جامعة صحار
Sohar University

The 1st SU GFP Conference (SUFC1)

Empowering Students in the 21st Century

Organized by
General Foundation Program, Sohar University

Wednesday, 21 May 2025

Sohar University, Sohar, Sultanate of Oman

نضيء المستقبل
Enlightening the Future

Preface:

Welcome to the proceedings of the 1st International SU GFP Conference, held on May 21, 2025, at Sohar University, Sultanate of Oman. This conference, themed "Empowering Students in the 21st Century," brought together scholars and practitioners to explore innovative approaches and research in various critical areas. These proceedings compile the accepted abstracts, reflecting the diverse and impactful contributions presented at the conference. We extend our gratitude to all authors, reviewers, and the organizing committee for their dedication and hard work in making this event a success.

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The Future of Learning: Pedagogical Paradigms in the Age of Artificial Intelligence through the Advent of ChatGPT as an Innovative Digital Tool in the Era of Technology

Rasha Abdulraheem

Abstract

Due to the advancements in the technological field, that have been led by the advent of the Generative AI tools whose presence paved the way towards leveraging their full utilization to meet the needs of the educational sector as the traditional methodologies no longer prove appropriate in respect to meeting the demands of the 21st century (Serdyukov, 2017), this paper highlights the implications of AI tools especially ChatGPT aligning it with the contemporary educational frameworks that are derived from the UNESCO's Sustainable Development Framework. This framework regards quality of education as one of its integral pillars which plays an essential role in the development of the global civilizations (Fischer, 2012) since it is closely connected with the significance of equipping the learners with the tangible skills that would enable them to be ready to face the future challenges.

In order for posterity to benefit from this, there has been a tendency to take wide steps in reforming education in many institutions by embracing innovative pedagogies that make these reforms possible. As a result, many learning environments decided to implement the use of AI, including ChatGPT, in their teaching and learning processes to foster both teaching practices and learning processes. This paradigm shift towards the adoption of AI did not occur spontaneously but was triggered by several factors. The first one is connected to the emergence of COVID-19 (Alam et al., 2022), a global crisis, that made both educators and practitioners aware of the power of technology and the role that it can play in enhancing the teaching and learning processes. Moreover, this shift has been consolidated due to the advent of digitalization, globalization, and economic competitiveness among global countries (Okana et al., 2018). These factors have made a vital transition in the educational field as there has been a shift from having passive learners into active ones who are taking active role in their learning, making the adoption of the constructivist approach a necessity as it has been supported by the introduction of collaborative learning, gamification, experiential learning through project based learning, and the computational thinking (Copridge et al., 2021) which the use of AI has leveraged.

By analyzing some case studies and conducting a thorough literature review, this study demonstrated the benefits of integrating ChatGPT into many educational environments, including the ESL environments, since many studies that have been conducted in various contexts have proved its ability to enhance the ESL receptive skills (reading and speaking) and productive skills (writing and speaking), as Meniado (2023) indicated. Moreover, the study referred to the use of ChatGPT in creating rubrics, providing constructive feedback, and acting as a personal tutor (Su & Yang, 2023), making it one of the AI tools that can be implemented in ESL classrooms to promote English language acquisition.

Despite its advantageous effects, the study highlighted some challenges which are connected to ethical considerations especially in terms of privacy and security concerns (Southgate, 2020) , the teacher's reluctancy to use the AI due to their lack of preparation (Ahmed et al., 2023), the threat of plagiarism (Halaweh, 2023), the inequalities between countries (Huang et al., 2021) and the risks of over reliance on the AI tools which could undermine the human's skills such as communication and critical thinking

To tackle these obstacles, the article provided educational institutions with some propositions that would ensure the effective adoption of ChatGPT. One of these suggestions is related to the adoption of several frameworks that would ensure the successful implementation of this AI tool referring to the application of the universal design for learning (UDL) (Gottschalk, 2023) and bring your own device (BYOD) policies, as these policies would help the educational settings to embrace ChatGPT since these tools could be considered as a solution that could tackle the issue of educational settings (Siani, 2018) , which are known for their role in bridging the gap in educational inequality between countries. Additionally, the article encouraged countries to allocate part of their budget and increase their investment in the technological field, especially in the AI domain. Besides, the study emphasizes the significance of equipping ICT infrastructure to ensure the effective implementation of ChatGPT with ease (Van der Vlies, 2020). Additionally, it has been suggested to provide practitioners with the required skills that would enable them to implement the use of ChatGPT successfully by providing them with professional development opportunities (Sharma et al., 2022). Furthermore, in terms of protecting users' privacy, it has been suggested that the AI tool should delete the chat history after every use which can serve as a precaution to consider when tackling ChatGPT related problems (Sebastian, 2023). In addition, the study sheds light on the importance of creating a unified AI policy to legalize the use of ChatGPT, as some of these initiatives were put into action by Harvard University and the University of Abu Dhabi.

However, to effectively apply ChatGPT in education, the study addresses the use of the Kotter management change model, which consists of eight steps (Kotter, 1996). This model is known for its role in enabling the educational community to embrace the change and hinder their resistance to that change by involving stakeholders and engaging them in the decision-making process, as this can be done by having a considerate leadership that prioritizes transparency and objectivity in all of its decisions opening the doors for change to occur (Mancini, 2023). This model of change will ease the adoption of the change phases, minimizing the risks and resistance among various employees. Nevertheless, this model will not be accepted by stakeholders instantly, as educational leaders should employ various leadership practices and might face some resistance (Metre, 2008); however, such discomfort can be addressed by employing collaborative communication to make these changes applicable.

The study concludes by stating that ChatGPT can be used to address the diverse aspects of education, including ESL classrooms, since it is known for its ability to benefit both the teaching and learning processes. While many challenges are associated with the adoption of ChatGPT, especially in terms of ethical considerations, there is a continuous need to prepare educators and learning environments for its application. Such promises and threats should be highlighted by increasing research and development efforts to discover the potential uses and capabilities that ChatGPT possesses. Despite the availability of research in the field of AI and ChatGPT, many areas remain unexplored, indicating the need for further research to help practitioners responsibly and ethically leverage the use of ChatGPT to enhance the quality of education, whether in K-12 learning environments or higher education.

Keywords: Artificial Intelligence, AI Policies, Change Management, ChatGPT

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Impact of Promoting Awareness on the Student-Centered Active Learning Techniques

Nauman Ahmad

Abstract

Student-centered active learning is a teaching technique that helps students to stay more active in classrooms, understand things in a better way, and remember what they learn for a longer period of time. Instead of just sitting and listening to a teacher or memorizing notes from textbooks, students take part in learning by using helpful study techniques. This study initially prepared a framework named FLPKW through review of related literature and its connection with two higher tiers of the known DIKW pyramid (Knowledge and Wisdom) and then looked at how awareness promotion campaign help students learn about three useful learning methods: Practice Testing, the Loci System, and the Feynman Technique. These techniques are already known by researchers to improve learning, and successfully attain the intended learning outcomes, but many students do not know about them or how to use them.

Data is simply collected facts used for comparison (Zafar, 2021), whereas information is data that is organized and effective (Miller, 2000). Knowledge is the retention of structured information, as well as facts those are grown through experience and involvement (Collins, 2012; Cláudio et al., 2015). However, wisdom is the ability to make sound judgments based on facts and deep understanding (Cambridge-Dictionary, n.d). A solid understanding of knowledge leads to valuable outcomes (Ahmad, 2019, 2020a, 2020b, 2023a). This relationship is often referenced and explained through the DIKW pyramid, popularized by Ackoff in 1989 (Weinberger, 2010; Ackoff, 1989), which highlights the hierarchy of data, information, knowledge, and wisdom (Weinberger, 2010; Zomaya et al., 2017). Memory, at its core, is the ability to remember, and it begins with learning, followed by retention, when the brain holds on to what has been learned (Mehta, 2022).

A clear understanding of information helps learners in better performance (Ahmad, 2021a, 2021b, 2022, 2023a, 2023b). Memory is our ability to retain knowledge, but it fades with time (Hafeez & Aamir, 2014; Siu, 2024). Ebbinghaus (1913) found that we forget 40% of things we learn very quickly in just about 20 minutes, then with the passage of time, we forget more. Literature reveals that people forget about 50% in an hour, 70% in a day, and 90% in a week (Patton, 2019; Campbell, 2019). Procrastination is simply delaying important tasks even when we know it might cause problems at later stages (Hoffman & Wallach, 2009), and cramming is that last-minute memorization

before an exam (Engle, 2008). However, active learning makes students more engaged by combining interactive methods with traditional method of teaching (Prince, 2004).

Exams are designed to check what students know (Ahmad, 2021c), and practice tests are like self-quizzes those make recalling of material easy, and help in better performance (Dobson & Linderholm, 2015; Dunlosky et al., 2013). The Loci system, often called a memory palace, helps by linking new ideas to familiar places in the mind (Patrick, Hayslip & Hollis-Sawyer, 2021). Research has shown the Loci system to be highly effective for recalling and improving learning outcomes (Ahour, 2015).

The Feynman Technique takes this a step further by pushing learners to explain ideas in simple words, identify gaps, and refine their understanding through self-teaching or teaching others (Hollins, 2018; Learning, 2018). Studies have found that it helps towards deeper understanding, better learning, and higher test scores (Reyes et al., 2025). Awareness helps us to recognize the issues that shape how we think and behave (Sayers, 2006).

The literature was reviewed and FLPKW framework was developed, where 'F' was the initial word taken from the 'Feynman Technique', 'L' for 'Loci System', 'P' for 'Practice Testing', 'K' for 'Knowledge', and 'W' for 'Wisdom'. The 'Feynman Technique', 'Loci System', and 'Practice Testing' were identified as moderating variables, and were linked to 'Knowledge' and 'Wisdom' tiers of DIKW pyramid. 'Recalling of Information', 'Information Retention in Memory', and 'Deeper Understanding of Learned Contents' were counted as independent variables, and 'Effectiveness on Learning Outcomes' was dependent variable. This linking of the framework to the DIKW pyramid (Knowledge and Wisdom) showed how cognitive strategies and mental processes work together to improve the effectiveness of learning outcomes (the dependent variable).

The researcher created an awareness campaign to help the students towards the know-how of these techniques. This awareness campaign used a website developed by the researcher, and filled with created short videos, audio files, reading/writing materials, and communication with the teacher in classroom. The goal is to show students how these student-centered active learning techniques work and why they are useful. A total of 36 students from a course named '*Basic Computing Skills'* took part in the study. Before the campaign, they were given a pre-knowledge test to check what they already knew about these techniques. After they used the videos, audios, and reade/write materials, took part in the campaign, and took another post-knowledge test to see what they had learned.

The results of the post-knowledge test showed a big improvement in the students' awareness. Their scores went up by 50% for Practice Testing, 62.5% for the Loci System, and 50% for the Feynman

Technique. This shows that the awareness campaign worked well. When students learn about good study methods and how to use them, they start using them and can learn better. These three methods are powerful tools to help students remember and understand information, and this study shows that just learning about them can make a real difference.

This framework was linked to a known DIKW pyramid, which has four tiers: Data, Information, Knowledge, and Wisdom. Most students only reach the first two levels, Data and Information, where they memorize facts. But using this framework students can move up to the higher levels, Knowledge and Wisdom, where they can understand, explain, and use what they have learned.

Before the awareness campaign, many of the students knew very little about the three learning techniques. This showed that there was a gap in their learning tools. They were not using these techniques simply because they did not know about them. After the campaign, the situation changed. Their knowledge and test scores improved a lot, and they felt more confident using the techniques. This shows that making students aware is the first and most important step. If students do not know a helpful method exists, they cannot use it.

The awareness campaign was successful because different ways were used to share the information. The developed website for this study had videos for visual learners, audio files for auditory learners, text for reading and writing practice for read/write learners, and teacher support in class for guiding the students. This combination of materials worked for different types of learners. The teacher also played an important role by encouraging students to try the methods and answer their questions. This study made the learning more personal and effective for the students.

The FLPKW framework and study helped students to know about these methods, understand and test themselves. They became to know, for example, Practice testing technique helps to check the knowledge in terms of recalling of information, the Loci System helps in remembering the things by connecting them in their minds with the known places, and the Feynman Technique helps in understanding the things deeply by trying to teach or explain a topic to ourselves or others in simple words. These techniques gave them the ideas that how they can use them in their studies and become more independent learners.

The study also gives useful advice for schools, colleges and universities, especially in the Sultanate of Oman, GCC countries, and other regions. Educational institutions should think about conducting similar awareness campaigns to help students learn about student-centered active learning techniques. The techniques are economical in use and easy to share. Once students are aware of these

techniques, they can use them in different subjects, not just in one course. Teachers can also use these methods to guide students, increase students' engagement and make the process of teaching and learning more interesting.

Even though the number of students in this study was 36, the outcomes were very strong. This shows that even small campaigns of awareness results in big improvements. Many students in educational institutions struggle because they do not know good student-centered active learning techniques or ways to study. This is why it is extremely important to teach them the 'how' of learning, not just the 'what'.

In conclusion, this study shows that students can improve their learning a lot by simply promoting the awareness about better student-centered active learning techniques. The awareness campaign helped students in learning about Practice Testing, the Loci System, and the Feynman Technique. Their pre-knowledge test and post-knowledge test results showed clear progress. Literature reveals that these techniques are extremely useful for learning. This proves that making students aware is not just helpful, it is necessary. If they do not know a technique exists, they will not use it. Once they learn about the technique, they can study in a smarter and meaningful way. Therefore, making students aware is the first step towards better learning, and successful achievement of the intended learning outcomes.

Keywords: Awareness; Framework; Feynman Technique; Loci System; Practice Testing; Student-Centered Active-Learning Techniques

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Students' Exposure to Authentic Linguistic Input in Pedagogical Practices: Linguistic Landscapes

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Abstract

Linguistic landscapes' research was initially restricted to sociolinguistic investigations into public signage. Lately, though, it has appeared as a potential educational instrument for English language learning and teaching pedagogies, contributing meaningfully to students' language learning experiences in an authentic manner (Gorter, 2018). At first, Landry and Bourhis (1997) theorized linguistic landscapes (LL) as the visible language in public signage, then they have developed as active learning tools for language education. This development includes physical, cyber, and institutional landscapes, each exposing students to immersive, multimodal experiences with language in authentic settings. Whereas the initial emphasis of linguistic landscapes' scholarship revolved around language significance, ethnolinguistic identity, and sociopolitical power dynamics (Shohamy & Gorter, 2009; Backhaus, 2007), current research studies have targeted its pedagogical pertinency, mainly within official educational contexts (Gorter, 2018; Sayer, 2010; Wiśniewska, 2020). There is an increasing agreement in the literature that LL could function as wealthy linguistic input for students, particularly in situations where exposure to the target language is quite inadequate. For example, Sayer (2010) and, Roos and Nicholas (2019) reveal that pedagogies which utilize LL inspire students to actively engage with language not simply as abstract knowledge but as a dynamic, social practice. Students, placed as ethnographers and critical observers of their linguistic milieus, increase their linguistic awareness, develop their communication skills, and broaden their intercultural understanding. Furthermore, linguistic landscapes promote a critical pedagogy in which learners question sociolinguistic structures, symbolic power, and linguistic inclusion or exclusion rooted into their immediate semiotic environments.

The educational significance of linguistic landscapes is its promising potential to connect the gap between classroom practices and authentic language use. Moreover, teaching and learning which integrate linguistic landscapes as language learning sites allow learners to critically contextualize vocabulary, pragmatically analyze language, and rationally interpret socio-political narratives woven into textual signs and advertisements. Based on the theoretical frameworks of Lefebvre's (1991) model of space - perceived, conceived, and lived - Malinowski (2015) and Wiśniewska (2020), for instance, endorse experiential engagement with linguistic landscapes in which students are positioned

as dynamic co-constructers of meanings in their surroundings. This spatially grounded learning develop literacy, heightened critical thinking and reflexivity.

Although the educational capacity of linguistic landscapes is promising, numerous challenges are palpable. One frequent concern relates to methodological rigor. For example, Gorter (2018) maintains that the diverse and context-sensitive nature of linguistic landscapes entails research methodologies that are interdisciplinary and multi-modal, be they qualitative and quantitative methods. Besides, the dearth of the linguistic landscapes' resources in linguistically homogeneous or rural contexts can limit learners' immediate exposure to various language forms, requiring the production of digitally curated linguistic landscapes' experiences to simulate real-world situations for language pedagogy. Ethical issues also emerge in educational practices which utilize linguistic landscapes. For instance, Sayer (2010) cautions against uncritical use of linguistic landscapes' resources, especially in environments where linguistic landscapes accentuate unequal power structures and dominant ideologies. Teachers should be cautious while using authentic linguistic activities to promote inclusivity, challenge language domination, and inspire students to take a role in determining public discourses.

Evidently, there is the under researched yet abundant context of linguistic landscapes' research in the Gulf region. Recent studies such as those of (e.g., Algryani & Syahrin, 2021; Tuzlukova & Mehta, 2021; Dumanig & David, 2019) unfold how linguistic landscapes could be used to consolidate language learning where English language education suffers from meaningful and authentic exposure to the target language. To clarify, Algryani and Syahrin's (2021) research on translation instruction shows how bilingual signs in Oman can augment critical literacy, translation skills, and socio-cultural consciousness among university-level learners. The data of the study emphasize the role of linguistic landscapes in encouraging students to navigate the symbolic aspects of language use in public places and thus improving language competence and civic accountability. Likewise, Tuzlukova and Mehta (2021) investigate how English in Muscat's commercial signs mirrors changing identity constructions, hybridity, and globalization, presenting a nuanced lens through which language students can examine the social and semiotic fabric of their cities. Undeniably, the educational consequences of LL in such situations are profound. In Oman, where English functions as both a global lingua franca and a tool of socio-economic mobility, linguistic landscapes-based instruction can empower learners to negotiate their linguistic identities and critically assess the visibility and valorization of languages in their environment. Moreover, engaging with authentic input enables learners to perceive themselves as active contributors to the linguistic landscape, namely, future

professionals, translators, or policy advocates capable of shaping inclusive and representative language ecologies.

Despite the promising findings, the review underscores the need for more localized, longitudinal, and action-based research on the linguistic landscapes' impact in educational contexts. There is a pressing call for the development of teacher training programs that equip educators with the theoretical knowledge and practical strategies to effectively implement investigating linguistic landscapes in their classrooms. Assessment frameworks also need to be refined to measure the nuanced learning outcomes associated with linguistic landscapes-based tasks, such as intercultural competence, critical literacy, and semiotic interpretation. As a site for experiential, multimodal, and socially situated learning, linguistic landscapes hold transformative potential for language education, particularly in under-researched and linguistically complex contexts like Oman. By synthesizing current research and identifying key gaps, the review lays the groundwork for future explorations that will not only enrich academic discourse but also inform pedagogical innovation, curricular reform, and language policy development.

Keywords: authentic input, English language teaching and learning, linguistic landscape, pedagogical perspectives, Oman.

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AI-Powered Feedback in Second Language Acquisition (SLA): A Step Toward Learner Autonomy

Muneera Muftah

Abstract

The unprecedented development in technology, such as the introduction of chatbots with artificial intelligence (AI) competencies, has the potential to change the approach in understanding the field of second language acquisition (SLA) (Alhazmi & Muftah, 2025; Hmoud, 2024). These applications provide learners with opportunities to practice languages in a judgment-free, on-demand manner that replicates interpersonal communication in the real world (Law, 2024). Through chatbots, learners are given instant corrections and can be taught individually which aids greatly in self-paced learning (Guo, 2023; Liao, 2023; Tajik, 2024). In this case, AI-driven chatbots were used to enhance speaking proficiency, increase learner participation, and determine autonomy levels among learners using English as a Second Language (ESL) Program (Tai & Chen, 2024). A mixed-methods approach applying qualitative evaluation combined with a quasi-experimental design was implemented to analyze the quantitative outcomes and examine the language learning experiences shaped by AI technology. To accomplish these goals, seventy intermediate ESL students, aged 18-24, were selected. They were randomly assigned into two groups: the experimental group which used classroom instruction aided by chatbots, and the control group, which relied only on traditional methods. Over eight weeks, participants were assessed with speaking proficiency tests, engagement survey questionnaires, and participating in semi-structured interviews.

Findings from the study indicated that the implementation of AI chatbots offered more sophisticated engagement and better results with learners' speaking skills compared to older methods. The experimental group improved on average of 13.5 points out of 50 on a speaking test, while the control group only improved by 7.7 points. Moreover, the large effect size (Cohen's $d \approx 1.4$) coupled with most of the experimental participants outperforming the control group's top scores underlines AI-assisted practices effectiveness in fluent speech including grammar, pronunciation, vocabulary intensive multi-dimensional work. Also, students in that same group experienced a significant increase in willingness to communicate (WTC), marked by an increase from 3.3 to 4.5 while the control group only had an increase from 3.4 to 3.7 suggesting that infrequent, low-pressure interactions enhance self-assessed communicative ability stagnation. Qualitative data strengthened these outcomes stating that learners saw the chatbot as a powerful stimulator for independent practice which gave useful feedback throughout their learning process. They can control their own learning,

as demonstrated by the large number of corrected sentences they saved for later review. All these findings determine how AI chatbots can effectively aid language development by enhancing learners' independence and language proficiency (Fathi et al., 2024; Wiboolyasarin et al., 2025).

Pedagogically, the study proves that AI-powered chatbots can actually augment SLA by enhancing proficiency, promoting learner autonomy, and delivering inclusive, scalable support—most valuable in massive or low-contact classes (Jeon, 2024). In the future, advances in natural language processing hold the promise of delivering culturally more empathetic, context-sensitive, and affect-aware chatbots that will lay the basis for collaborative and human-AI-melded language learning experience. Finally, this research contributes to the literature in support of language learning using AI tools. Subsequent research will need to examine longitudinal effect, cross-linguistic application, and multimodal chatbots that support audio- visual input. By continuing to refine these tools and their pedagogical integration, the field of SLA stands to benefit significantly from AI's innovative capabilities (Parvin & Muftah, 2025).

Keywords: AI-powered feedback, chatbot-assisted language learning (CALL), ESL learners, learner autonomy, learner engagement, second language acquisition (SLA), speaking proficiency

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Beyond Dull Chatbots: Empowering Students to Innovate and Lead

Mokhtar Ounis

Abstract

As artificial intelligence (AI) has become widely accessible, its impact on teaching and learning has generated a new consensus. Most educators agree that students must be taught how to interact effectively with AI systems, use them to enhance their learning, and critically evaluate their outputs. With AI already providing students with unprecedented access to information, automation, and analytical tools, a pressing question emerges: What role remains for educators in empowering their students? This paper addresses this question by focusing on the role of teachers in an AI-enriched environment and exploring how they can meaningfully empower their students. The answer is rooted in a theoretical framework that promotes two core principles. First, human intelligence remains far more complex, creative, and nuanced. Second, excessive reliance on automated systems risks stagnating human knowledge, diminishing intellectual curiosity, and reducing students to passive consumers of algorithm-generated knowledge. This theoretical framework is not unique to this study. Instead, it resonates in various academic and educational contexts. While a thorough discussion of this decision is beyond the scope of this paper, the cautious stance toward AI is nonetheless significant for this study. Their attitude reveals that AI is controversial even for scholars who are expected to give unreserved support to machine learning, including ChatGPT. The controversy arises from the fact that AI is evolving rapidly in scale, speed, and scope. The faster it evolves, the more disruptive it becomes. It is no longer limited to text optimization; it now generates knowledge in a wide range of fields, including coding, marketing, music, artistic creativity, sciences, academia, and gaming. Moreover, AI is evolving in quality, increasingly rivaling and, in some instances, outperforming human capabilities (Akiba & Fraboni, 2023). Facing the high performance of AI and its expanding applications, it is necessary for educators to carefully consider its risks. Failure to integrate AI effectively into education may undermine the students' proficiency and, over the long term, compromise the broader enterprise of human knowledge. In such cases, these losses are irreversible. What is lost cannot always be regained or easily repaired, especially in education. Education has always been a sensitive domain, as it is a learner-oriented enterprise that cannot accommodate trial-and-error approaches or untested pedagogical experiments. At the same time, educators have always managed to adapt to technological innovations since the invention of the calculator and have constantly invented pedagogically sound strategies for integrating these technologies into their classrooms. Over time, they have learned that keeping pace with tools familiar to their students is not a choice. In a world where digital applications are used in all walks of life,

banning AI in educational settings is not only impractical but also counterproductive. For some educators, AI is much more complex than the traditional computer-assisted approaches and integrating these tools into education constitutes "not merely a technological shift but a methodological evolution" (Grájeda et al., 2024, p. 22). Strategic integration of AI in education entails planning and decision-making regarding how to deploy relevant AI tools to provide students with the kind of education they *can* and *should* have. Within a realistic context, combining feasibility (what students can do) and desirability (what they should have), AI has to align with the students' actual level and contribute to their learning progress. To ensure both relevance and usefulness, an efficient integration of AI in education should be based on a thorough assessment of both students and AI tools. The former are assessed in terms of their weaknesses and strengths relative to curricular objectives, while the latter are assessed in terms of their capabilities and risks. Such an assessment is essential to avoid two counterproductive scenarios and, at the same time, to create two productive ones. In the first counterproductive scenario, weak students are left free to use AI tools with no or little pedagogical guidance. Typical cases include students using AI to generate essays or complete assignments, often resorting to plagiarism due to their inability to construct even basic sentences. In such cases, students make no effort to address their weaknesses. In this scenario, which can be labeled "the negative loop", the students' weaknesses are exacerbated by overreliance on dull chatbots, and AI tools' risks are maximized. In the second counterproductive scenario, high-performing students are granted unstructured access to AI tools. As they are unguided, they may fail to find the relevant AI tools or may misuse the tools with which they are familiar. This scenario can be labeled "the skill atrophy" because it places the students' strengths at risk of stagnation and erosion. As for the productive scenario, AI tools are to be used appropriately for the students' level and lead to their academic progress. In the first productive scenario, AI tools are to be used to address the students' weaknesses and eventually to bridge proficiency gaps within mixed-ability classrooms. This scenario can be termed "the cognitive prosthesis" as AI tools function as external support to help students make the first steps towards becoming competent learners. It involves minimizing the students' weaknesses and maximizing the capabilities of AI tools. The second productive scenario involves using relevant AI tools to boost the skills of high-achieving students. This scenario, labeled "the skill leverage", is built on a maxi-maxi strategy whereby teachers take advantage of the AI tools' capabilities to further develop the skills of the high performers. These four scenarios yield two entailments. First, AI has no intrinsic educational value. Instead, its impact on education is essentially contingent upon the context in which it is deployed. Second, unguided AI integration in education is likely to lead to failure, resulting in negative learning loops and the gradual atrophy of the students' skills. By contrast, guided integration is likely to succeed as AI tools function as a cognitive

prosthesis that facilitates learning or as a skill leverage that enhances critical thinking and creativity. Taken together, these two entailments suggest that AI can only be beneficial when it is implemented within "a structured framework for AI integration" (Vieriu & Petrea, 2025, p. 1). Drawing on these scenarios and their entailments, a tentative framework for the efficient integration of AI in higher education may be articulated in three steps: reframe, construct, and empower. In the first step, learners' mindsets are to be reframed so that their behavior with AI can be improved. The desired behavior is a safe and ethical use of digital technologies. Reframing can be achieved through AI literacy courses and awareness campaigns designed to prevent misuse and abuse of digital tools (Rahiman & Kodikal, 2024). The second step involves laying the foundation for adaptive learning in which students' weaknesses are addressed through the use of relevant AI tools. Addressing weaknesses is a prerequisite for skill building and self-confidence, as demonstrated by three 8-week courses on AI at an American university (Tzirides et al., 2024). The third and final step is empowerment, in which teachers focus on developing learners' capacity to think creatively and critically. Learners are expected not only to master AI tools but also to innovate and create original projects. AI is expected to revolutionize education. The 21st-century teaching and learning can no longer rely on one-size-fits-all teaching models. AI tools will make adaptive learning accessible, easy, and frequent. Consequently, new educational approaches will necessarily incorporate AI, resulting in hybrid models in which humans and machines interact to provide each student with an optimal learning environment (Kamalov et al., 2023). An ideal learner-centered AI approach would balance human mentorship with digital capabilities. Within this approach, educators would embrace an agile pedagogical stance that encourages an experimental mindset. Accordingly, they would engage their students in deep learning experiences in which mentorship promotes students' emotional intelligence and prepares them for an "AI-driven workplace" (Chan, 2023). By embracing these roles, teachers reaffirm their irreplaceable role in guiding and empowering their students throughout their learning journey toward becoming active, innovative contributors to human knowledge.

Keywords: Adaptive learning, AI integration, critical thinking, empowerment, [5-7 keywords separated by commas, in alphabetical order]

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The Impact of Excessive Reliance on AI-Powered Tools on Learners' Critical Thinking Skills

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Abstract

Technological advancements have recently resulted in significant evolution across various sectors of life, particularly using Artificial Intelligence (AI) in the landscape of education. AI has recently brought innovative and transformative changes to education, enabling personalized learning, automated assessments, and global classroom access (Shrivastava et al., 2023). Such innovative technology systems offer unprecedented opportunities for personalized learning, instant feedback, efficient information processing, intelligent tutoring systems, and automated writing assistants. AI tools like ChatGPT, Grammarly, QuillBot, and other digital technologies have been crucial in fulfilling academic tasks, generating ideas, and providing immediate feedback (Ismail, 2024). However, while it offers several pros to education, AI poses significant cons and challenges. Following technology diffusion, there arose a notable trend among young learners towards the use of AI to replace learning instead of improving it (Kavanagh, 2022). Still, research was deemed limited to cover the issue of the excessive use of AI and its negative effects on critical thinking skills.

AI emergence has rapidly revolutionized several fields, without excluding the educational sector. The primary rationale for AI integration into education is to provide easy access to digital materials, as well as tailor and support personalized learning. Research has shown that these tools play a significant role in facilitating personalized learning and empowering learners to construct and actively expand their knowledge (Suthers, 1999, 2003; Suthers & Hundhausen, 2003; Woolf et al., 2010). It is claimed that AI integration is profoundly changing pedagogical methods and learning processes (Jackson, 2019; Luckin et al., 2016; Russel & Norvig, 2010). Some researchers like Blikstein and Worsley (2016) and Siemens and Long (2011) argue that the primary objective of AI integration is to enhance an effective educational procedure to better meet learners' needs. Therefore, implementing AI in education has numerous pros, such as simulating virtual reality, using adaptive learning platforms, and intelligent tutoring systems (Molina et al., 2024). Thus, the primary objective of AI, as argued by Chanda et al. (2024), is to improve student performance and offer constant feedback through establishing a dynamic learning environment.

AI tools present significant cons in education stemming primarily from learners' excessive dependence and reliance. The overreliance on AI tools can negatively impact students' performance by hindering their critical thinking and problem-solving skills, which in turn diminishes their ability

to produce original thoughts and leads them to habitually copy and paste generated ideas without creativity. Critical thinking is the primary skill to be affected by the overuse of AI. Facione (2013) defined the concept as the disciplined process to actively analyze, evaluate, and synthesize information. Critical thinking is fundamentally important for students to develop logical reasoning, problem-solving, and informed decision-making skills. In fact, education has long placed a strong emphasis on developing such skills through in-depth research, structured discussion, and independent study. Nevertheless, the easy-to-access use of AI tools that makes generating ideas and instant responses simply reachable creates a major concern and puts education at risk (Chanda, 2024). More precisely, the widespread AI tools encourage a culture of cognitive complacency where students value automated quantitative and speedy responses over qualitative and in-depth learning.

The present study investigates the impact of learners' overreliance on AI-based learning tools on their critical thinking skills development. In this endeavor, an e-questionnaire survey is distributed to Algerian university students across different fields to investigate their use of AI in learning and gather insights into their experiences and perceptions of AI technologies. To achieve this, a 10-question online survey that included both numbers and open-ended questions was created using Google Forms and sent to a randomly selected group of Algerian university students from different fields through their emails. Quantitative data were analyzed using Excel for descriptive statistics, while qualitative data were examined through thematic analysis involving iterative coding, theme generation, and validation. Triangulation was used to enhance the validity and reliability of research findings, as well as the robustness of interpretations. The main objective of the latter is to explore how they use AI in learning English and to gather in-depth insights into their experiences and perceptions of AI technologies.

The study examines AI use and reliance among university students, with particular focus on how this reliance negatively affects students' critical thinking skills and reduces creativity. The questionnaire's analysis reveals that AI tools are widely adopted among university students, specifically in advanced academic research. There is also disproportionate use among Humanities students compared to Science, Technology, Engineering, and Mathematics (STEM) fields' users. AI chat tools and writing assistants dominate usage among the participants, particularly assisting students in generating ideas, summarizing and paraphrasing, as well as proofreading given pieces of writing. The study further reveals behavioral risks, including AI tendency and lack of engagement with other materials. Nevertheless, while AI tools are excellent writing assistant tools that enhance efficacy and efficiency, concerns arise regarding their cognitive impact. More specifically, the analysis reveals that when overused, AI reduces critical thinking and problem-solving skills. Some

students admit that by relying heavily on AI tools, they have become less creative and interactive. Most participants argue that they have become slaves to AI technologies and that their critical thinking skills have been reduced. Despite these cons, most students still view AI as a supportive technology rather than a total replacement tool for independent thoughts.

The findings underscore an urgent need for a rigid and structured AI literacy program to promote reasonable use and mitigate potential risks, such as uncritical reliance and unethical usage, to ensure that AI supports rather than replaces human activity. In that vein, education policymakers and stakeholders need to establish clear guidelines to balance AI integration in academia in a way that fosters critical thinking and problem-solving skills which aligns them with technological skills. Moreover, higher education institutions should fund and support teacher training, cross-disciplinary collaboration, and AI infrastructure to facilitate AI integration in education. They should explicitly demonstrate when and how AI tools can be used to support, rather than substitute students' cognitive skills. Future studies should investigate disciplinary variations in AI technology adoption and examine longitudinal impacts on other higher-order thinking skills.

Keywords: AI tools, critical thinking skills, digital learning, excessive reliance, personalised learning.

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