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Editorial: The Crisis We Earned: Educational Technology Research and Teacher Education

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To see what is in front of one's nose needs a constant struggle.
— George Orwell

He who would do good to another, must do it in Minute Particulars
General Good is the plea of the scoundrel hypocrite & flatterer:
For Art & Science cannot exist but in minutely organized Particulars
— William Blake, Jerusalem

This is the first of four editorials, each led by a different colleague, running quarterly in *JTATE* and part of an initiative that builds on Moore's (2025) invitation to address grand challenges facing instructional design and technology. Recognizing the need for a coordinated vision and strategy, the 2025 National Technology Leadership Summit (NTLS) devoted one of its strands to examining "Grand Challenges in Technology and Teacher Education." An editorial report published in the *Contemporary Issues in Technology and Teacher Education (CITE)* journal included the objectives and outcomes of the strand, culminating in the need "To make technology in teacher education matter" (Milman et al., 2025, para. 20). The four editorials are a next step in expanding the vision and strategy and will culminate in a forthcoming call for articles in *JTATE's* Special Issue on Grand Challenges in Technology and Teacher Education. This first editorial is quite deliberately a provocation. It argues that educational technology research is facing a crisis of legitimacy, particularly in teacher education. This crisis stems, in part, from a growing disconnect between the questions our field asks, and technological realities students and teachers now face. It examines the dimensions of the crisis, our field's complicity in it, and what a more honest reckoning with our field's history might require. The goal is to foster discussion and dialogue and we welcome critical feedback. We would rather be usefully wrong, corrected by colleagues who care about teachers and this field, than safely silent.

INTRODUCTION

Educational technology is in crisis. For those of us who prepare teachers, it is also a reckoning, one we have, in no small part, brought upon ourselves. This crisis was caused by our mistaking the general for the particular, the measurable for the meaningful, and the classroom for the whole of a child's education. The consequences are now playing out in public, and they are hard to miss. We are not the only ones who have noticed. A recent special issue of the *Journal of Computing in Higher Education (JCHE)* took up the grand challenges facing instructional design and educational technology (Moore et al., 2025a), and this series of editorials is, in part, our response.

In the special issue of the *JCHE*, Moore (2025) surfaces a provocative set of ideas for the field of educational technology and instructional design to grapple with. Collectively, the authors call for a fundamental shift in how we conduct educational technology research, including pointed descriptions of the research we need (Moore et al., 2025b) as well as the research we don't need (Schmidt et al., 2025). The primary call to action is that we relinquish our obsession with technological *things* (e.g., artificial intelligence, virtual reality) and instead reorient research around the substantive teaching and learning challenges we face. One proposed solution is to identify "grand challenges," which are large-scale, complex problems such as student mental health, access for marginalized youth, or data rights and privacy, that can drive more impactful coordinated, long-term research efforts. The authors call for dismantling institutional systems that reward "the research we don't need" (Schmidt et al., 2025, p. 507), and they argue against an instrumentalist mindset that treats people and educational problems as resources to be optimized (McDonald & Ventura, 2025). Importantly, they advocate for more robust methodologies, such as educational design research (EDR), systems thinking, and translational research, to ensure that we produce scholarship which is relevant to practice and responsive to issues of social justice (Correia et al., 2025). Finally, they caution us, as technology enthusiasts, to resist rushing toward trendy topics like generative artificial intelligence (AI) without critical scrutiny.

The concerns raised in the *JCHE* special issue are not merely academic. They emerge at a moment when educational technology faces a growing crisis of legitimacy among the communities it claims to serve. There are signs of this reckoning everywhere. Sweden spent 15 years replacing printed textbooks with laptops and tablets. The government is now spending tens of millions of euros to reverse course, under a policy called, without irony, "from screen to binder" (Savage, 2026). Across the United States, parents are organizing to remove screens from classrooms that schools spent a decade wiring up (NBC News, 2026). As of June 2026, 35 states passed cellphone bans in K–12 classrooms in a single year, more than in the entire preceding decade (Ballotpedia, 2026). This past spring, Eric Schmidt, former chief executive of Google, was booed at the University of Arizona for telling graduates they would help shape AI (Joffe-Block & Aslam, 2026); the pattern repeated campus after campus whenever a speaker mentioned the inevitability of AI in the future. This ought to be a wake-up call for those of us in the field of educational technology. These are the machines we prescribed. We argued for them, studied them, and wrote the grant proposals, professional development workshops, and dissertations that justified them.

The pandemic sharpened the crisis. Almost overnight, screens became the only available school, and what had been a decade of careful, incremental adoption became a two-year global experiment run on every student simultaneously, without preparation, without consent, and without any of the contextual judgment our frameworks assumed. When schools reopened, the infrastructure remained. The market moved in and continues to do so. Eighty-six percent of education organizations now use generative AI, the highest adoption rate of any sector (IDC, 2024), and the AI education market is projected to grow from roughly seven billion dollars in 2025 to over 100 billion dollars within the decade (Precedence Research, 2025). At the same time, screens are increasingly blamed for a plethora of ills that learners face. We can argue that a tumultuous period marked by a pandemic, global instability, the prevalence of algorithmic information bubbles, as well as the rise of extremism, all contributed to the challenges our learners face, but the narrative seems to have focused on digital technology. And the pushback is coming not only from long-standing critics but from schools, parents, and policymakers themselves. So, we end up in this situation where users appear to be in open revolt, while investors are more bullish than ever. Add to this the irony that technology has become the only way to manage much of ordinary life. We book our medical appointments and read our test results online, we look up whatever we need to know, we reach the people we depend on, all through the same devices and platforms now under attack. We are being asked to ban the very tools we can no longer get through the day without.

THE CHALLENGE BEFORE US

The predictable response to this paradox is to file this under moral panic. Every new technology has triggered one: Socrates on writing, Victorians on novels, the 1950s on comic books and television, and the 1990s on video games. The pattern is real. But the actors are a handful of the most valuable corporations in history, whose business models are engineered to capture human attention, as well as embed and make us dependent on their tools in nearly every aspect of our lives; the technology changes faster than any institution, ours emphatically included, can study it; and the evidence of harm, while still contested, is mounting (Haidt, 2024; Orben, 2025), and governments are taking notice and implementing policy (United Kingdom Department for Science, Innovation and Technology, 2026).

These are the external factors. Even as we acknowledge their existence, we must concede the fact that some of this crisis was earned by us.

THE CHALLENGE WE FAILED TO SEE

For most of the history of this field, our central question has been: How do we integrate this tool into the classroom well? We produced frameworks we are proud of: TPACK (Technological Pedagogical Content Knowledge; Mishra & Koehler, 2006); SAMR (Substitution, Augmentation, Modification, Redefinition; Puentedura, 2006), PIC-RAT (Passive, Interactive, Creative; Replacement, Amplification, Transformation; Kimmons et al., 2020), TIM (Technology Integration Matrix; Florida Center for Instructional Technology, 2011), among others, asking how teachers might use technology meaningfully rather than mechanically. But every one of these frameworks assumed, without noticing the assumption, that the classroom was where the action was. We drew our research boundary at the school walls, studied what happened inside them carefully, and thus may have missed some of the most consequential educational influences shaping students' lives.

One account makes this absence concrete. It came not from our journals but from a journalist. Bhawna Parmar, an educator and journalist working outside the academy, spent months doing fieldwork in Odisha, the eastern Indian state, and wrote about a 14-year-old girl, Roza, whose school was a showcase of everything our field would call success: smart classrooms, interactive whiteboards, modern laboratories (Parmar, 2025). None of it touched her. Roza's real education was happening in the two hours a day she spent with a recommendation algorithm feeding her an escalating diet of conspiracy, communal hatred, and revisionist history: content engineered not to enlighten but to keep her watching, and very good at its job. The whiteboards were, in the most literal sense, beside the point. The transformation that mattered was happening entirely outside the walls we were studying. Roza's story, clearly, is not representative of every student experience online, but it reveals dynamics our dominant research questions were not designed to see.

Interestingly, those calling for bans on screens and those conducting research on educational technology share a foundational error: both assume the institution's perimeter is where education happens. The ban does nothing about the algorithm that resumes its work the moment the student walks out the gate, nothing about the psychological transformation that has, for most students, already happened by the time they arrive in homeroom. Our research, for decades, studied what happened inside the walls while the most consequential education of our students' lives took place outside them.

WHY CONTEXT MATTERS

None of this erases what educational technology has genuinely made possible. Digital and networked technologies have opened creative and social spaces that did not exist before: fan fiction communities where young writers found audiences and craft; online networks where LGBTQ+ youth in isolated towns found belonging and identity; global collaborations connecting classrooms across continents; the extraordinary creative surge of short-form video that has democratized expression. In specific communities and for specific students: the child who did not speak and found a voice through a communication device; the student in a village without a secondary school who reached a teacher three time zones away; the teacher who bent a clumsy piece of software to a purpose its designers never imagined and unlocked something in a room full of bored 14-year-olds. These gains are real.

If there is one thing that stands out in each of these examples, it is that every one of them is particular: rooted in a specific child, a specific community, a specific teacher, a specific and unrepeatable conjunction of need, tool, and human judgment. It is multifaceted, rich, and varied. It is deeply contextual.

As educators, we know this. Context is the knowledge we carry from years in classrooms and with teachers. Knowing that "it depends" is the finding, not a confession of defeat. Research systems and publication cultures have treated contextual knowledge as insufficiently rigorous, elevated aggregate findings over particular ones (Reeves & Lin, 2020), and left us without language to defend what we knew. Generalization was seen as the only legitimate object of inquiry, which undervalued the significance of the particular, and never really, as a field, built the evidentiary and rhetorical case to defend it. As we have argued elsewhere, educators bring "practical wisdom gained through localized, contextualized experience" as a core asset to technological transitions (Mishra et al., 2025). The failure was not in failing to name it, but in failing to make it count.

That vocabulary was always there, just not foregrounded. Aristotle distinguished between three kinds of knowledge: *episteme*, *techne*, and *phronesis* (Aristotle, ca. 350 BCE/2000). *Episteme* is scientific knowledge of general and necessary truths. *Techne* is craft knowledge: how to make things. *Phronesis* is practical wisdom: the capacity to discern the right action in a particular, contingent, and never-quite-repeatable situation. Teaching is *phronesis*. Our field spent its energy on *episteme* and *techne*. And AI is the apotheosis of *techne*: the dream of automating the method so

completely that judgment becomes unnecessary, which is precisely why it poses a specific danger to a profession whose entire substance is the judgment that technique cannot replace.

Shulman identified this gap precisely 40 years ago: teachers' knowledge, the capacity to make a subject learnable for this student, in this moment, was absent from our research paradigms. He called it pedagogical content knowledge (Shulman, 1986, 1987); it was, at its core, a form of judgment. We are making the same discovery now. Teachers' judgment is absent from the technology discourse of the 2020s, precisely at the moment a technology has arrived that makes wisdom itself seem dispensable. Part of the solution is recognizing the importance of this practical wisdom, something that cannot be supplanted by technology. Technology can play a role, but it cannot be the whole story. This is something we failed to espouse strongly enough, ceding ground and discourse to those with a limited understanding of learning, or with products to sell. Restoring teacher judgment and student learning back to the center of our thinking is only part of the task. The deeper challenge is that our research agenda has often reflected the same assumptions, as we tend to privilege questions based on what is easiest to measure, isolate, or generalize, and in doing so, we fail to ask the broader and deeper questions that address the most entrenched problems we face.

THE RESEARCH WE NEED AND THE RESEARCH WE DON'T

Aiming our methods towards teacher wisdom is necessary but not sufficient. The problem runs deeper since it does not engage with how these tools and media become part of our broader cultural landscape, influencing how we create, learn, and engage with knowledge. It is here that our field may have truly missed the boat since the most generative thinking about what media do to us came from outside our field. McLuhan, Ong, and Postman saw further into the nature of technological change than almost anyone our field has produced (McLuhan, 1964; Ong, 1982; Postman, 2005). Their shared insight was ecological: a medium doesn't carry content into a stable cognitive environment; it restructures that environment. The form of a technology reshapes how we think, remember, attend, and relate, before any particular content is delivered. The irony, of course, is that none of these scholars could publish their work in our journals today. There is no data in *Amusing Ourselves to Death*, and *Understanding Media* does not have a methods section. We assigned these books to doctoral students,

quoted "the medium is the message" in keynotes, and built a research culture with no room for the kind of thinking they did. Scholars like Audrey Watters spent decades documenting what our field's technologies were actually doing to schools, but we cited her selectively, rarely, if ever, genuinely engaging with the concerns she raised (Watters, 2023).

The same pattern holds for the feminist and critical race scholars who were mapping what these technologies did to the students our frameworks rendered invisible. Safiya Umoja Noble showed that search algorithms encode racism; Ruha Benjamin named the bias embedded in automated systems the New Jim Code; Virginia Eubanks traced how digital tools deepened inequality for families already living in poverty (Benjamin, 2019; Eubanks, 2018; Noble, 2018). This work was not tangential to educational technology. It named what was happening to our students in our classrooms.

This focus on *techne* reveals its own limits most clearly in a sequence of findings that tell us more about the instrument than about the technologies. In 2011, a study in *Science* warned that Google was becoming an external memory that atrophied our own (Sparrow et al., 2011). A decade later, an internet search was shown to produce the illusion of knowledge without its substance: people who searched to prepare for a quiz learned less than those given the same information directly (Fisher et al., 2015). Then a study found that large language models produced shallower knowledge than a Google search, and suddenly Google was the gold standard (Melumad & Yun, 2025). We are also sure that a bit of time on Google Scholar will provide studies that argue for the opposite. These are not findings about technology but evidence that the comparative frame, and the question it assumed, may have been broken to begin with.

Our institutional constraints and commitments drove us to comparative studies, to the question of whether this tool outperforms that one, a question that only makes sense if you believe technologies are interchangeable instruments operating in the same stable learning environment. They are not. For decades, media comparison studies asked precisely this question and kept returning the same null result, the so-called "No Significant Difference Phenomenon" (Russell, 1999). Print, web, and AI each restructure the conditions of learning, attention, memory, and social life that the study purports to measure. Asking which medium produces better outcomes measures the incoherence of the question, not any property of the technology.

The second structural problem is the idiosyncratic nature of academic time. For the most part, our research runs on three-year grants and 18-month review cycles, and the slow accretion of replicated findings. But the technology runs on a different clock entirely. By the time a well-

designed longitudinal study clears peer review, the technology it studied has been deprecated, retrained, or rebranded twice over. Generative AI is constitutionally incapable of holding still, as the model produces different outputs to the same prompt depending on which version is running, on one's conversation history, and on sheer algorithmic randomness. The randomized trial fares no better because it needs a clean control group, and there is no child left in the world who constitutes one; no one sits outside the ambient saturation of algorithmic media against whom we might measure the exposure. We built a methodological apparatus exquisitely designed to study a world that no longer exists, and perhaps never did.

In the United States, matters are complicated further. Research agendas here bend with each change of administration, so that what can be asked, funded, and published shifts with the political weather. And the distortion is not only political. The companies building these technologies hold a cultural and political sway with little precedent, a cachet that lets them shape the very discourse within which we are trying to study them, setting the terms, supplying the vocabulary, and underwriting the conferences, the labs, and increasingly the schools where the questions get asked. We are not neutral observers of an independent object. We are studying a technology whose makers help write the story we tell about it.

And the results of that myopia are here for us to see, as the news headlines show. What is sad is that if any field should have seen what was coming, it was ours: the attention economy, the polarization, the rewiring of a generation's relationship to truth. While the platforms were doing it, we were, for the most part, running careful studies on whether interactive whiteboards improved test scores on the fractions unit, investigating teachers' beliefs/perceptions about educational technology, researching short-term uses of technology and its short-term effects, or conducting small-scale studies with little if any long-term impact. That is on us. Not on the companies, whose incentives were exactly what we should have expected. Not on the legislators reaching for the blunt instrument of the ban, but on us.

The challenges ahead will stress our systems further still. AI converses in natural language, speaks in the first person, expresses emotion, flatters, and ingratiates: it is engineered to be maximally persuasive in service of purposes that have nothing to do with learning. Its deepest effects will play out outside the classroom far more than within it. While our field designs comparison studies and raises alarms about plagiarism, AI is already being deployed to distort information, manipulate belief, and consume the very attention and agency that learning requires. Our methods were already falling short of the world they were trying to describe. They are now falling further behind with every model release.

OBLIGATIONS FOR THE FIELD

Three obligations follow from this diagnosis. The first is methodological. We need rigor adequate to a moving, ecological, irreducibly particular object: the rigor of the anthropologist who lives in the context, the historian reasoning carefully about a singular and unrepeatable sequence of events, the media theorist taking the long view of what a technology does to the shape of thought. Our field has treated these as second-class for a long time. The argument is not for less rigor but for rigor adequate to the object. We need rigor embedded in research questions that address the complexity and variability of the digital society we are building.

The second is political. The forces bearing down on teachers are being contested in school boards, legislative chambers, and the press: vendors selling AI as a replacement under the guise of efficiency and effectiveness, policy mandates treating teachers as implementation surfaces, surveillance dashboards reducing judgment to a compliance metric. Our field has the expertise to enter those conversations that we have largely stayed out of, preferring the safety of the research journal to the messiness of public discourse.

The third obligation belongs to the field as a whole: in the research we design, the methods courses we teach, the dissertation work we treat as legitimate, and the scholars we hire and promote. These are the sites where our epistemological commitments get grounded. Our role, rather our responsibility, is not merely to adapt to technological change but to actively shape it. The teachers our programs prepare are already doing that. The question is whether our field will join them.

LOOKING AHEAD

We recognize that these obligations represent a significant shift in the questions we ask, how we collaborate, how we conduct and communicate research, and how we envision a better future for technology and teacher education. This editorial is the first in a series of four editorials that will appear in upcoming issues of *JTATE*. In these editorials, we will delve more deeply into the grand challenges facing technology and teacher education. We will examine these challenges from multiple perspectives and invite dialogue from our colleagues. This series will culminate in a *JTATE* special issue focused on "Grand Challenges in Technology and Teacher Education," which synthesizes themes and tensions raised across the four editorials. The

purpose of the editorials and the accompanying special issue is to spark dialogue and invite colleagues to join us in this effort. This will provide an opportunity to question existing assumptions and examine the emerging challenges we face. The special issue will provide an opportunity to identify priorities that can shape the next phase of scholarship in technology and teacher education. We do not expect to arrive at definitive answers. Rather, we offer this series as an invitation to question, debate, critique, and collaborate to collectively shape the future directions of the field.

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