

## Rethinking teaching in the age of Artificial Intelligence

### Repensar la enseñanza en la era de la Inteligencia Artificial

Stephen Murgatroyd

*Futures Leadership for Change Inc., Canadá*

<https://orcid.org/0000-0002-2696-8779>

*E-mail: murgatroydstephen@gmail.com*

#### Abstract

The emergence of powerful natural language Artificial Intelligence systems, such as ChatGPT 4.0, has created a new dynamic in schools, colleges and universities. Some see the present moment as a turning point in our thinking about teaching, learning and assessment, with new approaches and practices suddenly becoming possible. Others are concerned that unleashing powerful AI tools on an unready education system may distort and damage a fragile system. AI tools can be used to advance the agenda of technification and the global education reform movement (GERM) or can be used to enable a mindset shift to a more engaged, authentic, compassionate, and collaborative approach to teaching and learning. This paper explores this moment of truth.

*Keywords:* Artificial intelligence, teaching, learning, assessment, student agency, engaged learning.

#### Resumen

La aparición de potentes sistemas de inteligencia artificial en lenguaje natural, como ChatGPT 4.0, ha creado una nueva dinámica en escuelas, institutos y universidades. Algunos ven en este momento un punto de inflexión en nuestra forma de pensar sobre la enseñanza, el aprendizaje y la evaluación, con nuevos enfoques y prácticas que de repente se hacen posibles. A otros les preocupa que desatar potentes herramientas de IA en un sistema educativo que no está preparado pueda distorsionar y dañar un sistema frágil. Las herramientas de IA pueden utilizarse para hacer avanzar la agenda de la tecnificación y el movimiento global de reforma de la educación (GERM) o pueden utilizarse para permitir un cambio de mentalidad hacia un enfoque más comprometido, auténtico, compasivo y colaborativo de la enseñanza y el aprendizaje. Este artículo explora este momento de la verdad.

*Palabras clave:* Inteligencia artificial, enseñanza, aprendizaje, evaluación, agencia estudiantil, aprendizaje participativo.

#### The “Big Bang”

In November 2022, the company OpenAI launched Version 3 of ChatGPT. Within weeks it had secured over one hundred million users, becoming one of the most widely adopted software applications in the shortest time-span in the world. While some were taken aback by what this technology could do – they developed “AI-anxiety” - others embraced it as heralding a new era in the deployment of “human-like” tools to support the work of lawyers, teachers, health care workers, video creators and others.

ChatGPT was not new. The first version was launched in 2018, with new versions following each year. What is different about v3.5 versus v1 is the knowledge base it uses to respond to users' questions. ChatGPT 1 was “trained” on 117 million parameters. The current version (ChatGPT 4 released in 2023) was “trained” with over one trillion parameters as well as live access to the internet. Over time ChatGPT is more accurate, produces fewer “nonsense”

*Recibido:* 07/06/2023

*Aceptado:* 18/07/2023



Este es un artículo de acceso abierto bajo la licencia CC BY 4.0 (<https://creativecommons.org/licenses/by/4.0/deed.es>).

responses, has reduced bias and has accessed more information in more languages from more parts of the world.

Microsoft, which paid US\$10 billion to be able to integrate ChatGPT and other AI products developed by OpenAI, will now integrate these large language learning (LLL) model-based AI systems into all of its Office products with what is known as “co-pilot.” This permits users to write documents in Word, develop PowerPoint slide decks or analyze data in Excel to access a 24x7 digital assistant to accelerate workflow and reduce the complexity of these tasks.

Some have expressed deep concern about the emergence of such AI systems as ChatGPT, suggesting that there was a need to “pause” AI developments while the legal, ethical, cybersecurity and bias concerns were more fully understood. Several school districts and educational institutions “banned” ChatGPT seeing it as an engine for “cheating” and plagiarism. Governments in Europe and Asia, concerned about privacy and security issues and compliance with regulations governing such products, paused access to ChatGPT until compliance could be demonstrated. All in all, there has been quite a furore about AI, especially in education.

This paper explores the underlying issues with the deployment of advanced AI in education and the possible futures of such deployment. It looks at specific uses of AI that can have an impact on the work of teaching, learning and assessment and suggests a pathway for the future. While ChatGPT is one valuable product and service that learners should be using, several other AI resources are of great value to teachers and students alike. These will be catalogued at the end of this paper (See Appendix 1). The aim is to challenge the underlying models of teaching, learning and assessment that have led to such negative reactions amongst some teachers to the deployment of AI.

## **Implicit Models of Teaching, Learning and Assessment**

### ***The Banking Model***

AI software for educational use is often designed and developed by those who do not understand the interpersonal, compassionate and contextual nature of teaching and learning. For them, learning is like “banking”:

- Teachers make a knowledge deposit to a class of students.
- The student organize the deposited knowledge into appropriate “accounts” (chemistry, language arts, history, etc.).
- Students are encouraged to revise and check their mastery of the knowledge as deposited, using past test and assessment items to help them understand what matters most and what they need to know.
- Teachers test the student as to their ability to both recall the knowledge as deposited and to assess their capabilities in using this knowledge in appropriate ways.
- Students who can demonstrate mastery of knowledge and show that they can apply that knowledge then secure recognition of this mastery through credit, badges, or credentials – a kind of “interest payment.”

Many early teaching machines provided ways of presenting knowledge to students without a teacher present. They also offered ways of assessing their mastery through simple multiple-choice assessments (Watters, 2021). The underlying psychology of these devices was behaviourism.

The focus on technology for learning is not new. Watters (2021) outlines the long history of teaching machines, starting in the mid-1920s and Weller (2021) focuses on the proposition many engaged in the “EdTech” sector advocate: teaching machines and learning systems will individualize instruction, allowing students to move at their own pace through

their lessons and free teachers to focus on mentoring, coaching and guiding students. Individualized does not mean “custom co-designed curriculum”. It means using adaptive assessments and other approaches to enable the learner to find their route to knowledge mastery in their own time.

### ***Engaged, Authentic Learning – Student Agency for Co-Creation***

An alternative model of teaching and learning emerged in the 1960s following a variety of challenges to the idea of education in use at that time. These challenges came from philosophers like Ivan Illich (1971), Freire (1970,1973, 1998) and sociologists like Postman and Weingartner (1971) and Young (2014). The implicit model of teaching and learning developed by these authors and others was one of guided inquiry and exploration, linked to a broad framework of curriculum intention. It led to this kind of work:

- Teachers present students with challenges and tasks. Sometimes the teacher knows what it is the students are expected to “discover” (e.g., how to solve a quadratic equation), but sometimes they set a design challenge where the teacher learns alongside the student (Murgatroyd, 2010).
- Students develop their routes to learning, mentored, and coached by their teacher and other supports.
- Students self-assess their learning periodically. Sometimes peer assessment is also used.
- Teachers assess students against a competency framework – some assessments focus on specific skills, some of the students ability to use and integrate knowledge and some are focused on process (e.g., critical analysis, writing, research).

The underlying psychological approach here gives emphasis to the student as an agent for their own learning – it focuses on learning by discovery and adaptation. A combination of humanistic psychologies (Frankl,1988; Rogers, 2004) and Bandura’s social learning theory (Bandura, 1951).

### **Constructions of Teaching**

Both of these constructions are extremes designed to contrast fundamentally different approaches to the art and risk of teaching (Biesta, 2020). In one (banking), emphasis is given to outcomes and the work of the teacher in “producing” these outcomes; the other (discovery) gives emphasis to both the social purpose of education and to its role in enabling each individual student to discover their passions, concerns, social and personal commitments. In both models, teachers need to assess learning, but their role in enabling learning differs. In one (banking), it is focused on instruction and assessment. In the other (discovery), it is to challenge, coach, guide, encourage, share, mentor and enable while also pausing to assess. In one (banking), the student is a recipient of knowledge and capabilities; in the other (discovery), they are co-creators and agents in their own learning journey.

In both, as Biesta (2023) reminds us, teaching is more than steering students through high-stakes tests. Teachers educate young human beings to be more thoughtful, compassionate, caring, knowledgeable, thoughtful and imaginative. They help students develop their sense of direction and purpose. This is the social purpose: enabling engaged, creative, critically reflective citizens to find their place in the world.

## **AI and Technification**

Artificial Intelligence (AI) enables learning, assessment, research, creativity, and collaboration. Its emerging presence is focused on:

- **Learning Analytics** – using algorithms and datasets to predict student behaviour and engage in early intervention to support retention and completion.
- **Automated Assessment** – using AI to generate assessments, administer assessments and automate marking and grading.
- **Supporting Learning Variety** – automated creation of multimedia materials (video, audio, infographics, slide decks, text-to-speech, speech-to-text) – especially important for ensuring access to learning and resources for students with disabilities and exceptionalities.
- **Assessing Soft Skills** – video interview assessment systems are capable of assessing a student's knowledge and emotional disposition and can provide feedback related to emotional intelligence.
- **Research** – automated finding of appropriate research materials and resources, showing inter-relationships between these resources and suggesting linkages.
- **Smarter data analysis** of data collected by researchers, students and others for projects, degrees, and diplomas.
- **Reducing Information Overload** – automated summarizing of complex documents, video and audio recordings and other materials.
- **Facilitating Creative Collaboration** – through intelligent meeting software, ideation sharing, co-curation of resources and other technologies.
- **Automated Course Creation** – automatic creation of course content, assessments, flash cards and other resources based on a limited amount of materials submitted to “kick-start” course creation.
- **Instant Language Translation** – ChatGPT can translate between thirty-three different languages. Google Translate between over 130 languages. Both have varying degrees of accuracy.

A short catalogue of specific tools is provided in Appendix 1.

All of these systems rely on significant volumes of data, both to start their work and to maintain it. Some AI systems learn from their interactions with humans and can “appropriate” information and knowledge to improve reliability and accuracy. All use certain kinds of algorithms to do their work and perform poorly if the evidence-based the algorithms are based on is narrow and small (e.g., a highly specialized knowledge domain with less than 10,000 reference points). Some algorithms show bias, favouring some views over others and favouring some cultural groups over others.

Not all of the information AI systems produce is correct. Error and hallucination (producing what looks like sensible information but which turns out to be nonsense) are not uncommon, especially in early versions of ChatGPT (versions 1-3.5). Developers are working systematically to reduce errors, end hallucination and to increase reliability. ChatGPT 4, for example, is trained on over one trillion parameters (versus 300 billion for ChatGPT 3). As a result, ChatGPT 4 is 40% more likely to produce accurate factual responses than its predecessor.

For these systems to work well, educational institutions, their staff and students will need to share a great deal of data, hence the concerns of EU nations and Japan with privacy and security.

The other domain of concern is “technification” - seeing the art of teaching and the risk of learning as a technical challenge to be overcome by the widespread deployment of technology. Biesta (2023) describes the technification-mindset:

“...researchers who promise that with more research, more of the “right” research, and also with more money for (their) research, they will eventually be able to deliver the so-called evidence base that will put education on a secure path of progress (albeit it is never entirely sure what this path will look like, where it will lead to, what the financial and human costs of getting there are and when this promised land will actually arrive.”

The author William Rankin (2020) puts the issue of fads, trends, and technology more succinctly:

“Each new craze proclaims that the house is falling down, even as it does nothing to repair the real, foundational problems. Digital white boards that promised to usher in *Twenty-First-Century Learning*<sup>TM</sup> now bear ghost-town witness in ten thousand classrooms to the foibles of wasting budgets on flashy, non-transformative technology rather than investing in people and training. MOOCs have proven so hollow that even Udacity has sworn off. Like the flat-earth myth of ‘learning styles,’ Dr John Hattie’s “visible learning” is as academically rigorous as Dr. Pepper and as credible as Dr. Oz. Even most STEM programs — promising to give learners *The Modern Skills They Need*<sup>®</sup> — are as intellectually nutritious as styrofoam, more focused on improving a school’s testing rank (“Our students have got to start scoring better against [insert group name] if they’re going to be competitive in the Twenty-First Century!”) than giving learners meaningful experiences and skills....  
The common feature all these failed educational panaceas share is a focus on facilitating and verifying the transfer of information. In other words, they’re all built on the same lie.”

Technification, as Biesta (2019) notes, is linked to the idea that the quality of education is measured through high-stakes testing. Rankings can then be created of students, schools, regions, and nations. Reducing a rich, complex learning experience to a few simple indicators measured on a single day is both reductionist and an example of technification. We now measure what is easy to measure rather than what matters (Jansen, 1998; Ravitch, 2011; Gulson et al., 2022, Sellar et al., 2017). Seeing AI as enabling such technification will reinforce a strategy for education as banking and reduce the capacity of students and communities to respond to the complex challenges we face (Murgatroyd, 2023).

What AI systems and applications could be used for is to refocus education away from technification and towards a more humanistic, creative, and compassionate form of education which empowers and engages students to have agency for their learning. This sees the present moment as a time to reject the thinking of the global education reform movement (GERM), which focuses public policy on educational outcomes, high stakes testing, a narrow curriculum focused on students as human capital destined for the labour market and de-professionalizes teachers. It instead requires us to embrace a very different mind-set for the future of teaching and learning (Murgatroyd and Sahlberg, 2016). That mindset is focused on helping students understand their purpose, building capacities for compassion, collaboration, critical reflectivity, analytic skills, embracing creativity and imagination, and developing an ability to be life-long learners. Rather than focus on test scores, this approach focuses on helping the student become

an engaged, informed and active citizen – the kind of learning John Dewey advocated (Dewey, 1916).

AI can be an enabler of this mind shift. The tools and new ways of working it enables can be seen as providing one of those rare moments in time when teachers, students and educational administrators can embrace new approaches to the art of teaching, learning and assessment.

## REFERENCIAS

- Bandura, A. (1951). *Childhood and Adolescence: A Psychology of the Growing Person*.
- Biesta, G. (2019). Reclaiming Teaching for Teacher Education: Towards a Spiral Curriculum. *Beijing International Review of Education*, 1(2-3), 259-272.
- Biesta, G. (2020). Risking Ourselves in Education: Qualification, Socialization and Subjectification Revisited. *Educational Theory*, 70(1), 89-104.
- Biesta, G. (2023) "On Being a Teacher: How to Respond to the Global Construction of Teachers and Their Teaching? In Krause, S., Proyer, M. and Kreamsner, G. (editors) *The Making of Teachers in the Age of Migration: Critical Perspectives on the Politics of Education for Refugees, Immigrants and Minorities*. London: Bloomsbury Academic,
- Dewey, J. (1916). *Democracy and Education*. New York: MacMillan.
- Frankl, V. (1988). *Man's Search for Meaning*. Washington, DC: Washington Square Press.
- Freire, P. (1970). *Pedagogy of the Oppressed*. London: Penguin
- Freire, P. (1973). *Education for Critical Consciousness*. London: Continuum.
- Freire, P. (1978). *Teachers as Cultural Workers – Letters to Those Who Aspire to Teach*. Boulder, Co: Westview Press.
- Gulson, K.N., Sellar, S., & Taylor-Webb, P. (2022). *Algorithms of Education: How Datafication and Artificial Intelligence Shape Policy*. Minneapolis: University of Minnesota Press.
- Illich, I. (1971). *Deschooling Society*. New York: Harper & Row.
- Jansen, J.D. (1988). Curriculum Reform in South Africa: A Critical Analysis of Outcomes Based Education. *Cambridge Journal of Education*, 28(3), 321-331.
- Murgatroyd, S. (2010). Wicked Problems and the Work of the School. *European Journal of Education*, 45(2), 259-279.
- Murgatroyd, S., & Sahlberg, P. (2016). Two Solitudes of Educational Policy and the Challenge of Development. *Journal for Learning and Development*, 3(3). Available at Volume 94(3), 29-36.
- Murgatroyd, S. (2023). Futures possibilities for education in the face of global challenges: regenerative design as a driver for change. *Revista Paraguaya de Educación a Distancia*, 4(1), 23-30.
- Postman, N., & Weingartner, C. (1971). *Teaching as a Subversive Activity*. New York: Delta (Dell Publishing).
- Rankin, W. (2020). *Education is Over*. Blog Posted at Regenerative.global, April 4<sup>th</sup>. Available at <https://medium.com/regenerative-global/education-is-over-8b9d57502b2c>
- Ravitch, D. (2011). *The Death and Life of the Great American School System: How Testing and Choice are Undermining Education*. New York: Basic Books.
- Rogers, C. (2004). *On Becoming a Person*. London: Constable and Robinson.
- Sellar, S., Thompson, G., Rutowski, D., Berliner, D., & Sahlberg, P. (2017). *The Global Education Race: Taking the Measure of PISA and International Testing*. Edmonton: Brush Education.

Watters, A. (2021). *Teaching Machines: The History of Personalized Learning*. Boston: MIT Press.

Weller, M. (2020). *25 Years of EdTech*. Athabasca, Canada: Athabasca University Press.

Young, M. (2014). *Knowledge, Curriculum and the Future School*. In Young, M. & Lambert, D with Roberts, C. & Roberts, M. (Editors) *Knowledge and the Future School: Curriculum and Social Justice*. London: Bloomsbury, pp. 9-40.

## **Appendix 1**

### **AI Tools to Enable Learning, Teaching, Assessment and Research**

<b>Activity</b>	<b>Possible AI Tools (June 2023)</b>
Learner Analytics	PowerBI, Olli, Layerup
Automated Assessment	ChatGPT4, TAO, Kritik.io, Gradescope
Supporting Learning Variety	Chatbots: Mottlebot, Chatness, ProfBot Speech to Text: Transcribethis Text to Speech: Naturalreaders, Amazon Polly, IBM Watson.
Assessing Soft Skills	MyInterview
Research	Research Rabbit, Genei.ai, Elicit, Scisummary, ULog, Distillr.
Smarter Data Analysis	Defog.ai, Coefficient
Reducing Information Overload	YouTube Summarized,
Creative Collaboration	AI Suggests, Stormz, Osschat, Sense 2.0
Automated Course Creation	Minicoursegenerator, coursebox.ai, learndash, CourseAI.
Language Translation	ChatGPT 4, Google Translate, SSK Live