Doing the Soul Work: The Role of Artificial Intelligence in School Technology Leadership

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Abstract

This paper is a reflection of the field of school technology leadership, from founding to expansion. The authors present lessons learned from working with school leaders. By focusing on what the field knows about how humans learn, the authors offer suggestions for how artificial intelligence can might be used to support leading, teaching, and learning.

Key Words: AI, technology leadership, educational leadership

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A Moment Revisited

The Center for the Advanced Study of Technology Leadership in Education (CASTLE) was founded in 2005 as a program center of the University Council for Educational Administration (UCEA) in the United States. It was established in response to the widening gulf between developing digital technologies and stubbornly analog schools (see CASTLE history at https://schooltechleadership.org/history/). While there were many other education technology efforts at that time, CASTLE focused on issues around k-12 educational leadership, becoming active even before the publication of the National Educational Technology Standards for Administrators (NETS-A) in 2009. As the founding director, Dr. Scott McLeod, was fond of referencing, 'If the leaders don't get it, it's not going to happen.' In this initial 2006 post on what would become his popular blog, Dangerously Irrelevant, he wrote:

> We know … that sustainable success in schools never occurs without effective leadership. And yet, when it comes to digital technologies, our nation's school leaders are sorely lacking … We are failing to prepare our nation's students for their technology-suffused futures. Principals and superintendents have ceded the field to technology companies and students, and our schools are increasingly at risk of being dangerously (and ludicrously) irrelevant to the future in which our children will live. (McLeod, 2006, para 1, 5)

As early co-directors of CASTLE, we watched with fascination and apprehension as technology advanced rapidly. At the same time, school leaders largely sought to ban devices and limit access to the Internet. This fearful response to technology only accelerated after the launch of the iPhone in 2007, as the answers to the questions on the test were now available in students' pockets. The leadership gap served as motivation to advance research and practice to help school leaders bring modern, digital relevance to their schools. As McLeod (2007) said soon after launching the blog,

> Administrators' lack of knowledge is not entirely their fault. Most of them didn't grow up with these technologies. Many are not using digital tools on a regular basis. Few have received training from their employers or their university preparation programs on how to use, think about, or be a leader regarding digital technologies. So… let's help them out. (para 1-2)

Many aspects of the Internet and digital technologies fundamentally reshaped the construction of knowledge and learning. In *Here Comes Everybody*, Shirky (2009) captured the democratization of knowledge that populated the explosion of knowledge as people collaborated on new pages like Wikipedia. Lessig (2009) helped us understand radical new collaborations amongst this newly democratized knowledge base would *Remix* our notions of boundaries and regulations. *The Long Tail* by Anderson (2008) introduced the limitless potential of formerly niche, disconnected ideas and products as sites like Amazon redefined business, and countless sites emerged to connect passions. *The World is Flat* by Friedman (2005) showed a global, interconnected world across numerous domains. Christensen (1997) even articulated how major companies could be overtaken by startups that pursued disruptive innovations. He worried about this, in particular, for schools with the follow-up book *Disrupting Class* (Christensen et al., 2008). The book *Born Digital* (Palfrey & Glasser, 2008) introduced the term digital native to the world. It helped us to understand the children of the Internet generation would never know a world without it and would have fundamentally different futures and expectations. Scott McLeod's work on the original *Did You Know?* The YouTube video, released in 2007, made us keenly aware of how the medium of knowledge creation was changing rapidly. As of the writing of this paper, the video has had over five million views (XPLANE, 2007).

These books, and many others, clearly illustrated to us that society was undergoing tumultuous change due to new knowledge infrastructures. Yet, at least initially, k-12 school leaders largely ignored this in classrooms worldwide. The process of digitizing schools would instead be lengthy and lethargic, with widespread adoption emerging only after decades of work to transition classrooms.

Nearly a generation later, we find ourselves in a similar moment with the emergence of artificial intelligence (AI). In those early days of CASTLE, we frequently compared digital technologies with more established educational tools such as television and telephones and even simple tools such as hammers and pencils. This helped to position the new emerging technologies alongside established and less fear-inducing moments of change in society. An entire meme called #PencilChat (Dwyer, 2011), inspired by Papert's (1984) and Spencer's (2011) work, spread amongst the education technology network as a humorous allegory of the irrational fear of the new tools.

With AI, the comparisons are neither as simple nor as humorous. Yet, we can still learn much from contextualizing and juxtaposing emerging technologies alongside our existing knowledge bases. As such, we will explore these natural comparisons below. We will then return to place this current moment with AI in the context of what we have learned during the previous generation of technological development coinciding with the scholarship and work of CASTLE. We will conclude this article with advice for current k-12 school leaders facing this new shift in digital development.

The Soul of Learning & Intelligence

AI pushes boundaries even further. #PencilChat is harder to sustain as an allegory now. Instead, the comparisons to humanity itself become more adept. While still a tool, watching AI articulate robust, novel answers to nuanced questions is a qualitatively different experience than web pages or social media. Comparisons to a pencil or hammer fade into the absurd. It is clearly a tool fundamentally unlike those before.

Learning, in the context of AI, emerges as a distinguishing and determinative factor. As AI learns, it embodies something previously considered only organic.

Humans, though, do not fully understand either human or machine learning. Our best neuroscientists are only in the early stages of unraveling how the brain, human or otherwise, works. Similarly, our best computer scientists and machine learning experts also do not fully understand how generative artificial intelligence (GenAI) tools operate as they deploy neural networks to think through their responses to prompts. Something mysterious still

lies within the process of thinking and the soul of learning, even if the object doing the teaching does not have a soul.

Reflecting on the early days of CASTLE and the efforts at school technology integration through leadership development, the centrality of learning was not the sole focus; however, the focus on the *soul* became more prioritized as we each matured. As new tools and applications emerged quickly, simply trying to keep k-12 school leaders informed on the latest developments was a monumental (and, at times, losing) task. The field prioritized the deployment of 1:1 devices, learning management systems, wifi access, and a bevy of newly released software solutions. The rapidly developing education technology industry hyped the latest solutions that promised to revolutionize education. Looking back, student learning became lost in the digitally tantalizing sauce. In other words, we missed the *soul* purpose of learning.

As we now stand at the precipice of another technologically driven revolution, we have the wisdom of the previous generation of school technology leadership development to inform our current priorities. This journal, *AI Research in Educational Leadership*, stands to benefit from the experience of scholars and practitioners who have led research in the field of school technology leadership over the past 20 years. In doing so, we hope that a deep and fundamental prioritization of human learning and development as an intentional driver of research and practice will lead to the best implementation of these new technologies. We hope that at this juncture, we prioritize the soul of students over the sole technology.

Developing Learning First

Nearly all educational organizations claim to be a learning-first organization. Few are. Much of what we know about the current state of the science of learning and development is not tightly reflected in our current designs of schools nor in the design of how technology is integrated into teaching and learning. This is partly due to the difficulty of holistically comprehending learning and development and the lack of time and resources to appreciate the underlying science's subtlety fully.

As with many other technological revolutions, a likely immediate reaction to new technological developments is to proclaim 'Revolution!' and attempt redesigns of schooling to maximize the technological potential of genAI. In *The End of Education*, Postman (1995) criticized the embracing of the spectacle of television as an instructional tool over more holistic educational models. The novelty of the new can position such innovations as AI proliferation historically. As educational historian Cuban (2024) recently articulated,

> Too many policymakers, practitioners, and parents see technological innovations as unique initiatives unrelated to historic patterns in school reforms. They err. My experiences as both a practitioner, policymaker, and researcher have taught me to see technological devices as part of the river of reform that has flowed constantly through U.S. schools for nearly two centuries. (para. 5)

In examining a more extended scope of educational history, it can be easier for educational leaders to position innovations in AI within a more appropriate context of the timeless task of childhood development. Socol et al. (2020) promoted this timeless view of education as they argued for a progressive view of education that has long been known as critical to childhood development.

The Science of Learning and Development Alliance (SOLD) (2020) represents a detailed articulation of this timeless knowledge base of proven educational practices that help students learn. The alliance is a critical mass of educational organizations that united to craft a timeless articulation of best practices in education. As part of the work of this alliance, they crafted two critical playbooks that articulate the practices of both schools (SOLD, 2021, *Design Principles for Schools*) and community (SOLD, *Design Principles for Community-Based Settings*, 2021). These playbooks offer tangible suggestions on how to integrate science, learning, and development into formal and non-formal educational settings. The Science of Learning and Development Alliance (2020) compiled their key findings around human learning under seven themes.

1. **Potential.** Every child has the potential to thrive. Contrary to popular belief, there is no bell curve to student learning. Central to this finding is the debunking of genetic determinism.
2. **Malleability.** The human brain remains malleable throughout the lifespan. However, there are periods of heightened sensitivity (e.g., birth to five and adolescence).
3. **Individuality**. Every child has a unique neurological structure and thus learns differently. A central finding is that there is no average learner, and children do not learn in cohorts. On the contrary, variability is the norm.
4. **Context.** Individual experiences, environments, and cultures define brain development.
5. **Relationships.** Positive relationships impact brain development.
6. **Integration.** Learning occurs through a nesting of physical, cultural, cognitive, and emotional environments.
7. **Continuum.** Human development is not linear.
8. **Meaning-making.** Brains develop in response to context, relationships, experiences, environments, and culture.

This ability to learn through an interconnected web of unique experiences and relationships is fundamentally what theorists mean when they convey the term deeper learning. Learning through inquiry is among our most valuable assets as humans, but it is also what makes human learning particularly challenging to supplant with technologies. Human learning must be human-centered. Providing robust human support, encouraging meaningful experiences, and building strong relationships with our children in school through a system designed to let children engage across multiple disciplines is critical to the development of our societies.

While many similarities provide insights into our current educational quantities, fundamental differences separate human learning from machine learning. Primarily among these is a difference between inquiry and prediction.

Early AI tools were built around the concept of prediction. This can be seen most clearly in the auto-complete features that have become ubiquitous in email platforms and other text-generation platforms. The AI uses input text to predict an accurate response. While the AI's responses may feel unique or novel, they are merely drawing upon their existing large language databases to predict the correct language response.

Unfortunately, this is most of what is similarly asked of students in school. Educators have tried to provide students with a knowledge base to predict expected answers to test questions. As such, students are held accountable for regurgitating predictable lines of questions and answers. In this way, AI is being asked to replicate fundamentally shallow learning.

What inquiry grounded in experiences and relationships offers is the ability to discover new knowledge. This ability has been reserved for humans, but that is quickly changing. While early generative AI tools could interrogate novel questions to predictive language intelligence, they could not seek to generate and test new knowledge independently. As of this writing, this is quickly changing as, for example, Anthropic's Claude is working on the agent loop, a repeatable process of deciding, evaluating, and acting until AI completes the task. Buckle up; machines might soon deploy inquiry-based learning of their own!

It is possible (read, likely) that generative AI will master this curious inquiry. When that happens, it will be even more tempting to assume AI might genuinely support students' learning. However, AI is a long way away from providing the relationships, belonging, emotional development, individuality, and memorable experiences sufficient to develop young people beyond content mastery.

As we have experienced previously with CASTLE and the digital development of the previous decades, educational leaders will be overwhelmed with promising novelty and expectations amongst many of either rapidly integrating AI into the classroom or banning it altogether. The nuanced, thoughtful, science-informed middle ground will be hard to defend.

Lessons for Educational Leaders in the Age of Generative AI

We are still in the early development of generative AI. In fact, as we write this conclusion, China released its DeepSeek chatbot. AI agents are emerging quickly. Even talk of near-term timelines for artificial general

intelligence (AGI) is growing. As in the early days of the Internet, there will be constant rapid change, with countless new products emerging quicker than we can digest the longer, broader patterns.

These types of innovations will continue to come fast and furious over the next few years. As such, predicting how generative AI will ultimately impact schools is problematic. Thus, to offer advice to educational leaders on the best approaches, uses, and mindsets relative to AI usage in schools would be presumptuous. AI is a fundamentally different technology than anything that has come previously. Thus, using the past to predict the future is a work of folly. Instead, we offer a series of reflections on the lessons learned through the 20 years of the development and deployment of the field of school technology leadership.

Focus on Learner-Centered Development

The Science of Learning and Development Alliance (2020) has done yeoman's work in laying out what we scientifically know about human learning and childhood development. The development part is often overlooked in favor of content-based mastery masquerading as learning. The easily measured definitions of student learning narrowed our mindsets as leaders to shallow, temporal expectations rather than mindsets that embrace the rich, long, complex, and deep emotional and skill development of deeper learning.

Admittedly, in our early years with CASTLE, we at times got caught up in the hype of the dazzling new technologies without realizing that these tools frequently reinforced those shallow expectations of learners. Similarly, AI has the potential to dazzle but ultimately detract from deeper learning.

Prioritize Teacher Design, Student Inquiry-Based Learning

Just prior to the pandemic, we traveled to 30 schools looking at innovative practices that lead to deeper learning (see Richardson et al., 2020). As scholars of school technology leadership, we were, of course, keenly focused on how technology was being deployed. What we learned, however, is that deep, meaningful learning experiences start with inquiry. Technology is often present but frequently an afterthought. In fact, frequently in our conversations with school leaders, it was not mentioned until we raised the question.

Instead, what we heard from leaders were stories of personalized learning and project-based learning. The most meaningful stories were grounded in student inquiry experiences and the relationships and belonging that developed alongside them. As AI matures, it will undoubtedly prove itself useful in helping teachers and students inquire, make meaning, reflect, and, perhaps, even relate. AI could serve as a co-pilot for teachers as learning experience designers.

However, we cannot imagine a future where teachers are able to be replaced with AI in any content area. Certainly, a multitude of platforms will emerge purporting to teach math, writing, foreign languages, health, and a variety of other subjects. For many of these domains, such as foreign languages, both the finances and available personnel are limited. Thus, leaders will be tempted to deploy an AI-infused software model at a fraction of the cost, theorizing it is "better than nothing."

However, these AI-only courses might actually be worse than nothing because nothing in this scenario would allow a student to have a teacher-driven relationship in another content area. To the extent that leaders can prioritize teacher instructional designers with authentic projects and inquiry-driven experiences, they should.

Leverage AI for Shallow Tasks, such as Information Retrieval

While we prioritize both teacher-driven curricula and deeper learning designs, that does not rule out the presence of AI in schools. In fact, we see a prominent role for AI in schools in support of deeper learning.

On any given day, all of us, adults and children alike engage in a variety of learning tasks; from the deeper learning tasks such as inquiry, reflection, analysis, design, and creation, we also engage in many shallow learning tasks such as calculating, defining, retrieving, listing, and memorizing. While not perfect, Webb's (2002) depth of knowledge work provides some insight into the depth of learning exclusive only to humans and appropriate for

shallow support from AI. In fact, using AI as a partner for these shallow tasks can free up time and capacity to focus on the more complex tasks of deeper learning.

For instance, AI, in its current form, is adept at retrieving basic information. This is core to any learning activity. Educational leaders must focus on informational retrieval, information sorting, and information dissemination. AI can easily perform these tasks. School leaders who focus on student learning experiences understand that information is not learning. By reducing the effort to retrieve information, we can place more emphasis on what kids do with that information.

Intentionality & Caution with AI Choices

Having observed nearly two decades of technology integration from school leaders, we have generally seen that the most successful long-term approaches involved high levels of both intentionality and critical thinking when making changes to school operations. It is trite, but successful leaders who implement change are very clear about the why before they undertake change. In fact, it is even better if the why emerges from the community rather than from the leaders themselves.

In choosing to implement, successful leaders assume both a critical and cautious stance. Rather than diving in headfirst, leaders ask hard questions:

- What is the total cost of change, not just for the tool but also the infrastructure, maintenance, and time required to sustain it?
- If we assume some students will abuse the technology, what will that look like, and to what degree can that harm be mitigated?
- Will students get equitable access to the opportunities inherent in the new technology?
- Do the privacy and security risks outweigh any potential benefits?
- Are staff membersboth skilled and confident in the new technology?
- Do parents understand and agree with our position on using this new technology?
- Do we have a process to manage emergent concerns and challenges?
- Are we clear in advance about how we will evaluate this change and how we will stop if it is not working?

We are not suggesting that a school leader needs to have ideal answers to all such questions. Still, leaders who are actively asking and accounting for these types of difficult questions will fare better over time than those seeking to be innovators and early adopters simply for the sake of positioning the school at the forefront.

Assume Questionable Ethics

It is no secret that some of today's AI tools have been created using nefarious means. AI is a commodity, which means that some companies will prioritize profits over protections, such as student privacy. As the current state of AI development feels like a race to grow and make profits, the ethical ramifications of this growth are not being fully considered. The risks inherent in AI, such as using data and intelligence to manipulate kids, are numerous. With adolescents in particular, societies must prioritize keeping kids' data safe. A recent literature review on AI ethics in K-12 education found a variety of concerns emerging, particularly with classroom usage by students (Gouseti et al., 2024).

There is, of course, no way for leaders to fully understand and compensate for all the potential ramifications of AI, just as there were few school leaders capable of understanding all of the risks in digital and internet deployment previously. However, leaders need to assume questionable ethics amongst AI companies and seek support from others and legal counsel in making policy and purchasing decisions. Leaders must protect sensitive data and enforce privacy policies, even if that means disconnecting some systems from the internet and holding back innovative teachers seeking to push new boundaries (see Lee, n.d.).

Closing Thoughts

The founding principle for CASTLE was to help k-12 school leaders become more competent in the use of technology and help them navigate the integration of technology into teaching and learning. In our early days, we were not intentional enough about putting learning and child development at the center. Twenty years of our own development later, it has become our North Star. We have fully embraced putting the needs of students first and designing meaningful learning experiences around those student needs. The field of school technology leadership has come to embrace the idea that technology is simply in service of that learning experience. The only difference with AI is the scale and the speed of advancement. As of this writing, generative AI has been out of public release for just over two years, and so much has changed. But this new technology is just the latest in a long line impacting education, and it will not be the last (Cuban, 1986).

Rand published a report in February 2025 (see Kaufman et al., 2025) investigating AI adoption among teachers and principals in 2023-2024. They found that just 18% of U.S. principals reported providing AI guidance to teachers and students. In high-poverty areas, guidance was half as likely to be provided. This is despite the fact that 58% of U.S. principals reported using AI to draft communications, support administrative tasks, support teacher hiring/evaluations, create instructional resources for teachers, and conduct research. Thus, K-12 school principals, at least for themselves, see the value proposition in adopting AI. Yet, they are not leading for AI in their schools. In conversations with these principals, the researchers found that top concerns about AI included a lack of professional learning opportunities, data privacy, and uncertainty of its uses. The key takeaways from this report include:

1. Districts should create intentional policies to support teaching and learning.
2. AI developers should understand what applications are most likely to improve teaching and learning.
3. Researchers must collaborate with developers to build a body of evidence of what works.

As k-12 school leaders, we must pay attention to the downside of AI in education as well. At the onset of CASTLE's work, we were not nearly critical enough of the influence and profit motivations of edtech corporations. We naively assumed positive intentions and similar hopes in wanting technology to improve teaching, leading, and learning. As we all have experienced, at times, this has morphed into companies trying to hock their wares at a huge cost to schools, parents, states, and nations. Not only was there a financial cost, but by losing sight of learning and development, the highest cost was ultimately paid by students spending hours on computers disconnected from the type of experiences and relationships we know to be at the center of learning. Advances in AI-driven educational technology will likely exacerbate this issue. Leaders must stay keenly aware of when an AI solution may be a cash grab by investors and companies and when it is a relevant tool that can improve leading, teaching, and learning.

The three calls to action from Rand (Kaufman et al., 2025) echo those CASTLE has been making. Technology should be in service of teaching and learning. Technology use should have clear policies for teachers and students. And researchers must remain focused on understanding what works and what does not work.

With AI developments moving so quickly, it might be hard to keep up with these three calls. However, we firmly believe that situating student learning at the center of k-12 school leadership decisions about AI is the path forward. The SOLD Alliance (2021a; 2021b) lays out the empirical research on learning and development. There is a clear and timeless path. We know what works, despite whatever new technologies emerge. The task ahead is to ensure schools mirror the science of learning and development, embrace AI where appropriate, and remain focused on the *soul* purpose of schools: to guide the learning and development of children.

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