

The second Revolution, which ranged from the late nineteenth until the early twentieth centuries, prompted by the use of electricity and the internal combustion engine, brought with it an additional transformation in education: new subjects were added, such as more advanced sciences and mathematics, in order to prepare students for technical and administrative work.

During the third Revolution, beginning in the mid-twentieth century, a notable change occurred in the development of competencies linked to information and communication technologies (ICTs). New fields of study have been added such as computer science and programming, to prepare students in the growing technological sector. Schoolrooms were digitalized in this period, benefiting teaching.

Today, we are immersed in a fourth Revolution, an era defined by the omnipresence of digital technologies and the integration of AI into all aspects of life. This includes education, of course, which has once again been transformed, giving rise to its 4.0 version as an essential response to the challenges imposed by a world driven by technology and automation and that focuses on equipping students with appropriate skills, adaptable to the future.

In this context, technology is completely integrated into the classroom, fostering access to global knowledge, personalized learning, and the resolution of complex problems. Education 4.0 does not merely transmit knowledge, but promotes critical thinking, creativity, and the ability to adapt to change.

How Is Artificial Intelligence Changing Education?

As mentioned above, AI has transformed the way we teach and learn. Through advanced algorithms and data analysis, it personalizes the educational process, adapting it to students' individual needs. This makes for more efficient, effective learning and at the same time offers teachers powerful tools for evaluating students' progress.

AI has democratized the access to knowledge, making it possible for students from around the globe to virtually access high-quality educational resources regardless of their geographical location or economic level. AI has fostered different online learning platforms and the massive open only course (MOOC). Specifically, the National Auton-

omous University of Mexico (UNAM), through its Coursera platform, is hosting specialized courses in areas as diverse as physics, chemistry, mathematics, engineering, biology, health, social sciences, the humanities, and art. Recently, a course called "Generative AI in the Classroom" has been added, dealing with the educational nature, usefulness, challenges, and possibilities of this kind of AI through direct experience, reading, and discussions. The aim is to propose useful applications for learning and teaching, while at the same time taking into consideration the ethical implications of its use.¹

These AI innovations make a more individualized, accessible experience possible, ranging from powerful educational chatbots that offer instantaneous responses, to recommendation systems that personalize learning content for each student, automated evaluation solutions, and virtual tutorial platforms.

Let's Talk about Generative Artificial Intelligence

AI is a branch of computer science divided into several sub-disciplines. Where all of these meet, a very important field of study emerges: generative artificial intelligences (AIGEN), capable of producing content in the form of text, sounds, and images. Outstanding among them is Large Language Models (LLM), which can generate text like that of human beings. Representative examples are the conversational chatbots like ChatGPT, Copilot, and Gemini.

Chatbots and AI in the Era of Interactive Learning

Chatbots are creating a new paradigm in interactive learning. These virtual assistants can answer students' and teachers' questions, explain complex concepts, and give practical examples in real time. For example, ChatGPT, with an estimated 100 million active users, has been used in online tutorial platforms to offer detailed explanations about a broad range of topics.² Its ability to maintain interactive dialogues and offer precise information makes it a versatile tool for students who need to clear up doubts, get help on homework, or simply have an accessible way of learning and exploring new concepts through the conversation.



Generation of educational content with AI. Image created using Copilot, image generator.

North America, not only from desktop, but also mobile devices. This suggests users' increasing adaptation and dependence on AI platforms that incorporate chat and search services, essential elements in daily interaction in the virtual sphere.

As these chatbots become protagonists in fields like education, they also face significant challenges. The precision in answers, natural conversation, data privacy, and the elimination of bias are only some of the obstacles that must be overcome to ensure that these virtual assistants are effective and ethical. In a world that is increasingly dependent on AI, understanding and facing these challenges is fundamental for guaranteeing more efficient and trustworthy interactions with these systems.

The Generation of Educational Content with Artificial Intelligence

AI-backed applications have revolutionized the creation and edition of multimedia content in the field of educa-

Continual teacher training in the use and getting the most out of new technologies is fundamental in order to diminish digital and knowledge gaps that emerge when a new trend in technology appears.

tion. Through multiple online platforms and specialized apps, education professionals can streamline multimedia content searches, gathering, and generation. This allows teachers to dedicate more time to interact with students and activities that make learning more attractive and effective.

Generating and improving images, creating presentations, editing audio and video, and developing interactive resources are only a few of the tasks that previously required specialized software and advanced technical abilities. Today, with the apps that AI offers, this can be done in less time with only a few clicks. This technological evolution also broadens out creative possibilities, offering teachers varied tools for enriching the learning experience.

In this context, the “Challenges and Opportunities for Streaming at the UNAM” workshop has presented lectures and tutorials related to the creation of multimedia content with AI. We can therefore invite those interested to explore these resources on the @streamingunam5810 YouTube channel.



UNAM's streaming QR code.

Challenges and Perspectives For Educating Today

While AI has the potential for adapting educational content to students' individual needs, we must ask ourselves about data privacy and the ethics of stockpiling personal information: How can we strike an appropriate balance between personalization and the protection of privacy? What are the ethical frameworks needed for guiding the use of AI in this area?

On the other hand, AI is transforming the workplace, which implies that students need to develop new skills. So, how can we take advantage of it to promote the acquisition of skills like critical thinking, problem solving, and creativity? Its introduction in the schoolroom poses the need to train teachers to effectively integrate this technology in their practices. In this context, how can we guarantee that educational professionals will be prepared to deal with the digital and knowledge gaps that are constantly created when these kinds of technologies are developed?

Final Considerations

Given this panorama in educational systems, ethical algorithms, appropriate privacy laws, and solid practices must be established to guarantee data protection.

Education and awareness training about privacy are fundamental issues that must be dealt with by individuals and collectives.

In this regard, the UNESCO offers orientation about how to take advantage of the opportunities and deal with the risks of AI in education in order to guarantee its ethical, inclusive, and equitable use.³ For its part, the United States government recently took measures to establish new standards for security in using AI, protecting user privacy, equity, and civil rights, as well as that of consumers and workers.⁴ The U.S. presidential order is based on voluntary commitments by companies like Meta, OpenAI and Google, among others.

The importance of preparing students with essential skills such as critical thinking, problem solving, and creativity must be underlined. This can be achieved by an effective integration of AI in education. To do that, continual teacher training in the use and getting the most out of new technologies is fundamental in order to diminish digital and knowledge gaps that emerge when a new trend in technology appears.

In the last analysis, dealing with these challenges and taking advantage of the opportunities will require a collaborative approach and continual attention to ethics and equity in the use of technology. As technology continues to advance, AI will continue to play a fundamental role in the transformation of many human activities, among them, education. This means future generations must be prepared for a world that is increasingly digital and globalized. ■■■

Notes

- 1 You can access this course at <https://www.coursera.org/programs/mooc-unam-en-coursera-para-ti-uzeau/learn/iagenerativa?source=search>.
- 2 Robert Brandl and Cai Ellis, “ChatGPT Statistics 2023. All the Latest Statistics about Openai's Chatbot,” Tooltester, <https://www.tooltester.com/en/blog/chatgpt-statistics/>, August 31, 2023, accessed November 3, 2023.
- 3 Fengchun Miao, Wayne Holmes, Ronghuai Huang, and Hui Zhang, “ai and Education: Guidance for Policy-makers,” UNESCO, Digital Library, 2021, <https://unesdoc.unesco.org/ark:/48223/pf0000376709>.
- 4 Forbes Staff, “Biden firma orden ejecutiva para controlar el desarrollo de la inteligencia artificial,” *Forbes*, <https://www.forbes.com.mx/biden-firma-orden-ejecutiva-para-controlar-el-desarrollo-de-la-inteligencia-artificial/>, October 30, 2023, accessed November 2, 2023.

Our Books NEWS



**Aaraón Díaz Mendiburo y
Marty Otañez (eds.)**

México: CISAN, UNAM, 2024
ISBN: 978-607-30-8725-4



Alejandro Mercado-Celis (editor)

México: CISAN, UNAM, 2024
ISBN: 978-607-30-8750-6



Aaraón Díaz Mendiburo
México: CISAN, UNAM, 2023
ISBN: 978-607-30-8070-5



Alejandro Mercado-Celis y Santiago Battezzati (eds.)
México: CISAN, UNAM, 2023
ISBN: 978-607-30-8047-7