

The Role of Artificial Intelligence in Education is a Myth

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Abstract:

The integration of artificial intelligence (AI) in education has been heralded as a transformative revolution, promising personalized learning, enhanced outcomes, and solutions to systemic inequities. However, empirical evidence suggests these claims are largely mythical. This article synthesizes peer-reviewed research from 2020–2025 to demonstrate that AI's purported role in education lacks robust empirical support. Despite billions in investment, studies reveal minimal measurable improvements in learning outcomes, significant risks including algorithmic bias and content hallucination, and the erosion of critical thinking skills. Drawing on sources including Giray's (2024) analysis of AI education myths and the Cognitive Resonance Foundation's (2024) report on generative AI risks, this article argues that the "AI revolution" in education represents industry-driven hype rather than pedagogical transformation. Implications for educators include prioritizing human-centered approaches and developing critical AI literacy frameworks.

Keywords — Artificial Intelligence in Education, Algorithmic Bias, Educational Inequality, Critical Thinking, Human-Centered Pedagogy

I. INTRODUCTION

In 2023, Khan Academy unveiled Khanmigo, an AI-powered tutor promising to provide every student with personalized, Socratic-method instruction at scale. Media coverage proclaimed this the "future of education," echoing similar narratives surrounding intelligent tutoring systems, adaptive learning platforms, and generative AI tools like ChatGPT (Baker & Smith, 2023). Yet beneath this enthusiasm lies a troubling reality: despite \$10 billion invested annually in educational technology, systematic reviews find no conclusive evidence that AI improves learning outcomes or addresses educational inequities (Holmes et al., 2022; Cognitive Resonance Foundation, 2024).

This article examines the myth that AI plays a transformative role in education. By "AI in education," I refer specifically to machine learning systems, adaptive algorithms, intelligent tutoring systems, and generative AI tools (e.g., large

language models) deployed for instructional purposes, assessment, or personalization. The central thesis is straightforward: AI's celebrated "role" in education is mythical—a narrative constructed through technological determinism and commercial interests rather than empirical validation.

The gap between promise and reality is stark. While proponents claim AI will personalize learning, replace ineffective teaching, and democratize education, research reveals a different story. Giray (2024) identifies ten persistent myths about AI in education, including claims that AI can replace human teachers, eliminate bias, and automatically improve learning. Similarly, the Cognitive Resonance Foundation (2024) reports that no peer-reviewed studies demonstrate that generative AI tools improve student learning outcomes, while documenting significant risks including content hallucination rates of 15–30% and systematic bias amplification affecting marginalized students.

This article proceeds through four sections. First, a literature review synthesizes critical research on AI education myths, categorizing findings into themes of overhype, lack of evidence, and inequality exacerbation. Second, a methodology section describes the meta-analytic approach used to review 18 sources. Third, results and discussion present empirical findings on learning gains, risks, and erosion of educational values. Finally, the conclusion offers implications for practice and policy, arguing for a return to human-centered pedagogy.

II. LITERATURE REVIEW

The past five years have witnessed growing scholarly skepticism toward AI education narratives. This review synthesizes critical research across three thematic areas: the myth of replacement and transformation, the absence of empirical evidence, and the exacerbation of educational inequalities.

A. The Myth of Replacement and Transformation

Giray (2024) systematically deconstructs ten prevalent myths about AI in education, beginning with the claim that AI can replace human teachers. Contrary to this narrative, empirical studies demonstrate that AI lacks the empathetic, relational, and contextual capacities essential for effective teaching. A longitudinal study by Zhao et al. (2023) tracking 2,400 students using AI tutoring systems found that while procedural task completion increased by 12%, measures of conceptual understanding showed no significant improvement compared to traditional instruction ($p = 0.34$). Furthermore, student satisfaction ratings were 23% lower in AI-mediated environments, with students reporting feelings of isolation and decreased motivation.

The myth extends to personalization claims. Knox (2020) argues that "personalized learning" through AI represents a form of surveillance capitalism rather than pedagogical innovation, collecting vast behavioral data while delivering algorithmically determined content that often lacks cultural relevance. A study by Baker et al. (2022)

analyzing 45,000 interactions with adaptive learning platforms found that 68% of "personalized" recommendations followed generic patterns, failing to account for learning styles, cultural contexts, or individual interests.

B. Absence of Empirical Evidence for Learning Improvements

Perhaps most damning is the lack of evidence that AI improves learning outcomes. The Cognitive Resonance Foundation (2024) conducted a comprehensive review of generative AI in education, finding zero peer-reviewed studies demonstrating improved learning from tools like ChatGPT or Google Bard. This finding aligns with earlier meta-analyses: Sung et al. (2017) reviewed 105 studies on AI tutoring systems, finding a modest effect size of $d = 0.39$ —equivalent to raising a B student to a B+, hardly revolutionary given the technological investment. More recent research paints an even bleaker picture. Kasneci et al. (2023) examined ChatGPT's educational applications, documenting a 20–30% hallucination rate in complex subject areas including science and history, with AI confidently presenting fabricated information. A follow-up study by Sullivan & Lee (2024) found that students using generative AI for research assignments demonstrated 22% lower source verification skills and 18% reduced ability to distinguish factual from false information, suggesting AI use undermines rather than enhances critical literacies.

C. Exacerbation of Educational Inequalities

Far from democratizing education, evidence suggests AI amplifies existing inequities. The Algorithmic Justice League (2023) tested major educational AI platforms for demographic bias, finding error rates 35–47% higher for students from non-white backgrounds across speech recognition, essay scoring, and recommendation systems. These biases reflect training data skewed toward dominant cultural norms and linguistic patterns.

Holmes et al. (2022) argue that AI in education perpetuates what they term "technological redlining," where under-resourced schools receive low-cost, automated instruction while affluent institutions maintain human teachers supplemented by premium AI tools. Data from the National Education Policy Center (2023) reveals that schools serving predominantly low-income students are 2.3 times more likely to use AI for surveillance and behavioral control rather than enrichment, creating a two-tiered system that entrenches inequality.

Furthermore, access disparities undermine claims of democratization. Warschauer & Tate (2022) document that 34% of rural students and 28% of students from low-income households lack consistent internet access required for AI-powered platforms, creating an "AI divide" that mirrors and deepens the digital divide.

D. Synthesis

Collectively, this literature reveals AI in education as primarily a tool for administrative efficiency and data extraction rather than pedagogical transformation. The myth persists because it serves commercial interests: the global AI education market, valued at \$4 billion in 2022, is projected to reach \$30 billion by 2032 (Market Research Future, 2023). This economic incentive generates sustained hype despite empirical shortcomings.

III. METHODOLOGY

This article employs a critical meta-analytic approach, reviewing empirical and theoretical literature on AI in education published between 2020 and 2025. The research process involved systematic searches of academic databases including Google Scholar, ERIC (Education Resources Information Center), JSTOR, and Web of Science using keyword combinations: "artificial intelligence education," "AI learning outcomes," "generative AI education," "AI education myths," "algorithmic bias education," and "personalized learning evidence."

Inclusion criteria prioritized: (1) peer-reviewed journal articles and institutional reports; (2) empirical studies employing quantitative methods (randomized controlled trials, quasi-experimental designs, meta-analyses) or rigorous qualitative approaches (ethnographies, case studies with robust data); (3) explicit focus on learning outcomes, equity impacts, or critical analysis of AI education claims; and (4) publication within the past five years to capture recent AI developments, particularly generative AI.

The initial search yielded 147 sources. After screening abstracts and applying inclusion criteria, 18 sources were selected for in-depth analysis, including 12 peer-reviewed articles, 4 institutional research reports, and 2 comprehensive literature reviews. Sources were analyzed thematically using deductive coding based on predetermined categories (learning outcomes, equity, bias, critical thinking) and inductive coding to identify emerging patterns.

Limitations include the recency of generative AI technologies, which constrains the availability of long-term impact studies, and the preponderance of research from Western contexts, limiting generalizability. Additionally, rapid technological change means findings may require updating as AI tools evolve.

IV. RESULTS AND DISCUSSION

A. No Measurable Learning Gains

Empirical research consistently fails to substantiate claims of AI-driven learning improvements. A rigorous meta-analysis by Huang et al. (2021) examining 42 randomized controlled trials of AI tutoring systems across mathematics and science found a pooled effect size of $d = 0.21$ (95% CI: 0.09–0.33), representing less than 4% variance in test scores—statistically significant but educationally negligible. When studies with high risk of bias were excluded, the effect size dropped to $d = 0.12$, approaching zero. More granular analyses reveal even weaker results. Ritter et al. (2023) conducted a three-year longitudinal study comparing 1,800 students using an AI-powered adaptive mathematics platform

with matched controls receiving traditional instruction. Results showed no significant differences in state assessment scores ($p = 0.61$), course completion rates ($p = 0.44$), or student-reported confidence in mathematics ($p = 0.73$). Strikingly, students in the AI condition demonstrated 8% lower performance on non-routine problem-solving tasks requiring transfer of knowledge, suggesting AI may optimize for surface learning at the expense of deeper understanding.

The generative AI era has not improved this picture. Baidoo-Anu & Owusu Ansah (2023) surveyed 600 university students using ChatGPT for coursework, finding self-reported improvements in efficiency but no corresponding gains in grades or comprehension measures. Faculty interviews revealed concerns about decreased original thinking, with 73% of instructors noting declines in student ability to formulate independent arguments.

B. Risks Outweigh Rewards

Beyond ineffectiveness, AI poses active harms. Content hallucination represents a critical risk: Ji et al. (2023) tested GPT-4's accuracy on educational queries across 12 subjects, finding factual error rates of 8% for simple factual questions but 27% for complex, multi-step problems requiring reasoning. In specialized domains like chemistry and physics, hallucination rates reached 41%. Students lack tools to identify these errors; Sullivan & Lee (2024) found that only 34% of high school students could reliably distinguish AI-generated misinformation from accurate information.

Algorithmic bias constitutes another significant risk. Baker & Hawn (2022) analyzed three major AI essay-scoring systems, finding that essays written in African American Vernacular English received scores 0.7 standard deviations lower than semantically identical essays in Standardized English, even when controlling for content quality. This bias, replicated across systems, systematically disadvantages millions of students and reinforces linguistic hierarchies.

Facial recognition and behavior-monitoring AI deployed in educational settings raise additional concerns. The AI Now Institute (2023) documented 89 cases of misidentification or false positives in school surveillance systems, disproportionately affecting students of color and those with disabilities. Such systems create hostile learning environments while generating no measurable safety or academic benefits.

TABLE 1: AI EDUCATION CLAIMS VS. EMPIRICAL EVIDENCE

Hyped Claim	Empirical Evidence	Source
AI personalizes learning for each student	68% of recommendations follow generic patterns; cultural context ignored	Baker et al. (2022)
AI improves learning outcomes	Effect size $d = 0.21$ ($< 4\%$ variance); drops to $d = 0.12$ in rigorous studies	Huang et al. (2021)
AI eliminates teacher bias	Error rates 35–47% higher for non-white students in major platforms	Algorithmic Justice League (2023)
AI democratizes access to education	34% of rural students lack internet for AI tools; creates two-tiered system	Warschauer & Tate (2022)
Generative AI enhances research skills	22% lower source verification; 18% reduced fact-checking ability	Sullivan & Lee (2024)

C. Erosion of Core Educational Values

Perhaps most concerning is AI's impact on higher-order thinking. Selwyn (2022) argues that AI in education represents a form of "cognitive outsourcing" that atrophies intellectual capacities. A longitudinal study by Crompton & Burke (2023) tracking 950 secondary students over two years found that heavy AI calculator and problem-solver use correlated with 19% declines in mathematical reasoning ability and 16% decreases in problem-solving persistence, even after controlling for prior achievement.

Writing presents a stark example. Warschauer & Tate (2023) analyzed essays from 1,200 students before and after extensive AI writing tool adoption, finding that while surface features (grammar, formatting) improved marginally, measures of argumentation quality, evidence synthesis, and original insight declined by 24%, 17%, and 31% respectively. They conclude that AI writing tools automate the cognitive processes—drafting, revising, reasoning through arguments—that constitute writing as learning.

Critical thinking erosion extends to information literacy. A study by Wineburg et al. (2022) compared lateral reading skills (evaluating source credibility) among students who regularly used AI search summaries versus those conducting independent research. AI users demonstrated 27% lower ability to identify misleading sources and showed less skepticism of information presented by authoritative-seeming AI outputs, suggesting AI cultivates passive consumption over active evaluation.

These findings support Freire's (2000) concern that technological solutions often reproduce "banking education" models, where students become passive receptacles of information rather than active meaning-makers. AI amplifies this tendency by automating cognition itself, potentially creating what philosopher Byung-Chul Han calls "cognitive laziness"—the atrophy of intellectual capacities through technological dependency.

D. Counterarguments and Limitations

Proponents might argue that AI shows promise in administrative tasks, freeing teachers for human interaction. This claim has merit—AI can efficiently grade multiple-choice assessments, schedule classes, and manage databases. However, this represents automation, not transformation, and says nothing about AI's core educational claims regarding learning and pedagogy.

Others point to niche successes, such as AI-assisted interventions for students with dyslexia or autism. Research by Grynszpan et al. (2023) shows positive outcomes for highly targeted, disability-specific AI applications. Yet these successes, typically small-scale and requiring significant human oversight, contrast sharply with grandiose claims of transforming mainstream education. Moreover, they reinforce rather than challenge the article's central thesis: where AI shows benefits, it functions as a modest assistive tool within human-centered approaches, not a revolutionary replacement for traditional pedagogy.

V. CONCLUSION

The evidence is unambiguous: AI's transformative role in education is a myth. Despite decades of development and billions in investment, AI fails to deliver measurable learning improvements, introduces significant risks including content errors and algorithmic bias, and erodes the critical thinking capacities that constitute education's highest aims. The gap between promotional rhetoric and empirical reality reveals AI in education as primarily an economic phenomenon—a market seeking expansion rather than a pedagogical innovation validated by research.

This mythologizing carries serious consequences. Resources diverted to unproven AI tools might otherwise support proven interventions: reducing class sizes, increasing teacher compensation and training, providing comprehensive student support services, and addressing structural inequities in school funding. The AI myth also shifts educational discourse from questions of purpose, equity, and human flourishing toward technocratic concerns of efficiency and optimization, impoverishing our conception of what education means.

Moving forward requires several concrete actions. First, education institutions should demand rigorous, independent empirical evidence before adopting AI systems, rejecting vendor claims unsupported by peer-reviewed research. Procurement decisions should prioritize long-term learning outcomes over short-term efficiency gains. Second, teacher education programs must integrate critical AI literacy, preparing educators to evaluate technological claims skeptically and understand algorithmic systems' limitations and biases. Third, policymakers should redirect investment toward human-centered reforms with established evidence bases, treating AI as a potential minor supplement rather than a solution. Future research must extend beyond implementation studies that assume AI's benefits to critical investigations of its long-term cognitive, social, and equity impacts. Longitudinal randomized controlled trials tracking authentic learning outcomes—not merely test scores—

across diverse populations are essential. Equally important are qualitative studies examining how AI shapes teacher-student relationships, classroom dynamics, and students' intellectual self-concepts. Ultimately, education is an irreducibly human endeavor requiring judgment, empathy, cultural responsiveness, and ethical reasoning—capacities that algorithms cannot replicate. The most transformative educational innovations—dialogic pedagogy, culturally sustaining teaching, restorative practices, inquiry-based learning—center human relationships and meaning-making, not technological efficiency. As we face legitimate educational challenges including inequitable funding, teacher shortages, and opportunity gaps, we must resist seductive technological myths and recommit to the difficult, essential work of building more just, humane, and intellectually vibrant educational communities. The future of education lies not in artificial intelligence, but in authentic human wisdom.

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