

Distinguishing Four Levels of AI's Impact on Education

By Matthew Pittinsky, Ph.D. · **DRAFT** · Last Revised May 14, 2026

I know it is geeky to write, but I love a good framework. After Star Trek, peanut butter, Ellio's frozen pizza, and my family. Not necessarily in that order.

By a framework I mean a way of organizing my thinking about a topic into structured, discrete elements. A good framework helps me do two things. First, it lets me think more clearly about each element on its own terms. Second, it helps me see how the elements interrelate, and -- in its strongest form -- structures my decision-making.¹

For institutional leaders grappling with the impact of AI, a framework would be handy, specifically one that stimulates strategic thinking. I aspire to formulate one over time as I write about different aspects of AI's impact on education. The first step is identifying the discrete levels at which AI operates. I keep coming back to four — Curriculum, Pedagogy, Delivery Model, and Delivery System. They sometimes run together in public conversation, which is a problem: the dynamics of each differ.

1. In graduate school, a policy professor hammered into me the value of frameworks using Graham Allison's *Essence of Decision*. Since I have yet to be consulted on a nuclear missile crisis, Clayton Christensen's *Innovator's Dilemma* is the framework I think about most often. Closer to home, my colleagues and I developed the *Academic Innovation Framework* at early Blackboard — a maturity model for institutional adoption of academic technology — and introduced the *Credential Innovation Framework* at Parchment — a guide for evolving credentials from digital paper toward machine-readable evidence of learning.

Curriculum is what is taught. Pedagogy is how it is taught. Delivery Model is how programs are designed and produced -- the cost structure and the revenue model around a course or a degree. Delivery System is the digital infrastructure through which all of the above is organized and delivered. AI is affecting (or will soon affect) each of them in different ways. The point of distinguishing them is to think about each individually *and* in relation to one another. From there a framework can emerge that provides a basis for evaluating each and ultimately informing action.

Curriculum

By curriculum I mean what is taught.

As an American University alum and a trustee, I have tracked with particular interest what the Kogod School of Business is doing. Kogod has integrated AI across its entire business curriculum -- nearly sixty AI-infused courses, a new major, certificates, a required technology foundation for every incoming student, and roughly ninety percent of the faculty teaching with it. In practice, that means finance students learning to model with AI and marketing students working with generative tools. [Poets&Quants](#) called Kogod's effort "one of the most ambitious by any business school" and later named the program a Best in Class for AI in its 2024 awards.

AI in the curriculum is about more than tools and vocational applications at the micro level. At the meso level, every graduate should understand how AI models work, just as we

expect an educated person to understand markets and the logic of supply and demand, or the difference between correlation and causation. At the macro level, curriculum integration takes on the larger, discipline-by-discipline questions AI raises.

It seems much more likely to me that substance will become more valuable, not less, in an AI era. AI values intellectual habits as well as technical skills. As a Star Trek fan, my mind goes to Captain Picard and the Enterprise's junior Starfleet officers. They both have access to the same machine. What separates them is what each one brings to the machine. Picard's edge is a liberal education at work – close reading, careful argument, a sense of history and ethics, and the practical wisdom to know which question to ask and how to judge the answer.

Of course, there are several concerns we need to address when incorporating AI at the curriculum level. AI tooling moves fast, which means institutions risk teaching students surface skills that will be ephemeral by the time they graduate. There is an opportunity cost -- whatever gets added to the curriculum displaces something else. And especially at the K-12 level, there is the perennial worry about commercialization — about industry getting design influence inside schools at an early age. These are but a few.

Pedagogy

By pedagogy I mean how it is taught.

The most obvious and oft-discussed impact is personalization, which has been the holy grail of educational technology for decades. AI is the first technology that can deliver something close to it at scale.

A less discussed example is assessment. As I described in *Assessment Is the Great AI Unlock*, the longstanding critique of assessment in higher education has been too much summative, too little formative. Alternatives have been impractical to run at scale. AI may finally make embedded, formative, rubric-aligned assessment practical, with the faculty member directing rather than authoring every piece. Done well, the same infrastructure produces something institutions have wanted for decades but still often lack: continuous, evidence-grounded, course-by-course documentation of what students actually learned -- useful for the student, the instructor, the program, and the accreditor at the same time. These are just two examples of how AI may change pedagogy. It will be exciting to watch the organic process of faculty reimagining their courses with these new tools and capabilities.

As with curriculum, AI's impact on pedagogy raises concerns. Cognitive offloading is real -- if students hand the most difficult cognitive work to a model, the model may do the work and the learning may not. (Learning involves struggle.) Our ability to maintain academic integrity is a related and equally critical concern. Learning involves attempts, failure, and struggle, which raises questions about the unintended consequences of constant observation, recording, and projection of a student's learning process. (It feels icky; a technical term.) And there is understandable concern from experience over hype cycles

promoting technology-enabled practices that never delivered. From the Internet era, the flipped classroom jumps to mind as something whose actual adoption and impact have been a fraction of the attention it received. These are but a few.

Delivery Model

By delivery model I mean how a program is designed, produced, packaged, and priced -- the unit economics of a course or a degree.

The founding figure of the LMS, Carol Twigg, ran Educom's National Learning Infrastructure Initiative and then founded the National Center for Academic Transformation. Her central claim was that you do not get the benefit of a new technology by simply digitizing instruction. You have to *redesign* the course around what the technology enables -- substituting computer-mediated practice for some lecture hours, restructuring the use of TAs and faculty time, changing the ratios of who does what. NCAT's redesigned courses, on average, lowered cost by about a third while improving learning outcomes in roughly seven of ten cases. Cost structure and learning outcomes moved together — usually they trade off.

The Internet expanded every college's addressable market, most obviously by unbounding institutions from their geography, although equally so for all. Online learning broke the constraints of time and place that had set hard limits on who could enroll, when, how they progressed, and from where

they learned. But the online market is mature. According to Phil Hill's analysis of the Fall 2024 IPEDS data, ~55 percent of U.S. higher-education students take at least one course online; ~27 percent are enrolled exclusively at a distance; total enrollment has rebounded modestly to ~20 million. Online participation has “stabilized at a higher baseline” and “a new equilibrium, not a return to pre-COVID norms.” Institution leaders I speak to -- deans and provosts -- expect AI to drive the next wave of market expansion and unit-economic innovation.

So, how will AI impact the course delivery model? Education operates with a labor-intensive cost structure. The production process should benefit from efficiencies in course design, content production, instructional support, and advising, to name a few. Importantly, these benefits will accrue to classroom-based learning, as well as online, without requiring students to shift modality, provided we are vigilant in preserving the special characteristics of face-to-face.

As with curriculum and pedagogy, AI's impact on the delivery model raises plenty of concerns. Learning is a social process. I fear the special characteristics of face-to-face -- presence, peer interaction, the mentor relationship -- are easy to erode in the name of unit economics. For campus-based students, we've seen online courses go from an optional convenience to de facto requirement for many students seeking to graduate on time. Who will capture savings? Institutions, vendors, or students? Other concerns: commoditization of courses to the point where institutional differentiation thins; unbundling pressure as students substitute AI tutoring for parts of the

degree; and displacement of the people whose labor makes a campus what it is. These are but a few.

Delivery System

By delivery system I mean the digital infrastructure through which everything we've discussed so far is organized and experienced -- the LMS and the broader ecosystem it supports.

The shift I describe at length in the *LMS at 30 Part 2: Learning Management in the AI Era* is that AI changes the delivery system on two axes at once -- sustaining it on the course-management side, while standing up an entirely new learner-centered layer beside it:²

"First, the LMS will embrace AI as a sustaining technology, which is to say a 100x better way of doing course publishing and management. Second, AI tutors and agentic TAs will pioneer a new dimension of the 'instructional management system' -- learner-centered support of teaching and learning. Put simply, the name change from course management to learning management will be true in fact, not just positioning. Third, these capabilities will combine with and transform the LMS into a new, expanded, more valuable, core platform for learning adopted by schools and universities around the world."

The delivery system is the level the other three depend on. Curriculum changes have to be authored, sequenced, and

delivered somewhere. Pedagogical practice depends on what the platform can actually surface for an instructor and a learner in real time. Delivery-model innovation requires that the underlying infrastructure can support new program shapes, new licensing arrangements for course materials, and new patterns of who does what work in a course.

The delivery system is, simultaneously, the enabler of AI's promise across the other three levels and the constraint that paces their realization. Cosmetic improvements notwithstanding, the LMS hasn't changed that much over the last 30 years. LMS providers need to lead, not follow, aligned with the pace of change in the levels above.

The concerns are real here too. The first is concentration and operational fragility. The recent [ShinyHunters breach of Instructure](#) -- which took Canvas offline during finals week at thousands of institutions across the U.S., U.K., Canada, Australia, and Europe -- is a reminder that when a single platform sits at the center of teaching, learning, and student communication, an outage at the vendor is an outage of academic continuity. Vendor concentration and lock-in only worsen if a single platform "eats" what used to be tutoring, courseware, and instructional labor spend. Second, the line between infrastructure and pedagogy thins. A delivery system that surfaces AI tutors and content becomes, in effect, an opinionated participant in teaching, not the neutral plumbing the LMS has been for thirty years. These are but a few.

2. For the long-form arguments, see [The LMS at 30 \(Part 1\)](#) on how we got here, [LMS at 30 Part 2](#) for the AI-era rebuild, and [Platform Was Always the Point](#) on why the platform layer -- not the application layer -- is where the value accrues.

Next Steps Toward a Framework

Reasonable people may disagree on whether the right way to think about AI's impact on education is these four levels. I'm sure they could be broken out further, aggregated up, or expanded. And of course, there are already useful frameworks for thinking about AI in education from other angles.³ What I am working toward here is more aimed at stimulating strategic thinking for institutional leaders.

The next steps, now that the levels are separated, are twofold: how they interrelate, and how to evaluate each one on its own ground.

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3. For example, UNESCO's [Guidance for Generative AI in Education and Research](#).