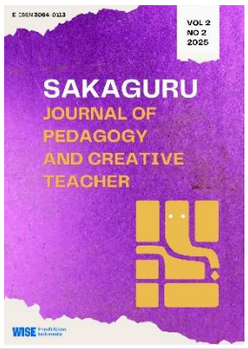

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Research Article

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

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Abstract

The rapid emergence of Generative Artificial Intelligence (AI) tools, particularly ChatGPT, has reshaped contemporary education by addressing the growing demands of the 21st century, where traditional teaching methodologies are no longer sufficient to meet learners' evolving needs. This study aims to examine the pedagogical and ethical implications of integrating ChatGPT into English as a Second Language (ESL) instruction, situating the analysis within UNESCO's Sustainable Development Goal 4 on quality education. Employing a qualitative, literature-based design, this paper synthesizes recent empirical and conceptual research published between 2018 and 2025 to evaluate both the opportunities and limitations of AI-enhanced pedagogy. The findings reveal that ChatGPT supports language acquisition by enhancing interaction, scaffolding productive and receptive skills, and fostering learner autonomy and creativity. However, issues related to ethics, digital equity, and responsible use remain significant challenges. The study concludes that successful integration of ChatGPT requires evidence-based pedagogical frameworks and unified AI policies to ensure ethical, inclusive, and sustainable educational transformation.

Keywords: 21st Century Skills; ChatGPT; Educational Ethics; ESL Pedagogy; Generative Artificial Intelligence; Sustainable Development Goal 4

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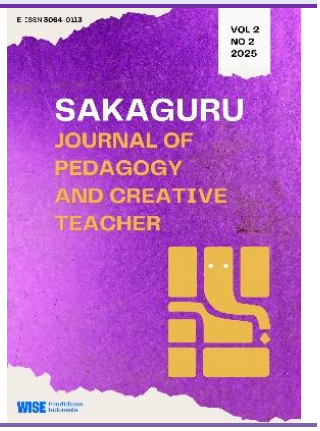

INTRODUCTION

Education is regarded as a social institution that provides its people with all the indispensable 21st-century skills that would lead to the holistic personal and professional development of character, as [1] mentioned. Due to that, education has been regarded as one of the sustainable goals of the United Nations 2030 Agenda as it is one of the sectors that has witnessed continuous changes and developments to meet the demands of the 21st-century globalized and digitalized environments, as [2] stated. Therefore, for these environments to prosper and adapt to the changes that are taking place in the 21st century, there has been a tendency to integrate 21st-century skills into teaching and learning by utilizing innovative technological and digital skills [3]. Consequently, the acquisition of these digital skills was driven by the advent of technological advancements which have transformed education by introducing novel technological breakthroughs such as Learning Management Systems (LMS), Personalized Learning (PL), and Artificial Intelligence (AI), which led to significant changes in the learning process by creating unique learning environments.

One way learners can be prepared for the future is by equipping them with the indispensable digital Skills that enable them to make significant contributions to their societies. To be able to do that, our learners should be able to implement the use of the AI tools, specifically the use of ChatGPT, which became an integral AI tool that can be a game changer in the educational field since its advent has become a necessity due to the advancements that have been witnessed in the information technology and to the fact that using the conventional ways of teaching are inadequate to meet the demands of the 21st century skills [4] .

Therefore, this research will explore the pedagogical implications of emerging digital tools, such as ChatGPT, highlighting the advantages and disadvantages of adopting it in various learning environments. Moreover, this paper will highlight the successful implementation of ChatGPT in ESL classrooms by examining its role in enhancing various English language skills. Additionally, this essay will present some innovative solutions for the pressing issues associated with ChatGPT, exploring the most effective management systems that have led to these creative solutions. Finally, some recommendations will be demonstrated to ensure the efficiency and practicality of implementing AI in diverse educational settings.

Transformation of Educational Pedagogies Using AI

Our current era, which is considered the era of technology, has experienced various advancements in Information Communication Technology (ICT). These advancements played a significant role in changing many areas of education, such as the pedagogy, the curriculum, the instructions, and the role of teachers and students in the learning process as all of these changes led to the alteration of the passive learning environments into active ones [5].

Consequently, these changes that occurred in education were caused by many reasons. The first one can be connected to the transformation of the goal of education from "education for life" to "lifelong learning" as today's learners should be able to analyze, look for and perceive information whenever needed, as this would pave the way towards teaching the students to be creative, critical thinkers, active decision-makers, and problem solvers [6] which are necessary skills for the development of the economy. The second reason is related to the global crisis, such as the spread of COVID-19, which forced many educational institutions to

adopt new digital educational pedagogies, including distance learning and blended learning, to ensure the continuity of learning [7]. Furthermore, [8] referred to other drivers that caused the transformational transitions in education, such as the effect of globalization on education and the need for many educational institutions to save time and costs.

These reasons mentioned above led to the implementation of constructivist active learning pedagogies such as collaborative learning, experiential learning, computational thinking, and gamification, which allowed learners to participate actively in their learning process [9]. These active learning pedagogies are motivating and engaging, especially when combined with the appropriate technological tools [10], causing a pedagogical digital transformation. This transformation entails the use of various ICT hardware and software tools. Some of these tools were mentioned by [11] (Figure 1).

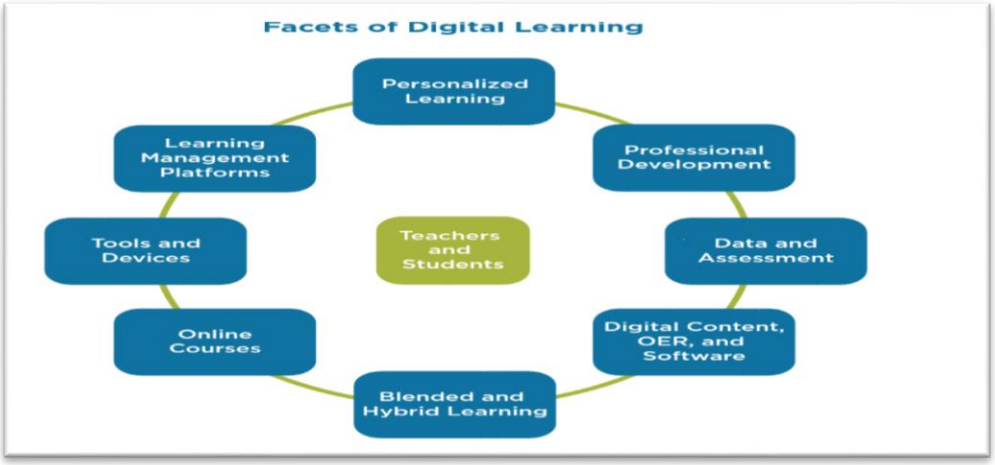

Figure 1. Facets of Digital Learning According to Schwartzbeck and Wolf (2012)

One of these technological tools that revolutionised teaching pedagogies is artificial intelligence, which has transformed every industry, including education. Using AI in education is not a new phenomenon, as it dates back to the mid-20th century, particularly in 1956 when McCarthy, Minsky, Rochester, and Shannon presented it at a workshop at Dartmouth College in terms of digital computers [12]. From this time until now, it has undergone numerous changes, incorporating various tools that have been integrated into education, which have contributed to the development of the field of AI in education (AIED). [13] mentioned some of these tools, such as teaching robots, intelligent tutoring systems, adaptive learning systems, learning analytics dashboards, and human-computer interactions. Other tools are presented in Figure (2).

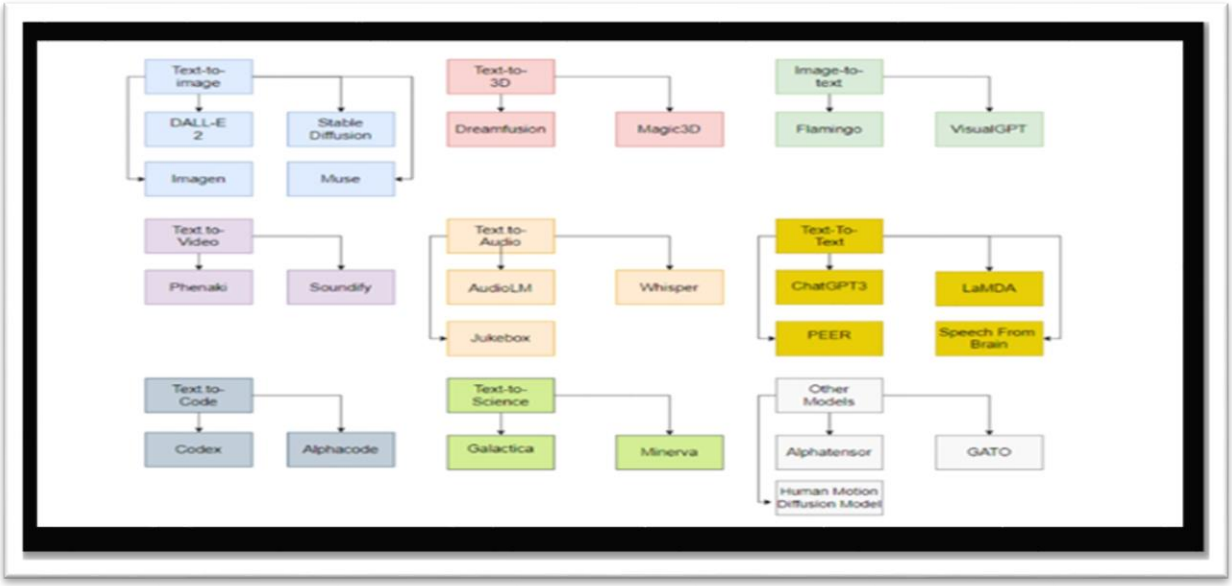

Figure 2. AIED Applications

One of these AI tools that has gained popularity in education is the ChatGPT for its myriad advantages in supporting students and teachers. Unfortunately, most of these benefits can be found in studies that were conducted on higher education, as [14] stated, as the studies about the effectiveness of ChatGPT in classes from K-12 are scarce, as [15] indicated. Due to that, I will refer to case studies regarding the positive impact of ChatGPT in higher education. For example, in the study conducted by [16] on university students in Peru , the researchers found that using ChatGPT enhanced students' performance in various courses by employing it as a learning aid tool. This study is compatible with the findings of [17] who stated that the ChatGPT could foster the students' learning by creating content that would meet the student's learning styles and different needs, especially the needs of the SEND learners. Moreover, [18] studied the effect of using ChatGPT on students in Spain, and he concluded that ChatGPT enhances the learners' critical thinking skills, as the same finding had been highlighted in the study of [19], who examined the use of ChatGPT in science education. Furthermore, [20] explored the effect of ChatGPT on the teaching of academic writing at Al Ain University in the U.A.E. and found that ChatGPT improved learners' research writing skills and saved them considerable time in searching for helpful reading resources and journal articles. In addition, [21] investigated the effect of ChatGPT on Polish university students and found that it promotes the students' motivation and engagement, as this positive impact had been mentioned in the research of [22].

Moving on to the ChatGPT benefits for teachers, the research of [23] in Mexico (2023) found that the tool can save teachers time by enabling them to create efficient and innovative teaching materials such as quizzes, sheets, PowerPoints, and lesson plans in a short period of time as the research paper of [24] supports this. Additionally, ChatGPT utilizes the teachers in grading the learners' tests, analyzing these results, and providing feedback on them efficiently and precisely, as the papers of [25] and [26] suggested.

Despite all these positives, the above-mentioned case studies collectively referred to almost the same drawbacks associated with using ChatGPT in education. Firstly, using ChatGPT does not ensure fairness since developing countries may suffer from not only the

digital divide but also from the algorithm divide [27] due to a lack of appropriate internet connections and suitable technological tools, which would deprive some developing countries of the opportunity to use ChatGPT in their educational institutions. Secondly, ChatGPT entails ethical and safety issues [28] that may result from collecting and spreading confidential or personal data, as it is still unable to protect users' privacy and promote digital security. Thirdly, the problem of plagiarism remains a prevalent issue, particularly in higher education, where it is common in writing assignments and theses. Fourthly, teachers are still reluctant to try ChatGPT tools in their classrooms due to the lack of appropriate training. Finally, using AIED tools may exacerbate students' and teachers' communication, social, and human decision-making skills, which would result in making people lazy [29]. A reference to solutions will be presented in the next section.

Proposed Solutions For the ChatGPT Pressing Problems

To tackle the issues mentioned above regarding the use of ChatGPT, many solutions can be put in place to maximize the benefits of implementing ChatGPT in education. For example, to tackle the problems of the digital divide and equity, educational systems around the world are requested to embrace some approaches, such as the Universal Design for Learning (UDL) (Figure 3), which refers to the use of flexible and rich technology learning settings to support the students' learning [30] Moreover, another approach that needs to be addressed here to ensure equity and mitigate the effects of the digital divide is combining the teachers' pedagogies with the use of digital tools to have better outcomes. This can be achieved by utilising suitable models of technology integration, such as the TPACK Model (Figure 4), which integrates technology with pedagogy, content, and knowledge.Another policy that can be implemented to minimize the digital divide and promote equity is the adoption of Bring Your Own Device (BYOD), which has been proven to enhance students' learning by utilizing available technological resources efficiently and easily, as [31] suggested. Moreover, governments are required to increase their investments in supporting educational institutions with internet connections and the latest cutting-edge technologies, as indicated by [32]. This solution was mentioned in a report which was conducted by OECD's Teaching and Learning International Study (TALIS) in 2019, in which around 35% of the interviewed principals suggested that they had to increase the school's budget and steer it to investments in digital tools, making it a high priority [33].

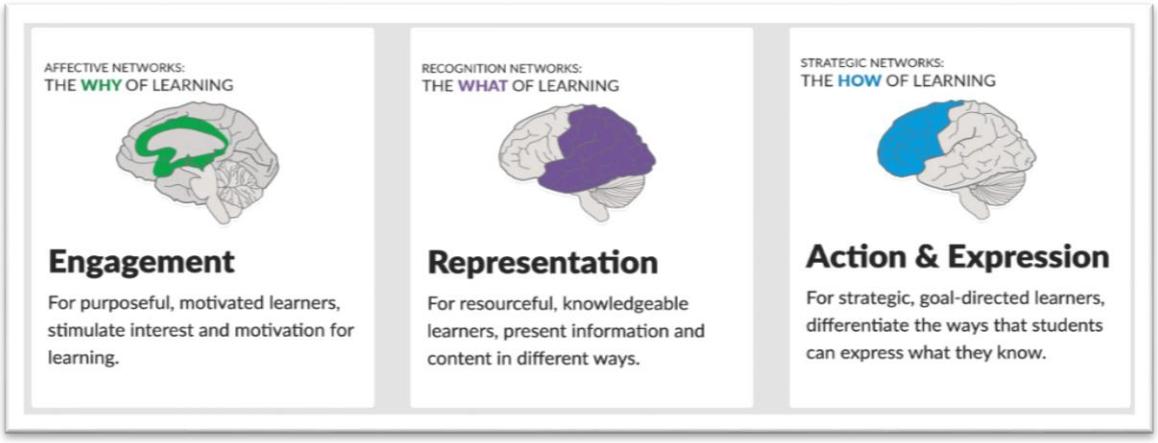

Figure 3. The Principles of UDL Approach

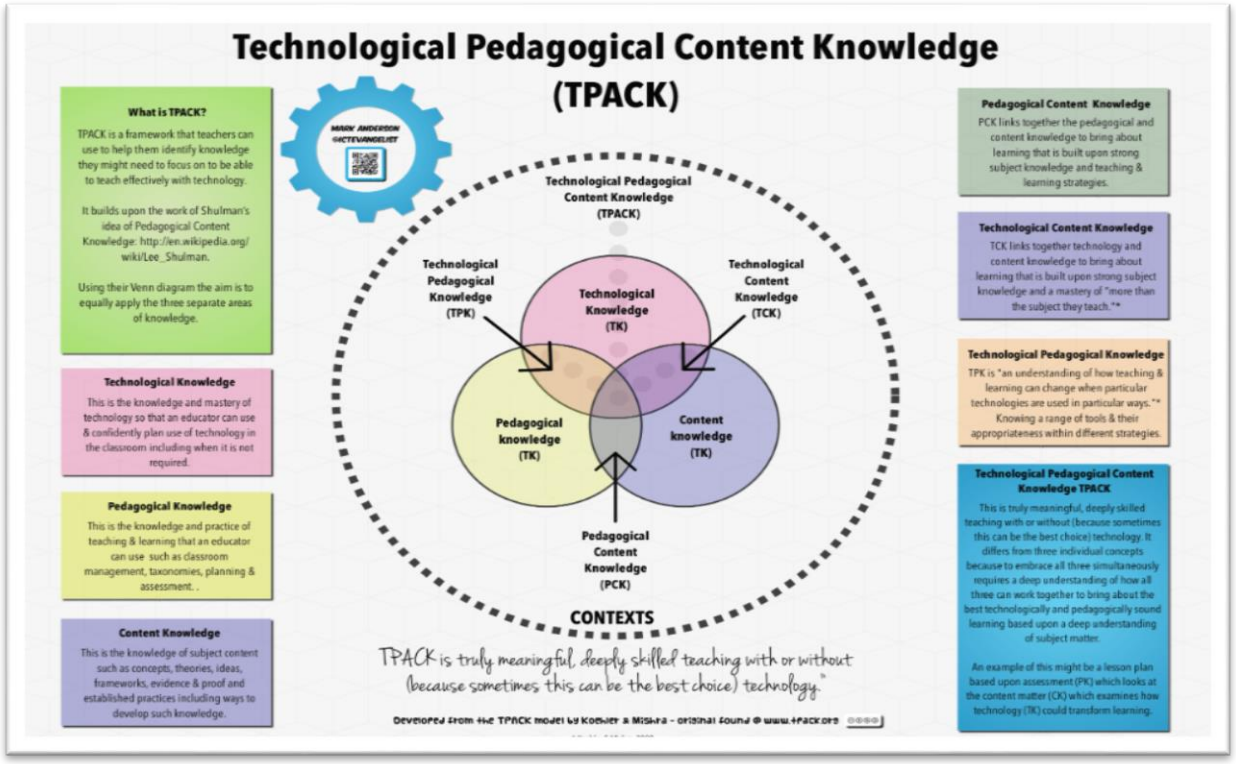

Figure 4. TPACK Model

Moving on to mitigating privacy issues, ChatGPT initiated a new feature that would enable its users to turn off the chat history with the application, as [34] suggested. Regarding the issue of plagiarism, the introduction of innovative plagiarism detection tools can be an effective proposition. For example, some universities have started using programs that can detect texts written by AI, such as GPTZero [35]. Even the well-known plagiarism detector tool Turnitin launched a new tool that can detect AI-written assignments as well [36]. Moving on to address the teacher's reluctance in using ChatGPT, it is essential to provide teachers with professional development sessions [37]. that would enhance their skills and experience with the ChatGPT, as these PDs will make them more confident in using the ChatGPT as a teaching aid tool in their classes, as they are requested to connect it with their teaching pedagogies to achieve the best outcomes. Furthermore, learners should be provided with guidelines that enable them to use the platform ethically. [38] provided a roadmap for students that sheds light on the ethical use of ChatGPT in writing, which would help teachers assess their learners' work with ease. Additionally, to mitigate the issue of over-dependency on the ChatGPT, which may make both educators and students lazy, both sides should be aware that the ChatGPT is presented in the educational field as an aiding and instructional tool that has the ability to equip the learners with competencies that would impact their motivation and future experiences as [39] indicated. Eventually, the problems associated with the use of ChatGPT in education will be gradually solved as this cutting-edge technology continues to develop, particularly in terms of mitigating bias, ensuring conditional accuracy and security, and preventing plagiarism.

The Use of Chatgpt in Supporting ESL Classrooms

Since the advent of ChatGPT which stands for "Generative Pre-trained Transformer" as an AI tool that OpenAI has developed, practitioners were cautious about its integration in the educational field, especially in terms of its long-term impact on enhancing the students' learning and the teachers' teaching of the English language in various learning environments as [40] suggested. Despite the availability of this gap in research in terms of the long term impact of using the ChatGPT as a novel AI tool that can utilize the learners in fostering their listening, speaking, reading, and writing skills, most of the available research highlighted the short term benefits of using ChatGPT as a tool that can enhance the ESL acquisition of both receptive (listening and reading) and productive (writing and speaking skills) skills [41] which means more research is needed to tackle the long term effects of ChatGPT on improving the acquisition of the English language skills.

For example, in terms of leveraging ChatGPT to enhance productive skills (speaking and writing), numerous studies have been conducted. For instance, the study by [42] examined the effectiveness of ChatGPT in generating speaking materials for ESL students, finding that it can be leveraged as a tool for creating a good quality speaking teaching materials Moreover, other studies, such as the research by [43] and [44] have referred to its positive impact on enhancing ESL speaking by using ChatGPT as an effective speaking partner. Moreover, research [45] has stated that ChatGPT can be used as an assessment tool to evaluate learners' speaking skills by embedding a speaking rubric within it through the creation of a customized GPT.

Moving on to the use of ChatGPT to improve the students' writing skills, numerous studies have been found. [46] and [47] referred to ChatGPT's role in enhancing students' writing by motivating and engaging ESL learners in writing tasks, thereby shifting writing from a daunting task into an engaging and encouraging one. Additionally, [48] and [49] research on ChatGPT's ability to act as a tool that would provide the learners with instant and detailed feedback, enabling them to check their work, learn from their mistakes, and edit their pieces accordingly, as this research is in line with the study of [50] and [51]. This can be achieved by creating chatbots using the paid version of ChatGPT, which provides special GPTs with detailed rubrics, and refining them to obtain the best results. Additionally, other studies have found that ChatGPT has the ability to assess learners' written assignments, as highlighted in the studies by [52] and [53].

Regarding ChatGPT's impact on fostering the learners' skills, some research has been found as these studies indicated the positive effect of ChatGPT in enhancing the ESL reading skills such as reading accuracy, reading assessment, reading comprehension, critical thinking skills, pre-reading skills and enhancement of reading among special education needs (SEND) students. To exemplify, the studies by [54] and [55] concluded that ChatGPT has the ability to enhance learners' reading comprehension skills. Moreover, the research of [56] indicated that using ChatGPT can improve ESL's reading accuracy. Furthermore, [57] proved ChatGPT's ability to assess the learners' reading effectively and efficiently when compared with humanized assessment. Besides its impact on enhancing the reading skills of regular students, many studies have indicated that using ChatGPT can play a significant role in improving the reading skills of SEND students, as the studies of [58] have supported this.

Moving on to the use of ChatGPT to enhance ESL learners' acquisition of other skills, such as vocabulary and grammar, few studies were found. Yet, no studies were found regarding ChatGPT's influence on the learners' listening. However, a handful of studies have been found to demonstrate its ability to improve learners' vocabulary and grammar, and even these studies have created controversy among researchers. For example, in terms of ChatGPT's role in improving vocabulary skills, one study [59] investigated ChatGPT's ability to generate vocabulary materials. It concluded that learners using ChatGPT-designed materials out performed those using traditionally created materials. Nevertheless, this has been refuted by [60], who stated that the vocabulary exercises generated by ChatGPT were of low quality, claiming that they entail numerous distractions for learners. Moving to teaching grammar, [61] referred to the use of ChatGPT for teaching and learning grammar, indicating that the scores of students who used ChatGPT in learning grammar were higher than those of students who did not.

Despite the availability of the previously mentioned studies on integrating ChatGPT in teaching and learning English, a gap remains in demonstrating its effectiveness in ESL and EFL contexts, as [62] suggested. Therefore, further studies are needed to support its effectiveness in teaching English. Moreover, to implement the proper integration of ChatGPT, a suitable management change model should be adopted to ensure the desired outcomes, which will be the focus of the following subheading.

The Role of the School's Change Management System in Driving the Process of Digital Tools Implementation

Once, the Greek philosopher Heraclitus said, "The only constant in life is change". Upon careful examination of Heraclitus' statements, it becomes clear that change is an integral part of our daily lives and the lives of any organization [63], including schools, companies, and factories. This change, which is occurring in our current era, according to [64] is driven by many factors such as globalization, the competitive environment, and the rapid digitalization which is responsible for most of the change. Hence, the advent of technology requires the organization to adapt and lead a successful technological transformation, as [65] suggested. For that to happen, organizations need to be ready to conform to any new circumstances that may emerge, as [66] indicated. However, sometimes the changes that may take place in an organization may fail due to the unavailability of sufficient resources, the organization's policy, and the incompetence of the leaders [67]. Consequently, to have a better comprehension of the role of system change in driving digital transformation, especially the use of ChatGPT in schools, I will utilize one of the renowned theories of system change that has been proven to be successful in leading digital implementation in education, which is Kotter's Change Model for its ability to integrate theory with practice as [68] suggested. The rationale for selecting this model to address ChatGPT-related problems is its potential to mitigate risks and enhance profits, as noted in [69]. To clarify, the Kotter Model, introduced by Kotter (1996), comprises eight steps (Figure 5) that should be implemented in the correct order.

Figure 5. John Kotter Model of Change

This model was chosen to tackle problems which are related to ChatGPT for various reasons. The first one is connected to the simplicity of the model that can be easily implemented due to the explicit descriptions that are available under each phase which would make it easier to follow. Moreover, the second reason is associated with its emphasis on involving the stakeholders and making them integral partners in the change process. Furthermore, this model has been shown to be effective and successful in many educational institutions, especially higher education [70], during the implementation of online and blended learning, as this result has been confirmed by a study [71], which can be applied to the implementation of AI, specifically ChatGPT.

Despite the successful application of the Kotter system of change when it is applied to the adoption of digitalization approaches, this model is still facing some challenges in terms of resistance to change, as some of the teachers are not convinced by the idea of embracing the culture of change, especially in times of crisis or abrupt circumstances. The reason behind this resistance has been explained by [72] who explained, “Change affects people’s ability to feel comfortable, capable and confident because it means that they must learn a new system, work in new ways, and accept new responsibilities while being expected to maintain or increase existing productivity levels” (P.17). Another challenge that would be worth mentioning here is the lack of adequate and fruitful communication between the leaders and the teachers, as [73] indicated in his study.

However, these challenges could be mitigated by establishing a collaborative environment, giving teachers a voice, since they are the primary agents of the change process, as [74] mentioned. Moreover, educational institutions should provide teachers with training sessions that would enable them to use any novel adopted technology in their classrooms with confidence [75]. These are some of the suggested solutions that can be implemented to mitigate resistance to change. Nevertheless, other recommendations and future implications will be presented in the next point.

Recommendations, Implications and Future Trends in The Implementation of Chatgpt in Education

ChatGPT Implications

AI as a transformational technology has a significant impact on education. A good example of this can be clearly noted is the spread of ChatGPT among the world population, which is still presented as a controversial issue among educators. Despite that, the reality is that ChatGPT is there, and it is leading tremendous changes in teaching and learning. Undoubtedly, ChatGPT has impacted teaching and learning as it has potential opportunities to support the student's learning and the teachers' teaching, enabling them to understand convoluted concepts, fostering their creative thinking and helping them to brainstorm and enhance the teaching materials' quality. To clarify, ChatGPT has not only influenced teaching and learning, it also has transformed our thinking about these two terms, especially with the future advent of around 450 AI startups [76]. These tools would alter our thinking about education which would eventually drive teachers to integrate their information and practices with AI in their learning settings, as [77] suggested. Depending on that, teachers should be provided with explicit guidelines that would lead them to incorporate ChatGPT in their practices. Some of these recommended practices can be related to providing educators with PDs ,which will help them embed the effective use of ChatGPT by interacting and creating suitable prompts, which will in turn, help them gain better results. Moreover, giving practitioners time to reflect and rethink their interactions and practices with ChatGPT would be an essential step to prepare them for the successful implementation of ChatGPT with no fear or hesitation [78]. Additionally, educators should be aware that ChatGPT-generated materials should not be taken for granted, as they may contain false information or hallucinations, and therefore require them to provide their insights into these materials [79].

Despite the AI and ChatGPT beneficial effects on education, we should be aware of the challenges that are associated with using these tools in terms of data privacy, ethical implications in the decision-making process, and the notion of creating a balance in the interaction between human and technology to achieve the best results. As a consequence, policymakers should collaborate with AI engineers and school leaders to find solutions to tackle the issues of privacy, bias, and discrimination [80] to maximize the benefits of implementing the use of AI and ChatGPT in education.

ChatGPT Recommendations

The use of AI tools, especially ChatGPT, has earned profound attention in the educational field for its ability to support personalized and adaptive learning experiences and provide interdisciplinary learning opportunities.

Due to that, it is expected that AIED technologies will continue to develop to support many areas, including the teaching and learning pedagogies, the curriculum, and the assessment. Therefore, it is recommended to launch a universal AI policy that would regulate its application in education. It is true that many countries have their individual AI policies (Figure 6), as there are around 300 AI policies which had been initiated by 60 countries [81]; nevertheless, some of these policies refer to education. Hence, there is an urgent need to create

a unified AI framework that would leverage the potential opportunities and address the challenges in addition to its role in ensuring the ethics of equality, diversity and inclusion.

	APPROACHES		
	Independent	**Integrated**	**Thematic**
Argentina		Aprender Conectados (Ministry of Education, Argentina, 2017)	
China	Next Generation Artificial Intelligence Plan (Government of the People's Republic of China, 2017).		New ICT Curriculum Standards for Senior High School (Ministry of Education, People's Republic of China, 2017) Innovative Action Plan for Artificial Intelligence in Higher Education Institutions (Ministry of Education, People's Republic of China, 2018)
Estonia			ProgeTiger Programme (HITSA, 2017)
European Union	The Impact of Artificial Intelligence on Learning, Teaching, and Education (Tuomi, 2018)		GDPR (European Union, 2016, 2018) DigComp (Carretero et al., 2017)
Malaysia		#mydigitalmaker (Ministry of Education & Malaysia Digital Economy Corporation, 2017)	
Malta	Towards an AI Strategy. High-level policy document for public consultation (Government of Malta, 2019)		
Republic of Korea	Mid- to Long-Term Plan in Preparation for the Intelligent Information Society (Government of the Republic of Korea, 2016)		
Singapore			Code@SG Movement-Developing Computational Thinking as a National Capability (Infocomm Media Development Authority, 2017)
United Arab Emirates	UAE Strategy for Artificial Intelligence (United Arab Emirates, 2017)		
United States of America	National Artificial Intelligence Research and Development Strategic Plan (National Science and Technology Council, 2016)		

Figure 6. AI Policies around the World

Another recommendation is to provide teachers with PD sessions that enable them to leverage their self-efficacy and utilise AI and ChatGPT in innovative ways, thereby supporting students' learning. Moreover, there should be a tendency towards enhancing the Research and Development (R&D) in AI to address unexplored areas regarding the use of AIED in education, such as the effect of AI and ChatGPT on students' motivation and engagement, the integration between the use of ChatGPT and active learning pedagogies referring to the stakeholders' perceptions in these areas, and the potential challenges of AI especially ChatGPT and how to mitigate these challenges.

ChatGPT Future Trends

In the future, it is predicted that the use of AI will increase in educational environments, not only in higher education but also in schools, as many learning settings will launch several projects that will utilise AI as a pedagogy, not only as a digital tool. This step has been taken forward by Harvard University, which introduced the AI Pedagogy Project (AIPP) to help teachers apply AI in their teaching. Moreover, many educational institutions will allow using ChatGPT as a technological aiding tool, similar to the University of Abu Dhabi in the U.A.E., which is taking wide steps in regulating the use of ChatGPT. Furthermore, IT professionals will continue their efforts to enhance the features of ChatGPT to ensure safety and privacy, especially with the introduction of ChatGPT 4 (the paid version), which will include OpenAI Research. Besides, the U.A.E government has announced the commencement of teaching AI curriculum, including ChatGPT, in the public schools from K to 12 in the academic year 2025-2026 to prepare the posterities for the rapidly evolving digital world, which would enhance the

acquisition of digital literacy skills that would enable the learners to be ready for the future workforce.

CONCLUSION

This assignment utilized ChatGPT, one of the AI tools that has generated debates among educators. As this assignment shed the light on various aspects of the ChatGPT in many educational environments, it can be noted that the AI integration in education, specifically the ChatGPT holds promising positive implications in education mainly when it is used for teaching and learning the English language for its ability to transform teaching and learning in a way that would benefit the learning communities. Consequently, supporting the use of ChatGPT with suitable management systems, such as Kotter's model, would present a valuable framework that would ease the integration of AI in educational systems by providing a clear vision that requires effective collaboration among all stakeholders. This collaboration is vital as it would help educational institution leaders minimize the risks and increase the acceptance of the new technology.

Nevertheless, the presence of an effective management system will not be sufficient to optimise the advantages of using this AI tool, as ethical considerations such as privacy and equity should be addressed, making the use of this tool as friendly as possible. As a result, strategic and inclusive unified policies should be created to regulate the use of this evolving landscape, enhancing learners' creativity and productivity. Eventually, having an AI policy will not guarantee the success of the embraced AI tool, so the educational stakeholders should actively educate themselves and their learners on how to integrate this tool in their learning environments both ethically and responsibly, as the developments of this tool will not come to an end or slow down which can be seen clearly in the introduction of Bard by Google as a competitor for ChatGPT or with the announcement of the integration between ChatGPT and Bing by Microsoft.If companies are racing to integrate ChatGPT into their tools, then new directions for AI research and inventions are on the horizon for the educational sector.

LIMITATIONS

Although this study provides valuable insights into the pedagogical and ethical implications of integrating ChatGPT into English as a Second Language (ESL) instruction, several limitations should be acknowledged. First, the research relied exclusively on secondary data and literature-based analysis, which limits its ability to capture the real-time experiences of teachers and learners. Second, as a conceptual and narrative review, it does not provide quantitative evidence or comparative evaluation of learning outcomes across contexts. Third, most of the reviewed studies were published in English and from Global North institutions, which may introduce geographical and linguistic bias, limiting the generalizability of findings to other educational settings. Finally, given the rapid evolution of generative AI technologies, the relevance of some findings may change over time. Future research should therefore employ empirical classroom studies, cross-cultural comparisons, and longitudinal analyses to evaluate how AI-driven pedagogy such as ChatGPT continues to transform educational practices across diverse learning environments.

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CONFLICT OF INTEREST

"The authors declare no conflict of interest."

DECLARATION OF USE OF AI IN SCIENTIFIC WRITING

The author used Grammarly during the preparation of this work to edit and proofread the article. After utilizing Grammarly, the author thoroughly reviewed and edited the content as necessary and assumed full responsibility for the publication's content.

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