AI's Role in the Future of Education: The Potential and Ethical Danger of Implementing Learner-, System-, and Teacher-Facing Programs

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Abstract: *This essay investigates the implementation of artificial intelligence in educational settings, focusing on three main types of programs: learner-, system-, and teacher-facing. Learner-facing systems show opportunities to customize education with adaptive algorithms that, as a result, require massive amounts of sensitive data collection. System-facing programs have many similar ethical considerations, including debates on who controls the data and how administrators might manipulate AI products immorally. Teacher-facing systems appear to be the safest step toward utilizing this technology in school, acting as a supplementary tool that aids a current process instead of attempting to replace it. However, regardless of the AI systems considered for the classroom, all necessitate a search of deeper understanding of potential consequences, as well as regulations to guide the proposed changes in a manner that protects sensitive data, the human aspects of education, and equitable learning environment for students.*

Keywords: AIED, artificial intelligence, data ethics, learner-facing, system-facing, teacher-facing, technology in education, ChatGPT, data regulation

John von Neumann was one of the most brilliant men of the twentieth century—a one of a kind mathematician, economist, physicist and even the inventor of the famous "prisoner's dilemma." His work extended into the electronic field, where he declared while working on a new electric computer, "It would appear that we have reached the limits of what is possible to

achieve with computer technology, although one should be careful with such statements, as they tend to sound pretty silly in five years" (Thompson). Not everyone felt the same way as Von Neumann, especially in regard to "artificial intelligence," which for a while was widely viewed equivocally to science fiction. This debate evolved with technology, extending into realms like chess as computers began to learn the game. The idea that computers could beat the human mind was laughable to some, like Scottish chess master David Levy, who was so confident in 1968 that he wagered that he would not lose a game to a computer in 10 years ("Human vs Computer in Chess"). He won the bet, surviving until 1989, when things unraveled quickly after his defeat against the computer program Deep-Thought. The madness continued until 1997, when the chess world champion, Garry Kasparov, was defeated in nineteen moves by IBM's Deep Blue ("Deep Blue Defeats Garry Kasparov"). Two decades later, computers went on to defeat the Go world champion, Lee Se-dol. Lee retired three years later, saying, "AI is an entity that cannot be defeated" (qtd. in Pranam).

Five years ago, society was at a point where few thought computers would surpass humans in terms of pedagogy. Yet, today, Lee's situation seems much more relatable. AI has not stopped at chess, expanding into many fields including education. This has spiked uncertainty from technology experts and the public alike, as represented in a 2019 survey comparing the US general public's opinions on AI with tech executives' ("2019 Artificial Intelligence Survey"). Astonishingly, the views of the public aligned with those of tech executives, with the majority of both groups believing it would "lessen the need for people to interact with others [...] [and] lead to a loss of human intellec-

tual capabilities." This overlap in opinion between two classes with vastly different levels of interaction with such technologies indicates the extreme power AI is perceived to have.

Naturally, while the rise of AI has been met with much excitement from some, the overall public has grown more apprehensive over time. A study by Pew Research in August 2023 on the general opinion of AI in daily life notes that "overall, 52% of Americans say they feel more concerned than excited," which is an increase of "14 percentage points since December 2022" (Tyson and Kikuchi). It is important to understand the foundations for these fears of AI in all applications and how these fears specifically manifest within the educational setting. In the discussion of artificial intelligence in education (AIED), those who resist the incorporation of AI in education fear the ethical consequences it might bring, with the concern for privacy typically at the forefront, fueled by "systems that gather large amounts of personal data about learners" (Berendt et al. 313). Many other fears support this central one, including worries about the growth of discriminative biases within software, misuse of data storage, and issues of informed consent.

On the other hand, many look to revolutionize the high school and higher education landscape with the integration of AI, citing its ability to provide personalized feedback for each student and improve efficiency as two of the many potential benefits. The voices in support of AI mainly refer to its capabilities to improve learning environments through personalized resources for students and scalable models that could lower long-term costs (Office of Educational Technology 2). Additionally, proponents of AIED remark on the technology's ability to aid teachers in carrying out their duties effectively. As stated aptly

in Singapore's National AI Strategy, AI could help instructors "spend less time on routine assessment tasks, and [...] guide students' learning more effectively through data driven insights" ("National Artificial Intelligence Strategy" 34). Thus, there are just as many concerns with AIED as there are arguments in favor. Both sides of the debate have justifiable points, and all perspectives involved seem to agree on one point summarized by Contact North: "[AI] technology is inexorably linked to the future of higher education" ("Ten Facts about Artificial Intelligence" 5). With the increasing likelihood that AI will be used in the future of pedagogy, the question will be the extent of its use and how safely it is adopted.

This essay will address the growing spotlight on AI's role in education and investigate the most popular forms it is likely to take in an academic setting, differentiating between learner-, system-, and teacher-facing programs and explaining forms of software like intelligent tutoring systems (ITS). Most importantly, though, this essay documents the substantial ethical concerns associated with the hypothetical future of AI into education, and how the potential issues are both more likely and dangerous with specifically learner- and system-facing programs. As a result, it is advisable to refrain from implementing these forms until more is known and controlled. Furthermore, this essay argues that some programs, predominantly teacher-facing ones, can be cautiously implemented soon to reap various benefits with significantly fewer ethical dangers. In the next few years, AI should be integrated into the high school and undergraduate education levels as a merely supplementary tool for the existing learning procedures, aiding the current practices instead of replacing them, while being restricted in scope

to protect data privacy, emotional connections, and the other vital aspects of the current educational system.

Background: Artificial Intelligence in Education

Certainly, with so many different definitions and ambiguity as to what AI "is," and thus how it should be interpreted in the world of education, there is a need to define the parameters of this research. Generally, many experts tend to agree that AI is computer programming that "tr[ies] to simulate intelligent behavior" and "distinguishes [itself] from other computer programs [with] the ability to self-learn" (Bochniarz et al. 1). This flexibility allows AI to fit into a wide variety of industries in many different forms. As far as how it fits into the educational world, Zawacki-Richter et al. contextualize the technology's place in the learning process through the means of "profiling and prediction [...] assessment and evaluation [...] adaptive systems and personalisation, and [...] intelligent tutoring systems" (1). With these programs, AI can take on a much more active role in teaching by working with students' unique learning patterns, speeding up their tasks, and giving administrators more information on how to guide their curriculum.

AI applications in the education industry can be divided further into more detailed categories of learner-, teacher-, and system-facing AI programs:

> Learner-facing AI tools are software that students use to learn a subject matter, i.e. adaptive or personalised learning management systems or ITS. Teacher-facing systems are used to support the teacher and reduce his or her workload by automating tasks such as administration, assessment, feedback and plagiarism detection.

> [...] System-facing AIED are tools that provide information for administrators and managers on the institutional level, for example to monitor attrition patterns across faculties or colleges. (Zawacki-Richter et al. 4)

All three of these systems have both exciting potential benefits and ethical consequences to consider. Learner-facing systems could be used to revolutionize teaching, becoming the primary vessel for students to interact with, but necessitating the collection of high volumes of personal data to effectively do so. Teacher-facing systems appear to collect less individualized data, instead collecting information like summary statistics of a classroom's performance while automating select tasks, making those systems a seemingly less controversial addition. Lastly, system-facing tools would likely collect a lower volume of personal data than learner-facing ones might but differ in who controls its implementation. In the hands of administrators, AI programs could easily be misused to manipulate data to better a school's performance on tests or automate vitally complex decisions, like college admissions. As Zawacki-Richter et al. explain, AI can fit various roles in education, impacting and possibly revolutionizing many levels of learning. Yet, to put the situation into the words of Jeff Goldblum's character in *Jurassic Park*, who says, "Your scientists were so preoccupied with whether or not they could, they didn't stop to think if they should," in the context of AI in education, the issue is not whether or not it could be implemented, but rather, whether it should.

Learner-Facing Programs: Ethical Implications of Data Collection

Although AIED sparks excitement about saved money and improved efficiency, nearly all these benefits raise ethical impli-

cations associated with data collection. For student-facing programs—ones that students would be directly working with—the nature and sheer quantity of data collected opens doors to many long-term consequences in the form of data leaks, discriminative algorithms, a more competitive learning environment, and more.

While nearly all forms of AIED would require some form of data collection, systems specific to learners raise "concerns [...] about the large volumes of data collected [...] (such as the recording of student competencies, inferred emotional states, strategies and misconceptions)" (Holmes et al. 508). As the effectiveness of educational AI tools moves in tandem with the amount of personal data collected, it creates a dangerous cycle where the push for better teaching tools risks a catastrophe in the case of a breach. In essence, student-facing systems would monetize personal data, rewarding higher levels of data collection with more effective learning systems—an incentive that risks personal safety for results. Moreover, AIED researcher Jesus Boticario points out that as data collection increases, "because there is so much information available on anyone [...] data are people themselves and should be treated as such" (qtd. in Holmes et al. 512). AI programs that collect learners' data would hold such a comprehensive picture of users' identity through an endless and gapless tracking of their activities; this information could be mined for incriminating details in the wrong hands and potentially provide a greater opportunity for identity theft. Thus, until data is seen as the extension of a person and accompanied by regulations that support that idea, student-facing and similarly powerful systems pose much too high a risk for implementation.

Similarly, advancing any powerful technology like AI is precarious even when it is fundamentally understood. Therefore, when there is a lack of knowledge about the extent of a new tool, extreme caution should be exercised. Research on the ethical considerations of the increased data collection demanded by AI systems is lacking, which consequently is a common concern among professionals. In a study that compiled responses from seventeen leading researchers in the field of AIED, "when asked '*What are the most important ethical issues for AIED?*' nine respondents directly referenced 'data,' with several more identifying issues overlapping with the governance of data" (Holmes et al. 512). This overlap in responses for such a widely controversial topic indicates a clear warning against proceeding without gathering more information, specifically on the impact and processing of high volumes of personal information. Thus, while the overlapping concern of experts might be data collection and ownership, the true largest danger they propose resides in their unknown long-term effects, which branches into a blossoming tree of consequences we are not able to fully prepare for.

Despite these potential consequences, the allure of student-facing systems, like the notable "intelligent tutoring systems (ITS)," which provide adaptive feedback and learning methods tailored to each student, is understandable given their potential to decrease current gaps in learning. These systems are exciting for their ability to mold to the specific learning conditions that best match each student (Shute and Zapata-Rivera 279). Moreover, these systems could open the door to more insightful learning methods that "can render inferences about states from a variety of inputs (e.g., excessive fidgeting implying inattention)" and adequately respond with stimulation as necessary

(280). The danger associated with the constant monitoring of students is also exactly what makes AIED systems so powerful, as it is with persistent tracking that unending adaptation and optimal improvement is achieved. These functions could provide a massive benefit to disabled students, offering supportive options tailored for them. Caroline Bone and Constance Smith, creative strategists in the AI landscape, state, "Various forms of robotic assistance could [...] [help] them to make comfortable environmental transitions" and "provide an extra set of eyes and ears for therapists, teachers, and parents." These supplementary tools would simultaneously improve the learning process for those with disabilities and provide their support network with an additional resource to learn about their child. From a school's or teacher's perspective, these functions are exhilarating, as they essentially simulate the "optimal" school system, providing custom lessons and support for each student with spectacular consistency. Indeed, these ITS systems have "enormous potential" through their ability to provide instantaneous feedback and mold into a teacher, friend, or resource as needed (Zawacki-Richter et al. 4). Undoubtedly, this could be massively beneficial to instructors' pedagogies; by providing more specific focus and care to each student, AI could ensure no one feels neglected and is learning from the method most effective to them.

Nonetheless, for these systems to flourish, AI algorithms would require a large intake of personalized data from students, which could lead to consequences beyond data leaks that are extremely challenging to foresee. One example is the exacerbated discrimination that AI could impose. When the quality of data collection, such as demographic or behavioral characteris-

tics, directly influences the effectiveness of the learning module, students may suffer if they inadvertently fall out of the algorithm's designed parameters, magnifying inequalities through uneven data utilization. As Berendt et al. note, "poor quality data will negatively impact equity, which, in turn, may lead to unwarranted surveillance of 'poorly performing' students" (315). Students might give lower-quality data that is inaccurate, incomplete, inconsistent, biased, etc., without even realizing it. In turn, those students may be disadvantaged when the entire curriculum revolves around AI-based systems. That is not to say that the current education system is discrimination-free—much could improve, of course—but the idea that some students are scrutinized at separate levels, albeit by AI instead of humans, is not fundamentally ethical, especially when humans control the AI programs created and thus can improve upon them with this issue in mind before implementation.

Specifically, ITS systems' programming could "ignore under-served/ underrepresented/minority students and fall short of providing fair learning opportunities" (Holmes et al. 514). Students with varying backgrounds may choose to interact with the AI differently for one reason or another, especially if the programs are designed with a focus catering to a majority in the school. This would, in turn, punish minorities in comparison to the students that best fit the target group the algorithmic system was designed for. On top of that, those with better resources—economic or otherwise—might be provided with more tools to access AI, or even have better systems themselves, providing an unfair advantage in the classroom. This already exists to some extent—those with more wealth already do have the option to purchase better education—but with the arrival

of AI, the process might become markedly easier and increase the gap between classes. The difference would be the ease of the process; instead of having to relocate entire lives to better school districts, a student might only need to purchase a better system or subscriptions to supplemental tools with a click of a button. In essence, ITS systems are dangerous for the same reasons they are powerful; their seamless ability to capture and adapt to human needs can aid learning but could exacerbate the existing inequalities in the education system in the long run.

On top of potentially heightened discrimination, learner-facing systems could create an environment detrimental to the mental health of students through continuous tracking of their activities. In pursuit of providing the best data, students will inevitably be monitored as much as possible. However, as Berendt et al. note, "the continuous assessment of student performance, as opposed to being tested at milestone intervals, places learners under continuous stress" (318). Students do not learn linearly and might have some days that are better or worse than others. By monitoring them every day and constructing an environment where every speck of work may be compiled into a portfolio that could be used for résumés, college acceptance, and more, AI forces students to learn under pressure without exception. Understandably, the duress of performing without a break could have detrimental effects on students' mental health.

In addition to all the potential post-implementation issues of learner-facing programs is the problem of gaining informed consent before implementing in the first place. Such unprecedented technology necessitates consent from the students, the ones impacted the most, but with such an undefined tool, achieving truly informed consent is an oxymoron. Holmes et

al. identify this problem, saying, "The application of AI to children and young people was noted as a distinguishing feature of AIED," and the authors continue to bring up the question of how students at the K12 level can offer informed consent on a process they know nothing about (514). Allowing parents to decide for their children does not alleviate the issue; not even experts in the field are sure what the boundaries of AI are. The only true agreement among experts in AIED is that due to the "constant self-improvement of AI, its potential and limits are unknown" (Bochniarz et al. 1). Because of these unknown factors, nearly any decision made is in some way uninformed.

Thus, a crucial aspect of integrating AI into society is ensuring that the public is comfortable and educated on its implications. As Schiff notes, "for citizens to meaningfully shape a future with AI [...] they must be able to assess its risks and opportunities" (537). There can be no ethical step forward that integrates students with AI until the public better understands what they are dealing with. Many countries have already begun introducing AI literacy courses to the public, like Singapore's National AI Strategy 2.0 (NAIS 2.0), which aims to help the public "master AI, rather than think of it [...] as [...] a luxury" ("AI for the Public Good"). The establishment of a similarly focused program in the US might alleviate the current issue of allowing students or parents to make uneducated decisions. However, at this time, informed consent is essentially unachievable, and thus, even if students grant "permission," more factors should be considered before proceeding.

System-Facing Programs: Data Ownership and Manipulation

Though implemented with different data than learner-facing programs, system-facing programs, which are designed to

interact with the internal systems or structure of an organization as opposed to people, have similar ethical consequences, as well as a few of their own to consider. Generally, the issue with system-facing programs regards who owns the data, and how their manipulation of such powerful tools could lead to unfairly favoring certain demographics or worsening mental health in learning environments through a prioritization of profits over learning.

System-facing programs have applications in nearly every aspect of a school's management, from staffing to the dissemination of educational requirements. For example, in the hands of administrators, according to the National Institution for Transforming India (NITI), AI could be used in the "automation of teacher hiring and transfer systems" (Schiff 540). Moreover, this technology could even grow to use "predictive algorithms [...] to guide college admissions decisions, [but] could produce race, gender, or socio-economic biases by directly or indirectly favoring students with certain demographic characteristics" (Schiff 544). Involving AI in such impactful operations gives it the power to make life-changing decisions through a complex algorithm. Just like with the learner-facing systems, it is important to consider whom these programs are designed for and how minority groups could be disadvantaged through their integration. When considering the possibility of potential prejudices or programming faults in this situation, the ethical consequences are too severe to disregard. Thus, even without taking in as much personal data as any learner-facing program might, system-facing applications do not avoid the potential for discrimination.

Different from learner-facing systems, however, are the consequences that could arise not from what data is collected and

used, but from who can access and utilize it. Administrators might misuse programs as a tool for "[making] sure students achieve the grades they need to ensure sufficient income stream for the organisation" (Berendt et al. 315). This issue would likely expand to meet other metrics as well; it is not a stretch to assume that eventually, some would manipulate AI to retarget their students in the direction of better performance on state tests as opposed to their genuine learning, all in hopes of improving the value, and therefore reputation, of their school. Per the previously mentioned stresses of constant monitoring, the students would suffer the consequences of enhanced metric-based learning. In the current educational system, research supports how the pressures from a focus on quantitative benchmarks "are felt by students, who internalize the assessment focus [and] unhelpfully compare themselves with peers" (Thompson et al. 382). An environment that focuses on standards breeds increased competition, teaching students to compare themselves based on numeric values as opposed to genuine learning, personal growth, or intangible values. As with many other examples, I believe implementing AI would not create this issue from scratch; rather, it would magnify the existing problem with more advanced tools. Thus, while system-facing programs might intake different types of data, they can still harm the students through the environmental shifts they might cause.

Teacher-Facing Programs: Supplemental Options with a Controlled Scope

When compared with learner- or system-facing, teacher-facing programs that work directly with educators seem like the safest step forward for a handful of reasons. Most importantly,

it seems that these systems would collect less personal information, making them both more ethical and secure. Moreover, they would be used at the discretion of the teachers, whose motivation to misuse such powerful technology, while not nonexistent, is probably less impactful and less likely than that of administrators. Most importantly, teacher-facing programs allow the human element of learning to remain, supporting the role of instructors as empathetic facilitators of such a valuable experience instead of replacing their position entirely.

Previous research "suggests that AI-systems should focus on assisting concrete pedagogical tasks that for a human teacher would be perceived as exhausting and time-consuming, for example assisting in constructing grade responses" (Humble and Mozelius). Utilizing AI to provide feedback on assignments is still a daunting suggestion to many, and understandably so for teachers who might fear for their jobs. However, the point of these systems is not to replace teachers but to support them. AI can provide suggestive feedback that teachers can use at their discretion, illuminating new angles to a paper that might deepen their understanding of the student's work, for example. In an even less intimidating application, AI can "reduce [a teacher's] workload by automating tasks such as administration, assessment, feedback and plagiarism detection" (Zawacki-Richter et al. 4). In essence, these programs would not differ much from how a calculator or Microsoft Excel helps professionals in today's world and would not be in the hands of administrators who might misuse their capabilities for profit. Even more valuable, these systems would intake data from students in a way that does not attribute it directly to them, like with summary statistics on challenging review questions, for example. In

that role, AI merely carries out tasks a teacher could already do more efficiently and avoids the compilation of online portfolios full of personal information.

In fact, some teachers have already begun to experiment with AI as a supplementary tool for their classroom. April Edwards, a sixth-grade teacher in Texas, has even grown a following of over 60,000 users on TikTok solely from sharing her favorite ways to utilize AI in developing her classroom (Langreo et al.) Among her various uses, Edwards mentioned how she used one tool, "Magic Write," to help her develop a daily lesson plan with timestamps, as well as to build a professional template for emailing parents. In her applications, AIED only responds to her inputs and bolsters the existing power that she holds in shaping future generations. Langreo et al. also discuss Mike Kerr, a high school English teacher, who mentioned in an interview the value of utilizing ChatGPT to help students process challenging writing structures like Shakespeare's Elizabethan English. Providing students with an additional resource improves the quality of teaching on both ends of the process: Students can ask more valuable and critical questions as tools like ChatGPT help them bridge the gap on technical issues, and teachers can provide more creative, challenging discussions to classrooms with the time added back from AI's assistance. These are only two specific examples, and they serve not as a representation that all teachers can and should learn to love AI, but rather, that the idea is approachable. Many teachers will likely begin to incorporate AI into their classrooms for its benefits regardless of official policy decisions, so creating a unified, well-defined transition could combine the efforts of teachers, parents, and administrators toward one superordinate goal.

Certainly, the teacher-facing systems examined are not without flaws, and it is important to recognize what to consider before moving forward. Most notably, extended teacher-facing systems might bleed into the realm of system-facing programs, meaning the same potential for "a school leader's early warning system [to] highlight poverty status, prior grade history, and disciplinary actions as [...] factors associated with a higher likelihood of course failure, without explaining the underlying causes of failure" (Gillani et al. 105). In short, functions of teacher-facing systems could mimic the issue of selection with system-facing programs, thereby flagging students as a "risk" for reasons they cannot control, like family income, for example. Some might argue that biases in feedback are better handled by teachers than they would be by organizations, as teachers could leverage their personal connection with students to provide context to an otherwise purely algorithmic conclusion. While optimistic, this seems like an unfair and unlikely assumption to proceed with. Thus, this issue is in no way resolved for teacher-facing systems and needs to be considered before proceeding; being safer than a system-facing program does not by default make it safe enough, and the consequences could be devastating in either application if not taken seriously.

Though teacher-facing systems raise many concerns that need addressing, they also bear one of the most interesting potential benefits: the chance to reshape the current method of learning into one that emphasizes critical thinking and collaboration as opposed to memorization and regurgitation of topics. While this seems optimistic, Roll and Wylie argue in their analysis of forty-seven papers from the *Journal of AIED* that using AI could make teachers helpful inspirers in projects. With this

support, teachers are given more freedom to help "learners in seeking, finding, [...] integrating information, and becoming independent collaborative thinkers" (592). The transformation of the role of a teacher from being a disseminator of hard facts to a guiding hand in critical thinking could make education more meaningful in the long run for students. Personal connections would be emphasized, and each student could develop their own problem-solving routines, strategies, and habits that could be applied across all subjects they might encounter.

Moreover, AI can emphasize this critical thinking by offering a host of feedback that students and teachers can consult as an extra source for ideas or criticism. Dyane Smokorowski, a digital literacy coordinator for Wichita Public Schools in Kansas, notes that she had considered the usage of AI to improve the feedback process in schools. Specifically, she argues the technology is "a writing coach" that, when used correctly, is not "rewriting their content or putting their voice in" (Langreo et al.). In this context, AI can allow students to examine their writing through a lens that preempts teacher involvement, allowing more time for specific and personal feedback. More importantly, these systems supply a resource for information on topics a student mentions that an instructor is not as educated on. This assumption certainly overlooks some considerations; for example, if AI is grading or offering suggestions for free-response assignments, the quality of feedback might dwindle when compared to human teachers, and in that case, AI would merely stimulate a higher quantity of free-response assignments completed and graded at a lower quality. Nonetheless, if effectively configured to avoid these shortfalls, the potential to shift the nature of learning remains exciting.

Teacher-facing systems can also succeed ethically by refraining from overtaking the importance of a human connection in teaching. One of the most valuable aspects of learning arises from the relationship between a student and their teacher. As Selwyn remarks, "The danger, of course, lies in seeing data and coding as an absolute rather than relative source of guidance and support. Education is far too complex to be reduced solely to data analysis and algorithms" (106). No matter how powerful AI becomes, it will almost certainly never fully replicate the relationship between teacher and student, and to assume so would diminish a crucial pillar of the educational process. Specifically, humans still retain "abstract reasoning and learning how to learn" at a much higher level than AI-powered machines, which is well demonstrated by an attentive teacher's ability to identify key gaps in a student's knowledge or learning processes within a short number of questions or interactions (Gillani et al. 105). In this way, the human element of teaching is incalculably valuable; a teacher's instinct on the intangibles of the classroom and connection with his or her students can allow them to identify problems as they occur, sometimes even preemptively, and utilize interpersonal skills to resolve them with emotional grace. The meshing of complex decisions with emotion resides much above the reach of AI and only emphasizes that this technology will never fully replace the human element that is so crucial to teaching. Thus, the teacher's role in education is just as pertinent as ever, and the programs implemented should focus on supporting these foundational elements of teaching instead of overtaking them.

Conclusion: The Overarching Message

The growing interest in AIED, whether terrifying or exciting, comes with an entirely new set of considerations to be investigated. The three most likely categories that AI will conform to in the classroom—learner-, system-, and teacher-facing programs—all open the door to new possibilities and threats. Learner-facing programs that collect personal data are the most dangerous and should not be implemented at this point, as they cannot fully gain informed consent and could cause catastrophic data leaks that could endanger every student involved. In addition, the long-term potential consequences of these learner-facing systems, like worsened discrimination against minorities or an exhausting environment of constant assessment, are only a few of the many potential problems. System-facing programs might hold less personalized data as there is less direct interaction with students, but in the hands of those who can influence their personal profit, can still lead to discrimination and could be misused to weaken the quality of learning in pursuit of better test scores. Teacher-facing programs, while far from perfect, provide the best option for taking a transitional step toward AI in the classroom. These systems hold data that is less comprehensive and is wielded by teachers instead of administrators, while still retaining the human element of pedagogy.

Even with teacher-facing systems, or any other seemingly safe application of AI, regulations need to precede the technology's arrival. Some countries have recognized this, and "to make sure [the] use of learners' personal data provides benefits for the learners themselves [...] governments and supra-national entities (such as the European Union, EU) have made explic-

it political choices in favour of protecting individual rights" (Berendt et al. 314). While no one can say for sure what the best regulation to put on AIED is, especially because its full power is not known yet, some boundaries need to be created. It appears the best way to do so would be to draw from something that already works, using a blanket policy such as the General Data Protection Regulation (GDPR) in Europe, which tackles all forms of automated data usage by ensuring that "individuals whose data are processed by an AI application have the right to be given meaningful information about the functioning of the application" (Wulf and Seizov 612). This policy is meant to prevent technology from interfering in human lives without their approval beforehand, thereby ensuring that the freedom of well-informed choices remains in the hands of the humans utilizing these powerful tools. A more comprehensive regulation might be needed, but at the very least, a wide-reaching policy could be a good start, affecting all varying forms of technology as opposed to just AI, because singling out AI might not help with any similarly designed advancements that go under a different name.

Regardless of what form AIED is implemented in, even well-regulated teacher-facing systems, the stakes are much higher now than they were decades ago. AI's growing capabilities necessitate limitations because it has real-world consequences, ones that can lead to inequity in schools or the endangerment of future generations. With any form of integration into classrooms, we risk equity in learning opportunities among millions of students and control the future of education, be that spectacular or dystopian. With AI, we need to push for more regulation

and hold the education system accountable, because we are no longer impacting the exchange of pieces on a game board; we are impacting the quality and safety of learning itself.

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