

Artificial Intelligence and future of higher education

La Inteligencia Artificial y el futuro de la Educación Superior

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Abstract

Many engaged in the development of Artificial Intelligence (AI) see education as a potential market for sales. They predict that AI will transform teaching, learning and assessment. In describing just how this will occur, AI advocates suggest a combination of individualized learning, adaptive and engaged assessment, and personal support for the learners' journey will be the hallmarks of the new reality for education. Harsh reality suggests something different. Using a simple framework of the potential impact of AI tools and the burden they require; a more incremental adoption is likely. This paper presents both the transformation framework and the more likely incremental approach as the choice for instructors, administrators, and policymakers.

Keywords: Artificial intelligence, assessment, teaching and learning, hype curve, transformation, burden.

Resumen

Muchos de los que se dedican al desarrollo de la Inteligencia Artificial (IA) ven en la educación un mercado potencial para las ventas. Predicen que la IA transformará la enseñanza, el aprendizaje y la evaluación. Al describir cómo ocurrirá esto, los defensores de la IA sugieren que una combinación de aprendizaje individualizado, evaluación adaptativa y comprometida, y apoyo personal para el viaje de los alumnos serán las señas de identidad de la nueva realidad de la educación. La cruda realidad sugiere algo diferente. Utilizando un marco simple del impacto potencial de las herramientas de IA y la carga que requieren, es probable una adopción más gradual. Este artículo presenta tanto el marco de transformación como el enfoque incremental más probable como opción para instructores, administradores y responsables políticos.

Palabras clave: Inteligencia artificial, evaluación, enseñanza y aprendizaje, hype curve, transformación, carga.

Artificial Intelligence (AI) is hardly new. The first self-learning program for the game “checkers” was launched in 1952, and the first natural language processing chatbot called *Eliza* appeared in 1964 (Yu and Yu, 2022). The apparent “shock” within education over the arrival of ChatGPT 3 in November 2022 tells us a lot about how weak educational systems are at anticipation and understanding the speed at which technological change is emerging. As Jónasson (2016) observed, educational systems, unlike other systems (health, business, agriculture), are slow to explore possible futures and weak at anticipation, innovation and risk-taking.

The first version of ChatGPT was launched in 2018, and anyone who kept “up to date” with emerging technologies knew what was coming. The next version – Chat GPT 5 – permits multimedia inputs and outputs and strongly focuses on educational support and services. Learning resources, assessments, peer networks, and other adaptive learning resources will be built into this version of the new generative AI system. Similar systems, such as Claude2, Cohere, DeepMind’s AlphaFold, IBM Watson or Google’s Imagen, can also be deployed with smart prompting to support educational uses. The development of AI will continue apace, and

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educational institutions and systems will continue to struggle to keep up. The technology is moving faster than policy, understanding of risk and possibilities and applications to classrooms.

While individuals – students, teachers, and administrators – explore possibilities and uncover limitations and challenges, policymakers at all levels are struggling with three critical questions:

1. How will AI impact the existing business models and ways of working of colleges, universities and research institutions?
2. What are the legal, ethical and contractual challenges AI poses to our ways of working?
3. What are the transformative opportunities – the possible futures – which the emerging developments in AI will afford?

While some have been preoccupied with the power of AI systems to support academic misconduct and cheating (Marron, 2023), this is largely a distraction. Cheating has been going on since the Ming dynasty introduced the public service examinations and will remain present so long as we continue to deploy poorly designed assessment practices and the overuse of summative assessment in our education systems. AI tools make it more obvious that it is time to reimagine the purpose and practice of assessment.

What this paper will explore is the possible futures AI enables us to imagine for a college or university. The paper is built on three assumptions:

1. That institutions want to be outstanding in teaching, learning and assessment aimed at unleashing the potential of each of their students.
2. That AI can be embraced as a support for organizational change and transformation to improve teaching and learning, but the full consequences of deployment need to be better understood.
3. That AI tools will continue to evolve faster than quality assurance and regulatory regimes can manage suggests a need to rethink not just teaching and learning but the entire higher education ecosystem.

These assumptions are predicated on the idea that “business as usual” for our colleges and universities would be a very unusual thing to do at this time. The survival of our higher education system will depend on its ability to transform and change, something there is little evidence our colleges and universities are good at.

About Artificial Intelligence and the Education Agenda

Technology companies each seek to claim that the attributes of their software and algorithms will enable greater efficiency, effectiveness, and the individualization of learning. Some of these claims may be valid, but most are “hype.” Indeed, if we look at accounts of such claims over the years that EdTech has been in existence (i.e., since 1920’s and Sidney Pressey’s first “teaching machine”) and study the Gartner Hype Curves for education (Prinsloo & Deventer, 2017), a lot of false claims have been made as are well documented by Watters (2019, 2021).

The current claims about the potential for AI can be summarized as follows:

- **Personalization of learning:** This has been the desired goal of almost all EdTech developments since the first teaching machines in the 1920’s. What personalization

means is the deployment of behaviourally shaped adaptive learning systems which use assessment to determine what the learner knows and now needs to know to deliver the next learning activity. Personalization does not mean, at least at this time, pursuing ideas and learning opportunities in creative and imaginative ways, though some AI systems are emerging that would enable this. The implicit learning models are behaviourist rather than constructivist (Murgatroyd, 2023).

- **Highly interactive learning environments:** Using multimedia, simulations and serious games, AI can enable powerful, engaged learning. AR/VR systems, coupled with instructionally designed algorithms, can create realistic situations which test a student's ability to apply their learning. Such systems are used extensively in pilot and air-crew training, engineering, health education and IT as well as in some trades education (Zoellner & Alexander, 2019).
- **24x7 Teaching Assistants (Chatbot Tutoring)** – Using large language learning models, chatbots can be created to tutor and support learning across a range of courses or for a very specific course. These can support student learning by answering questions, suggesting appropriate learning activities, assessing student progress or drawing attention to learning deficits based on the results of assessment. The creation of a chatbot is now much easier and faster than it once was and many instructors are deploying them to be available whenever a student needs help (Tsivitanidou & Ioannou, 2021).
- **Adaptive Assessment on Demand** - Adaptive assessments leverage AI algorithms to analyze student responses in real time and adjust the difficulty level and content of questions based on individual performance. This allows for a precise evaluation of each student's knowledge and skills. As students answer questions, the AI system identifies their strengths, weaknesses, and knowledge gaps. It then selects the optimal next questions to maximize information gain about the student's abilities. By continuously adapting the assessment based on the student's responses, the system can pinpoint their exact level of understanding across different concepts. Most learning management systems have adaptive assessment engines. There are also dedicated adaptive assessment systems, such as Adaptemy and Reaizeit are dedicated AI systems for this work.
- **Curriculum Design, Development and Deployment** – Smart creative AI engines can generate course content, including designs for student activities, assessments and projects, in a few minutes rather than several hours. Initially, the content of such material was poor, but course generation engines such as *Leanery* and *CourseGen* are gradually improving.
- **Increased Access to Learning Anytime, Anywhere:** The key value proposition for the Academy within ChatGPT5 is that students at any level (K-PhD) will find appropriate content, self-assessments, peer support and chatbot tutors for any subject at any time. While this may not lead to recognized certification, it may lead to faster completion of programs through the more extensive use of competency assessment and prior learning assessment and recognition.
- **Data Analytics to Aid Retention and Completion:** Using multiple data points and AI algorithms, student support services can be directed to those most in need, anticipating student drop out. Significant improvements in retention and completion rates have been reported using analytics (Hooshyar, *et.al* 2023).
- **Support for Project-Based Learning and Research:** New AI tools for finding and gathering research materials, analyzing data and automating many research processes are a major focus for certain kinds of AI developers. Products like Research Rabbit, Layer and Scholarcy are attracting a great deal of attention.

- **Support for Multi-Language Learning through Instant Translation:** As communities become more complex, language and translation become increasingly important. New generative AI tools enable instant translation, text to speech and speech-to-text in over one hundred and forty languages. AI is also being used to create powerful resources which enable video, audio or text written in one language to be instantly into many others. New work is being done by researchers to capture dying Indigenous languages using AI tools.

There are many other applications, for example in relation to student mental health or the creative arts (image creation, music generation, 3D printed sculptures, etc.), with some thirty new AI application released to the market each business dayⁱ.

A key observation is that EdTech sees education systems as markets and customers who will support the burgeoning EdTech sector through increasing the share of expenditure in education with expanded technology budgets. In the period since 2010, venture capital investments in EdTech worldwide are estimated at \$85.35 billionⁱⁱ, reaching their peak during the height of the pandemic switch to remote teaching. The prize: securing growth in EdTech spending from 4% of the \$6 trillion spent on education in 2022 to 10% of the projected \$10 trillion to be spent on education by 2050ⁱⁱⁱ.

The Challenge AI Poses to Our Models of Higher Education: The Big Bang of Transformation

While the debate over inappropriate uses of AI continues, the debate which is being avoided is about the opportunity the emergence of next-generation AI tools creates for rethinking teaching, learning and assessment at a fundamental level. AI and quantum computing (still some years away in terms of large-scale impact) provide a starting point for a transformation of how schools, colleges, and universities support learning.

Five key elements of this transformation as described by EdTech Imagineers like Sam Altman (CEO OpenAI) and change advocates, such as Crow (2020), Seldon and Adiboye (2018), Winnick (2023) and many others are:

1. **An end to “batch” teaching** – working with cohorts of learners in grades or classes. Instead, individual learning agendas are developed based upon both an assessment of what skills, competencies and capabilities the learner already has and ongoing conversations about the purpose of this learning: where the learner want the learning to take them? AI systems, coupled with coaching, mentoring, guiding and some instruction and peer support networks then ensure that the learner is supported on their agreed and carefully mapped learning journey. Teaching can still take place – students challenged with a set of related issues can be brought together for a boot camp or focused period of instruction before returning to their individualized study activities.
2. **An end to “time” as a learning metric** – undergraduate courses are described in terms of “credit hours,” and school courses are shaped by the number of hours given to, say, mathematics at Grade 5. Rather than use time, the possibility of learning and assessment on demand, fast-tracking or slow-tracking using adaptive assessment, and students completing modular learning when they are ready liberates us from the time-based metric.
3. **An end to exams as we know them**– exams are an efficient way of judging the output of batch teaching but are not good indicators of learner knowledge, skills and

capabilities. With AI-enabled assessment generation, automated marking and assessment on demand, examinations are no longer needed. Moreover, more authentic assessments – project-based, team challenges, work-based learning activities, and student self-directed projects – can become the norm.

4. **Increased feedback and advising** – because AI systems will never tire of setting formative assessments and giving feedback, and chatbots will support the learning that feedback suggests as needed to overcome misunderstandings, learning gaps or learning deficits, feedback and a focus on continuous improvement at the individual level will become the norm. Analytics will suggest that some students need to be supported by teachers or others with special skills (writing coaches, statistical support workers, numeracy advisors). The aim will be to ensure that every learner follows and is successful in the learning journey they have contracted to complete.
5. **Greater Accessibility** – One feature of our school and higher education system is that it is organized around blocks of time: semesters or terms. There is no good reason for this in the present time. Students should be able to begin their learning at any time and be assessed when they are ready to be assessed. A four-year undergraduate degree could be easily completed in sixteen months by a diligent student or even in less time for someone arriving in the program with substantial life and work experiences. In addition, AI systems can leverage available technologies to ensure that the resources and supports for learners reflect who they are (culture, language, experience and skill) and what challenges they face (disabilities, learning styles, etc.).

This is the kind of “fantasy of the future” that is behind the educational components of ChatGPT5 and several other AI educational products and services.

The five elements of the change bundle just outlined are not going to happen for seven key reasons:

1. **They are too disruptive of the current revenue streams, organizational structures and contracts of employment that exist in school, college and university systems.** What is being described above is the prescription for new entrants into the market. The existing providers will not leap to a different future.
2. **They would lead to Governments struggling to regulate such a complex system.** Government seeks simplicity in how they approach regulatory control and funding. A system based on individual learning journeys would require a fundamental rethink of what outcomes were, what cost were and where the public interest lies. Governments will not want to do the hard work such a system requires.
3. **Unions would oppose these developments.** Teacher unions are already concerned that AI will cost jobs and they will resist changes which require a major shift in roles, responsibilities and scope of practice. Such developments as outlined here would also require significant investments in professional development and a re-imagining of teacher education.
4. **It would require new infrastructure and costs.** Education budgets, especially for higher education, have been reducing per capita over time. The developments outlined here would require substantial broadband investments, significantly enhanced access to affordable technology for all students, not just some as well as significant investment in maintaining support services for all users. Most educational systems are strained already. The long-term impact of the widespread use of AI on electricity systems and water systems (used for cooling servers) are a cause of serious concern.
5. **The understanding of “quality” would need to be reimagined.**

6. **Students' levels of digital fluency are not adequate for the imagined transformation**, nor are the skills of self-management and self-direction implied.
7. **Employers are already struggling to understand what the education systems' "products" are** – this will confuse them even more.

The Incremental Approach

What is happening is that educational institutions are cautiously exploring implementations which improve effectiveness, efficiency and outcomes. Significant reviews of adoption, such as those by Molek (2023) and Toumi (2022), demonstrate significant caution and limited levels of adoption, especially in relation to assessment of learning and the design of engaged learning experiences.

Buckley (2021) provides a helpful framework for understanding the decisions educators, administrators and policy makers are making. Using two dimension: (a) the extent to which the deployment of an AI resource has significant positive impact on outcomes and processes; and (b) the extent to which the deployment of AI imposed burdens on teachers, learners and the “system,” Buckley suggests we can explore the logic of AI deployments based on low burden coupled with high impact: the less demands deployment makes and the more impact it has, the more likely it is to be used.

We can show Buckley’s framework in a simple diagram shown below in Figure 1. The more an AI application fits into square 1 the more likely it is to be deployed. AI applications in square four are unlikely to be deployed.

Figure 1. The Buckley Decision Framework

High Impact	1	2
Low Impact	3	4
	Low Burden	High Burden

This is aligned with the analysis provided by Murgatroyd (2021) and with the findings of several review studies of current deployments in higher education (AIDhaen, 2022; Ghnemat *et al*, 2022; Walczak & Cellary, 2023).

Key to future implementation will be the investment made by educational institutions in professional learning and development. For high impact, instructors and administrators need to be supported through systematic learning, collaboration and the sharing of best practices. While there are pockets of innovation happening around the world, sustainable innovation happens at scale when best and next practices are shared in a collaborative learning environment.

CONCLUSIÓN

There are a lot of concerns about some aspects of AI – ethical, equity, security, bias, and reliability are among the most serious concerns that need to be addressed. What is clear is

that the deployment of AI in education is unstoppable. The issue is: can we harness the deployments of AI so that they have a real impact on student learning and produce richer, more authentic and valued learning experiences than the current system provides? Rather than adopt AI “because it is available,” we need to assess the potential against the burden and opportunity analysis suggested here.

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End Notes

ⁱ See There is an AI For That aggregator which tracks new releases in a searchable database.

ⁱⁱ Source: Holon IQ at <https://www.holoniq.com/notes/904m-of-edtech-vc-in-q3-2023-strong-series-b-c-market-everything-else-down-50>

ⁱⁱⁱ Source: <https://www.morganstanley.com/ideas/education-system-technology-reboot>