
The Efficiency Trap

*A Critical Analysis of AI in Education,
Learning Design, and Productive Struggle*

Portfolio Literature

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Introduction

In recent years, the integration of artificial intelligence into the education system has moved from a futuristic concept into a daily reality. The U.S. Department of Education defines artificial intelligence, or AI, as “automation based on associations” (Office of Educational Technology, 2023, pg. 1). Much like the predictive text feature on a smartphone, artificial intelligence functions by calculating the likelihood of the next piece of information based on massive datasets. However, as artificial intelligence is marketed to schools as a seamless, ‘plug and play’ solution for accessibility, inclusion, differentiation, and efficiency, a fundamental conflict emerges. A significant tension exists between using artificial intelligence for a speedy output compared to using it to support human effort and ethical learning practices. The implementation of artificial intelligence in education is only successful if it preserves human agency and avoids the efficiency trap that prioritizes output over the learning process.

False promise of Neutrality

There is a common belief that solutions that come from a computer are neutral and unbiased. Some people even believe that computers are better than humans; Broussard calls this belief “technochauvinism” (2023, pg, 6). Behind artificial intelligence, there is code and mountains of collected data that are used to train the models. This is where the artificial intelligence systems can unintentionally become biased, racist, and sexist. There are many examples of artificial intelligence and other computer systems demonstrating discriminatory traits ranging from inaccurate ability to use facial recognition on people with darker skin leading to imprisoning the wrong person due to a technical error (Broussard, 2023, pg. 21) to racist soap dispensers that only work for people with lighter skin tones (Broussard,

2023, pg. 7). These examples are not just technical glitches, they are a foundational flaw. In the educational industry, artificial intelligence is often framed as a neutral arbiter of accessibility and a progressive educational tool. This myth actually masks a darker reality; that these tools are not merely passive software. Instead they often mirror and intensify historical inequalities and social biases they claim to solve. Relying on these tools to automate tasks like reading placement or rubric creation risks weaving in historical prejudices directly into our grading system. A truly frictionless learning environment requires a human teacher who can see the student behind the data, not an algorithm that ignores a child's lived experiences and cultural heritage.

Efficiency trap: agency vs. productive struggle

The adoption of artificial intelligence in education raises ethical questions related to equity, accessibility, and the fundamental roles both students and teachers play in the classroom. Historically, "In traditional education, students are encouraged to take an active role in their learning process by developing skills in exploration, analysis, and problem solving. Critical thinking skills are essential for shaping students' overall learning experiences." (Vieriu & Petrea, 2025, pg. 2). However, as artificial intelligence is becoming a staple in the educational environment, these active roles are beginning to shift towards more passive consumption. Mollick discusses that because artificial intelligence can now bypass any given homework assignment, the traditional methods are now changing (2024). This shift threatens to undermine the critical thinking skills that are "essential for shaping students' overall learning experiences" (Vieriu & Petrea, 2025, pg. 2). When artificial intelligence does all the heavy lifting, students stop coming up with their own ideas and the productive struggle that is needed for growth is removed.

Despite these new challenges, education has seen and has successfully navigated similar shifts in values and prioritizing student's own work on assignments when calculators, spell check, or the internet became widely available. In those instances and with artificial intelligence today, "educators often rely on questioning techniques, collaborative activities, and assignments to enhance students' ability to evaluate information and develop independent perspectives." (Vieriu & Petrea, 2025, pg. 2). History shows us that new tools don't have to make student work less valuable; they just change how we approach it. However, a calculator is a tool used to handle a specific math problem, whereas artificial intelligence can take over the entire creative process of how a student thinks. Educators and policies are needed to make sure that the technology is helping the learner without taking away the actual Act of thinking that builds a regulated, capable brain.

A question that teachers often hear from their students in regards to using artificial intelligence is, "why should we have to do this work by hand when a computer can do it for me?" Selwyn warns us that if we let the computer take over the mental burden of teaching and learning, we might end up with a version of education that is "efficient but hollow"; it would be lacking the struggle and "human connection that makes learning meaningful" (2022, pg. 623). This "hallowness" happens because we aren't just trying to produce a simple answer; we are trying to build a successful person. Even in 1973, Illich foresaw issues that technology didn't give us agency and freedom but instead he argues that "machines enslaved men" (pg. 17). To counter this, we have to remember that the effort of learning is what actually changes the brain. As Lakhani points out, "you do not get the growth unless you go through the struggle" (2025, 10:20). Education should not be a series of boxes that need to be checked, by the fastest means possible. Mollick and Lakhani both discuss how learning and education matter more than ever in the age of AI, because machines can't replace the ability to think critically; however when we outsource this heavy lifting, we aren't saving time, we are accidentally automating

away the very experiences and make us a capable, regulated, and independent learner.

Even with artificial intelligence, teachers can support students in productive struggle. Lakhani describes productive struggle as a “mental effort that builds understanding” (2025, 5:10). If society prioritizes speed over effort and struggle, then we are robbing students of the difficult or messy parts of learning which is where deep understanding actually happens. When students use artificial intelligence to bypass the mental effort, they are actively avoiding learning rather than using the technology as a tool to help them learn. When artificial intelligence provides a quick output, it creates an illusion of competence. Personalized learning shouldn’t mean easier or faster learning, instead we need to focus on the student’s growth and the cognitive heavy lifting that is required for longer term memory and understanding. To ensure that artificial intelligence is a successful tool in the classroom, educators and EdTech administrators must purposefully design environments where students are supported by the technology through the messy or difficult productive struggle that Lakhani identifies as the catalyst for deep understanding.

Vulnerability and ethics with AI in SPED

Incorporating artificial intelligence into education has “shown potential in supporting students with special education needs” (OECD, 2025, pg. 23), as long as there is emphasis on “child-centered AI that ensures fairness, safety, and inclusion in digital learning environments” (Li et al., 2025, pg. 2). However, without strong policies and consideration to child development of students who have disabilities, artificial intelligence risks becoming a quick fix button that ignores the personal, individual needs that every student needs to actually learn. Developers without

inclusive expert knowledge may create tools that are framed in techno-ableism, which is “the assumption that technology should render individuals able-bodied and neurotypical” (OECD, 2025, pg. 32). Artificial intelligence tools are often built for people who are disabled instead of being designed and built in collaboration with the students who are going to be using the tool.

The inclusion of artificial intelligence in special education raises serious concerns regarding truly informed consent for data collection. The OECD identifies students with special education needs as a “vulnerable research population,” noting that these individuals are often the least able to advocate for their own data privacy (2025, pg. 25). While artificial intelligence systems offer efficient data collection often function by extracting every student interaction including mistakes and emotional responses to improve their algorithm. Every moment of frustration or error is recorded to train the system for students with disabilities; this means their most vulnerable moments of struggle are turned into permanent digital records, often without the necessary safeguards to protect where the data goes or how it defines them as they grow older. If a student cannot understand the terms of service or the long-term implications of their digital footprint the responsibility falls entirely on the institution to act as a shield to protect all students.

Moving forward, classroom tools should focus on Universal Design for Learning as a foundational requirement and using artificial intelligence to make the classroom environment more accessible, instead of trying to change the student. When accessibility features are built into the tools, these features often benefit everyone, not just students with disabilities. Universal Design for Learning is defined as “interdisciplinary educational framework that centers on the creation of flexible and inclusive learning environments” (Song et al., 2024, pg. 1). When accessibility is built directly into the classroom, we experience the curb cut effect; just as physical ramps cut into sidewalks for users in a wheelchair, others also

benefited including parents with strollers, travelers with luggage, shoppers with full carts. Artificial intelligence driven accessibility features can benefit every learner, not just those with identified learning difficulties.

By integrating these tools, we “can ensure that all students, including those with potential or unidentified students with special education needs, are provided agency and flexibility to choose their preferred modes of learning” (OECD, 2025, pg. 40). However, we must remain cautious about the trap of efficiency; because most research only covers short term usage, there is a “significant gap in our understanding” of how most artificial intelligence tools affect the long term cognitive and social growth of our diverse learners (Song et al., 2025). If we only focus on immediate efficiency, we risk implementing tools that could ultimately weaken a student's capability to grow into an independent learner. Universal Design for Learning isn't about making the work disappear, it's about ensuring every student has a clear and accessible path to engage in the struggle that leads to understanding and mastery.

Policies with AI in Education

Some schools have already implemented policies in regards to students and teachers using artificial intelligence. These policies range from free use of artificial intelligence, moderate use of artificial intelligence, and just a blanket ban of artificial intelligence in any form or fashion for both student and teacher. The problem with a general ban of any product that could incorporate artificial intelligence is that artificial intelligence is going to be in classrooms whether we accept it or not. Artificial intelligence goes beyond just using chatbots, it's already incorporated into many of our online student curriculums. There is an urgent need to create policies and safeguards for our students. The foundation of these

discussions on artificial intelligence need to include “culturally responsive and sustaining ways supported by strong professional development for teachers, transparent communication with families and the larger school community, and education for students” (Oregon Department of Education, 2023. pg, 10).

The Oregon Department of Education uses the metaphor of an electric bike vs. a robot vacuum in regards to artificial intelligence use in the classroom; while using “an electric bike, the human is fully aware and fully in control, but their burden is less, and their effort is multiplied by a complementary technological enhancement. Robot vacuums do their job, freeing the human from involvement or oversight” (2023, pg. 53). To ensure that technology in the classroom augments human effort rather than replacing the more difficult or messy parts of learning, policies need to ensure that artificial intelligence mirrors the electric bike effort and less like the robot vacuums meaning that the humans are fully aware and in control but the burden of the work can be less. Efficiency must support the teacher’s experience, not overwrite it. This can be done by keeping humans in the loop: In the context of education this looks like teachers and learners having agency over instructional decisions and interpreting artificial intelligence patterns and feedback. It is essential that educators, not algorithms, remain the primary decision makers because of their relationships with their students and their professional knowledge in the classroom. Policies need to explicitly state that artificial intelligence lacks “contextual judgment” meaning humans must remain responsible for the “health and safety of our children” (Office of Educational Technology, 2023, pg. 17). Teachers and students should have the right to a human alternative if the artificial intelligence system makes a mistake or if they don’t want to use an automated tool.

One of the suggested guardrails discussed by UNESCO includes establishing a clear “minimum threshold” of thirteen years old to be able to use artificial intelligence independently (2023, pg. 21). These specific safety guardrails are

needed to protect our younger, more vulnerable students. There should be protective policies put in place that protect students from artificial intelligence systems making biased decisions for students. “Students want to talk about the ethics of products they experience in their everyday lives and have much to say about the kinds of products they’d like to see or not see in school” according to the Office of Educational Technology (2023, pg. 22). By establishing these clear boundaries, policy becomes a shield that protects the messy but essential journey of learning. We must recognize that artificial intelligence is “certainly not a fix for broken systems” (Office of Educational Technology, 2023, pg. 22) and instead requires intentional, human centered design to ensure it serves students growth rather than prioritizing instructional pace. Ultimately, these robust policies ensure that the pursuit of efficiency never comes at the cost of human agency and critical thinking that define a meaningful education.

AI in the Classroom

To ensure that artificial intelligence is used as an empowerment tool rather than a replacement, its implementation must preserve human agency and avoid the efficiency trap that prioritizes the student’s output over the learning process. This success depends heavily on moving away from the large, one-size-fits-all business tools and towards a system that can be “customized to the individual needs of the classroom environment” (Mollick, 2024, 12:18). This customization allows teachers to act as the primary directors of the technology, rather than just passive users. Teachers possess a honed skill of explaining concepts and directions that translate to using artificial intelligence. Mollick notes that “teachers are actually among the best workers with AI because what you need to do is understand the AI’s mindset, it doesn’t have a mind, but it works like a person” (2024, 11:16).

This means that the 'human in the loop' aspect isn't just a safety measure; it's the secret to making the technology work effectively. A teacher's ability to sense when an explanation isn't quite right allows them to pivot and refine the artificial intelligence's output, ensuring that it meets the unique cultural and academic context of their students. By treating artificial intelligence as a partner, educators can ensure that the pedagogical needs of the students are being met and remain at the center; while also maintaining the right to override any artificial intelligence decisions made that don't align with their professional judgement.

Artificial intelligence's primary value isn't just that it can save time, but instead it redirects that time towards what matters the most. The Office of Educational Technology highlights that "teachers will feel that AI is helping them teach with a focus on their human connection to their students when the necessary (but less meaningful) burdens of teaching are lessened" (2023, pg. 5). When artificial intelligence tutoring systems are used, it can be alongside teacher instruction. In practice, a teacher can work with a small group of students to go through the first few questions and then students can lean on the tutoring system to support them with the final questions, allowing the teacher to support the next group of students. By using artificial intelligence to provide step by step feedback and personal pathways that mimic human tutoring, students can get immediate support without removing the teacher's oversight. However, students must be taught that artificial intelligence isn't a magic source of pure truth and knowledge. To demystify these misconceptions, students need specific lessons on safety, accuracy, and algorithmic biases.

Overall, while artificial intelligence can issue digital badges or reward points, it'll never be able to replicate the profound validation found when a teacher celebrates a student's breakthrough. Students flourish when they feel safe and confident, trusting that they're being guided by a human who truly cares for their

well-being and growth, rather than a distant algorithm. If we allow the classroom to drift towards the state of “automated efficiency”, acting more like “robot vacuums” (Oregon Department of Education, 2023. pg. 53) that prioritize data over human oversight, we risk losing the “human connection that makes learning meaningful” (Selwyn. 2022, pg. 623).

Conclusion

The future of artificial intelligence in our schools isn't defined by how advanced the algorithms are, but by the intentionality of the humans behind the screen. Throughout this analysis, it is clear that while artificial intelligence offers incredible potential for accessibility and personalized feedback, it also carries the risk of “technochauvinism,” the belief that a computer's output is somehow more neutral or superior than a teacher's professional judgment (Broussard, 2023). If we let artificial intelligence become a “robot vacuum” that automates away the messy but productive struggle of learning, we would create an educational experience as efficient but hollow (Oregon Department of Education, 2023).

To avoid the efficiency trap, policies must ensure that technology functions more like an “electric bike,” where humans remain in control and technology merely supports the effort (Oregon Department of Education, 2023). Backgrounding artificial intelligence in the principles of Universal Design for Learning and maintaining a focus on culturally responsive pedagogy, Educators can protect the accessibility benefits of Technology without sacrificing the students agency. In conclusion, the goal of Education is not to produce the fastest answer but to cultivate a capable, regulated, and independent learner. As we move forward in the most successful classrooms will be those where artificial intelligence is used to

remove barriers to access, while the human teacher remains that irreplaceable heart of the learning connection.

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