Jurnal Pendidikan Indonesia Gemilang Vol.4, No.2, 2024, pp. 211-232
e-ISSN 2809-5073. DOI. 10.52889/jpig.v4i2.458

Embracing Generative AI in Education: Exploring Teachers' Perceptions, Practices, and Potential Impact

Submitted 22 August 2024, Revised 28 August 2024, Accepted 29 August 2024

Jimson Ananayo Echave[1*], Vicelyn Joy Par Donato[2], Ofelia Damong Acosta[3]

[1]Don Valentin Torres Integrated School, Pangasinan, Philippines

[1,2,3]School of Arts and Sciences, Northern Luzon Adventist College, Pangasinan, Philippines

Corresponding Email: *jimsonechave@r1.deped.gov.ph

Abstract

This research investigated how AI technologies can change education, focusing on personalized experiences, adaptive systems, and integrating AI tools in teaching practices. A mixed-method research design was applied, using both surveys and interviews to gain data from teachers concerning their views on generative artificial intelligence (AI) and its implications for their teaching practice. The study concludes that there is a range of teachers' familiarity with generative AI, indicating an optimistic perspective despite challenges such as training gaps and technological barriers. This report reveals that the successful implementation of AI technology in their work demands support and constant professional development programs. Age-related discrepancies were uncovered among the respondents, necessitating specialized training to handle different requirements across various ages. Inclusion in educational environments requires collaboration among teachers, policymakers, and artificial intelligence developers. It is recommended that future studies should include longitudinal impact assessment, comparative analysis of AI tools, cross-cultural exploration of AI adoption, investment in infrastructure policies that might promote the use of ICTs in education as well as development policies relating to technology yet this work adds to the existing literature on AI integration by providing insights for educators, policymakers, researchers who want to leverage the potentials of generative artificial intelligence (AI) technologies for improved teaching-learning process.

Keywords: Artificial intelligence (AI), Education, Generative AI, Teacher perceptions, Personalized learning

INTRODUCTION

The integration of Generative AI (GenAI) in education has attracted a lot of attention because it has the great potential to change teachers' teaching methods and improve students' learning results. However, there are only a few longitudinal studies done in this field between AI and education due to fast technological changes since the rapid development of generative AI tools means that the old findings may become irrelevant as the technologies and their applications keep changing and developing (Kadaruddin, 2023; Denny et al., 2023; Walczak & Cellary, 2023). There is no established framework or methodology yet for integrating generative AI into educational research, making planning and performing longitudinal studies difficult (Denny et al., 2023; Eager & Brunton, 2023; Johri et al., 2023). This has resulted in poor infrastructure and policy investment in this area.

The study of the impacts of GenAI on education is still too limited to draw concrete policy conclusions, thus making it difficult to come up with informed policies and infrastructure (Bannister et al., 2023); hence it was recommended that there should be collaboration and policy work. It is important for teachers to collaborate with decision makers and developers so that they will effectively hurdle the challenges posed by this new emerging technology in the

educational setting. This particular partnership and collaboration will allow the sharing of ideas, insights, and even best practices that can assist the teaching and learning processes yet, on the other hand, these technologies are still emerging and we can observe a great deal of gap into policies crafted and the necessary infrastructure for its adoption (Knight et al., 2023; Kadaruddin, 2023). The full integration of GenAI into traditional teaching practices raises significant difficulties for teachers' roles and traditional approaches, while current curricula are not fully developed or supported by existing infrastructure (Walczak & Cellary, 2023).

Integrating Artificial Intelligence (AI) technologies in education transforms traditional educational practices, offers personalized learning experiences, and enhances educational systems' efficiency. Personalized learning and adaptive systems were slowly being integrated into the academic setting. AI and machine learning (ML) systems are being used to tailor educational content to individual student needs, improving learning outcomes through personalized learning experiences (Zafari et al., 2023; Soelistiono, 2023; Aggarwal et al., 2023; Kavitha et al., 2023). There is this sophistication of technology like the analyzation of the performance of the learners provides a more personalized approach AIntelligent Tutoring Systems (ITS) and adaptive learning platforms have now become the forefront of innovation and revolutionizing teaching at present time (Zafari et al., 2023; Tiwari, 2023; & Aggarwal et al., 2023). Generative AI can personalize learning experiences, create interactive content, and facilitate adaptive assessments, potentially boosting learner engagement and knowledge retention (Kadaruddin, 2023; Jauhiainen & Guerra, 2023). Artificial Intelligence (AI) makes learning more personal, addressing learners' diversity and boosting their motivation and skills development in elementary education (Jauhianen & Guerra, 2023).

Artificial Intelligence (AI) has also been found out also that it boost the present educational tools and techniques such as Natural Language Processing (NLP) and the 3D animations that are eventually utilized in the teaching and learning process like the Adaptive Learning System (AILS) that assists learners in a self-paced learning (Soelistiono, 2023). These AI technologies automates the traditional tasks of teachers such as giving grades of learners on their outputs, creating learning materials for their learners, and these makes the teachers focus more on their more complex tasks which gives efficiency on their jobs (Aggarwal, et.al., 2023). The interaction of both technology (AI) and human efforts in the educational setting, it has the potential to transform creative outputs and even encourage collaborative learning among learners (Creely & Blannin, 2023). AI technologies significantly change the horizon of the teaching and learning processes by emulating the soft and hard techniques of the educational tasks employed by the teachers (Dron, 2023).

In the educational setting, teachers have reported that they are hesitant to use such AI technologies because they have been aware of the data privacy of their learners and the potential biases of its algorithms (Jianzheng & Xuwei, 2023; Tiwari, 2023; Rashmi, 2023). This poses the necessity to provide the necessary training and education for the teachers to effectively utilize these emerging technologies to ensure that AI will complement the work of the teachers rather than take their place in the educational setting (Jianzheng & Xuwei, 2023; Rashmi, 2023). Sharples (2023) therefore recommends that educational decision-makers address the ethical issues encountered in the use of such technologies. There are significant concerns about the opacity, data privacy, and fairness of generative AI applications in education, necessitating careful consideration of these issues (Yu et al., 2022).

The studies of Smolansky et al., (2023) and Zastudil et al., (2023) call for teachers and learners to discuss to align their preferences and values to ensure success in integrating AI in the curricula. By doing so, the discussion can foster a deeper understanding of how these technologies can be used by formulating guidelines for the utilization of AI in their educational settings (Smolansky et al., 2023; Zastudil et al., 2023). To mitigate the potential problems and the disadvantages of the integration of generative AI in the educational setup, it is therefore recommended that teachers and educational decision-makers utilize them thoughtfully (Zastudil et al., 2023).

The main concern at present in the educational setting is the role of AI in enhancing the present educational framework . According to studies by Jianzheng and Xuwei (2023), Aggarwal et al. (2023), and Huraj et al. (2023), artificial intelligence has the power to change the educational landscape because it can support lifelong learning among students, provide avenues for accessibility to educational and also to make the educational setting very inclusive. Some of the most promising AI applications in education encompass a wide range of tools for innovation such as social robots, smart learning environments, and intelligent tutoring systems, which collectively contribute to modernizing educational practices (Ahmad et al., 2021).

We have to understand how teachers perceive the utilization of AI technologies in their profession. It is also needed to perceive their practice because these are crucial in their integration to the educational setting. Teachers who are incorporating AI and adapting to this technology need to focus on learners' critical thinking and authentic learning performance (Smolansky et. al., 2023; Zastudil et al., 2023). And, at the time of writing, teachers are more concerned about academic integrity and prefer assessments that assume AI usage, thus encouraging higher-order thinking skills (Smolansky et al., 2023). Pre-service teachers are strongly interested in AI literacy, emphasizing the need for practical, critical analysis-oriented

AI education integrated into both specialized and general curricula (Noh & Han, 2023). It is recommended that pre-service teacher education should include the utilization of AI in the plan of teaching-learning so that incoming teachers will understand the technology's potentials and limitations (Creely & Blannin, 2023). It is therefore needed for teachers to consider authentic assessment and should effectively use AI to assist them in evaluating learner outputs (Preiksaitis & Rose, 2023; Walczak, & Cellary, 2023). The use of generative AI in higher education necessitates fostering digital literacy and ethical use of AI among students (Walczak & Cellary, 2023). Further research is needed to explore best practices for integrating generative AI in education and we have to focus on human-AI interactions and developing AI-driven pedagogical approaches (Preiksaitis & Rose, 2023; Denny et al., 2023). The potential for generative AI to transform teaching and learning approaches requires ongoing collaboration between educators, policymakers, and AI developers (Kadaruddin, 2023; Matthew et al., 2023).

METHOD

A mixed method of quantitative and qualitative was utilized to determine teachers' practice and perceptions of AI integration in education. The participants in this research were teachers from various educational settings, with data collected through a structured survey questionnaire to determine the quantitative data and in-depth follow-up interviews to determine the qualitative data. The researchers used SPSS software to determine the extent and significant difference while thematic analysis was done to determine the insights of the participants. Informed consent from the participants was secured to ensure that the data gathered were treated with utmost confidentiality.

RESULTS AND DISCUSSION

Table 1. Teacher's Familiarity to Generative AI Technology in Education

		Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Unfamiliar	23.5	23.5	23.5
	Neutral	17.6	17.6	41.2
	Somewhat Familiar	41.2	41.2	82.4
	Very Familiar	17.6	17.6	100.0
	Total	**100.0**	**100.0**	

Table 1 presents that there is a varying level of perception among the respondents when it comes to familiarity with generative AI in the educative setting. The majority of the respondents 41.2% have claimed to be "somewhat familiar", followed by 23.5% of the respondents as "somewhat unfamiliar". Table 1 also shows that there is an equal percentage between the "neutral" and "very familiar" respondents with a percentage of 17.6%. There is an implication that the respondents need to increase their awareness on the use of artificial

intelligence as indicated in the cumulative percentages of 82.4% that belong to the "somewhat unfamiliar" to "somewhat familiar" range.

As indicated in Table 1, there was a remarkable percentage that the respondents are "somewhat familiar" and "somewhat unfamiliar" and this highlights that the respondents should be given seminars and workshops to utilize this know-how in the teaching-learning process. This result is significant in the teaching work of the respondents. As a result, it is recommended for educational leaders to provide professional development on generative AI among the teachers will ensure that there will narrow knowledge gap among the teachers and it will ensure that this knowledge will be well distributed among them. This will effectively support the teachers in their integration of AI into their own teaching jobs (Kopcha, et.al., 2022)

As educators become more acquainted with generative AI, careful consideration must be given to how these technologies can be ethically and responsibly integrated into teaching practices, curriculum development, and assessment processes while addressing privacy concerns. It is recommended that educational leaders and policymakers program a comprehensive professional development for teachers particularly on the etiquette and ethics of utilizing AI, child privacy security, and synergizing the potentials of the technology with human capabilities for better integration (Alshehri, 2023; de Oliveira Silva & dos Santos Janes, 2020).

Table 2. Teachers' Perceptions to Generative AI's Potential to Enhance Teaching Practices

		Percent	**Valid Percent**	**Cumulative Percent**
Valid	Disagree	5.9	5.9	5.9
	Neutral	23.5	23.5	29.4
	Agree	35.3	35.3	64.7
	Strongly Agree	35.3	35.3	100.0
	Total	**100.0**	**100.0**	

Table 2 presents very interesting data on the respondents' perceptions. It denotes that the majority of the respondents have expressed their outlook positively into this technology which they posed a strong belief in its capabilities. The respondents' majority specifically 70.6% of them either "agree" (35.3%) or "strongly agree" (35.3%) that the said technology enhances their role in the educational setting. Since these results have posed the respondents' openness to the technology, it further suggests that teachers should not only be aware of the advantages but also they should be eager to find new ways to integrate them into their day-to-day work in the educational setting. On the other hand, teachers should consider caveats such as more training, resources, and guidance to implement them effectively. They must be empowered to harness

these full potentials, to enable them to design more enriched curricula that will benefit their learners.

Despite the optimism that emanates from the result of this data, the respondents still pose their concerns such as the risks and challenges accompanied by this technological shift. The follow-up interview confirms that many of the respondents express their fears of replacing the efforts of teachers with artificial intelligence thus, it disrupts the traditional learning processes according to Kehoe (2023) and Dron (2023).

The respondents see the technology as something that has the potential to revolutionize, to reshape and to improve learning (Dron, 2023; Bahroun et al., 2023; Morris, 2023). These positive perceptions that the respondents have reflected emphasize their strong belief that generative AI can be harnessed as a valuable weapon in the teaching and learning process. Teachers recognize these potentials to empower their teaching approaches, enhance the engagement of their learners, and improve the educational outcomes as a whole.

This receptiveness of the respondents poses an opportunity for our schools to invest and improve on integration strategies. It presses for the formulation of a professional growth programs for teachers to equip them with knowledge and skills to shift into this emerging educational landscape. As it is indicated in the survey result, the teachers believe in the potential impact of generative AI to improve their practices that would result to a greater implication in the education sector.

With this emerging landscape of the educational setting, there is a need also to reconstruct our curricula and teaching approaches to fully make use its advantages. As this new landscape can foster interdisciplinary approaches and can enhance teaching designs, and provide new ways to innovate (Bahroun et al., 2023; Coleman, 2023).

There is a strong emphasis on the ethical utilization of AI which is crucial, that teachers should focus on transparency, to address the biases in its use, and also to promote responsible technology use (Bahroun et al., 2023; Chen, 2023). Importantly, the teachers should prioritize equity among learners that they will have equal access to these technologies.

Table 3. Teachers' Adoption to AI Tools in Teaching Practices

		Percent	Valid Percent	Cumulative Percent
Valid	No, not interested	5.9	5.9	5.9
	No, but interested	35.3	35.3	41.2
	Yes, occasionally	35.3	35.3	76.5
	Yes, frequently	23.5	23.5	100.0
	Total	**100.0**	**100.0**	

Table 3 shows that 58.8% - the majority or more than half of the respondents - actively integrated these AI technologies into their teaching work. This also includes 35.3% of the

respondents who utilize them occasionally while 23.5% use them frequently. This result signifies an extent of growing interest and adoption of AI tools in educational work among the respondents and it further denotes a remarkable shift in their academic setting and a shift to their AI-integrated teaching approaches. Moreover, it is noteworthy that there is an additional 35.3% of the respondents expressed their genuine interest in the integration of AI tools, even if they are already doing so. This positive acceptance and enthusiasm reflects a broader openness among the academic community to discover the use of such emerging technologies provided that they will be receiving the necessary support and infrastructure. On the other hand, only a small minority 5.9% have reported no interest in using AI tools which underscores the overall receptiveness of the respondents to the benefits of AI tools in educational work.

These findings give a positive picture of the adoption of AI technologies in the educational setting. Schools, administrators, and educational policy-makers have this opportunity to capitalize on the existing interest and integration by crafting professional development programs to ensure its access and address the barriers that may hinder its integration. In the follow-up interview among the respondents, it shows that several factors influence the respondents' use of AI technologies including their know-how, gadgets, workload, sense of ownership, support mechanisms, and ethical considerations, and is also confirmed by Nazaretsky et al., (2022) and Cukurova et al., (2023). To develop their trust and willingness in these emerging technologies, their academic community needs to address these through the development of comprehensive professional development programs and the crafting of educational policies about their adoption.

The result of the survey creates an opportunity for schools and educational policymakers to invest in the integration of AI into the educational framework. The implication of this survey data is significant to their sector since the high level of adoption and interest among the respondents signifies a growing readiness among them to embrace its integration. As AI technologies are becoming more prevalent among the respondents, there is a crucial need to reconsider the curricula and teaching designs in their schools which includes crafting policies and guidelines that address the ethical concerns and privacy implications.

Therefore, the integration of AI into the professional development of the respondents can support adaptive teaching and can cultivate their professional vision that can stem development and innovation (Tammets & Ley, 2023; Kusmawan, 2023). This highlights a need for crafting professional development programs for them that focus on empowering teachers to use such technologies.

Table 4. Types of AI Tools Used by Teachers

		Responses *Percent*	Percent of Cases
AI Tools[a]	AI-powered content creation tools	37.5%	64.3%
	Personalized learning platforms	37.5%	64.3%
	AI-driven assessment tools	16.7%	28.6%
	Chatbots for student support	8.3%	14.3%
	Total	**100.0%**	**171.4%**

The data presented in Table 4 is the type of tools used by the respondents. It denotes that among the varied AI tools utilized by the respondents are the AI-powered content creation tools and personalized learning platforms, each with a total response of 37.5%. This result reveals a glimpse of the present landscape of AI adoption among the respondents. By looking into these findings, it is becoming more clear that the respondents have a growing adoption of such technologies to enhance their teaching practices. This indicates that the respondents utilize this technology to enrich their teaching work by generating customized instructional materials to cater to the diversity of their learners. Generative AI tools like ChatGPT and Google Bard are becoming more popular among the respondents and according to the follow-up interview among them, one of the reasons why they use such is it not only saves time in their work but also upgrades the quality of their teaching materials as confirms by Kehoe (2023). With these technologies, the respondents confirmed in the follow-up interview that these produce resources that align with their teaching objectives making them concentrate more on their pedagogy instead of being bogged down by administrative tasks.

Following closely behind the adoption of the respondents is the AI-driven assessment technology which is composed of 16.7% of their responses. This denotes that there is a segment in their responses between the integration of AI-powered assessment solutions to their teaching approaches to streamline their evaluation procedures and provide personalized feedback to their students. The respondents confirm the study of Pearce, et.al. (2023) through the result of the follow-up interview that they use these AI technologies to facilitate their grading process, to integrate in their grading, and to augment and enhance the interactive practical aspect of AI teaching. They further affirm that their employment of AI offers them tailored educational content and assessment which ultimately improve both their teaching efficiency and their learners' performance (Sun et al., 2021; Liu et al., 2022). Interestingly, the respondents claim that the use of chatbots for learner support is less prevalent which represents only 8.3% of their total responses. The follow-up interview confirms that the respondents ban the use of AI chatbots in doing their assignments for it encompasses cheating on the part of the learners even if these chatbots can provide learners with an interactive learning experience (Pearce et al., 2023; Mageira et al., 2022).

Overall, the data presented in the table indicates that the respondents are positive in embracing a variety of AI tools with an average of 1.71 technologies being adopted per respondent. This data shows the increasing use of AI technologies in their teaching work. This result is significant to the development of enhanced teaching-learning practices.

Table 5. Perceived Benefits of AI Tools as Reported by Teachers

		Responses	**Percent of Cases**
		Percent	
AI Benefits[a]	Improved student engagement	20.0%	43.8%
	Enhanced learning outcomes	25.7%	56.3%
	Time-saving in lesson preparation	34.3%	75.0%
	Personalized learning experiences	20.0%	43.8%
	Total	**100.0%**	**218.8%**

Table 5 presents an illumination of the key benefits that the respondents associate with their teaching practices. One of the highlighted benefits of the respondents with an impressive 75.0% of the respondents is the time-saving aspect of their lesson preparations. This confirms the studies of Liu et al. (2022), Seo et al. (2021), and Harry & Sayudin (2023). The follow-up interview among the respondents confirms that by automating their routine daily tasks, AI makes them devote their time to what truly matters which is engagement with their learners. As stated by Liu, et.al. (2022), the respondents affirm that it allows them to focus on their teaching, enriching their classrooms which subsequently caters to the diversity of their learners. This result among the respondents highlights their appreciation for the efficient benefits and work alleviation that AI tools can provide in their work. As per the follow-up interview, the respondents claim that these technologies alleviate their burden in writing their lesson plans, allowing them to devote their time to their teaching and improving their teaching approaches.

The second most cited benefit of the respondents is the potential to enhance learning which is reported by 56.3%. It suggests that the respondents recognize the educational value of AI technologies such as the improvement of student learning. According to the follow-up interview, the respondents claim that these technologies give adjustments to their teaching approaches thus leading to improved academic performances of their learners. Subsequently, the data presented above aligns with the third most cited by the respondents which is the personalized learning experience as confirmed by 43.8% of the respondents and as confirmed by the respondents, they claim that these AI tools tailor the teaching and learning processes enhancing their overall effectiveness and empowering the learners to learn at their own pace in ways that align with their learning styles (Liu et al., 2022; Harry & Sayudin, 2023; Ashwini et al., 2023).

Table 5 shows that 43.8% of the respondents associate the use of AI tools with improved learner engagement and this indicates that the respondents' view of AI as a means to foster learner interest, motivation in class, and participation in the educational setup. The respondents claim that AI enhances their learners' engagement (Seo et al., 2021; Sangarsu, 2023; Yousuf et al., 2023). The follow-up interview confirms Yousuf et al., (2023), and Cornelisz & Klaveren (2018) that AI makes learning more interactive and enjoyable. Overall, each respondent as indicated in the table reports an approximate of 2.19 various benefits of utilizing AI technologies. This data highlights the possibility of AI to develop the respondents' teaching practices and leverage these for positive and effective teaching-learning outcomes. The respondents claim in the follow-up interview that these technologies foster creativity and innovation (Liu et al., 2022; Harry & Sayudin, 2023; Ashwini et al., 2023; Hasibuan & Azizah, 2023; Pardamean et al., 2022; Hashim et al., 2022) and they further affirm that these technologies enhance their students' learning performance and engagement to the lesson (Pardamean et al., 2022; Hashim et al., 2022).

Table 6. Challenges Faced by Teachers in Adopting AI Tools

		Responses	**Percent of**
		Percent	**Cases**
AI Challenges[a]	Lack of training and support	36.4%	70.6%
	Concerns about student data privacy	12.1%	23.5%
	Integration with existing curriculum	24.2%	47.1%
	Technological barriers	27.3%	52.9%
	Total	**100.0%**	**194.1%**

Table 6 presents the significant challenges of the respondents upon integrating AI technologies into their work as teachers. 70.6% of the respondents claim that they have inadequate training and support in this technology which exposes a gap in this emerging landscape with their respective sectors in education. One of the reasons for this according to the follow-up interview is their feeling that they are ill-equipped to effectively use them due to lack of professional growth programs in AI integration. This result also confirms the studies of Arpilleda et al., (2023) and Tzoneva (2023) that the respondents' insufficient training not only hampers their ability to adopt but also encompasses the need for such professional development programs.

Going back to the table, it also shows that the second most cited challenge among the respondents pertains to technological barriers as reported by 52.9%. These challenges as confirmed by the follow-up interview entail myriads of issues with infrastructure limitations and the overall utilization of AI tools. It is therefore recommended that these barriers be addressed for successful integration in their respective schools particularly in the less developed areas. These challenges significantly hinder the effective adoption of AI as the respondents

claim in the follow-up interview that they face struggles to learn and integrated these technologies despite their demanding workloads (Tzoneva, 2023; Richardson, 2011).

Another predicament as reported by 47.1% of the respondents is their difficulty in integrating AI technologies into the well-established curriculum standards and learning objectives and this unveils the need for a cohesive approach among the respondents to the design of the curricula to accommodate such innovations. The respondents further confirm through the follow-up interview that they find it hard to incorporate these technologies into their teaching approaches which necessitates an overhaul in the course content and delivery of instruction as confirmed also in the study of Brzycki & Dudt (2005).

There is another growing concern among the respondents when comes to the data privacy of their learners when they integrate AI into their instruction. 23.5% of the respondents claim that they still consider this issue that be addressed by educational decision-makers through policies, guidelines, and protection of data and this confirms the recommendation also of Woolf et al. (2013).

On average of the respondents, over 70% of them claim to have lacking in training and support highlighting the need for a professional growth program for them to be empowered in its effective integration. Over 50% of the respondents have reported that they face technological barriers and this also calls for the need for the improvement of the technological infrastructure of the educational sector.

Table 7. Teachers' Interest in Professional Development on Generative AI in Education

		Percent	Valid Percent	Cumulative Percent
Valid	Yes, if relevant to my subject area	5.9	5.9	5.9
	Yes, definitely	94.1	94.1	100.0
	Total	**100.0**	**100.0**	

Table 7 presents an impressive level of enthusiasm among the respondents when it comes to professional development opportunities that have a focus on the integration of generative AI in their teaching jobs which is represented by 94.1% who responded with with a resounding "yes, definitely," that indicates a very strong desire for such. The interest of the respondents is overwhelming which necessitates their educational leaders to craft a professional development program since the participants have expressed their willingness and receptiveness to improve their knowledge and skills in leveraging generative AI in their work; this result confirms the study of Xu (2020) and Nazaretsky et al., (2022) indicating that the respondents recognize AI's potential to enhance both teaching and learning overall educational experience.

On the other hand, there is a reported small percentage of 5.9% among the respondents that their interest in the professional development program would hinge on its relevance to their specific majors or subject area they are teaching. Whilst there is an openness to professional

development in terms of utilizing AI, some prefer content that fits the requirements of their respective disciplines. The follow-up interview confirms that lack of trust is one of the barriers to the adoption of AI and often, the respondents sometimes have misconceptions and fear of the emerging AI technologies. They have hesitancies to fully embrace the technologies and Nazaretsky et al., (2022) recommend that these should be addressed with professional development programs to build more trust and willingness to leverage the benefits of such technologies.

The report of Table 7 overall, has a comprehensive 100% interest that they are either interested or indicated their desire for a relevant program in their subject area. The respondents' educational leaders should prioritize the professional development programs that focus on their education to equip the workforce.

The enthusiasm of the respondents is a crucial opportunity to drive a strategic incorporation of AI in classrooms to enhance their teaching and learning outcomes. It is recommended that the respondents' educational leaders and policymakers ensure that these programs meet the diverse requirements of the workforce. The data presented in Table 7 highlights the respondents' eagerness to engage in this new emerging technology to create a robust framework for its integration, to foster an environment where the respondents feel empowered and equipped, and ultimately, benefit the learners to more personalized learning that are responsive to their individual needs.

Table 8. Perceived Importance of Ongoing Support and Training for Implementing Generative AI in Teaching

		Percent	Valid Percent	Cumulative Percent
Valid	Neutral	5.9	5.9	5.9
	Important	47.1	47.1	52.9
	Very Important	47.1	47.1	100.0
	Total	**100.0**	**100.0**	

Table 8 depicts the necessity of continued assistance and training in AI technology, as assessed by respondents. According to the findings, a significant majority of respondents view such help and training as "important" (47.1%) or "very important" (47.1%), for a total of 94.2%. It is an overwhelming consensus of the respondents that they have highlighted the role of professional development in enabling them to integrate generative AI in their classrooms.

The respondents have manifested a positive attitude toward AI as confirmed by Joshi et al., (2021) and Polak et al., (2022) that they recognize the significance of such technologies in fostering skill development among their learners which is essential for their learning and development (Salas-Pilco et al., 2022). The follow-up interview signifies that the respondents

have understood that technology continues to advance and that teachers should equip themselves with skills that are necessary to navigate and thrive.

Interestingly, there is a small minority of 5.9% among the respondents have expressed a "neutral" stance on the importance of such training and this suggests that there is a strong consensus among them that their educational leaders should prioritize the development and delivery of such comprehensive training programs on the integration of generative AI in their workplace.

Additionally, the respondents believe that their creativity and emotional intelligence cannot be replaced by AI as revealed in the follow-up interview. Chan & Tsi (2023) also affirm that human attributes are important to fostering social and emotional competencies of the students which AI cannot replicate. The respondents also claim that they are not prepared for the integration of AI in their classrooms because they lack familiarity with the technology and they also lack understanding on the positive impact of such in their teaching (Lee & Perret, 2022).

According to the follow-up interviews, the respondents' students appreciate and respect them as human beings, understanding that their relationships and everyday interactions are critical to the teaching and learning experience. This mood among respondents enhances their belief about the importance of their work, despite the rising influence of AI, as proven by Chan and Tsi (2023).

The nearly uniform consensus among respondents that such professional development is either "Important" or "Very Important" highlights the crucial need for education stakeholders to prioritize the development and implementation of comprehensive training programs. The education sector can empower the teaching staff to grasp the revolutionary potential of these new tools by providing them with the information and skills they need to use generative AI technologies ethically and effectively.

Table 9. ANOVA Result on Age-Related Differences in Perceived Potential of Generative AI to Enhance Teaching Practices

		Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**	**Interpretation**
Do you believe that generative AI technology has the potential to enhance teaching practices?	Between Groups	6.338	3	2.113	3.841	0.039	*There is significant difference*
	Within Groups	6.600	12	0.550			
	Total	**12.938**	**15**				

As we can see in Table 9, the ANOVA findings through the SPSS software, reveal significant differences in how respondents evaluate the potentials of using AI technology to enhance teaching methods across different age groups and this research suggests that age affects

how individuals utilize AI technologies in the classroom. It raises significant considerations regarding how various generations perceive the influence and usage of this technology in education.

Looking deeper at Table 9, we can see that the "sum of squares" gives useful information about how age affects variance. Meanwhile, the 6.338 "between group" number demonstrates how typical opinions vary between age groups. This shows that people of different ages see AI differently or hold opposing views on it. However, the sum of squares for the "within groups" at 6.600 indicates that there are disagreements among the age groups as well. This statistical finding demonstrates that while the majority of individuals concur on the benefits of incorporating AI into the classroom, opinions vary with age groups.

The F value of 3.841 with a p-value of 0.039 signifies that there is a significant difference in the opinions of the respondents on generative AI which is statistically significant at the 95% confidence level. This result implies that the attitudes of the respondents on integrating AI differ on their age which has a significant implication in the educational setting. These findings highlight the significance of age considerations when introducing and promoting AI-powered devices in education. Understanding age gaps and harnessing the knowledge of responders from varied backgrounds can help the education sector successfully use AI's revolutionary ability to improve teaching methods and student learning experiences.

Also, senior responders' confidence and considerable experience have a significant impact on their positive opinions regarding technology integration. These professionals have extensive subject matter knowledge and teaching experience, which allows them to appreciate the value of technology in increasing student engagement and enhancing learning outcomes (Rohaan et al., 2012; Gamboa & Estrella, 2022). Their knowledge of traditional teaching approaches provides them with a firm basis for understanding how AI may improve and supplement current practices, resulting in a more dynamic and successful educational environment.

Table 10. Teachers' Perceptions of Generative AI's Potential to Enhance Teaching Practices by Age Group

Age	Mean	Std. Deviation
Under 30	2.0000	.
30-39	4.2000	0.78881
40-49	3.5000	0.57735
50-59	5.0000	.
Total	**3.9375**	**0.92871**

Table 10 shows respondents' perspectives about the incorporation of AI technology to improve their teaching techniques by age group. The data analysis demonstrates considerable discrepancies in how people of various ages see the potential of generative AI technology to

improve teaching practices. The findings imply that age affects people's opinions and attitudes about adopting AI-powered technology in the classroom and that understanding these traits is crucial for effective AI deployment in educational contexts.

If we are to take a closer look at the data, it shows that there are some intriguing insights regarding the age disparities of the respondents. One intriguing insight shows that the oldest respondents who aged 50 to 59, claimed a strong belief in the potential of generative AI, giving it an impressive mean rating of 5.0 and this high mean reflects their optimism about the role that AI can play in education. In the follow-up interview, these seasoned teachers claimed that they have a deeply rooted positive outlook on emerging technologies due to their experience over the years that they have witnessed numerous technological advancements and how these innovations have contributed to the development of the teaching and learning processes.

The senior respondents claim in the follow-up interview that they have been recipients from time to time of a supportive network which includes their colleagues and family members who are assisting them during the past technological turnovers. Gamboa & Estrella (2022) affirm that these support systems for these seniors play a crucial role in uplifting their positive outlook on new emerging technologies despite the initial struggles that they are facing.

In contrast, it also shows that the younger respondents specifically those below 30 years of age express their favor less with a mean score of only 2.0. This implies that there is a certain degree of skepticism or caution among these younger generations of respondents and is also confirmed by the follow-up interview. The interview with these younger respondents affirms that they are more attuned to the challenges and ethical issues posed by integrating AIs specifically on issues of academic dishonesty and integrity and the authenticity of their learners' work.

On one hand, respondents belonging to ages 30-39 fall in the middle with a mean score of 4.2 which indicates a more positive outlook than those respondents belonging to ages 40-49 with a mean score of 3.5. This difference highlights the complexity of how the respondents from different age groups see it and respond to its integration. The younger respondents are aware of the potential according to the follow-up interview yet they feel that their learners might leverage them for cheating. This problem is confusing since it is difficult to differentiate between student and AI-generated work (Crawford et al., 2023; Stepanechko & Kozub, 2023).

According to the respondents, the use of AI such as ChatGPT is widely considered as a new form of academic dishonesty (Crawford et al., 2023). They are also concerned that this may lead to dependency and a lack of the necessary abilities for future personal and professional success (Stepanechko & Kozub, 2023). Furthermore, respondents say that the usage of

ChatGPT is a major problem since it has caused academic trust difficulties between them and their students (Stepanechko & Kozub, 2023; Gorichanaz, 2023). In response to this worry, schools have issued restrictions for its usage, including a prohibition, to avoid potential misuse and maintain academic standards (Stepanechko & Kozub, 2023).

CONCLUSION

This research investigated the potential of integrating artificial intelligence (AI) in education with a special emphasis on learning experiences, adaptive mechanisms, or respondents and their integration into the teaching and learning process. The study's mixed-methods approach, which includes surveys and interviews, attempts to better understand teachers' attitudes, practices, and the influence of generative AI in education.

The result of the study shows that the respondents have varying degrees of familiarity with generative AI with the majority of them falling into the classifications between "somewhat unfamiliar" to "somewhat familiar". Despite these, the respondents are optimistic about the technology's integration to improve their teaching and they are keen to learn about integrating them in their work since they enjoy the benefits of reducing their time for lesson preparation and also in improving their learners' outputs.

On the other side, respondents experience various hurdles when integrating generative AI technologies into their education, such as a lack of training and assistance, technological impediments, and difficulties. To address these issues, thorough professional development programs should be designed and implemented for them.

This study also reveals that respondents' perceptions of artificial intelligence technology change according to their age by indicating that the older respondents had a more optimistic attitude toward AI's ability to improve teaching and learning methods than their younger counterparts. Therefore, there is a necessity for personalized assistance programs that address the requirements of responders of all ages to achieve equitable and successful adoption of such technology.

There is a need to provide the respondents with the required assistance and training as they apply this growing technology in their work. If this materializes, the sectors they are in will be able to completely transform and harness the potential of AI to improve their own teaching and learning practices. It is consequently proposed that responders, legislators, and AI developers work together to actualize these potentials in the educational landscape.

SUGGESTIONS

In future studies, it’s important to consider longitudinal research that tracks the long-term effects of generative AI technologies on teaching practices, student learning outcomes, and the

overall educational system. By conducting comparative studies, we can gain valuable insights into how different AI tools and platforms perform in real educational settings. It is recommended to conduct more cross-cultural studies on this subject matter because it will uncover more about how generative AI is understood and used in different cultural and educational environments so that policymakers will adjust various tactics to address varied situations.

This research highlights the need for practitioners and policymakers to conduct comprehensive impact assessments to evaluate the results of this study among different educational institutions so that investments can foster an environment that embraces innovative teaching methods.

REFERENCES

Aggarwal, D., Sharma, D., & Saxena, A. B. (2023). Adoption of Artificial Intelligence (AI) For Development of Smart Education as the Future of a Sustainable Education System. *Journal of Artificial Intelligence, Machine Learning and Neural Network (JAIMLNN)*, *3*(6).

Ahmad, S. F., Rahmat, M. K., Mubarik, M. S., Alam, M. M., & Hyder, S. I. (2021). Artificial intelligence and its role in education. *Sustainability*, *13*(22), 12902.

Alshehri, B. (2023). Pedagogical Paradigms in the AI Era: Insights from Saudi Educators on the Long-term Implications of AI Integration in Classroom Teaching. *International Journal of Educational Sciences and Arts (IJESA)*, *2*(8), 159-180. https://doi.org/10.59992/ijesa.2023.v2n8p7.

Arpilleda, A. J., Resullar, M. P., Budejas, R. P., Degorio, A. L. G., Gulle, R. T., Somera, M. C. J., ... & Atis, J. M. S. D. (2023). Mathematics Teachers' Views on Online Learning Implementation Barriers. *Journal of Instructional Mathematics*, *4*(1), 31-40.

Ashwini, N., Kumar, N., Nandan, M., & Suman, V. (2023). Leveraging Artificial Intelligence in Education: Transforming the Learning Landscape. *International Research Journal of Computer Science*, *10*(05), 192-196.

Bahroun, Z., Anane, C., Ahmed, V., & Zacca, A. (2023). Transforming education: A comprehensive review of generative artificial intelligence in educational settings through bibliometric and content analysis. *Sustainability*, *15*(17), 12983.

Bannister, P., Urbieta, A. S., & Peñalver, E. A. (2023). A systematic review of generative AI and (English medium instruction) higher education. *Aula Abierta*, *52*(4), 401-409.

Brzycki, D., & Dudt, K. (2005). Overcoming barriers to technology use in teacher preparation programs. *Journal of Technology and teacher education*, *13*(4), 619-641.

Chan, C. K. Y., & Tsi, L. H. (2023). The AI revolution in education: Will AI replace or assist teachers in higher education?. *arXiv preprint arXiv:2305.01185*.

Chen, S. (2023). *Generative AI, learning and new literacies. Journal of Educational Technology Development and Exchange.* https://doi.org/10.18785/jetde.1602.01.

Coleman, K. (2023). Generative AI and education ecologies. *Pacific Journal of Technology Enhanced Learning*, *5*(1), 19-20.

Cornelisz, I., & van Klaveren, C. (2018). Student engagement with computerized practising: Ability, task value, and difficulty perceptions. *Journal of Computer Assisted Learning*, *34*(6), 828-842.

Crawford, J., Cowling, M., & Allen, K. A. (2023). Leadership is needed for ethical ChatGPT: Character, assessment, and learning using artificial intelligence (AI). *Journal of University Teaching & Learning Practice*, *20*(3), 02.

Creely, E., & Blannin, J. (2023). The implications of generative AI for creative composition in higher education and initial teacher education. *ASCILITE Publications*, 357-361.

Cukurova, M., Miao, X., & Brooker, R. (2023, June). Adoption of artificial intelligence in schools: unveiling factors influencing teachers' engagement. In *International conference on artificial intelligence in education* (pp. 151-163). Cham: Springer Nature Switzerland.

de Oliveira Silva, A., & dos Santos Janes, D. (2020). Exploring the role of artificial intelligence in education: a comprehensive perspective. *Review of Artificial Intelligence in Education*, *1*, e5-e5.

Denny, P., Becker, B. A., Leinonen, J., & Prather, J. (2023, June). Chat Overflow: Artificially Intelligent Models for Computing Education-renAIssance or apocAIypse?. In *Proceedings of the 2023 Conference on Innovation and Technology in Computer Science Education V. 1* (pp. 3-4).

Dron, J. (2023). The human nature of generative AIs and the technological nature of humanity: Implications for education. *Digital*, *3*(4), 319-335.

Eager, B., & Brunton, R. (2023). Prompting higher education towards AI-augmented teaching and learning practice. *Journal of University Teaching and Learning Practice*, *20*(5).

Gamboa, D. M. D., & Estrella, E. O. (2022). Get Ready To Be Techy: Struggles of Senior Citizen Teachers in the Utilization of Technology in the Classroom. *International Journal of Multidisciplinary Research and Analysis*, *5*(8), 2020-2026.

Gorichanaz, T. (2023). Accused: How students respond to allegations of using ChatGPT on assessments. *Learning: Research and Practice*, *9*(2), 183-196.

Harry, A., & Sayudin, S. (2023). Role of AI in Education. *Interdiciplinary Journal and Hummanity (INJURITY)*, *2*(3), 260-268.

Hashim, S., Omar, M. K., Ab Jalil, H., & Sharef, N. M. (2022). Trends on technologies and artificial intelligence in education for personalized learning: systematic literature. *Journal of Academic Research in Progressive Education and Development*, *12*(1), 884-903.

Hasibuan, R., & Azizah, A. (2023). Analyzing the Potential of Artificial Intelligence (AI) in Personalizing Learning to Foster Creativity in Students. *Enigma in Education*, *1*(1), 6-10.

Huraj, L., Pospíchal, J., & Luptáková, I. D. (2023, October). Learning enhancement with AI: From idea to implementation. In *2023 21st International Conference on Emerging eLearning Technologies and Applications (ICETA)* (pp. 212-219). IEEE.

Jauhiainen, J. S., & Guerra, A. G. (2023). Generative AI and ChatGPT in school children's education: Evidence from a school lesson. *Sustainability*, *15*(18), 14025.

Jianzheng, S., & Xuwei, Z. (2023). Integration of AI with higher education innovation: reforming future educational directions. *International Journal of Science and Research (IJSR)*, *12*(10), 1727-1731

Johri, A., Katz, A. S., Qadir, J., & Hingle, A. (2023). Generative artificial intelligence and engineering education. *Journal of Engineering Education*, *112*(3).

Joshi, S., Rambola, R. K., & Churi, P. (2021). Evaluating artificial intelligence in education for next generation. In *Journal of Physics: Conference Series* (Vol. 1714, No. 1, p. 012039). IOP Publishing.

Kadaruddin, K. (2023). Empowering education through Generative AI: Innovative instructional strategies for tomorrow's learners. *International Journal of Business, Law, and Education*, *4*(2), 618-625.

Kavitha, K. B., Pradeep Kumar, T. K., Nithiya, S., & Suguna, A. (2023). Implementation of Artificial Intelligence in Education. *International Research Journal of Computer Science*, *10*(5), 104-108.

Kehoe, F. (2023). Leveraging Generative AI Tools for Enhanced Lesson Planning in Initial Teacher Education at Post Primary. *Irish Journal of Technology Enhanced Learning*, *7*(2), 172-182.

Knight, S., Dickson-Deane, C., Heggart, K., Kitto, K., Kozanoğlu, D. C., Maher, D., ... & Zarrabi, F. (2023). Generative AI in the Australian education system: An open data set of stakeholder recommendations and emerging analysis from a public inquiry. *Australasian Journal of Educational Technology*, *39*(5), 101-124.

Kopcha, T. J., Wilson, C. Y., & Yang, D. (2022). Improving teacher use of educational robotics to teach computer science in K-5 mathematics. In *Computational Thinking in PreK-5: Empirical Evidence for Integration and Future Directions* (pp. 47-54).

Kusmawan, U. (2023). *Redefining Teacher Training: The Promise of AI-Supported Teaching Practices.* Journal of Advances in Education and Philosophy. https://doi.org/10.36348/jaep.2023.v07i09.001.

Lee, I., & Perret, B. (2022, June). Preparing high school teachers to integrate AI methods into STEM classrooms. In *Proceedings of the AAAI conference on artificial intelligence* (Vol. 36, No. 11, pp. 12783-12791).

Liu, Y., Chen, L., & Yao, Z. (2022). The application of artificial intelligence assistant to deep learning in teachers' teaching and students' learning processes. *Frontiers in Psychology*, *13*, 929175.

Mageira, K., Pittou, D., Papasalouros, A., Kotis, K., Zangogianni, P., & Daradoumis, A. (2022). Educational AI chatbots for content and language integrated learning. *Applied Sciences*, *12*(7), 3239.

Matthew, U. O., Bakare, K. M., Ebong, G. N., Ndukwu, C. C., & Nwanakwaugwu, A. C. (2023). Generative Artificial Intelligence (AI) Educational Pedagogy Development: Conversational AI with User-Centric ChatGPT4. *Journal of Trends in Computer Science and Smart Technology*, *5*(4), 401-418.

Morris, M. R. (2023). Scientists' Perspectives on the Potential for Generative AI in their Fields. *arXiv preprint arXiv:2304.01420*.

Nazaretsky, T., Ariely, M., Cukurova, M., & Alexandron, G. (2022). Teachers' trust in AI-powered educational technology and a professional development program to improve it. *British journal of educational technology*, *53*(4), 914-931.

Noh, Y., & Han, S. (2023). Exploring perception and support strategies for Generative AI Literacy: Focusing on pre-service secondary teachers. *Korean Association for Learner-Centered Curriculum and Instruction*. https://doi.org/10.22251/jlcci.2023.23.17.317.

Pardamean, B., Suparyanto, T., Cenggoro, T. W., Sudigyo, D., & Anugrahana, A. (2022). AI-based learning style prediction in online learning for primary education. *IEEE Access*, *10*, 35725-35735.

Pearce, K., Alghowinem, S., & Breazeal, C. (2023, June). Build-a-bot: teaching conversational ai using a transformer-based intent recognition and question answering architecture. In *Proceedings of the AAAI Conference on Artificial Intelligence* (Vol. 37, No. 13, pp. 16025-16032).

Polak, S., Schiavo, G., & Zancanaro, M. (2022, April). Teachers' perspective on artificial intelligence education: An initial investigation. In *CHI Conference on Human Factors in Computing Systems Extended Abstracts* (pp. 1-7).

Preiksaitis, C., & Rose, C. (2023). Opportunities, challenges, and future directions of generative artificial intelligence in medical education: scoping review. *JMIR medical education*, *9*, e48785.

Rashmi, D. (2023). Unlocking the Potential of AI in Education: Challenges and Opportunities. *International Journal for Multidisciplinary Research (IJFMR)*, *5*(4), 1-11.

Richardson, J. (2011). Challenges of Adopting the Use of Technology in Less Developed Countries: The Case of Cambodia. *Comparative Education Review, 55*, 008-029. https://doi.org/10.1086/656430.

Rohaan, E. J., Taconis, R., & Jochems, W. M. (2012). Analysing teacher knowledge for technology education in primary schools. *International Journal of Technology and Design Education*, *22*, 271-280.

Salas-Pilco, S. Z., Xiao, K., & Hu, X. (2022). Artificial intelligence and learning analytics in teacher education: A systematic review. *Education Sciences*, *12*(8), 569.

Sangarsu, R. (2023). Enhancing Student Engagement in Learning with Modern Web and AI Technologies. *International Journal of Science and Research (IJSR)*, *12*(10), 1439-1442.

Seo, K., Tang, J., Roll, I., Fels, S., & Yoon, D. (2021). The impact of artificial intelligence on learner–instructor interaction in online learning. *International journal of educational technology in higher education*, *18*, 1-23.

Sharples, M. (2023). Towards social generative AI for education: theory, practices and ethics. *Learning: Research and Practice*, *9*, 159-167.

Smolansky, A., Cram, A., Raduescu, C., Zeivots, S., Huber, E., & Kizilcec, R. F. (2023, July). Educator and student perspectives on the impact of generative AI on assessments in higher education. In *Proceedings of the tenth ACM conference on Learning@ Scale* (pp. 378-382).

Soelistiono, S. (2023). Educational technology innovation: Ai-integrated learning system design in ails-based education. *Influence: International Journal of Science Review*, *5*(2), 470-480.

Stepanechko, O., & Kozub, L. (2023). English Teachers'concerns About The Ethical Use Of Chatgpt By University Students. *Grail of Science*, (25), 297-302.

Sun, Z., Anbarasan, M., & Praveen Kumar, D. J. C. I. (2021). Design of online intelligent English teaching platform based on artificial intelligence techniques. *Computational Intelligence*, *37*(3), 1166-1180.

Tammets, K., & Ley, T. (2023). Integrating AI tools in teacher professional learning: a conceptual model and illustrative case. *Frontiers in Artificial Intelligence*, *6*, 1255089.

Tiwari, R. (2023). The integration of AI and machine learning in education and its potential to personalize and improve student learning experiences. *International Journal of Scientific Research in Engineering and Management*, *7*.

Tzoneva, I. (2023). Benefit and Challenges in Using AI-Powered Educational Tools. *Education and New Developments* 2023 – Volume 2. https://doi.org/10.36315/2023v2end079.

Walczak, K., & Cellary, W. (2023). Challenges for higher education in the era of widespread access to Generative AI. *Economics and Business Review*, *9*(2), 71-100.

Woolf, B., Lane, H., Chaudhri, V., & Kolodner, J. (2013). AI Grand Challenges for Education. *AI Mag.*, 34, 9-14. https://doi.org/10.1609/aimag.v34i4.2490.

Xu, L. (2020, December). The dilemma and countermeasures of AI in educational application. In *Proceedings of the 2020 4th international conference on computer science and artificial intelligence* (pp. 289-294).

Yousuf, E., Wahid, A., & Khan, M. Y. (2023). Exploring the Effectiveness of AI Algorithms in Predicting and Enhancing Student Engagement in an E-Learning. *International Journal on Recent and Innovation Trends in Computing and Communication, 11*(10), 23-29.

Yu, H., Liu, Z., & Guo, Y. (2023, April). application Status, Problems and Future Prospects of Generative ai in education. In *2023 5th International Conference on Computer Science and Technologies in Education (CSTE)* (pp. 1-7). IEEE.

Zafari, M., Bazargani, J. S., Sadeghi-Niaraki, A., & Choi, S. M. (2022). Artificial intelligence applications in K-12 education: A systematic literature review. *Ieee Access*, *10*, 61905-61921.

Zastudil, C., Rogalska, M., Kapp, C., Vaughn, J., & MacNeil, S. (2023, October). Generative ai in computing education: Perspectives of students and instructors. In *2023 IEEE Frontiers in Education Conference (FIE)* (pp. 1-9). IEEE.