

An Inquiry Into the Use of Generative AI and Its Implications in Education: Boon or Bane

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ABSTRACT

The emergence of generative AI technologies has provoked considerable debate among educators regarding their role in education. This study is an investigation of the benefits, disadvantages, and potential strategies for integrating generative AI in educational settings by analyzing societal impacts based on a literature review. We have surveyed the influence of generative AI in education through sources from peer-reviewed journals. The main findings show that generative AI can enhance accessibility and customization in learning for individual learners' needs and pacing. But there are problems with algorithmic biases, discrimination, and data privacy issues, too. This study advocates for mitigating bias, data transparency, and promotion and evaluation of AI policy and research. Generative AI in education hinges on how it is responsibly integrated and observes ethical guidelines, by way of the constant assessment that will guarantee its potential in revolutionizing learning.

KEYWORDS

Generative AI, Artificial Intelligence, ChatGPT, Opportunities, Challenges, Possible solutions, Education

INTRODUCTION

The recent introduction of generative artificial intelligence (AI) has evoked much interest and debate in almost all fields of practice but most within the educational community. ChatGPT, one of generative AIs, has gained over 100 million users within two months of its launch in November 2022 (Hu, 2023). ChatGPT marks an enormous breakthrough in the area of natural language processing and machine learning, unexpectedly creative in the domains of content creation and human-like writing capabilities. It potentially offers personalized and accessible learning experiences that fit the diversity of students, thereby changing how we teach and how they learn in the future (Hwang, 2022; Jeong, 2022; Mishra & Heath, 2024; Mogavi et al., 2024; Trust et al., 2023).

However, integration attempts with generative AI are not easy, with challenges involving algorithmic bias, potential discrimination, and concerns over data privacy posing very huge obstacles to broad adoption (Asgary, 2023; Salazar et al., 2024; Strowel, 2023). The transparency in sharing that data becomes a major concern due to the fact that OpenAI's ChatGPT derives data from its user base. In view of this, integration in education requires an understanding of the ethical and pragmatic aspects if integration is to be possible (Akgun & Greenhow, 2022; Mogavi et al., 2024). This calls for educators and researchers to consider the possible implications such advanced technologies would

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bring in shaping the future of education. The debate about the role of generative AI in education is still in the infancy of its development and is marked by diverse opinions and limited empirical studies (Mogavi et al., 2024).

This current study, therefore, takes a review of the literature of recent publications to provide a contemporary, comprehensive assessment of the educational impact of generative AI. First, the nature of this fast-paced and constantly emerging technology requires continuing analysis and examination. The discussion aims to give a view of the societal effects brought about by generative AI technologies within the educational sphere, highlighting its potential for innovation and the associated challenges. After all, this discussion seeks to balance the benefits and risks and to guide the thoughtful incorporation of AI in education with the objective of a seamless fusion of technology and educational practices.

PROSPECTS FOR CHATGPT IN EDUCATION

Artificial Intelligence (AI) is a component of computer science that studies, theorizes, and designs machines with human-like capacities and intelligence (Buchanan, 2005). Recently, AI systems have been defined by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) as intelligent systems that use data and information to perform tasks with human-like intelligence through learning algorithms, reasoning techniques, and capabilities such as perception, prediction, control, and planning. (UNESCO Recommendation on the Ethics of Artificial Intelligence document, adopted on November 23, 2021). The document further states that there is a wide range of AI system adaptations, including machine learning, deep learning and reinforcement learning, and machine reasoning including planning, scheduling, knowledge representation and reasoning, search, and optimization.

While studies on Generative AI in education are just beginning, the literature to date has already pointed out its wide range of applications, which rely on learning patterns and data structures unlike those used in traditional AI. These include supporting teaching methodologies, facilitating student assessment, enhancing learning experiences, fostering creative thinking, and improving reading, writing comprehension, and critical media literacy skills (Tate, et. al., 2023). From aiding in brainstorming sessions to combating writer's block, AI has veritably demonstrated its value as an indispensable aid to researchers and writers (Gordijn and Have, 2023). Beyond improving learning outcomes, AI can also address teacher and resource scarcity, and optimize educational effectiveness which can lead to better student success in academic, social, and career opportunities (Hwang, 2022).

Generative AI can personalize content for students, allowing them to take control of their learning at their own pace, and assist in students' understanding of difficult concepts by providing them with extra support through writing aids (Trust, et. al., 2023). Initiatives such as "AI for K-12 (AI4K12) by the Association for the Advancement of Artificial Intelligence (AAAI) and the Computer Science Teachers Association (CSTA), are all for using AI in educational spaces (AI4K12, 2020), emphasizing the benefit of future-safing students for the job market by making them understand and appreciate its practical applications; providing them training on how to incorporate AI literacy in the K-12 setting (Relmasira, et. al., 2023); educate students on the ethical "design of autonomous decision-making systems;" and also, helping them acquire AI-related competencies as life hacks (Touretzky, et. al., 2022).

CHALLENGES OF CHATGPT IN EDUCATION

As a form of Generative AI, Language Models (LLMs) undergo training through self-supervision using extensive datasets tailored for customization. They can be fine-tuned to perform specific natural language tasks, eliminating the need for distinct models for each task (Sejnowski, 2023, p. 309). LLMs are evolving along with challenges that require careful analysis in navigating these tools and

its responsible use. Weidinger, et. al. (2023), identified six risk areas concerning harms related to discrimination, misinformation, malicious use, and hazards to the environment. Misinformation, in particular, is where proliferation of massive amounts of informative text is considered an “AI-driven Infodemic,” the scale of a global health emergency driven by the LLMs’ ability to manufacture such at breakneck speed (De Angelis, et. al., 2023, p. 1). This same bias also infringes on confidentiality, as observed by Trust, et. al. (2023) in AI-based student monitoring systems currently in use. Moreover, these technologies are often disproportionately used in schools with high populations of typically disadvantaged and discriminated students, such as students of color, students with disabilities, and LGBTQ+ students, causing them to feel like they are being watched and monitored, thereby creating a hostile learning environment.

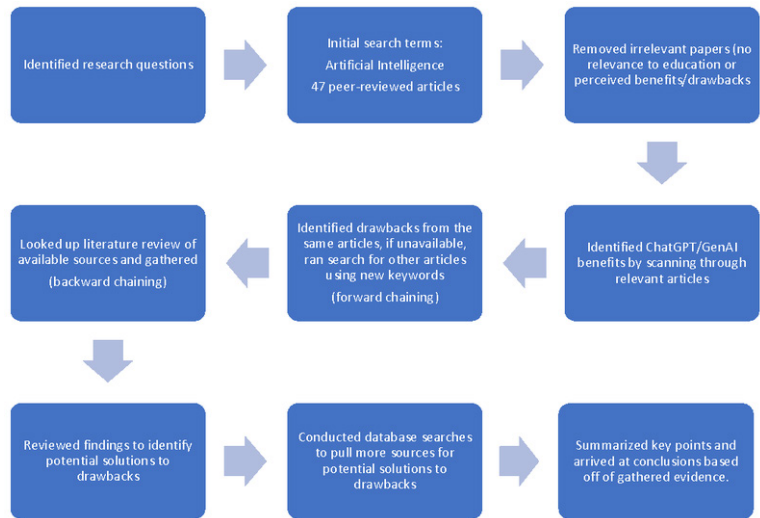
Another risk is that LMMs, like ChatGPT, tend to feed information off of the prompts they are provided, which can be in the form of user data and analytics (amount and time of usage, access on device, location sharing through IP address) which can be sold or turned over to interested parties (Trust, et. al., 2023). Further, data prompted into generative AI cannot be deleted even if the account that provided the data is removed or canceled, opening up a discussion on materials that Generative AIs are trained on. Studies and reports show that students have been submitting ChatGPT-generated content as their own in assignments, distance learning quizzes, and essays (Trust, 2023), resulting in the New York City Public Schools outright prohibiting the use of ChatGPT on their computers (Trust, 2023, citing Goulding, 2023, & Study.com, 2023). Even worse, generative AI may also be used to create content for malicious purposes by bad actors, such as fake news and deep fakes that may be incorporated into reputable research (Raman, et. al., 2024), leading to a “halo effect” due to generation of well-crafted statements (Eke, 2023), as well as creating “plausible-sounding but incorrect or nonsensical answers” and making up references that are fictional (Thorp, 2023). There is also the risk of incurring the “hallucination effect” where answers seem very legitimate but are, in fact, made up by generative AI (Shen, et. al., 2023).

Misuse has not been limited to education, as evidenced by the publication of more than 70 erroneous articles purportedly generated by AI through the tech website CNET, corrections for which were eventually issued (Trust, 2023). These incidents raise concerns about its seriousness, leading to calls for regulation and oversight of these technologies, including the validation of AI-generated output to safeguard learning outcomes and prevent the spread of misinformation (Sinha, 2023). There is pending litigation worldwide around the issue of copyright infringement, particularly in the US, where the question of whether or not training materials used by AIs are covered by fair use laws, while the EU established two exemptions regarding content mining (Text and Data Mining/TDM), and Articles 3 and 4 of the EU Copyright Directive (CDSM) EU 2019/790): authorization by copyright holders on content being shared, and liability on unauthorized use of protected works without authorization of copyright holders (Margoni & Kretschmer, 2022; Strowel, 2023). Given these concerns, it is not surprising that many are calling for a moratorium on AI development, as countries are still scrambling to develop regulatory laws on AI and its broader ecosystem in the interest of public safety (The Conversation newsletter, 2023), and to address fears over forecasts that human labor will be potentially displaced by the technology (Gruetzemacher, et. al., 2020).

METHODS

This inquiry availed of a review of related available literature on the topic of practical uses and implications of generative AI. The data gathered was processed into a narrative synthesis as it offers a more comprehensive overview of the subject while using an unstructured study design and qualitative information (Wollscheid & Tripney, 2021) that does not adhere to a specific method (Moons, et. al., 2021). This data was obtained using the OneSearch tool from a library at a southern California State University, along with EBSCOhost Academic Search Premier and JSTOR, which support keyword searches. Additionally, searches through Google and Google Scholar were utilized. The results

Figure 1. Step-by-step analysis of literature used for the study



covered the years 2005, and 2020 through 2024. The searches were conducted between March 2023 and March 2024. The initial results were 47 articles from peer-reviewed journals. Citation chaining strategies were also utilized, which are methods of locating additional sources for topics or keywords that are related to the topic (Embry-Riddle Aeronautical University Library, 2023) of Generative AI or ChatGPT in education. The knowledge base was created by starting with existing references or backward chaining. These references were then used to find even more relevant sources through both Google Scholar and the southern university at California’s library OneSearch Tool. A reference list made of interconnected information is the result of a continuous search for new references (Source: Rowan University Libraries, n.d.). Forward-chaining or reference-tracking was also used to discover if the citation used was, in turn, made into a reference point in newer articles (Source: Simon Fraser University Library, n.d.). Once the key points were identified, conclusions and recommendations for further research were arrived at and are discussed in the subsequent sections.

A literature matrix was assembled and sorted through an analysis of topics and studies that were considered relevant and had a similar pattern to the research question, and by using keyword searches such as “ChatGPT in education, Artificial Intelligence in Education, Challenges, Opportunities, generative AI in education,” further branching out to “AI regulation, AI Bias, AI ethics, AI data privacy, AI impact on labor.” Criteria for inclusion were history and explanation of generative AI and related terms, ChatGPT and its related terminology, generative AI, and AI in education. On the other hand, the criteria for exclusion were irrelevance to perceived benefits or drawbacks of generative AI/ChatGPT, non-education related articles. 34 journal articles are included in the final analysis.

A synthesis of these relevant studies is presented in the following section in table format to present the practical use and implications of Generative AI/ChatGPT.

RESULTS

The following table is an excerpt of the collected data from published/broadcasted sources that form part of the inquiry into the practical uses of Generative AI, its drawbacks, and potential solutions.

Table 1. Summary of benefits, drawbacks, and possible solutions of generative AI in education

Benefits	Drawbacks	Possible solutions/Additional Insight
Aid in writing lesson plans, academic papers, syllabi, objectives, discussion prompts (Tate, et al., 2023)	Reliance on AI-produced content may lead to non-exercise of critical thought/Human automation bias (LAist 89.3 FM, 2023),	Academia needs a critical restructuring to sustain integrity. Academic policies should be reflective of current trends in technology while maintaining adherence to ethical guidelines (LAist 89.3 FM, 2023) Human accountability should be in the forefront of all AI-related activity (Eke, 2023).
Feedback writing tool for student work, writing rubrics, assessment tools (Tate, et. al., 2023)	Reliance on AI may lead to non-exercise of critical thought (LAist 89.3 FM, 2023), dangers of plagiarism	Take advantage of ChatGPT by using it as a teaching and research device Emphasize higher-order thinking, introduce and realign educational goals to match domain learning tasks (Zhai, 2022) Move from traditional ways of thinking on scholastic success (Eke, 2023) Provide both teacher and student training to maximize potential benefits and promote ethical use to reduce risks to academic integrity (LAist 89.3, 2023) Develop ways to shift assessments and what teachers are asking of students Have students do evaluations instead of just producing writing Students should learn to analyze and discuss AI writing as “higher cognitive functions on the learning taxonomies.” (LAist, 89.3, 2023) Summative assessments can no longer be considered reliable—instead, rely on formative assessments and monitor student progress through self-reflection and evaluation (Farrokhnia, et. al., 2023)
Generating and revising essays (Tate, et. al., 2023)		Collaborate with stakeholders to establish regulations on citing ChatGPT and other AI tools in the educational setting (LAist 89.3 FM, 2023); To be socially responsible, get in the habit of recording AI output to properly attribute Generative AI source (McKnight, 2022)
Productivity and research tool (Tate, et. al., 2023)	Risks for plagiarism	Require flaggers, and auditors. Use AI detectors with caution (Hacker, et. al., 2023; Eke, 2023)
Lessened teaching workload (Farrokhnia, et. al., 2023)	Simplistic interpretation of context (Farrokhnia, et. al., 2023)	Develop media and digital literacy in schools (Farrokhnia, et. al., 2023)
Facilitate personalized learning (Farrokhnia, et. al., 2023)	Decline/lack of higher order thinking skills (Farrokhnia, et. al., 2023) Cannot replace in-person interactions (Chang & Kidman, 2023)	Encourage creativity skills and promote critical thought exercises (Farrokhnia, et. al., 2023). Add Generative AI to complement teaching (Chang & Kidman, 2023)
Facilitate complex learning (Farrokhnia, et. al., 2023)	Response quality is questionable (Farrokhnia, et. al., 2023)	Have students create reflections and assess generative AI content to exercise higher order learning (Farrokhnia, et. al., 2023)
Create spaces for practice and experimentation through prompt-generated simulations (Chang & Kidman, 2023)	Decline/lack of higher order thinking skills (Farrokhnia, et. al., 2023)	Use AI to design material that can encourage “reflection, empathy, and self-awareness.” (Chang & Kidman, 2023)

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Table 1. Continued

Benefits	Drawbacks	Possible solutions/Additional Insight
Rapid output of text in a mass scale /facilitate rapid learning (Chang & Kidman, 2023)	Spread of misinformation(DeAngelis, et. al., 2023)	Need for accurate detection of AI produced text, as well as regulation (DeAngelis, et. al., 2023)
	Risk in producing biased and fake output, especially into scientific research, as a result of “Halo effect” (Eke, 2023) Risk of incurring “Hallucination effect” (Shen, et. al., 2023)Widespread use can lead to a “pollution of mistruths in environments of information.” (Sobieszek & Price, 2022)“Digital Divide”, or Internet access inequality due to lack or limited infrastructure, resulting to fewer opportunities to utilize and appreciate advantages of AI (Celik, 2023) Equity issues - who has access and who doesn't (LAist 89.3, 2023)Perpetuating discrimination in education (Farrokhnia, et. al., 2023)	Heightened awareness through fact-checking or including “human verification” (Eke, 2023)Calls for regulation to ensure all children worldwide should have equal access to AI technology (Chang & Kidman, 2023)Guarantee better internet access and reliability (Sharma & Sharma, 2023)
	Gender equity issue as women are underrepresented since 88 percent of AI professionals are men (Ethics of Artificial Intelligence UNESCO)	Develop regulation to review gender gap issue (UNESCO)
	May perpetuate systemic bias and discrimination(Trust, 2023);	Call for global regulation, protection of human dignity, well-being and harm prevention (UNESCO)
Generating plausible responses(Farrokhnia, et. al., 2023)	Decline/lack of higher order thinking skills (Farrokhnia, et. al., 2023)AI does not contain pedagogical information, unlike teachers (Trust, 2023)	Heightened awareness through fact-checking or including “human verification” (Eke, 2023)Students can craft reflections and assess generative AI content to exercise higher order learning (Farrokhnia, et. al., 2023)
Intelligent automation of resources (Eke, 2023), e.g., democratization of medicine and telehealth (Sharma & Sharma, 2023)	Automatic generation of solutions may cause harm to humans impacted by it through human automation bias (Eke, 2023)Ethics and data privacy issues, regulations regarding licensing for healthcare professionals (Sharma & Sharma, 2023)	Human accountability in scientific practice (Eke, 2023)
New industries/labor forces/ worker value chains are developed through AI engineering	Possible harm to usersWorkers in the lower-value chain may be displaced (Gruetzemacher, et. al., 2020)Categorizing employees into high-skilled and low-skilled positions (Autor 2010;Bárány & Siegel, 2015; Brown, 2016; Goos, Manning & Salomons, 2014, as cited by UNESCO International Centre for Technical and Vocational Education and Training)	Humans must be front and center of any AI activity (UNESCO)Humans' lack of trust in AI maybe due to the unequal division of labor between humans and AI, rather than a conflict of interest between the two (Jain, et. al., 2022)AI as total replacement for human labor is impractical and should never be the case (Tobar & Gonzalez, 2022).
	Non-transparency of data use and commercial transactions should be treated as intellectual theft (Strowel, 2023).	Cooperation among stakeholders (developers, academia, government) to mitigate risks and potential theft of intellectual property (Eke, 2023)
Increased accessibility of information (Farrokhnia, et. al., 2023)	Risk of plagiarism (Farrokhnia, et. al., 2023)	Revisions to goals, tasks, and assessments in curricula. (Farrokhnia, et. al., 2023)

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Table 1. Continued

Benefits	Drawbacks	Possible solutions/Additional Insight
Potential as a personalized learning tool	Default lacks personalization, (Engelbrecht & Borba, 2023).	Need to tailor instruction while addressing privacy and ethical concerns (Engelbrecht & Borba, 2023).
	The absence of transparency in the AI decision-making process for generating mathematical solutions dealing with complex mathematical language and syntax	Explanation of the processes on how AI generates solutions [to mathematical problems] must be guaranteed, as well as in preventing misinformation and skepticism (Farrokhnia, et. al., 2023; Sinha, 2023; Monte-Serrat & Cattani, 2023).
	Standards alignment—exposing children to AI activities may be valuable, but education alone may not prepare them to ethically understand, use, and evaluate AI	Importance of incorporating AI literacy and aligning it to curriculum standards when integrating it into the educational system. (Relmasira, et. al., 2023)
	Limited Mathematics datasets due to limited research;	Assess the effectivity of AI in Math learning by using different viewpoints and different stakeholder groups (Hwang & Tu, 2021) to produce diverse and comprehensive mathematical problems for training AI models (Davies, et. al., 2021) in order to generate realistic problem-solving scenarios and results that are relevant to mathematics learners.
AI technology empowers learners to self-direct knowledge acquisition and fuel natural curiosities	Decline in higher order cognitive skills in the absence of educators to provide guidance (Farrokhnia, et. al, 2023)	Students should not be left to their own devices, as the presence of a teacher is vital in fostering a positive learning environment (Johnson, 2023) Educate younger students on the ethical use of AI (Touretzky, et. al., 2022)

DISCUSSION

The implementation of generative AI in education has been a buzzworthy topic of late. Research data has been conducted and analyzed to identify the potential in Generative AI as well as its issues, and along with it, possible solutions. In selecting sources particular to this study, publications from the years 2020 to 2023 were selected as this was a period which AI development gained considerable traction. Given that this research originated in the first quarter of 2023, the discussions and studies on generative AI and its impact on education were still in its early stages and remained disparate and limited in scope, resulting to the inclusion of news reports, blog posts, radio programs, government report, along with journal articles. This diverse range of sources allowed for a thorough understanding of AI and issues of note that need improvement or resolution for effective implementation.

The sources for opportunities and drawbacks in this study have themes that center around **efficiency and productivity** (Tate, et. al., 2023; Farrokhnia, et. al., 2023; Chang & Kidman, 2023; and Sharma & Sharma, 2023), **personalized learning** (Tate, et. al., 2023; Farrokhnia, et. al., 2023; Zhai, 2022; and Chang & Kidman, 2023, Engelbrecht & Borba, 2023; Sinha, 2023; Monte-Serrat & Cattani, 2023; Relmasira et. al, 2023; Hwang & Tu, 2021, Davies, et. al., 2021), **ethical concerns and human oversight** (LAist 89.3 FM, 2023; Eke, 2023; Trust, 2023, and UNESCO, Sharma & Sharma, 2023), **critical thinking and skill development** (Zhai, 2022; Farrokhnia et. al, 2023, Chang & Kidman, 2023, Johnson, 2023; Touretzky, et. al., 2023), **accessibility and equity** (Celik, 2023; Sharma & Sharma, 2023), **plagiarism and misinformation** (LAist 89.3 FM, 2023; McKnight, 2022; Hacker, et. al., 2023; DeAngelis, et. al., 2023; Sobieszek & Price, 2022; Shen, 2023; Eke, 2023), **job displacement** (Greutzemacher, et. al., 2020; Jain, et. al, 2022; Tobar & Gonzalez, 2022), **copyright and intellectual property** (Strowel, 2023). The overall positive impacts of generative AI in education as identified from the studies are:

- Increased efficiency in classroom tasks
- Learning materials and assessments can be personalized for individual needs
- Immediate and detailed feedback on written assignments

- Easy access to information
- Open new avenues for learning through generated simulations and immersive learning
- Knowledge is democratized for all.

The negative impacts are:

- Overreliance and potential decline of critical thinking
- Plagiarism concerns due to easy access
- Bias and misinformation from results due to improperly trained data
- Data privacy, decision-making transparency, and accountability issues
- Educational inequalities stemming from digital divide
- Task automation leading to job losses, especially for educators
- AI-generated content may lack depth and content, needing constant human evaluation and verification.

Additional insights and recommendations from these studies reveal a need for teacher and student training in AI, global technological equity and the creation of global laws and regulations on AI and human accountability while promoting ethical use, using AI to promote higher-order thinking and to complement learning, proper attribution of AI-generated content, and the development of AI for higher-order tasks to minimize job loss, as well as encouraging cooperation among stakeholders to mitigate potential risks.

To add value, similar theoretical research on Artificial Intelligence and generative AI in education were brought into the picture to identify commonalities and gather new insights. The similarities across these citations (Hwang et. al., 2020; Chiu, et. al., 2023; Khosravi, et. al., 2022; Chen, et. al., 2020; Adeshola & Adepoju, 2023; Montenegro-Rueda et. al., 2023; and Pradana, et. al., 2023) are also grouped into positive and negative impacts, the benefits being:

- Personalized learning
- Improved efficiency
- Data-driven decision-making
- Content generation
- Early identification of at-risk students

The challenges/negative impacts of AI were identified as:

- Ethical considerations (bias, fairness, privacy)
- Teacher displacement
- Need for human oversight
- Limited effectiveness in early stages
- Plagiarism and misuse concerns

The comparative research articles used for this section were theoretical (Hwang, et. al., 2020; Khosravi, et. al., 2022), systematic literature-review based (Chiu, et. al., 2023; Chen, et. al., 2020; Montenegro-rueda, et. al., 2023), bibliometric analysis (Pradana, et. al., 2023) and quantitative/qualitative (Adeshola & Adepoju, 2023), which are similar to the previously-gathered citations detailed in the foregoing table, and address common benefits such as *increased efficiency, personalized learning, improved accessibility, and new learning opportunities*. The common drawbacks are: *ethical concerns* (plagiarism, bias, data privacy), *decline in critical thinking skills, potential job displacement*, and the *digital divide*.

One unique and notable advantage highlighted in the research comparison, which is not identified in the other citations, is the potential for AI in education administration. This is apparent in assisting with decision-making and academic guidance in forecasting student dropout probabilities (at-risk students), and determining factors that impact student academic performance (Chiu, et. al., 2023). Interventions can be implemented to meet student needs, positively impacting their educational journey (Khosravi, et. al., 2022). Clearly, incorporating AI in education administration can radically transform education as we know it and benefit both students and institutions.

This research draws its strength from the compilation of AI and Generative AI findings from various individual sources, allowing a multipoint perspective on its impacts on education. By covering a relatively broad spectrum of information, it highlights the possibilities of personalized learning and critical thinking, and emphasizes the need to address potential ethical concerns as well as take into consideration the balance needed to implement Generative AI in the educational field. The inclusion of contrasting viewpoints adds weight and a well-rounded perspective to the discussion, serving as a foundation for further research and a resource for best practices on classroom integration.

The scope of this research is confined to limitations stemming from sole reliance on literature review. A more insightful understanding of the personal impact of ChatGPT and other LLM can only be achieved through surveys from actual users. Incorporating data from students and teachers as stakeholders would enhance the depth and breadth of this study since their experience and perspectives can contribute to the evaluation of the impact of this new technology. This being said, the failure to incorporate additional data-gathering methods can be a limiting factor of this research, and we recommend future studies to address this knowledge gap for a better analysis of the effects of Generative AI. Furthermore, research can also be conducted to identify locations where AI is gradually implemented and determine any new ideas and best practices that have emerged as a result so these can be adapted for use in other regions and promote its advancement and efficiency of different industries and institutions worldwide.

LIMITATIONS & RECOMMENDATIONS

Much of the current research on generative AI relies heavily on theoretical and hypothetical scenarios, which may not be a best representation of the positives and negatives of applying generative AI in schools. Data on long-term impact of generative AI is still limited (Montenegro-Rueda, et. al.), thus, the effectiveness of using AI-enabled learning may not be assessed until a much later time. The literature gathered in this research is only a scratch on the surface regarding the many practical applications for generative AI or ChatGPT, in particular, in support of teaching, assessment, creative thinking, reading and writing comprehension, and developing critical media literacy skills (Tate, et. al., 2023).

Apart from these, concerns relating to data sharing, biases and prejudice, and potential job displacement are only a few of the projected effects of generative AI's widespread adoption. As we move forward, employing speculative methodologies is crucial (Bozkurt, et. al., 2023) as the use and development of generative AI requires careful oversight and adherence to ethical principles. It is crucial for educators and developers working with Generative AI technology to periodically conduct critical evaluations and audits of the data used to train algorithms and scan for biases or inaccuracies. Data transparency and deployment by Generative AI technology is also vital in order to build and maintain the trust of students from whom the data is generated, and their parents, to allay their concerns about infringement of privacy. More research is needed and encouraged to evaluate the impact and effectivity of Generative AI on students of today and the future, as well as the public at large.

The Ethics of AI document (Source: UNESCO, 2021) serves as a significant step toward establishing responsible AI practices. This framework provides a foundation for building ethical guidelines and ensuring responsible use of Generative AI in education and beyond. With the acknowledgement of both the promise and pitfalls, we can leverage the potential of Generative AI to

enhance learning experiences while mitigating potential risks. The collaborative efforts of researchers, educators, policymakers, and technology developers are crucial in ensuring responsible use and effective integration of Generative AI into the educational landscape.

In light of this, conferences have also been convened to discuss the formation of guidelines on Artificial Intelligence. UNESCO is urging member states to ensure equal access to digital technologies and learning methods provided through these conventions. Countries such as China (Wu, et. al, 2020), South Korea (oecd.ai, 2020; Jeong, 2022), Canada (Jeong, 2022), Singapore (Southworth, et. al, 2023), Finland (Hautala & Heino, 2023), and France (Bareis & Katzenback, 2022), have taken proactive measures to develop national strategies for incorporating AI education while collaborating with organizations such as the International Labor Organization (ILO) to anticipate and develop the necessary skills for workers to adapt to the AI wave. The advantages of AI are too significant to overlook. This research pattern reveals that for every issue, potential solutions either await exploration or are already in progress. It's important to note that history has shown us time and time again, from the introduction of calculators in the classroom to the invention of the Gutenberg press, that society always finds a way to embrace and evolve with new technology.

CONCLUSION

This research analyzes the impact that Generative AI can have on education by providing information to stakeholders about its benefits and drawbacks to encourage a continued thoughtful approach to its integration into education. Generative AI's strengths lie in its capabilities of making learning accessible and personalized, adapting to individual learner needs and paces, resulting in effective educational journeys for students. Alongside these benefits, Generative AI also presents risks like inherent biases and discrimination brought about by algorithms, as well as data privacy issues.

To navigate these challenges, this research recommends bias mitigation, data use transparency, and continuous review of AI policy and the encouragement of more research on the subject. Generative AI shows significant potential in the field of education, however, this is only beneficial if it is coupled with the establishment of ethical guidelines and ongoing evaluation and research for it to become a useful tool in the development of effective learning experiences for all.

CONFLICTS OF INTEREST

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