We negate resolved: In the United States, the benefits in the use of generative artificial intelligence in education outweigh the harms

Lets first define gen vs predictive AI.

Generative artificial intelligence (gen AI) uses data in order to create something new. Predictive AI uses data to forecast or infer a highly likely prediction of what could happen in the future.

C1: Learning

AI in education kills critical thinking.

Fonkam et al. 24 [Mathias Fonkam, PhD in computer science and Associate Teaching Professor @ Penn State University with over 20 years of experience in computer science education, xx-xx-2024, Risks of AI-Assisted Learning on Student Critical Thinking: A Case Study of Albania, International Journal of Risk and Contingency Management, https://www.igi-global.com/article/risks-of-ai-assisted-learning-on-student-critical-thinking/350185] BZ

INTRODUCTION

Artificial Intelligence (AI) has increasingly become a transformative force in the education sector, offering unprecedented opportunities to enhance learning experiences and outcomes (Bates et al., 2020; Çela et al., 2024). AI-assisted learning systems promise to revolutionize traditional educational paradigms including offering personalized learning pathways and real-time feedback mechanisms (Bates et al., 2020). However, alongside these advancements, there are growing concerns about the potential adverse effects of AI on critical cognitive skills, particularly critical thinking (Essel et al., 2024; Iqbal & Iqbal, 2024; Parsakia, 2023). This study examines these concerns through a focused examination of AI-assisted learning's impact on student critical thinking within the context of Albania's educational landscape. **Critical thinking is** a fundamental skill, **essential** for problem-solving, decision-making, and the ability **to analyze** and synthesize **info**rmation effectively (Dwyer et al., 2014). Critical thinking is vital for students to develop these skills to navigate an increasingly complex and information-rich world (Kitsantas et al., 2019). However, there is a growing body of literature suggesting that **AI**-assisted learning, while beneficial in many aspects, may inadvertently **undermine the development of critical thinking skills**. This issue arises from the tendency of AI systems to provide readily available solutions and information, potentially discouraging students from engaging deeply with the learning material and developing their analytical abilities.

Education is a fundamental pillar of society, **shaping the actions of new generations** and preparing them to confront future challenges. An educated populace facilitates national development and accelerates improvements across various sectors. In a dynamic society, the acquisition of new knowledge and tools is essential, particularly in the field of education. The

integration of AI within the educational system has revolutionized numerous aspects of teaching and learning. AI has introduced novel methods for enhancing personalized learning, improving assessments, and reducing administrative burdens for educators (Ayala-Pazmiño, 2023). The adoption of AI tools in both preuniversity and university education is inevitable, as they provide efficient means for students to meet assignment deadlines and enable professors to generate tailored tasks that address specific student needs. Ayala-Pazmiño (2023) highlights the efficacy of AI in analyzing student data, thereby enabling the customization of learning experiences to individual requirements. The implementation of AI in education promises a more personalized and responsive approach to teaching, ultimately benefiting the educational process.

Despite the numerous benefits associated with AI in education, many educators recognize the potential risks related to data privacy and security. While students may not be fully aware of these risks, educators can discern the potential dangers associated with AI, particularly concerning the automated generation of outputs that may lack appropriate context or accuracy (Cardona, Rodríguez, & Ishmael, 2023). Consequently, AI tools are seen as critical instruments for redefining classroom dynamics and enhancing student engagement in the teaching-learning process (Pavlenko & Syzenko, 2024). However, the extent to which AI tools represent an advantage or a drawback for educational systems remains unclear. Instructors and administrators grapple with determining whether the use of AI tools by students in their assignments might undermine their problem-solving skills and reduce their capacity to independently address complex issues. Conversely, students, who are the primary users of these tools, often perceive AI as significantly aiding their comprehension of complex concepts, irrespective of their field of study. This study aims to investigate the impact of AI tools on students' problem-solving skills and to assess the extent to which these tools assist students in understanding and completing assignments. Through this study, a comprehensive analysis of the benefits and drawbacks of AI usage in education, with a focus on its implications for student learning outcomes and problem-solving abilities.

This study employs a quantitative methodology to explore the risks associated with AI-assisted learning on critical thinking. A survey of 53 students was conducted in an educational institution in Albania to gather data on their experiences and perceptions regarding AI-assisted learning and its impact on their critical thinking skills. This approach allowed us to systematically measure and analyze the influence of AI tools on the cognitive development of students. The Albanian educational system presents a unique context for this investigation. As a country in the midst of educational reforms (Çela, 2022; Fetahu & Cela, 2022) and technological integration, Albania offers a valuable case study to examine the broader implications of AI in education. This research seeks to identify specific challenges and opportunities within this context, contributing to an understanding of AI's role in shaping critical thinking skills. Through this study, the complex relationship between AI-assisted learning and student critical thinking was examined, providing insights that can inform educators, policymakers, and technology developers. Ultimately, the goal is to ensure that the integration of AI in education enhances rather than hinders the development of essential cognitive skills, promoting a generation of learners who are both technologically adept and critically proficient.

BACKGROUND

In recent years, **society** ha**s encountered** significant **challenges** in adapting to continuous technological advancements, largely due to the **absence of comprehensive guidelines** for their implementation. The **educational** sector, inherently linked to the development of future generations, is profoundly affected by these changes. In Albania, legislative efforts have aimed to address these challenges (Fetahu & Cela, 2022). In 2012, Albania introduced a new law on the pre-university education system, designed to enhance the teaching-learning process by aligning it with the needs of students and the broader society (Fetahu & Cela, 2022). This was followed by a 2015 law on higher education, which intended to improve students' professional and soft skills (Çela, 2022). Since the enactment of these laws, numerous bylaws have been implemented annually to facilitate their application. Notably, the pre-university education law emphasizes the integration of technological tools into curricula from an early age. While this aims to familiarize students with technology, there is a growing concern that the misuse of these tools for tasks, assignments, or projects may erode students' critical thinking skills. Critical thinking is essential in higher education, where students must integrate theoretical and practical knowledge to succeed in their careers. Therefore, interventions are necessary to ensure students use technological tools appropriately without compromising their foundational knowledge and critical thinking development.

In response to these concerns, Albania has initiated various programs to enhance technological skills in pre-university education. The “21st Century Schools” program, a partnership between the UK government and Albanian educational institutions, aims to boost the critical thinking and problem-solving skills of students aged 10-15 through programming (Çela et al., 2024). This program provides schools with micro-bit devices, which are small, programmable computers that enable students to solve problems innovatively and engagingly. Similarly, the Albanian-American Development Foundation (AADF) has funded programs to enhance students' programming and technology skills (Fetahu & Cela, 2022). The vision of the Ministry of Education and educational institutions emphasizes that learning to code in pre-university education prepares students for a rapidly evolving technological world (Fetahu & Cela, 2022). While programming skills are directly applicable in many professions and advantageous in numerous others, an exclusive focus on programming can limit students' career paths, directing them towards specific skill sets. This is evident in the increasing number of students opting to study computer science or software engineering in university, driven by their early exposure to these fields.

Despite the benefits of technological tools in education, their improper use can lead to a decline in critical thinking skills in other areas. The rapid introduction of new technological tools often lacks accompanying guidelines, as seen with the implementation of AI. Though AI has the potential to offer significant educational benefits, its misuse can adversely affect the development of critical thinking skills. This study aims to explore the impact of AI tools on students' problem-solving abilities and assess their effectiveness in helping students understand and complete assignments. By providing a comprehensive analysis of the advantages and drawbacks of AI in education, this research seeks to inform strategies for integrating technology into the educational system without undermining essential cognitive skills.

REVIEW OF LITERATURE

AI, a subset of computer science, focuses on understanding the nature of intelligence and creating intelligent machines that simulate, extend, and enhance human capabilities (Huang & Qiao, 2024; Saheed et al., 2021). The benefits of technology are undeniable however, its extensive and unguided use has introduced significant challenges in the teaching and learning process, particularly in nontechnical study programs. Additionally, the pervasive use of AI tools has been linked to the erosion of students' soft skills, including critical thinking. One of the most prominent AI tools used by students is ChatGPT. Given the educational system's experiences with technological tools, it is acknowledged that these tools have facilitated learning processes and aligned closely with student and societal needs. However, their impact on critical thinking skills has been problematic, often resulting in student complacency and reduced motivation to engage deeply with assignments.

Machine learning systems, such as ChatGPT, can be particularly effective for problems where the rules for generating outcomes are unknown and must be inferred from data. Conversely, rule-based AI approaches manipulate data based on predefined logical propositions, which can be advantageous for problems where the rules are known but their application is cumbersome (Gillani et al., 2023). ChatGPT allows students to pose questions and receive text-based answers, simulating human-like participation in discussions and task completion. The model's reliability stems from its training to recognize patterns and relationships in data without explicit human guidance. However, reliance on AI-generated content can lead to superficial learning, where students memorize information for graduation rather than understanding it for future application. Moreover, ChatGPT's capacity to present preexisting biases or forms of discrimination can discourage students from developing **their own judgments** or statements, leading to biased learning experiences. Well-explained AI responses may appear more credible to students, causing them to neglect their ideas, resulting in reduced critical thinking and increased laziness.

Pickell and Doak (2023) argue that rather than banning AI tools like ChatGPT, educators should guide students in using them beneficially. This involves leveraging AI to enhance critical thinking by analyzing real-life implications, ethical usage (Huang & Qiao, 2024), and improving assignments without taking AI-generated information at face value. Educators must provide well-structured guidelines to help students achieve educational goals through AI use. AI education aims to develop learners' mindsets and skills concerning AI, facilitating its understanding and application (Huang & Qiao, 2024). Practical training and manuals from technology experts are essential to prevent the decline of critical thinking skills among students. Such guidelines will help students grasp AI principles, experience AI's achievements, and implement AI applications effectively (Xiaodong & Chengche, 2022). By understanding AI's influence, educators can adapt their curricula and teaching methods to remain relevant in an AI-driven future (Vashista et al., 2023). Properly informed students and instructors can use ChatGPT to select appropriate information, adapt it to given instructions, provide reasonable arguments, and define limitations, thus enhancing critical thinking rather than diminishing it.

Pusey-Reid and Ciesielski (2024) emphasize that AI usage in education enables the creation of complex and engaging simulations, providing students with immersive and interactive learning experiences. Interactive activities, such as writing responses to case scenarios and critically evaluating AI-generated outputs, promote critical thinking and enhance engagement and communication skills.

Another significant advantage of AI is its ability to aid in comprehending complex concepts (Vajjhala et al., 2021). When students use AI tools to explore study content and answer high-level cognitive questions, they provide rationales for their responses, deepening their understanding. It is crucial to teach students that AI is a tool to supplement, not replace, the in-depth study required for mastering essential concepts. Faculty members can also use AI to summarize class content and create accessible materials, promoting equitable access to education. Pavlenko and Syzenko (2024) note that the frequency of ChatGPT usage varies across disciplines, with higher usage among Information Technology (IT), Business, and Engineering students. These students rely on ChatGPT for information retrieval, brainstorming ideas, and improving grammar and punctuation. Ramirez and Esparrell (2024) highlight that AI tools can personalize learning by identifying student needs and tracking their progress, thereby developing problem-solving skills rather than merely generating information. Holmes and Tuomi (2022) believe that AI tools, combined with other technologies, can help create adaptive learning experiences tailored to individual student needs. This interaction enables students to identify and select appropriate information, thereby enhancing their learning experience. **The i**mpact of AI on education is significant and **will c**ontinue to grow (Alshahrani et al., 2024). Clear objectives and specific usage guidelines are essential to ensure that AI facilitates the development of problem-solving skills and critical thinking in students.

AI has become an integral part of modern education, influencing teaching methodologies and learning outcomes. AI tools, such as intelligent tutoring systems, adaptive learning platforms, and automated feedback systems, have been credited with enhancing personalized learning experiences and improving academic performance. Studies have demonstrated that AI can provide customized instruction tailored to individual learning needs, allowing students to progress at their own pace and receive immediate feedback on their performance (Holmes et al., 2019). The development of critical thinking skills is crucial for students to navigate the complexities of the modern world. Several researchers have explored the relationship between AI-assisted learning and critical thinking development. AI-supported learning environments could promote critical thinking by engaging students in problem-solving activities and providing them with opportunities to reflect on their learning processes (Cope et al., 2021). However, there are concerns that AI tools might inadvertently hinder the development of critical thinking. Selwyn (2019) argues that the convenience and efficiency **of AI** systems might lead to **passive** learning, where students rely **heavily** on AI for solutions rather than actively engaging in critical analysis. This perspective is supported by **empirical studies**, such as that of Ouyang et al. (2022), which **suggest** that while **AI** tools can enhance learning efficiency, they may also reduce opportunities for deep **cognitive engagement**.

The extent to which students benefit from AI-assisted learning may depend on their prior exposure to AI tools (Miller, 2023). Prior exposure can familiarize students with the functionalities and potentials of AI, enabling them to use these tools more effectively in their learning processes. Students with prior experience using AI tools are more adept at integrating these technologies into their learning strategies, resulting in better academic performance and skill development (Darvishi et al., 2024). Furthermore, prior exposure to AI can build a foundational understanding of how AI operates, encouraging students to engage more critically with AI-generated content. Students who had previous experience with AI tools demonstrated higher levels of critical thinking and problem-solving skills in AI-supported learning environments compared to those without such experience (Allen and Jevons, 2023; Cha, Strang, & Vaghela, 2021). Educational background plays a significant role in shaping students' readiness to utilize AI tools effectively (Ma & Lei, 2024). Students who are introduced to AI concepts and tools before entering university are likely to develop a more profound understanding of AI's capabilities and limitations (Borger et al., 2023). This early exposure can equip them with the skills needed to critically evaluate AI-generated information and apply it meaningfully in their academic pursuits. Drawing from the existing literature, it is evident that prior exposure to AI tools can influence the development of critical thinking skills. Students who are familiar with AI before entering university are better positioned to leverage these tools for cognitive development. This leads to the formulation of the following hypothesis: Hypothesis One: Students with prior exposure to AI tools (through school courses, online courses, or self-learning) before university show a more significant improvement in critical thinking skills than those without prior exposure. The frequency of AI tool usage varies among students, ranging from daily interactions to occasional use (Almaiah et al., 2022). This frequency can impact the effectiveness and perceived benefits of these tools. Research indicates that regular interaction with AI tools can lead to better academic outcomes by continuously reinforcing learning and adapting to students' evolving needs (Srinivasa et al., 2022). Conversely, sporadic use may limit the potential benefits that AI tools offer, as students may not fully leverage the adaptive and personalized features of these technologies. Academic performance is a critical measure of the effectiveness of educational interventions, including AI tools (Owan et al., 2023). Studies have shown that consistent use of AI tools can lead to significant improvements in academic performance. The adaptability of AI tools ensures that students receive targeted instruction that addresses their individual learning gaps. AI-powered platforms could dynamically adjust the difficulty of tasks based on students' performance, thereby promoting a more effective learning environment (Holmes et al., 2019). This adaptability is particularly beneficial for students who engage with these tools regularly, as it ensures that their learning experiences are always aligned with their current proficiency levels. Assignment efficiency refers to the ability of students to complete their assignments accurately and within a reasonable timeframe. The use of AI tools has been linked to enhanced assignment efficiency due to features such as automated feedback, time management aids, and resource recommendations (Selwyn, 2019). Regular use of these tools allows students to streamline their workflow, reduce the time spent on repetitive tasks, and focus more on critical thinking and problem-solving activities. This immediate feedback loop not only enhances learning but also improves the efficiency with which students complete their assignments. Students' perceptions of the effectiveness of AI tools are crucial in determining their willingness to use these technologies consistently (Albayati, 2024; Bernabei et al., 2023). Positive perceptions are often linked to the perceived improvements in academic performance and assignment efficiency. The existing literature suggests a strong relationship between the frequency of AI tool usage and various educational outcomes, including academic performance and assignment efficiency. Students who engage with AI tools regularly tend to perform better academically and complete assignments more efficiently (Chen et al., 2023). This leads to the formulation of the following hypothesis: Hypothesis Two: There is a positive correlation between the frequency of AI tool usage (daily, weekly, monthly) and students' perceptions of academic performance and assignment efficiency. Some researchers argue that AI tools can enhance problem-solving skills by providing students with challenging tasks and immediate feedback (Parsakia, 2023; Winkler et al., 2021). However, others caution that excessive reliance on AI for assignments may undermine the development of these skills (Al-Zahrani, 2024; Vajjhala & Strang, 2017). This concern is based on the observation that AI tools often provide readily available solutions, which can lead students to depend on these tools rather than engage in the critical thinking necessary to solve complex problems independently (Selwyn, 2019). The dependency on AI tools for completing assignments can have significant implications for students' cognitive development. While AI tools can increase efficiency and accuracy in completing tasks, they may also reduce the cognitive effort required from students (Almaiah et al., 2022). This reduction in cognitive engagement can result in a superficial understanding of the material and hinder the development of deeper problem-solving skills. Furthermore, students who rely heavily on AI tools may become passive learners, as they may not actively seek out solutions or develop the perseverance needed to tackle challenging problems (Bhise et al., 2022). This passive learning behavior can be detrimental in the long term, as it may impair students' ability to approach new and complex problems without the aid of AI. Drawing from the existing literature, it is evident that the relationship between AI tool usage and problem-solving skills is complex. While AI tools offer significant benefits, excessive reliance on them for assignments may negatively impact students' ability to solve complex problems independently. This leads to the formulation of the following hypothesis: Hypothesis Three: Reliance on AI tools for assignments negatively impacts students' problem-solving skills, reducing their ability to solve complex problems independently METHODOLOGY This study employed a quantitative research design to investigate the influence of AI tools on students' critical thinking skills, academic performance, and problem-solving abilities at a selected non-public university in Albania. The research framework utilized a survey-based approach, gathering data from university students to assess their perceptions and experiences with AI-assisted learning. The study aimed to test three specific hypotheses through statistical analysis of survey responses. The target population comprised university students in Albania, encompassing various disciplines and academic levels, including both undergraduate and graduate programs. The sample was designed to ensure diversity by including students with varying degrees of exposure to AI tools. A sample size of 53 students was selected to balance feasibility and statistical power, enabling rigorous analysis of inter-variable relationships. The study employed a stratified random sampling technique, stratifying the population based on major/field of study, academic year, and prior exposure to AI tools. Random sampling within each stratum ensured a representative sample, facilitating robust comparisons across different student groups. Data was collected via a structured questionnaire distributed through Google Forms. The survey comprised three sections, demographic information, previous exposure to AI tools, and AI tools usage and impact. Demographic data included the data on age group, major/field of study, and year of study. The questions on previous exposure to AI tools included gathered information on prior exposure to AI tools before university and the frequency of AI tool usage for academic purposes. The questions on AI Tools Usage and Impact addressed the purposes of AI tool usage, its impact on academic performance, critical thinking skills, problem-solving abilities, and overall perceptions of AI tools in education. The independent variables in this study were the prior exposure to AI tools (binary: yes/ no) and frequency of AI tool usage (daily, weekly, monthly). The dependent variables included the improvement in critical thinking skills, perception of academic performance and assignment efficiency, reduction in problem-solving skills, and belief in AI tools aiding understanding of complex concepts. The study compiled to ethical standards for research involving human subjects and informed consent was obtained from all participants, ensuring confidentiality and anonymity. Participants were informed about the purpose of the study, the voluntary nature of participation, and the measures taken to protect their data. The study acknowledges potential limitations, including the sample size, self-reported nature of the survey data, and the specific context of university students in Albania, which may affect the generalizability of the findings as data was collected from one single non-public university in Albania. RESULTS AND DISCUSSION The study surveyed a diverse group of students from various educational backgrounds to understand their experiences and perceptions of AI-assisted learning. The demographic data collected provides valuable insights into the respondents' profiles, which is crucial for contextualizing the findings. As shown in Table 1, most respondents fall within the 18-22 age group, accounting for 49 of the 53 participants. This predominance is expected given that the survey targeted were university students. Smaller numbers were observed in the 23-27 age group (2 respondents) and 28-32 age group (1 respondent), with one respondent in the 33 and above category. This age distribution highlights that the insights primarily reflect the experiences of younger students who are more likely to be engaged with current educational technologies. As shown in Table 2, the respondents' fields of study varied, with Software Engineering being the most common major, represented by 20 students. Computer Science followed with 14 students, and Business was the third most common with 7 students. Other fields such as Architecture, Business Informatics, Interior Design, Graphic Design, and Social Sciences were less represented. This distribution indicates a significant interest in technical and business-related fields among the respondents, which may influence their familiarity and comfort with AI tools. Most participants were first-year students, comprising 40 out of the 53 respondents. This is significant as first-year students might be experiencing AI tools in an academic setting for the first time. The remaining students were in their second year (5 students), third year (7 students), or were graduate students (1 student). This year-of-study distribution suggests that most insights come from students who are relatively new to university-level education and its associated technological tools. When asked about their previous exposure to AI tools before university, responses varied. As shown in Table 3, a significant number of students (25) had explored AI through personal interest and self-learning. Sixteen students reported no prior exposure to AI tools, while nine students had used AI tools through school courses and three through online courses. This variation in prior exposure is essential as it can affect how students perceive and utilize AI tools in their current academic activities. These demographic insights provide a foundation for understanding the context in which students interact with AI tools. The predominance of younger, first-year students from technical and business fields suggests a high level of adaptability and potential enthusiasm for integrating AI into their learning processes. However, the varying levels of previous exposure to AI indicate that while some students may be adept at leveraging these tools, others may need additional support and training to use them effectively. This background sets the stage for analyzing the impact of AI-assisted learning on critical thinking and problem-solving skills among university students. The interpretation as shown in Table 4 shows that students with prior exposure to AI tools have higher mean problem-solving skills score 3.216 compared to those with no prior exposure 2.688. The t-statistic for this comparison is -1.277, and the p-value is 0.208, which is greater than the 0.05 significance level. The p-value of 0.208 indicates that the difference in problem-solving skills between the two groups is not statistically significant. Mann-Whitney U test and Cohen's d were also calculated. Mann-Whitney U test is suitable for the comparison of differences between two independent groups when the dependent variable is either ordinal or continuous, but not normally distributed (Kahrens & Jaswal, 2022). Cohen's d is a measure of effect size that can be used to indicate the standardized difference between two means helping to understand the magnitude of the difference, even if the p-value is not significant (Ivarsson et al., 2013). The p-value of 0.172 is greater than 0.05, indicating that there is no statistically significant difference in problem-solving skills between students with and without prior exposure to AI tools. The effect size is 0.390, which indicates a small to medium effect size. The negative value suggests that students with no prior exposure to AI tools have slightly lower problem-solving skills compared to those with prior exposure, although this difference is not statistically significant. The results of the Mann-Whitney U test as shown in Table-5 support the findings from the two-sample t-test, indicating that there is no significant difference in problem-solving skills between students with and without prior exposure to AI tools. Cohen's d provides a measure of the effect size, suggesting that the difference, while small to medium in magnitude, is not statistically significant (Ivarsson et al., 2013). Hence, the failure to reject the null hypothesis and conclusion that there is no significant evidence to suggest that students with prior exposure to AI tools show a more significant improvement in critical thinking skills compared to those without prior exposure. Based on the analysis of the provided data, we aimed to test the hypothesis that there is a positive correlation between the frequency of AI tool usage and students' perceptions of academic performance and assignment efficiency (H2). We began by preparing the data and mapping the frequency of AI tool usage to numeric values: daily (3), weekly (2), and monthly (1). The relevant columns were extracted, and rows with missing values were dropped to ensure the accuracy of the analysis. The correlation analysis was performed, and the results are summarized in Table 6. The correlation matrix indicated a strong positive relationship between AI tool usage frequency and students' perceptions of academic performance (correlation coefficient = 0.741), as well as assignment efficiency (correlation coefficient = 0.720). The hypothesis testing results are presented in Table 7. The p-values for both correlations were extremely low (much less than 0.05), indicating that the correlations are statistically significant. Given the positive Pearson's correlation coefficients (0.741 and 0.720) and the very low p-values, we reject the null hypothesis. This confirms that there is significant evidence to support the alternative hypothesis: there is a positive correlation between the frequency of AI tool usage and students' perceptions of academic performance and assignment efficiency (H2). The linear regression plots illustrate the relationships between AI tool usage frequency and two variables: perceptions of academic performance and assignment efficiency. Figure 1 shows the regression line that fits the data points, indicating a positive linear relationship. The black line represents the predicted values based on the linear regression model, and it aligns well with the data points, suggesting that as the frequency of AI tool usage increases, students' perceptions of academic performance also tend to improve. Figure 2 also demonstrates a similar positive linear relationship. The regression line shows that increased frequency of AI tool usage is associated with greater assignment efficiency. These linear regression plots visually reinforce the findings from the correlation analysis and hypothesis testing, supporting the hypothesis that there is a positive correlation between the frequency of AI tool usage and students' perceptions of academic performance and assignment efficiency (H2).

The analysis of the **data** also **revealed** several key findings regarding the impact of reliance on AI tools for assignments on students' problem-solving skills. The descriptive statistics as shown in Table 8 demonstrate that the mean reliance on AI tools for assignments was 2.17, with a standard deviation of 1.25. In comparison, the mean score for problem-solving skills was 3.06, with a standard deviation of 1.39. These statistics indicate a moderate level of reliance on AI tools and a slightly above-average self-assessment of problem-solving abilities among students. The Pearson correlation analysis revealed a correlation coefficient of -0.712 between reliance on AI tools and problem-solving skills, with a p-value of less than 0.000000001. This indicates a statistically significant negative relationship, suggesting that as students rely more on AI tools for their assignments, their problem-solving skills tend to **decrease**.

Further examination through linear regression analysis showed that the model explained **50.7% of the variance** in problem-solving skills, with an R-squared value of 0.507. The regression coefficient for reliance on AI tools was -0.7918, with a **p-value of less than 0.00001**. This coefficient indicates that for each unit increase in reliance on AI tools, there is an associated decrease of approximately **0.79**18 units in **problem-solving skills**. The significant negative coefficient supports the hypothesis that increased reliance on AI tools negatively impacts problem-solving skills. The scatter plot shown in Figure 3 shows the correlation between reliance on AI tools for assignments and problem-solving skills. The scatter plot shows individual data points, and the black regression line indicates the negative correlation between the two variables. As reliance on AI tools increases, problem-solving skills tend to decrease, supporting the hypothesis (H3). Hypothesis testing using a t-test compared the levels of problem-solving skills among different levels of reliance on AI tools. The t-statistic was -2.618, with a p-value of 0.011, which is below the conventional threshold of 0.05. This result allows us to reject the null hypothesis and accept the alternative hypothesis (H3), confirming that reliance on AI tools for assignments significantly negatively impacts students' problem-solving abilities. The significant negative

correlation and regression results underscore the importance of addressing the balance between using AI tools for efficiency and maintaining the development of independent problem-solving capabilities. These insights are critical for educators and policymakers aiming to integrate AI tools into educational practices without compromising essential cognitive skills.

This is empirically shown to affect performance in school as well

Bastani 24 [Hamsa Bastani, 8-27-2024, "Without Guardrails, Generative AI Can Harm Education," Knowledge at Wharton, https://knowledge.wharton.upenn.edu/article/without-guardrails-generative-ai-can-harm-education/, accessed 3-1-2025] CW

A new study led by researchers at Wharton and Penn reveals that using generative AI improves student performance, but also makes it harder for students to learn and acquire new skills. The researchers designed an experiment with nearly 1,000 high school math students in Turkey to determine whether large language models can harm or help their education. One group of students was given GPT Base, a chat interface similar to ChatGPT-4, to help them during practice sessions. A second group was given GPT Tutor, an interface similar to ChatGPT-4 but with safeguards. It includes teacher input and is designed to guide students with hints rather than directly giving answers. The third group — the control group — had no technology assistance and relied only on traditional resources such as the textbook and notes. **During the AI-assisted practice session, the GPT Base group performed 48% better than the control group. But when AI assistance was taken away** from the Base group and they were given an exam on the material, **they performed 17% worse than the control group.** The GPT Tutor group performed an astonishing 127% better in the AI-assisted practice session, yet scored about the same on the exam as the control group. **According to the paper, the results suggest that the Base group depended on the software to solve the problems and didn't learn the underlying mathematical concepts deeply enough to do well on the exam. In contrast, the performance by the Tutor group shows that these harms are mitigated when AI is deployed with teacher-guided conditions and limits. "We're really worried that if humans don't learn, if they start using these tools as a crutch and rely on it, then they won't actually build those fundamental skills to be able to use these tools effectively in the future," said Hamsa Bastani, a Wharton professor of operations, information and decisions who co-authored the paper. "As educators, we worry about that."**

Education is crucial to poverty reduction and must not be overlooked.

King 11 [Elizabeth King, 1-28-2011, "Education is Fundamental to Development and Growth," World Bank Blogs, https://blogs.worldbank.org/en/education/education-is-fundamental-to-development-and-growth, accessed 2-23-2025] //JMB - Cole recut

Education is the greatest known civilizing force. Education communicates the experiences of the past to subsequent generations in an abridged and condensed form, so that the youth of today can build upon the entire past achievements of the society. Education is the key to development. As Kamaraj said, "Educate a man, he will develop himself." **Without education, development in any area has a very limited scope. Data published in the** 1980 **World Development Report confirms the close correlation between education on the one hand and income, health, fertility and nutrition on the other.** One study of developing countries revealed that farmers who received four years of general primary education obtained an average of 13% higher crop yields than uneducated cultivators. Other studies show that educated mothers have lower fertility and child mortality rates, and that the health and nutrition of their children are significantly higher than that of uneducated women of the same income group. The Report concludes, "**Educating** girls **may be one of the best investments a country can make in future economic growth and welfare** -- even if girls never enter the labor force." **Studies on the rate of return to education find that more schooling leads to higher earnings**, and when the extra earnings resulting from primary education are weighed against its costs, high rates of return are consistently found. In fact the overall rate of return on investment in education in terms of increased national production, GNP, compares very favorably with investment in other sectors. **Education is fundamental to development and growth.** The human mind makes possible all development achievements, from health advances and agricultural innovations to efficient public administration and private sector growth. For countries to reap these benefits fully, they need to unleash the potential

of the human mind. And there is no better tool for doing so than education. Twenty years ago, government officials and development partners met to affirm the importance of education in development—on economic development and broadly on improving people's lives—and together declared Education for All as a goal. While enrolments have risen in promising fashion around the world, learning levels have remained disappointingly and many remain left behind. Because growth, development, and poverty reduction depend on the knowledge and skills that people acquire, not the number of years that they sit in a classroom, we must transform our call to action from Education for All to Learning for All. [1]

Contention 2 is Cost

Integration of gen AI into schools is a blatant corporate attempt to increase profits

Professors Williamson from the University of Edinburgh finds in 2024 (Ben

Williamson is a Chancellor's Fellow at the Centre for Research in Digital Education and the Edinburgh Futures Institute at the University of Edinburgh. Alex Molnar is a Research Professor at the University of Colorado Boulder. Faith Boninger is NEPC's Publications Manager and Co-Director of NEPC's Commercialism in Education Research Unit and holds a PhD from Ohio State University. Williamson, B. Molnar, A., & Boninger, F. (2024). "Time for a pause: Without effective public oversight, AI in schools will do more harm than good." Boulder, CO: National Education Policy Center. http://nepc.colorado.edu/publication/ai #BellaireMC

School administrators and teachers already use an array of digital educational technologies in teaching and management.10 Their use has increasingly **obscured educational decision-making**, made a mockery of student privacy rights, and allowed student data to be exploited for non-school purposes.11 In the absence of effective public oversight, the introduction of AI systems and applications in education will likely intensify these problems and **create many more.**12,13 As existing school-focused platforms and applications are updated to include AI, the immediate danger facing educators is not a future apocalypse. Instead, the danger is that AI models and applications will become enmeshed in school processes and procedures in ways that allow **private entities** to **increasingly control** the structure and content of public education, to **reinforce surveillance** practices, and to **amplify existing biases** and inequalities.14 For decades, academic researchers have worked on AI models for use in schools.15 Today, however, it is commercial enterprises that are **aggressively pushing AI** (and its attendant risks) into classrooms.16 The campaign to promote AI in education follows the logic of a half century of commercial, political, and ideological efforts to privatize and **commercialize education.**17 Given this logic it is not surprising that, despite the known dangers, corporations, private researchers, and governments are aggressively promoting the use of AI18 before a statutory and regulatory framework has been put in place to ensure that AI programs are transparent and subject to effective public scrutiny and control.19 This puts schools under tremendous pressure to accept AI as an inevitable upgrade to existing processes.20 Computer scientists and software developers focus primarily on technical engineering questions21 and corporate leaders and **investors prioritize profit** 22 over the common good. Nevertheless, educators are being asked to trust that these people, who have **no educational expertise** and who stand to **financially benefit** when AI is used in schools, are best suited to imagine and lead educational transformation.

Indeed, Educational AI is increasingly expensive

UIUC 24 University of Illinois Urbana Champaign, 10-24-2024, "AI in Schools: Pros and Cons," College of Education, https://education.illinois.edu/about/news-events/news/article/2024/10/24/ai-in-schools--pros-and-cons, DOA 3-5-2025 //Wenzhuo

High Implementation Costs

The cost of **AI** in education can vary greatly, depending on how schools want to use it. Simple generative AI systems that teachers can use in lesson planning can cost as little as $25 a month, but larger adaptive **learning systems can run** in the **tens of thousands of dollars. Implementing these** larger **systems is** likewise **very expensive and** is **beyond the budgets of many schools, including those in underserved communities**. And then **there's the ongoing costs of maintaining and updating the systems and training staff to effectively use them.**

All in all, expenditures would explode

Nagel 23 David Nagel, 1-12-2023, "AI to Experience Massive Growth in Education," [Daniel Nagel is an author for the Technological Horizons in Education], https://thejournal.com/articles/2023/01/12/ai-to-experience-massive-growth-in-education.aspx, DOA 3-5-2025 //Wenzhuo

Artificial intelligence will experience more than a tenfold growth in the education sector over the next eight years. According to a new forecast by P&S Intelligence**, expenditures for AI by schools will grow** from $2.13 billion in 2022 **to $25.77 billion in 2030.**

Thus, the pressure of implementing AI will stand to economically harm underdeveloped schools

Williamson et.al 24 (Ben Williamson is a Chancellor's Fellow at the Centre for Research in Digital Education and the Edinburgh Futures Institute at the University of Edinburgh. Alex Molnar is a Research Professor at the University of Colorado Boulder. Faith Boninger is NEPC's Publications Manager and Co-Director of NEPC's Commercialism in Education Research Unit and holds a PhD from Ohio State University. Williamson, B. Molnar, A., & Boninger, F. (2024). "Time for a pause: Without effective public oversight, AI in schools will do more harm than good." Boulder, CO: National Education Policy Center. http://nepc.colorado.edu/publication/ai) //Bellaire MC

Dangers in Administration¶ Increased Costs¶ Learning management systems already used in many schools, such as Google Classroom, Blackboard, and Canvas, are beginning to integrate AI into their platforms.150 Google Classroom, with its suite of nominally "free" software and low-cost Chromebook hardware, dominates the market.151 It has already announced the launch of AI-based adaptive learning addons to Classroom, with associated additional costs for schools, as well as plans to upgrade Classroom further with generative language AI.152 "Practice Sets" is Google's AI-based adaptive learning system for education, and "Duet AI" is its "collaboration partner" for teachers.153 In addition to any pedagogical implications associated with using Google Classroom, its integration of further AI and automation into many aspects of school functioning also¶ carries potentially significant administrative implications.154¶ The most significant of these is to obscure the rationale for administrative decisions about critical institutional issues when decision-making is ceded to opaque machine learning systems controlled by tech firms. Google Classroom, for example, integrates with hundreds of¶ other ed tech products and can synchronize with a school's student information systems.155 It offers Google cloud services such as single sign-on, identity management, and device management, as well as plagiarism detection, automated grading, teaching templates, student grouping, and administrative analytics to facilitate "data-driven decisions."156 Such management systems facilitate the **transfer of control** of schools from the **public to private** corporations by acting as central conduits through which all of a school's digital activities must pass—making it hard for educators or administrators to see how any decisions based on the¶ data have been made.157¶ Because running AI is costly, the use of AI programs in schools will necessarily require schools to pay for operating costs for an increasing number of pedagogic and administrative AI applications. The promise that AI can save schools money by reducing staffing costs is likely illusory, as schools will probably be required to pay costly fees for accessing AI facilities. In other words, rather than saving money, administrative applications are more likely to shift existing funds to monopolistic technology providers. Khanmigo and Google Classroom already illustrate how this works. Khan Academy, when it¶ provides Khanmigo to districts, currently charges those districts **$60 per student** for annual use, citing high computing costs associated with OpenAI's GPT-4 as the justification for the charges.158 Likewise, districts must also pay for Google Classroom's AI upgrades. To access¶ its latest adaptive learning application, Practice Sets, they must switch from the free basic¶ offering to a for-fee premium package.159 In other words, tech firms are **extracting value** from school budgets to defray the high computing costs associated with AI (and grow company value).160

Increased Threats to Student Privacy¶ AI applications collect and aggregate data in order to function. In so doing, they normalize digital surveillance and privacy invasions in school.161 In practice, education technology¶ companies use applications like Google Classroom to routinely collect as much data as possible, well beyond that required to perform their assigned tasks.162¶ Although proponents of using AI in education tend to emphasize the efficiency of data-driven¶ administrative systems, privacy-related threats to equity are inherent in it.163 This is because¶ AI models are built using massive data sets that can be used to profile, compare, and assess¶ individuals who are then subject to potentially discriminatory decisions based on "statistical¶ dossiers" of their personal lives.164 Thus, a significant danger of digital technology in general,¶ and of the privacy-invasive model of AI in particular, is that they can reproduce and amplify¶ existing forms of inequality in education by using datasets containing examples of historic¶ bias and discrimination.165 For example, if a big data set indicates that certain marginalized¶ groups have underperformed historically, then a software application may be biased against¶ individuals from such groups in the future, singling out and targeting them as "at-risk" and¶ closing down or limiting their opportunities to access information and resources.166¶ Moreover, school data systems are vulnerable to breaches, hacks, ransomware, and denial-of-service attacks.167 A data breach at the student-tracking ed tech company Illuminate,¶ for example, compromised the educational data of at least a million public school students¶ and prompted New York City's Department of Education to ask schools to stop using Illuminate's products.168 School data systems feature highly detailed and intimate student¶ information, including personal and demographic data, grades, attendance, behavioral information, and other confidential information. Increasing AI capacity in ed tech products¶ may exacerbate these vulnerabilities, as student data are collected at even greater scale by a¶ wide range of companies—including AI companies—that offer only vague data privacy protections.169 Reduced Transparency and Accountability¶ Finally, enabling AI to play a role in school administration will reduce the transparency and¶ accountability of decision-making.170 Many digital products already used in schools are neither transparent nor accountable because current law and regulation allows companies to¶ shield the inner working of their products behind proprietary protections.171¶ AI is even more opaque than other digital programs.172 Black box machine learning and AI¶ models are so complicated that their outputs are often impossible to explain or interpret.173¶ Although in many cases simpler and more accessible statistical models can produce equally accurate results, companies benefit from selling access to proprietary models that require¶ customers to trust the systems and simply accept being unable to verify results.174 If the¶ system makes a mistake, it might never be identified or redressed and the public suffers the¶ consequences. For example, the facial identification systems used for remote testing often¶ fail to accurately identify individuals or mistakenly flag student behaviors as suspicious, but¶ they are very hard for students to challenge.175¶ In high-stakes decision-making in a sector like education, allowing such impenetrable models to assume responsibility for key administrative procedures necessarily means the creation of schools in which school leaders and teachers will be unable to exercise judgment,¶ provide a rationale, or take responsibility for classroom and institutional decisions.176¶ Considerations for the Future¶ Is AI Development Responsible?

The rapid creation of AI applications for schools raises the urgency of prioritizing ethics,¶ student rights, and social responsibility in their development.177 Responsible AI development would ensure that products are safe and trustworthy, designed to benefit people, communities, and society, and mitigate harms.178 As yet, there is little indication that such values are adequately addressed in education applications.179 Unfortunately, academic AIED¶ researchers have tended to ignore them or delegate addressing them to the educational tech¶ industry and policy centers.180 This complacency—along with the money and power held by commercial actors—enables commercial rather than educational imperatives to guide the development of AI and furthers political interests promoting relentless testing and school¶ surveillance.181¶ Responsible governance would require the companies developing AI to commit to transparent and responsible product design, and also to monitoring, understanding, and mitigating¶ the continuous impacts of AI in various contexts. Of particular concern is the automation¶ of decisions with "irreversible and severe consequences."182 For example, technologies to¶ identify emotions are currently being developed to assess if a person is lying and cheating.183¶ These technologies are inherently inaccurate, however, and an inaccurate judgment that a¶ student has cheated or that a witness is lying could have dire consequences for their lives.¶ Responsible AI governance might lead to delaying or indefinitely pausing development of¶ such technologies.¶ Although several responsible AI initiatives have produced principles, frameworks or checklists for safe and trustworthy AI development and accountability,184 these agendas can be¶ manipulated through various forms of industry lobbying and efforts to water down their¶ scope or possibilities of enforcement.185 Expanding responsibility for product safety to include the wide range of people or organizations that build and use AI—rather than leaving it¶ to technicians and business alone—would mitigate such dangers.186¶ Among the many obstacles to the implementation of responsible policies governing AI is¶ their cost. The goal of profit-seeking business is to shift to the public as many costs as possible while garnering the highest possible private rate of return on investments. Public oversight of AI necessarily entails either public ownership or a comprehensive regulatory regime¶ adequately financed to achieve its mission. The question is, where will the money come¶ from?¶ Moreover, the required regulation flies in the face of 50 years of policy devoted to deregulation and privatization. It would demand a fundamental rethinking of the government's¶ relationship to commercial interests. Such rethinking would, without a doubt, be attacked¶ by self-interested parties as not only too costly but also as stifling innovation and promoting¶ inefficiency. While these arguments may be relevant in individual circumstances, they are¶ neither generally nor self-evidently true.¶ From the perspective of education, responsible governance of AI therefore entails significantly more commitment than the simple principles of responsible development issued by¶ industry. It also requires costly and ongoing monitoring of the effects of AI in classroom contexts. It may also require delays and indefinite pauses in development where warranted—such as, for example, in cases where commercial AI providers seek to introduce products into schools with insufficient evidence that they produce beneficial outcomes, or when¶ those products automate professional judgement with potentially negative consequences, or¶ when they inadequately address questions of AI ethics directly relevant to education.¶ Is AI Inevitable?¶ AI products are moving into schools at dizzying speed. As we have noted, this is in part the¶ result of the pressure on schools to "modernize" by adopting the latest products that the¶ technology industry offers. There is already a consensus of sorts that the move to AI is inevitable. The director of educational technology at Newark Public Schools made the case to the¶ New York Times when he explained why his district adopted Khanmigo: "It's important to¶ introduce our students to it, because it's not going away."187¶ The de facto requirement that students serve as a technology company's experimental subjects might be explained by the initially low entry cost for school districts. Struggling districts, especially, might be willing to gamble that a technological innovation might turn things around for their students. However, before placing that bet it would be valuable to first ask some fundamental questions.

Computer scientist Joseph Weizenbaum posed such concerns 50 years ago, essentially arguing that no technology—including AI—should be implemented unless we know that it is both necessary and good.188

Unfortunately, this financial pressure from AI will put essential programs on the chopping block

Sinha 24 (Tannistha Sinha covers education, housing, and politics in Houston for the Houston Defender Network as a Report for America corps member. She graduated with a master of science in journalism from the University of Southern California in 2022, and was the recipient of the Annenberg Graduate fellowship. , "Texas school districts face $300 million federal special education funding cut", DefenderNetwork, https://defendernetwork.com/news/education/texas-special-education-funding-cuts/, 1-26-2024, DOA: 2-21-2025) //Bellaire MC

Texas public schools unexpectedly lost $300 million per year in federal special education funding amidst rising costs. The Texas Health and Human Services Commission notified school districts on Dec. 15.¶ The cuts are to the School Health and Related Services (SHARS), a federal special education program that allows Texas local educational agencies (LEAs) and shared service arrangements (SSAs) to request reimbursement for Medicaid health-related services. School districts are eligible for partial reimbursements when they directly offer medical services to students with special needs, instead of relying on a doctor or nurse.¶ The loss in annual funding relates to Medicaid reimbursements for special education students. It followed a court ruling in a billing disagreement between school districts and the federal government, dating back to 2017.

And, magnified educational inequality would accelerate poverty—

Emma **Garcia**, Sept 27, 20**17**, "**Education inequalities** at the school starting gate", EPI, https://www.epi.org/publication/education-inequalities-at-the-school-starting-gate///sugar

What this study finds: Extensive research has conclusively demonstrated that children's social class is one of the most significant predictors—if not the single **most significant predictor**—**of their educational success**. Moreover, it is increasingly apparent that performance gaps by social class take root in the earliest years of children's lives and fail to narrow in the years that follow. That is, **children who start behind stay behind—they are rarely able to make up the lost ground**. Using data from two academic cohorts, the kindergarten classes of 1998 and 2010, this study examines the relationship between children's socioeconomic status (SES) and their cognitive and noncognitive skills when starting school. We find that large performance gaps exist between children in the lowest and highest socioeconomic-status (SES) quintiles and that these gaps have persisted from the 1998 cohort to the 2010 cohort. The positive news is that the gaps have not grown, even as economic inequalities between these two groups of students have grown. The negative news is that the gaps have not narrowed, despite the fact that low-SES parents have substantially increased their engagement in their children's early education. Very large SES-based gaps in academic performance exist and have persisted across the two most recent cohorts of students when they start kindergarten. The estimated gaps between children in the highest and lowest fifths of the SES distribution are over a standard deviation (sd) in both reading and math in 2010 (unadjusted performance gaps are 1.2 and 1.3 sd respectively). Gaps in noncognitive skills such as self-control and approaches to learning are roughly between one-third and one-half as large (unadjusted performance gaps are about 0.4 sd in self-control, and slightly over 0.5 sd in approaches to learning in 2010). SES-based gaps across both types of skills among the 2010 kindergartners are virtually unchanged compared with the prior academic generation of students (the class of 1998). The only unadjusted cognitive skills gap between children in the high-SES and low-SES fifths that changed significantly over this period was the gap in reading skills, which increased by about a tenth of a standard deviation. Gaps in approaches to learning as reported by teachers and in self-control as reported by parents shrank between 1998 and 2010 by roughly the same amount (0.1 sd). Gaps in mathematics, in approaches to learning as reported by parents, and in self-control as reported by teachers did not change significantly. Taking into account children's individual and family characteristics, we find that parental activities, parental expectations for their children's attainment, and pre-K participation reduce the gaps between high-SES and low-SES children somewhat but do not come close to eliminating them. This means that though part of the SES gap is attributable to differences in these characteristics and in family investments between children in the high and low parts of the SES distribution, a substantial share of SES-related factors is not captured by these controls, but is important to explaining how and why gaps develop, and thus how to narrow them. Moreover, the capacity for these other factors to narrow gaps has decreased over time—as a whole, they accounted for a smaller share of the gaps in 2010 than they had in 1998. This suggests that, while such activities as parental time spent with children and center-based pre-K programs cushion the negative consequences of growing up in a low-SES household, they can do only so much, and that the consequences of poverty are increasingly hard to compensate for. This resistance of gaps to these controls is thus a matter of serious concern for researchers and policymakers alike. The characteristics of children in the lowest-SES quintile and highest-SES quintile changed between 1998 and 2010. Among **children in the low**-SES **quintile**, in 2010 **a larger share lived in poverty (84.6 percent, up from 71.3 percent in 1998)**, did not live with two parents (54.9 percent vs. 45.6 percent), and lived in homes where the main language is not English (40.3 percent vs. 31.2 percent). Just over half of these children (50.4 percent) were Hispanic (in 1998, 39.8 percent were). These children's likelihood of attending center-based pre-K did not change significantly across generations (about 44 percent for both cohorts: 44.3 percent in 2010 vs. 43.7 percent in 1998). However, in 2010 their parents reported having a somewhat larger number of books at home for the children, and there was also an increase in both indices of activities (literacy/reading activities and other educational and engagement activities). In addition to doing more for their children, low-SES parents have greater expectations for their children's educational attainment—a much smaller share saw them going no further than high school graduation, while a much greater share anticipated their children attaining bachelor's and even advanced degrees in 2010. Among children in the high-SES quintile, the group in 2010 includes a lower share of white children (falling from 78.8 percent in 1998 to 71.3 percent) and a larger share of Asian children (increasing from 4.7 percent in 1998 to 8.7 percent). They were slightly more likely to live with two parents (the share not living with two parents decreased from 11.1 percent in 1998 to 9.6 percent) and to have attended center-based pre-K (the share in center-based pre-K increased from 65.8 in 1998 to 69.9 percent in 2010). The share of high-SES homes reporting having more than 200 children's books slightly increased in 2010, as did parents' expectations for their children's educational attainment. Although research uses various indicators to measure individuals' social class, from composite measures such as the socioeconomic status index we use to single indicators such as mother's education or income, some sensitivity of the results to the indicator used is found. In our analyses, we find that all are equally reliable social-class proxies for the estimation of early achievement gaps, though absolute gaps and trends in them vary slightly depending on the indicator used.

Contention 3 is Climate

Educational AI uniquely requires especially large processing power, harming the environment

Evangelia Anagnostopoulou, 12-27-2024, "Trustworthy AI in education: A Roadmap for Ethical and Effective Implementation," [Evangelia is a professor at the Institute of Communication and Computer Systems in Athens], https://dl.acm.org/doi/10.1145/3688671.3688781, DOA 2-28-2025 //Wenzhuo

Moreover, the **environmental sustainability of AI** systems **in education poses significant challenges.** Many **AI** applications in educational settings **require extensive processing** and storage of data, **resulting in significant energy consumption and environmental impact** [25]. The energy-intensive nature of AI systems not only undermines their long-term sustainability but also contributes to environmental pollution. Addressing these challenges necessitates proactive measures to minimize the environmental footprint of AI systems in education, aligning with broader efforts toward environmental sustainability.

Specifically, it requires large water and electricity usuage

Steve Tetreault, 8-1-2024, [M.ED and Ed. D in Educational Administration, educator for 2+ decades, Masters of Information] "Should We Pump the Brakes on AI in Education?," No Publication, https://knowledgequest.aasl.org/should-we-pump-the-brakes-on-ai-in-education/, accessed 3-2-2025 //cy

Let's Get It Started

Alright, I'm gonna say it: I am an AI in Education skeptic. I think there are ethical, legal, and environmental issues with the use of AI that need clarification, at the least, before schools start promoting the use of AI. I realize I am in a very small group of folks. And I realize folks will say, "It's already out there, so we have to prepare students for how to use it." But there's a LOT of stuff out there that we DON'T take school time to prepare students for.

Who's Paying the Piper?

A prof of mine once said that education is like an aircraft carrier – once it has momentum, it takes a LONG time to turn in a new direction. I used to think this was a detriment for the system. Now, I'm not so sure. One major issue I have with AI is that it has been made so readily available and so easy to use; but the COSTS of setting it up and using it are hidden far away from the users. So it might APPEAR as thought using AI is just like using the internet. But it's not.

So Thirsty

First, the environmental impact of the water and electricity used to underpin AI infrastructure. AI takes big, hot computers. They have to be cooled. And they suck up an ungodly amount of water. If users had to give up all their drinking water for the day each time they used AI, there'd be a REAL hard re-think of how it's used. But those water costs are passed on to those who are least able to overcome them.

Furthermore this water is being stolen from rural communities

ITT'24

Data centers consume an average of 1–5 million gallons of water per day for cooling purposes- that's comparable to a small town of 50,000 people! For instance, in Oregon's Deschutes County, tech giants have sparked local concern over their water withdrawals, which could exacerbate drought conditions already affecting farmers and residents in Arizona,

It's Electric

Ditto for electricity – each time, AI users had to forego or offset the amount of electricity needed for some percentage of the set up and use, schools would not foot the bill. But those impacts are felt by others, elsewhere; and by users much later (Hi, Climate Change!). Those concerns ALONE should have educators taking a moment to think about whether they should be using AI.

Training just a single model magnifies harm to the environment -- it'll escalate

Shaolei Ren and Adam Wierman, Associate Professor of Electrical Engineering at UC, Professor of Mathematics @ Caltech, 7-15-2024, "The Uneven Distribution of AI's Environmental Impacts," Harvard Business Review, https://hbr.org/2024/07/the-uneven-distribution-of-ais-environmental-impacts, accessed 2-25-2025 //cy

The escalating and localized environmental costs of AI

Even putting aside the environmental toll of chip manufacturing and supply chains, the training process for a single AI model, such as a large language model, can consume thousands of megawatt hours of electricity and emit hundreds of tons of carbon. This is roughly equivalent to the annual carbon emissions of hundreds of households in America. Furthermore, AI model training can lead to the evaporation of an astonishing amount of fresh water into the atmosphere for data center heat rejection, potentially exacerbating stress on our already limited freshwater reasources.

All these environmental impacts are expected to escalate considerably, with the global AI energy demand projected to exponentially increase to at least 10 times the current level and exceed the annual electricity consumption of a small country like Belgium by 2026. In the United States, the rapidly growing AI demand is poised to drive data center energy consumption to about 6% of the nation's total electricity usage in 2026, adding further pressure on grid infrastructures and highlighting the urgent need for sustainable solutions to support continued AI advancement.

The generation of electricity, particularly through fossil fuel combustion, results in local air pollution, thermal pollution in water bodies, and the production of solid wastes, including even hazardous materials. Elevated carbon emissions in a region come with localized social costs, potentially leading to higher levels of ozone, particulate matter, and premature mortality. Furthermore, the strain on local freshwater resources imposed by the substantial water consumption associated with AI, both directly for onsite server cooling

The A.I. boom is leading to increasing energy demand– based on fossil fuels

Sorkin et. al 24 [Sorkin, Andrew Ross, Mattu, Ravi, Warner, Bernhard, Kessler, Sarah, de la Merced, Michael J, Hirsch, Lauren, Livni, Ephrat, 5-6-2024, "How Bad Is A.I. for the Climate?" New York Times, https://www.nytimes.com/2024/05/06/business/dealbook/ai-power-energy-climate.html, accessed 3-3-2025] // CW

Tech's energy needs are coming into focus as investors get to grips with how much of an "energy hog" generative A.I. is becoming. **Analysts** at Wells Fargo **see the A.I. boom helping to push up U.S. electricity demand by as much as 20 percent by 2030.** Shares in Dominion Energy rose last week after the company said it expected to supply 15 new data centers this year, some requiring a gigawatt or more of electricity. (For perspective, a gigawatt powers about 750,000 homes.) And Microsoft announced a $10 billion green-energy deal with Brookfield Asset Management to supply electricity to some of its data centers. Reporting earnings on Tuesday is Duke Energy, another utility with a big data center business. **But the A.I. revolution will largely run on fossil fuels.** There's a push underway to ensure that this increased energy demand is met with lower-carbon sources — consider the Microsoft initiative, or Amazon's $650 million acquisition of a Pennsylvania center that sits next to one of the biggest U.S. nuclear power plants. However, **A.I. power demands are likely to be fulfilled largely by natural gas this decade**, according to the Wells Fargo analysts. That could throw the climate pledges of utilities and tech giants alike into disarray. Surya Hendry, an analyst at Rystad Energy, wrote in a research note last month that "rising data center demand creates a tough problem for utility companies, technology companies and policymakers who want clean energy."

American fossil energy production is environmentally devastating

EIA 24 [No specified author, 4-16-2024, "Natural gas explained," U.S. Energy Information Administration, https://www.eia.gov/energyexplained/natural-gas/natural-gas-and-the-environment.php, accessed 3-3-2025] // CW

Natural gas is mainly methane—a strong greenhouse gas. Some natural gas leaks into the atmosphere from oil and natural gas wells, storage tanks, pipelines, and processing plants. The U.S. Environmental Protection Agency estimates that in 2021, **methane** emissions from **natural gas and petroleum** systems and from abandoned oil and natural gas wells were the source of about 33% of total U.S. methane emissions and about 4% of total U.S. greenhouse gas emissions.[1] The oil and natural gas industry takes steps to prevent natural gas leaks. The U.S. Energy Information Administration (EIA) estimates that in 2022, U.S. CO_2 emissions from burning natural gas for energy accounted for about 35% of total U.S. energy-related CO_2 emissions. Natural gas exploration, drilling, and production affects the environment. When geologists explore for natural gas deposits on land, they may disturb vegetation and soil with their vehicles. **Drilling** a natural gas well on land may **require** clearing and **leveling an area** around the well site. Well **drilling activities produce air pollution** and may disturb people, wildlife, and water resources. Laying **pipelines that transport** natural **gas** from wells usually **requires** clearing land to bury the pipe. Natural gas **production can also produce large volumes of contaminated water.** This water requires proper handling, storage, and treatment so that it does not pollute land and other waters. Natural gas wells and pipelines often have engines to run equipment and compressors, which produce air pollutants and noise. In some areas, natural gas produced at oil wells is not economical to transport for sale or contains high concentrations of hydrogen sulfide (a toxic gas), so it is burned (flared) at well sites. Natural gas flaring produces CO2, carbon monoxide, sulfur dioxide, nitrogen oxides, and many other compounds, depending on the chemical composition of the natural gas and on how well the natural gas burns in the flare. However, flaring is safer than releasing natural gas into the air and results in lower overall greenhouse gas emissions because CO2 is not as strong a greenhouse gas as methane.

U.S. emissions are key– any future increases undermine global climate efforts

Scott 23 [Scott, Michon, 8-30-2023, "Does it matter how much the United States reduces its carbon dioxide emissions if China doesn't do the same?" climate.gov,

https://www.climate.gov/news-features/climate-qa/does-it-matter-how-much-united-states-reduces-its-carbon-dioxide-emissions, accessed 3-3-2025] // CW

The smaller the increase in average global temperatures over the next several decades, the better off humanity and other life on Earth **will be**. A temperature increase of 2.5°C is better than 3°C, which is better than 3.5°C, and so on. Even though **the United States** no longer leads the world in total annual carbon dioxide emissions, **it was still**, as of 2021, **releasing** about 5 billion metric tons of carbon dioxide per year, which was about **13**.49 **percent of the total global emissions**—**more than twice that of all 28 countries in the E**uropean **U**nion **combined. Those emissions will continue to drive global warming.** Combined with the contribution that past U.S. emissions have made to warming to date, **any future U.S. emissions will undermine progress to stop global warming.**

Policy won't save us– Trump and Republicans hate clean energy

Webber 2/11 [Webber, Michael E. (Dr. Webber is a professor of public affairs and engineering at the University of Texas), 2-11-2025, "Trump Wants to Kill Clean Energy. He's Too Late." New York Times, https://www.nytimes.com/2025/02/11/opinion/clean-energy-tax-credits.html, accessed 3-3-2025] // CW

President **Trump**'s first few weeks in office feel like a bad movie remake. He **has once again withdrawn** the United States **from the Paris climate agreement, aggressively sloganeered against renewable energy, frozen government grants and love-bombed fossil fuels**. Together, these moves feel ominous for the fight against climate change. While there's plenty of well-founded uncertainty about how his administration will shape energy markets, much of what Mr. Trump has done so far amounts to bluster or actions that are unlikely to be sustained. For 20 years, we've seen a movement toward cleaner, cheaper sources of energy, and the executive branch's levers to disrupt it are not powerful enough to overcome it. What's more, if he tries to stop the substantial clean energy investments flowing from the Inflation Reduction Act and the bipartisan infrastructure law into Republican districts nationwide, as he has threatened, it's hard to believe that his own party will allow it. Mr. Trump has inherited a strong energy economy from the Biden administration. America is producing more energy — including oil, gas, wind and solar — than at any other point in history. Exports of oil and gas are also at record highs. Over the past 20 years, America's greenhouse gas emissions have dropped through increased efficiency and as wind, solar and natural gas have displaced coal in the power sector. America's total annual energy consumption has stayed level for over two decades, despite the economy nearly tripling and the population growing about 20 percent. It will be hard for him to disrupt that momentum.

Foreign models won't either– America took action to restrict DeepSeek immediately

Lee et. al 2/17 [Lee, Nooree, Huffman, Robert, Gweon, August, Shah, Akash, Adetuala, Bolatito, 2-17-2025, "U.S. Federal and State Governments Moving Quickly to Restrict Use of DeepSeek," Covington, https://www.insidegovernmentcontracts.com/2025/02/u-s-federal-and-states-governments-moving-quickly-to-restrict-use-of-deepseek/, accessed 3-3-2025] // CW

Last month, **DeepSeek**, an AI start-up based in China, grabbed headlines with claims that its latest large language AI model, DeepSeek-R1, **could perform on par with more expensive and market-leading AI models despite** allegedly **requiring less** than $6 million dollars' worth of computing **power** from older **and less-powerful chips.** Although some industry observers

have raised doubts about the validity of DeepSeek's claims, its AI model and AI-powered application piqued the curiosity of many, leading the DeepSeek application to become the most downloaded in the United States in late January. DeepSeek was founded in July 2023 and is owned by High-Flyer, a hedge fund based in Hangzhou, Zhejiang. The explosive popularity of DeepSeek coupled with its **Chinese ownership has unsurprisingly raised data security concerns from U.S. Federal and State officials**. These concerns echo many of the same considerations that led to a FAR rule that prohibits telecommunications equipment and services from Huawei and certain other Chinese manufacturers. What is remarkable here is the pace at which officials at different levels of government—including **the White House, Congress, federal agencies, and state governments, have taken action** in response to DeepSeek and its perceived risks to national security.

The Impact is Climate Change: Warming is an impact filter for all other scenarios –wars, food shortages, migration flows and security threats are exponentially worse on a hotter planet

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In the last two decades, many research works have pointed that **environmental stress is one main catalyst that creates societal insecurity** that may result in armed conflict.[1–6] Not only scarcity of renewable resources, but also resources scarcity-induced population migration might become a source of violent conflicts as well.[7,8] However, in recent years, the relationship between climate change and armed conflict has received more attention. It is often assumed that climate change will intensify environmental stress and might even create new conflicts.[9–14] The loss of living space and source of livelihood attributable to climate change could force the affected people to migrate. Arguably, the mass movement of populations due to climate change may create security concerns for a nation-state. Climate change has become a global environmental problem caused by the buildup of greenhouse gases, particularly carbon dioxide and methane, in the Earth's atmosphere. The world is warming up faster than any time in the previous 10,000 years. The predicted marked sea level rise caused by this climatic change may deprive millions of people of their living space and source of livelihood in the near future. The Intergovernmental Panel on Climate Change (IPCC) has predicted that sea levels could rise an average rate of 6 cm per decade over the next century.[15] A rise of this magnitude will no doubt threaten the densely populated low-lying countries and coastal zones of Asia and Africa and many island states in the Pacific and Indian Ocean. Not only developing

countries, rich countries like the Netherlands and the south-eastern part of the United States will also be affected by the sea level rise. Among other predicted impacts are increases in tropical cyclones. Increased number of cyclones would also enhance the risk of coastal flooding. Climate change can also potentially alter the typical rainfall pattern, which may lead to increased flooding, drought, and soil erosion in tropical and arid regions of the world. The issue of climate change is high on the world's policy agenda at present. The controversy over the science of global warming and the procedures adopted by the IPCC in collecting data fail to undermine decades of climate research confirming the overall global climate change. Doubts and denial give way to debates about the likely impact of climate change, particularly on developing countries.[16] Agricultural production may become highly vulnerable to climate change, given the other multiple stresses that affect food systems in the South. Response to climate change can also affect particular societies' cultural norms and social practices related to food production. Moreover, some countries and societies are better at formulating adaptation strategies for all aspects of land use practices to safeguard them against the negative consequences of climate change. To address the adverse effects of climate change, the effectiveness and coping abilities of existing institutions matter as well. Within this context, there is general recognition that the poor in the developing countries will be the hardest hit by the impacts of climate change, as they tend to depend more on the natural environment for their livelihoods and have limited coping mechanisms and adaptive capacity.[9] **Climate change** can also potentially increase the number of poor people by **reducing the existing resource base**, thereby **pulling more** people **into poverty**. It has also been argued that climate change will **compound** the propensity for **violent conflict**, particularly in states with weak governance, poor institutions, and low social capital. CLIMATE CHANGE AND INSECURITY Climate change has changed the discourse in international politics, bringing the conservative military security paradigm into the forefront of the debate. The interstate dimension clearly dominates this discourse. A major focus of the ongoing discussion is about the anticipated ice-free Arctic and, thus, the competition to exploit arctic oilfields. The other most discussed **emerging challenge** lies **in** the future of existing **water-sharing agreements** because the run-off in many of the river basins will vary more frequently and severely, because of changing climate dynamics. Challenges are expected with extreme glacier melting while, in other regions, droughts and meteorological disasters are the major threats. The geopolitical dimensions and military security consequences of climate change pose a severe challenge to interstate relations. However, it is the adverse impact on human security of a large number of nations is most worrying. A critical component of human security is **food security**, which is going to be **seriously affected** through the multiple impacts of climate change. The **agriculture sector is** very **sensitive** to changes in climate. Climate change will consequently lead to **more frequent extreme weather events** particularly in arid and tropical regions, such as droughts and floods, eventually **affecting**

agricultural **productivity** and likely **leading to food shortages and societal insecurity**.[17] **Sea level rise** has posed a serious threat to the survival of some of the smaller island states. But it also **threatens** the sources of livelihood for **millions** of people that live in low-lying river deltas in poor developing countries. Rich and developed states might be able to mitigate the impact of rising sea levels to some extent, for instance, London with the Thames Barrier. Others rich countries have long experience with seawater intrusion, e.g., Netherlands, which shields parts of its inland through the Oosterscheldekering (Eastern Scheldt Storm Surge Barrier). But, the situation is quite precarious for poor developing countries. CLIMATE CHANGE AND CONFLICTS **Conflicts will increase** owing to the impact of climate change, though not through a direct singular causal mechanism. The debate, which evolved prominently during the 1990s, frequently refers to population migration as one of the key linking points between climate change and armed conflict. The anticipated increase in the number of **climate change migrants will cause stress** on receiving communities, which might themselves suffer under resource stress, **and**, thus, eventually **lead to new security problems** through increased competition.[5,7] Some preliminary research finds quantifiable connections between climate change and organized communal violence.[18] Raleigh and Kniveton[19] confirm the trend of high rainfall leading to **increased risk of localized communal conflict**. However, the findings indicate that combination of socioeconomic and political factors with climate change factors lead to conflict. The discussion regarding the causal relationship between climate change and conflicts has yet to produce consensus.[16] On the basis of the existing literature, it can be safely argued that climate change may not generate conflicts in itself, but that climate change can, and in some instances already does, act as a "threat multiplier." CLIMATE CHANGE AND WATER CONFLICTS As climate change can potentially change water supply and demand patterns, sharing of scarce water resources of shared rivers systems in the arid and semiarid regions will become the most likely and indirectly for offsite electricity generation, can worsen prolonged droughts in water-stressed regions like Arizona and Chile.

Every incremental addition to warming is lethal

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warming already killed four million exceeded all global emergencies impact should grow along with temperature. **two degrees of warmin, 40 million additional deaths**.

For these reasons, we negate the resolution.