in interactive and student-centered tools for learning may be more participative with advanced problem-solving techniques.
- **Hypothesis 3:** Teachers may observe clear improvements in students' properties to work autonomously, argumentation, and analytical skills when using educational tools.

2.5. Sample of the Research

The research sample includes Twenty third-year high school students from Sadek Talbi High School in Laghouat during the 2024–2025 academic year. Participants were chosen through purposive sampling, focusing on those with consistent exposure to educational tools in their classroom learning. The sample maintains gender balance by including both male and female students.

2.6. Tools of research

Finding out whether educational tools can develop critical thinking skills among third-year high school students at Laghouat High School was conducted using two principal instruments: a student questionnaire and semi-structured interviews with the teachers. Both instruments were chosen to generate rich qualitative data.

- **Questionnaire:** The questionnaire aimed to elicit students' experiences of working with learning tools, how they view the influence of those tools upon their approach to thinking, and how comfortable they feel when dealing with them. The survey may have free and Likert type answers.
- **Collaborative interview:** The interviews with teachers sought to explore how the teaching materials are applied, the challenges involved, and the influence on students' performance. The interview for that purpose included four open-ended questions focusing on cognitive engagement, classroom environment, and students' growth.

Before using the instruments for actual data collection, we pilot-tested them on a small group of both students and teachers to ensure their effectiveness.

2.7. Questionnaire and Semi-Structured Interview Analyses

1. Students Questionnaire

The questionnaire developed in this research paper is designed to understand students' attitude towards educational tools and the perceived effect of the educational tools in developing critical thinking skills. It investigates how third-year high school students interact with visual aids, interactive activities, and collaborative learning, analyzing whether they improve their analytical, reasoning, and problem-solving skills.

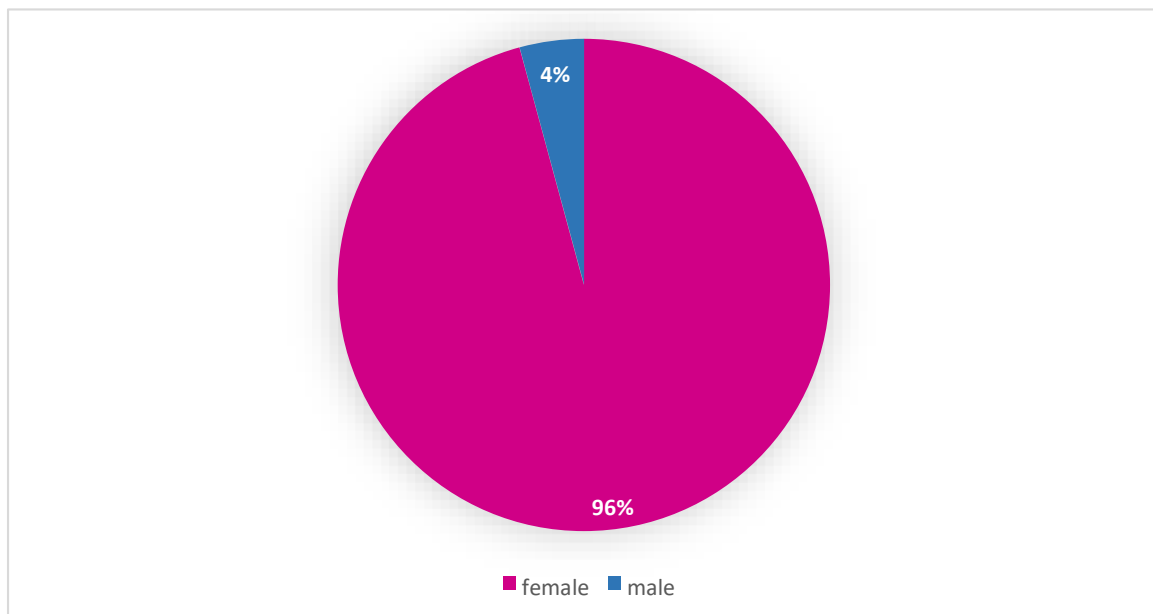
Additionally, the questionnaire imparts the challenges students face in the employ of these tools while comparing their learning experiences with traditional approaches. It espouses a reflection exercise as to how their thinking evolved before, during, and after exposure to classroom educational tools (See Appendices). It considered developing a theoretical construct about how educational tools could enhance critical thinking and students' engagement. The findings would then enhance the effectiveness of the teaching methods in the Algerian secondary school system, specifically those that enable more independent learners to think. The analysis of the data collected in this way was thematic, with recognition of recurring and similar patterns, opinions

of students, and salient facts regarding the effectiveness of these tools in shaping critical-thinking abilities.

2.8. Analyses and Interpretations of the Results

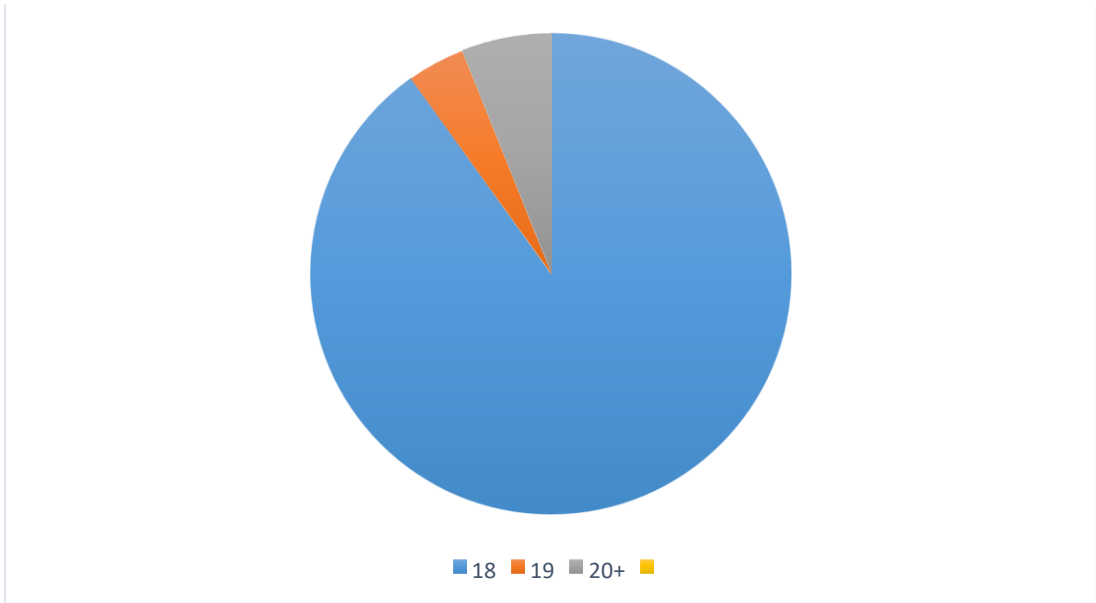
○ Personal Information

Figure 2.1. The Participant's Gender



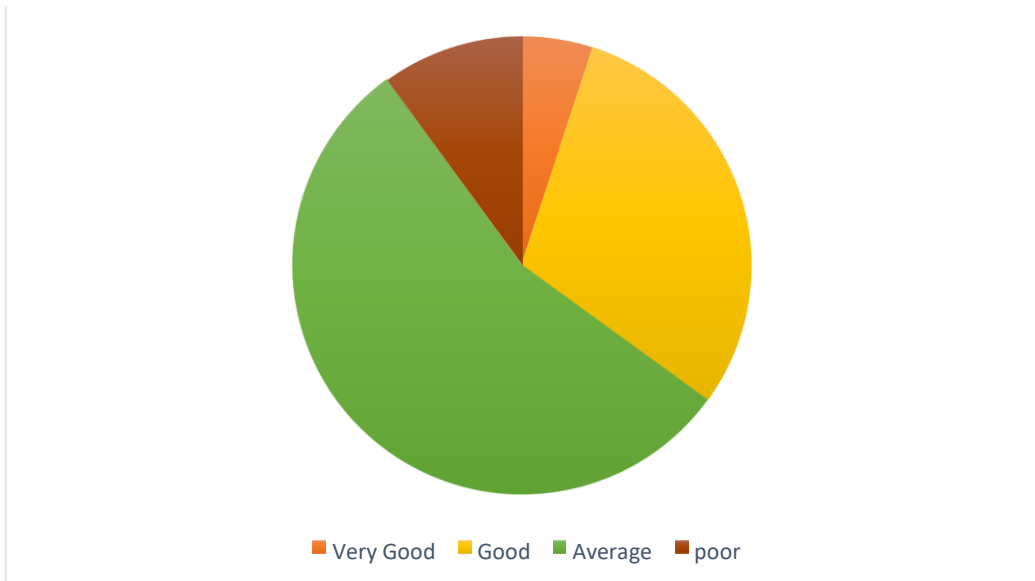
- ✦ The pie chart indicates that participants are female, making up 72.3% of the sample, while the rest participants are male, representing a modest 27.7%. This highlights the overwhelming majority of female participants in the study.

Figure 2.2. The Participant's Age



✦ Most students are between 18 and 20+ years old. The results show that a large number of the participants are teenagers

Figure 2.3. Students English Proficiency Level



✦ Figure 03: portrays the students' proficiency level ,we notice that the majority of students their level in English are Average ,while the rest levels of the students is between poor ,good and very good .

PART 02 : Familiarity with AI tools

When asked :Have you ever used any AI tools for educational purposes?

Figure 2.4.Using AI Tools For Educational Purposes .

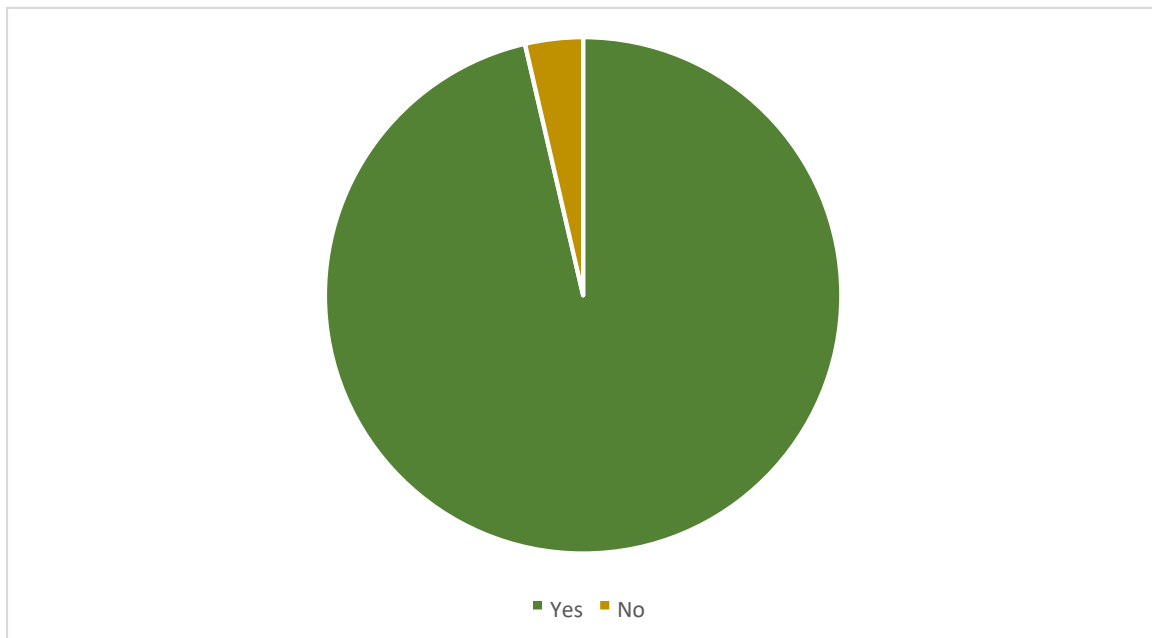
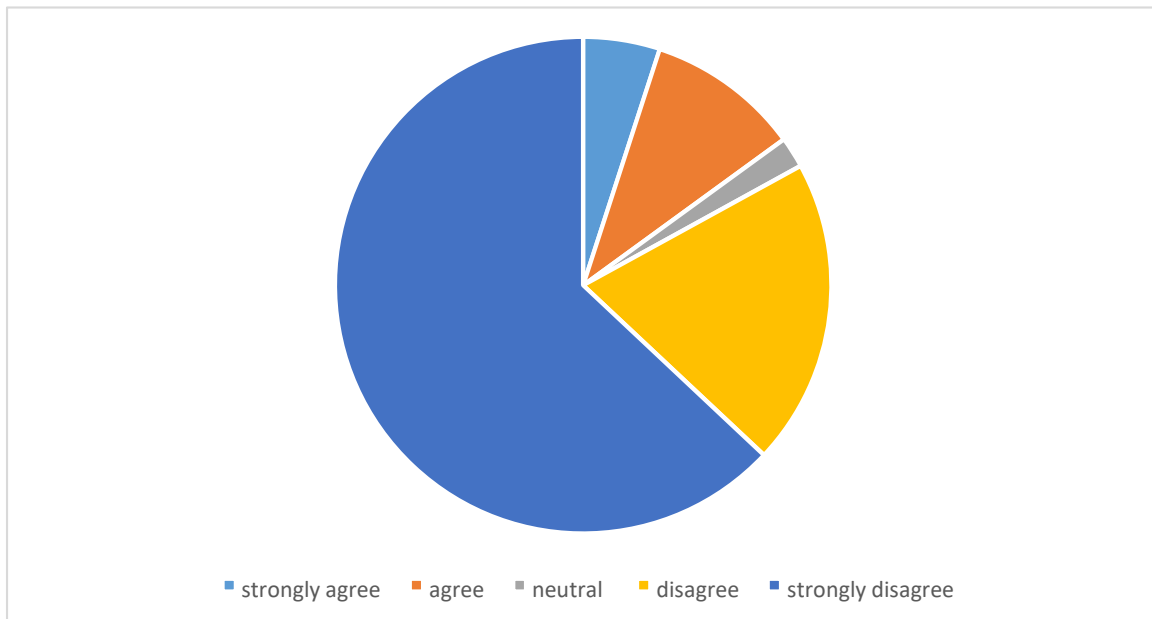


Figure 04 : illustrates students' experiences with AI-assisted tools , The graph above indicates that most students are familiar with artificial intelligence and use it in their daily lives and even in their studies. Among the artificial intelligence tools they use most frequently, their answer was chatGPT.

PART 03 : Critical Thinking Development

When asked :In your opinion, do AI tools encourage you to think critically ?

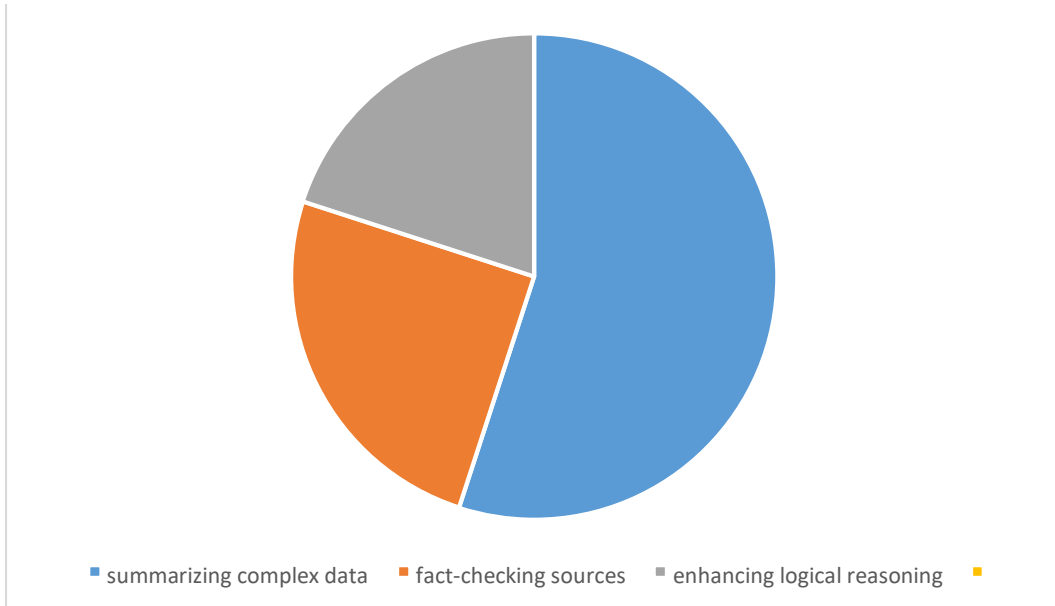
Figure 2.6. AI Tools Encourage Students' To Think Critically



As shown , The majority of students who studied English , they strongly disagree .That AI tools can encourage them to think critically . This response suggests that AI tools might be perceived as offering instant solutions instead of encouraging students to analyse and assess information independently.

Furthermore, when the students are asked: In what ways do AI tools help you analyse and evaluate information?

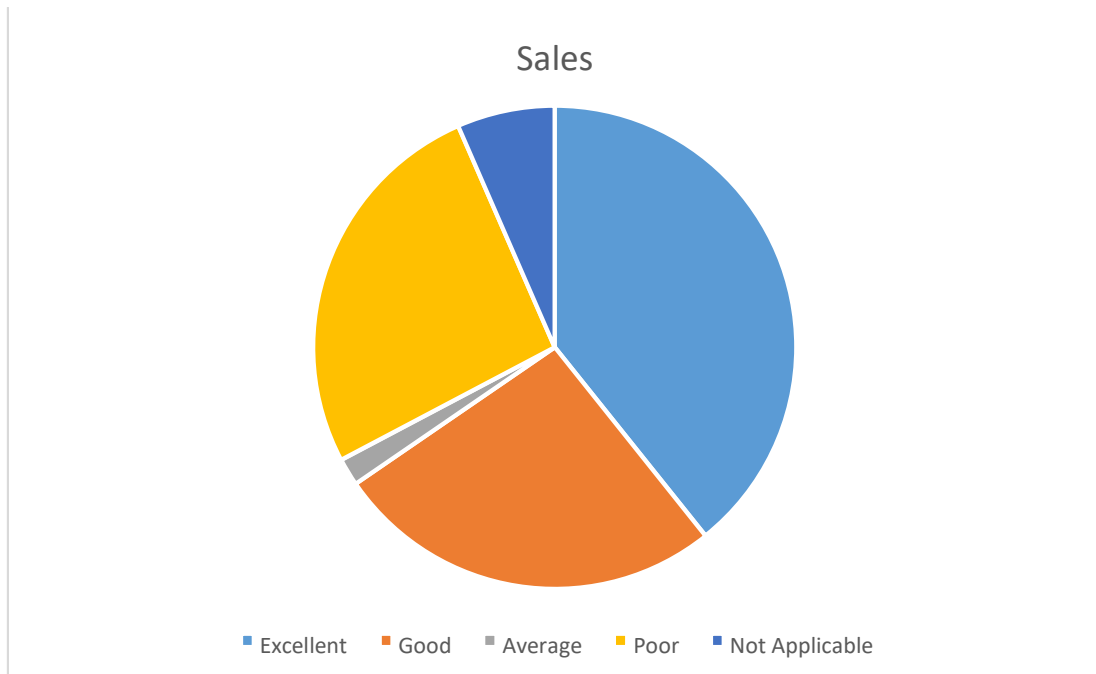
Figure 2.7. AI Uses



Most students agree that technology (AI) can help them to analyze and evaluate information by offering more interactive and engaging opportunities.

- Question 08 : How would you rate the effectiveness of AI tools in developing your creative problem-solving skills?

Figure 2.8 . The Participants Rate The Effectiveness of AI To Solve Problem .

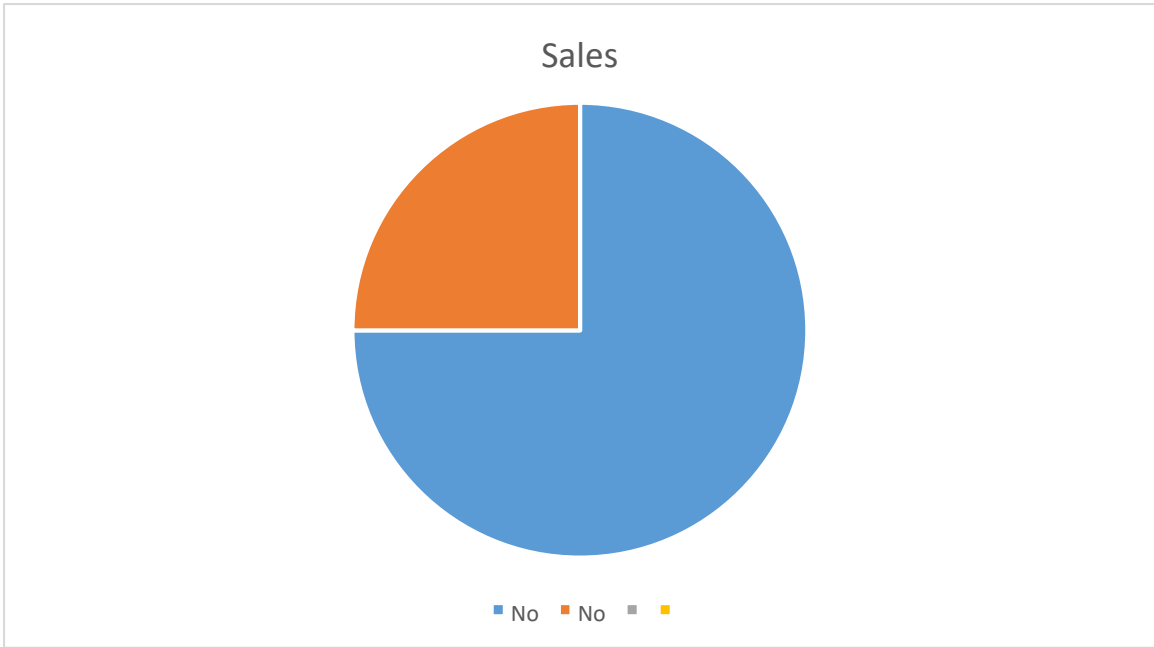


- ✦ The students believe that AI can facilitate and enhance creative problem-solving by offering new ideas, alternative solutions, and insights that challenge conventional thinking.

PART 04 : Challenges and suggestions

- Question 10 : Do you feel you rely too heavily on AI tools for learning and problem-solving?

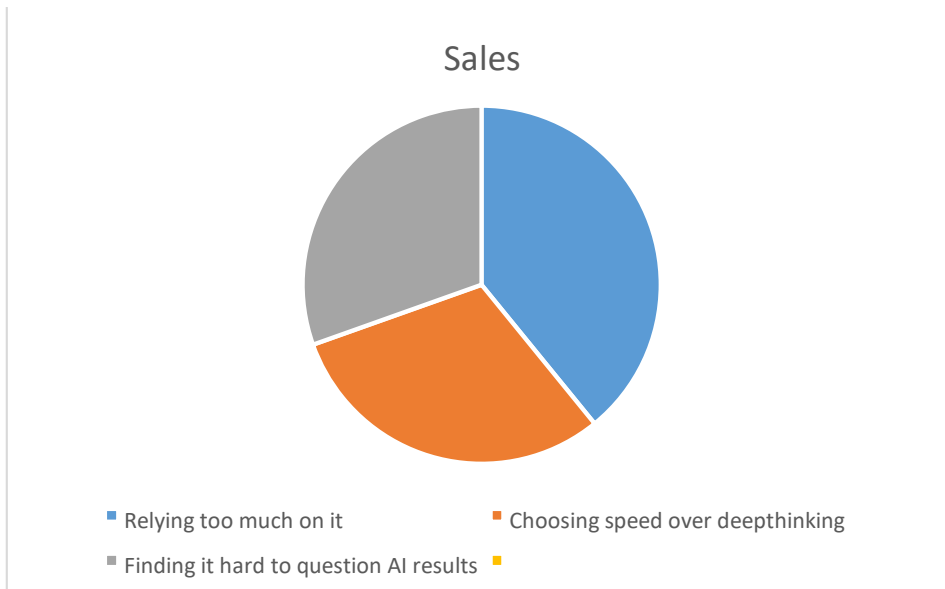
Figure 2.10. Students' Relines on AI For Learning



The majority of students say they don't rely too much on AI, it may suggest they are not fully utilizing its benefits, lack confidence in using AI, or prefer traditional learning methods .

- Question 11: What challenges do you face when using AI tools to develop your critical thinking skills?

Figure 2.11 : The Participants Challenges When Using AI To Develop Critical Thinking Skills

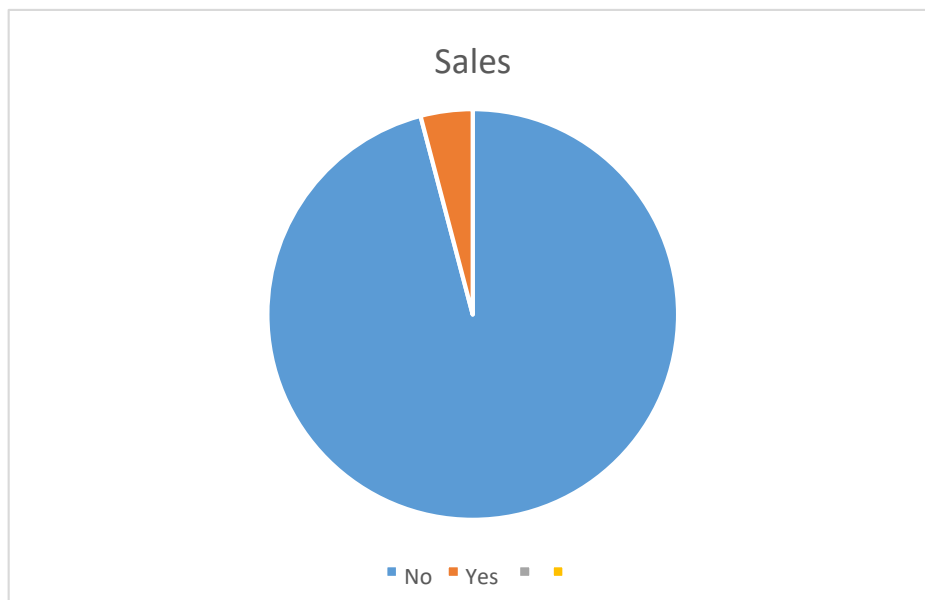


✦ Most of the Students fear that technological barriers may lead to unequal learning experiences and reduce the approach's effectiveness. They are also concerned about the level of tech skills needed to engage in critical thinking successfully

PART 05 : General Perspective

- Question 12 : Do you believe AI tools should play a greater role in education? Why or why not?

Figure 2.12 : The Role of AI In Education .



The pie chart above shows the role of AI tools in education where we see the majority of students answer with NO, because in their opinion, artificial intelligence cannot replace professors and their experience. And relying too much on AI may reduce independent thinking and limit traditional learning methods. The other participants answering with YES because they think that AI can enhance learning by providing personalized support and fostering creativity.

Interpretations of the Questionnaire Results

The findings from this study's questionnaire demonstrate valuable insights regarding third years of high school as they perceive and use AI tools in their initiatives to develop critical thinking. The age distribution (mostly at 18-19 years), a gender-balanced representation of the respondents, and a general self-reported "Good" and very good level of English proficiency indicate that this is a highly competent group technologically regarding interaction with digital tools as tools of learning in classrooms. Considering usage familiarity, it was reported that a huge number of students have previously relied on AI tools for their educational purposes. In most cases, people overwhelmingly quoted ChatGPT, Grammarly, and QuillBot. This group mainly relied on the tools for language development, content generation, and text paraphrasing. This is an indication that students are increasingly depending on AI for their learning. The majority indicated agreement or strong agreement that AI supports them in thinking critically while reading, verifying credibility, and thinking of alternative ways of doing something. When asked to elaborate, a majority of students explained that AI tools assist them in understanding difficult concepts, giving alternative perspectives, and critically analysing arguments. These are signs that artificial intelligence encourages thinking rather than accepting handed-down information.

Most respondents indicated that AI is Excellent or Good in the creation of solutions to novel problems. Most of the positive remarks were about abilities such as analyses, valuations and

inferences. There were fewer mentions of metacognition and decision making. Therefore, metacognition and decision making would need more assistance and could do with more specific targeted teaching even with the use of AI tools.

There were issues with students. They relied on AI too much, were not alert about the AI-generated content, and sometimes misinterpreted very complex questions. Most students understood the potential danger of using AI without working on developing their own cognitive abilities.

Notwithstanding the above negativity, the final summary of students was clearly in favor of much higher use of AI in the school system. It emphasized the deliberate guided effort of integrating AI into use for training critical thinking instead of providing instant answers. Most students felt that AI would be more beneficial when integrated into assignments that require interpretation, discussion, and collective understanding of ideas among peers. Most importantly, results support that AI tools are more than useful for a learner trying to integrate critical thinking into one's practice, at least when it is purposeful and guided. This study entails enlightening accounts that could very much inform how AI is integrated into high school pedagogy to develop analytical and reflective thinking in students.

2.10. Interpretations of the Semi-Structured Interview Answers

Along with the information obtained from the student survey questionnaire, semi-structured interviews were held with eligible teachers at Laghouat High School to determine how teachers view the contribution of AI tools in developing students' critical thinking skills. The interview was guided by the following four open-ended questions:

Question 1: To what extent do you believe AI tools like ChatGPT or Grammarly help EFL students develop their critical thinking skills?

In his opinion, AI technologies may stimulate critical thinking development by providing alternative perspectives, thus encouraging students to question, analyse, and reflect on information. These tools can help students comprehend complex issues by offering differing solutions and new concepts or by honing a student's reasoning abilities. However, the teacher fears that students will become accustomed to the notion of not thinking very deeply because of overuse. So, there is a need to introduce these tools in a manner that will push students to consider them aids and not necessarily the final answer.

Question 2: In your understanding, what are the major advantages and disadvantages of using AI tools in EFL instruction?

The teacher also stated many advantages of AI feedback including immediacy, increased vocabulary options, and possible individualization of learning opportunities for the individual child. Such tools make the learners ticketed far more becoming independent and likely to instil in them confidence in being speakers of that language. The teacher, however, remarked that the students would pose dangers in the sense that they would expect too much from AI only to accept the responses instead of analysing and understanding them. Such scenarios create issues with academic honesty and, most importantly, true cognitive activity. Accordingly, observance of the uses of AI tools and their integration into collaboratively competitive activities and tasks in their classrooms would be necessary for teachers

Question 3: What challenges or ethical concerns have you encountered while using AI tools in your classroom?

One of the major challenges," he said, "is that students feel more and more comfortable depending upon the AI for answers, which could inhibit their capacity for critical thinking when faced with learning tasks." Some students habitually accept the outputs of the AI without further inspection or investigation. There is also the more general question of academic integrity: students relying on AI to complete their work with no input or original thought of their own. The teacher also mentioned the unease regarding the privacy of data, especially in situations where students were uploading work onto third-party platforms or were pressed to create accounts. Those have raised the urgent question of how to establish explicit guidelines for, and instruction in, digital literacy regarding the ethical and effective use of AI in the classroom.

Question 4: Which methods do you propose for leveraging AI to enhance student critical thinking in analysis and problem-solving exercises?

The instructor suggests making AI the springboard to initiate evaluations and discussions. For example, students can generate AI responses to a question and then consider them together in order to identify merits and shortcomings. This process fortifies collaborative learning with critical thinking. Another suggestion for making use of AI with reflective activities is having the students compare their own ideas with products from AI or clarify how they developed their decisions. The point of these methods is to transform "from consumption to critical participation".

2.10.Results of the Hypotheses of the Study:

Findings from the students' survey and teachers' interview indicate that AI-powered educational tools improve to a meaningful extent the critical-thinking skills, engagement, and problem-solving abilities of students. Apart from stimulating independence in learners, these tools also develop further analytical abilities. However, challenges such as overreliance on technology

and inequitable access to digital tools could be noted. To ensure realized benefits from these tools, balanced integration must, however, be established.

Conclusion

It examined the positive and negative impacts on critical thinking skills in foreign language development shown by third-year students learning English. The questionnaire results show a divided opinion about AI impacts: the positive one reports on students with preexisting critical thinking skills using AI to learn new situations that enhance their analytical ability and deep thinking; conversely, other students who do not have those skills would develop more dependency through AI and would further not be able to judge and analyse information independently.



General Conclusion

General Conclusion

Critical thinking is considered an essential part of academic success, professional advancement and everyday challenges. With the increasingly prominent role of artificial intelligence (AI) on the educational horizon, it is pertinent to ask: what influence will the technology have on the development of critical thinking skills? More specifically, are there fears about the implications of greater reliance on AI in the classroom for children's capacity to think critically and independently. This study seeks to investigate the effect of AI educational tools on critical thinking of third year students in SADEK TALBI Secondary School in Laghouat. This study utilized a survey and a semi structured interview with students and teachers to explore how AI is used in the classroom and whether it influenced students' critical thinking.

The results of this study reveal a complex influence of AI on the critical thinking of the students. AI tools, on the one hand, seem to strengthen some elements of critical thinking by allowing students to seek out, and be provided with, a balance of perspectives and sources. This access stimulates abstract thought and moves students closer to applying strategies/cognitive operations with access. And AI tools also encourage self-directed learning, as students are free to browse materials at their own pace and interact with high-level concepts outside of traditional classroom walls. However, the research has also come across certain hurdles with reference to the AI application. One significant issue is that students are more likely to become heavily reliant on AI-sponsored information. Such passive dependence may develop apathy toward active, critical thinking instead. Thus, this dependency can derail students' initiation in acquiring essential skills to think independently and ask further questions. Yet, the undeniable advantages of critical thinking generating AI educational tools can, at times, potentially become disadvantages, there is also a way dependent on how they are used. Teachers have an important role in guiding students using these AI tools so that maximum benefits can be availed in the education settings. Teachers should also enhance their feedback, encouraging students to critically analyze AI-generated output, engage in reflection, and value independent thought. By making this balance between AI and traditional approaches, teachers can ensure that these AI tools will only boost instead of hindering students' critical-thinking skills.

Recommendations : *For Students:*

- **Engage Actively with AI Tools**

Use AI tools not only as a source of answers but also as sources to develop ideas and solve problems. Critically engage with the content so as to enrich understanding.

- **Critically Evaluate AI Content**

It is imperative to check the correctness and relevancy of the AI-generated contents, using aiding sources as necessary.

- **Maintain Academic Integrity**

Avoid plagiarism in using AI so that work reflects original thought, and where applicable, acknowledge usage of AI.

- **Practise Reflective Thinking**

Reflect on how the tools may help or hinder your learning process. Justify the choices you make as well as changes in your thinking *For Teachers* :

- **Hardwire AI into Pedagogy**

Lay down pedagogical tasks where students engage in critiquing AI-generated content, thereby bringing about critical thinking.

- **Specify AI for Classroom Instruction**

Make it clearer how AI should be employed in learning with respect to establishing guidelines for originality and ethics.

- **Impart Digital Literacy**

Educate students on the ins and outs of AI, including the boundaries of its applied possibilities, so they can use AI tools responsibly through a critical lens.

- **Understand AI for Personalized Learning**

Employ AI for semi customized activities to aid personal learning so that students work at a pace that suits themselves, fostering an independent spirit.

Limitations of the Study

The limitations of this research bear critical importance. First, we had a rather limited sample that was limited to one school and thus may not reflect a wider population. The period of study was also limited and may not have allowed sufficient time to capture any long-term impact AI has on critical thinking. Upon that is the fact that self-reported data provided by students and teachers can be confounded by personal bias. Students also had variable availability to AI tools, which was reflected again in their level of engagement with the technology. Finally, this research focused primarily on critical thinking without investigating many other cognitive skills that AI may impair or rather help. These limitations can be taken care of in future studies by an increase in sample size, study duration, and control of research.



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Zawacki-Richter, O., & Anderson, T. (2018). The role of AI in education. *Education and Information Technologies*, 23(1), 12–34. <https://doi.org/10.1007/s10639-017-9611-1> **Appendix I: Students' Questionnaire : Developing Critical Thinking Skills Through AI**

Tools

Dear Student,

This questionnaire seeks to explore your experiences and perspectives regarding the use of Artificial Intelligence (AI) tools in developing critical thinking skills. Your responses will contribute to enhancing educational practices. Please answer all questions honestly and thoughtfully.

Part 1: General Information

1. Gender:

Male

Female

2. Age:

18

19

20

21 or older

3. Your English proficiency level:

Very Good

Good

Average

Poor

Part 2: Familiarity with AI Tools

4. Have you ever used any AI tools for educational purposes?

Yes

No

5. If yes, which AI tools have you used? (e.g., ChatGPT, Grammarly, QuillBot, AI based learning platforms, etc.)

Please list all applicable tools:

.....
.....
.....

Part 3: Critical Thinking Development

6. In your opinion, do AI tools encourage you to think critically?

Strongly Agree

Agree

Neutral

Disagree

Strongly Disagree

7. In what ways do AI tools help you analyze and evaluate information?

Please explain:

.....
.....

8. How would you rate the effectiveness of AI tools in developing your creative problem-solving skills?

Excellent

Good

Average

Poor

Not Applicable

9. Please indicate the extent to which you agree that AI tools have helped you develop the following critical thinking skills during your lessons.

Critical Thinking Skill	Strongly Agree	agree	neutral	disagree	Strongly disagree
1. Analysis (Breaking down complex information into parts)					
2. Evaluation (Judging the quality and credibility of information)					
3. Inference (Drawing logical conclusions from available data)					
4. Interpretation (Understanding and explaining meaning from data or text)					
5. Explanation (Clearly expressing your reasoning or opinions)					
6. Problem-Solving (Identifying problems and generating solutions)					
7. Decision-Making (Choosing between options based on analysis)					
8. Metacognition (Thinking about how you learn and how to improve it)					

Part 4: Challenges and Suggestions

10 . Do you feel you rely too heavily on AI tools for learning and problem-solving?

Yes

No

11 . What challenges do you face when using AI tools to develop your critical thinking skills?

.....
.....
Part 5: General Perspective

12 Do you believe AI tools should play a greater role in education? Why or why not?
.....
.....

13 Please share any additional thoughts on how AI can influence the development of
critical thinking skills in students.
.....
.....

Appendix 2

Semi-structured Interview Questions

Dear respected teacher,

I am conducting research on the use of AI educational tools in enhancing critical thinking skills among EFL students, and I would greatly appreciate your insights on this topic. Please feel free to share your thoughts and experiences regarding the integration of AI in literature teaching and its impact on student engagement and cognitive development.

- **Question 1:** To what extent do you believe AI tools like ChatGPT or Grammarly help EFL students develop their critical thinking skills?
- **Question 2:** In your experience, what are the main benefits and drawbacks of integrating AI tools in EFL instruction?
- **Question 3:** What challenges or ethical concerns have you encountered while using AI tools in your classroom?
- **Question 4:** What strategies do you suggest for using AI to improve students' critical thinking, especially in analysis and problem-solving tasks?

الملخص

مع تزايد دمج الذكاء الاصطناعي (AI) في المجال التعليمي، تتصاعد المخاوف بشأن تأثيره على قدرة الطلاب على التفكير. كان هذا (شعبة اللغة الإنجليزية كلغة أجنبية) تهدف هذه الدراسة إلى استكشاف كيفية استخدام تلاميذ السنة الثالثة ثانوي. النقدي. الاستخدام يعزز مهارات التفكير المستقل في ثانوية صادق طالبي بولاية الأغواط لأدوات الذكاء الاصطناعي، وما إذ لديهم أو يضعفها. فمع الاعتماد المتزايد على الذكاء الاصطناعي في الكتابة، والترجمة، والبحث، تثار تساؤلات حول مدى فعالية منهجية اعتمدت قدرة التلاميذ على التحليل وطرح الأسئلة وتوليد الأفكار دون الاعتماد على التكنولوجيا. ضعب عم تلاباقمو، يناوشع. الدراسات يساردلا لصفلا لخاد طارخنلاو ملعتلا. بلع عز و نايبنتسا نيب عمجلا مت ثيح، ةطلتخم 20 لكشب مهرايتخامت أذيملت كولس بلع يعانطصلا ءاكذلل كز دم لا ريثأتلا ميبقت فدهب كلذو، ةذتاسلا العديد من التلاميذ أن الذكاء الاصطناعي فمن جهة، يرى أفكار معقدة وتحسين مهارات الكتابة، وهما: ساعدهم على فهم كشفت النتائج عن تأثير مزدوج عنصران أساسيان في التفكير النقدي؛ ومن جهة أخرى، ظهرت وأريكفت نود يعانطصلا ءاكذلا هذلوي يذلا بوتحملا نولبقتي نيذلا ذيملاتلا ضعب بدل ةبيلسلا بلع تارشوم تحتو سوردم لكشب مدختسا إذ يدقنلا ريكفتلا معدي نا نكمي تحقق ريفوت عم، ةحضاو ةيليلحت فادها نمض يعانطصلا ءاكذلا تاودأ جمذ. يعانطصلا ءاكذلا نا بلا ءساردلا تصلخ هج وم يوبرت فارشا خلال اعتبار الذكاء الاصطناعي تدريب لكل من المعلمين والطلاب حول. ةرورضب يصوتو

هلديتسي نأ نم لادب يدقنلا ريكفتلا ززعي هنا نامض نكمي ، قرصتخم ةليسو . فمن . الاستخدام المسؤول لهذه الأدوات
سيلو ملعتلا يف أكيرش