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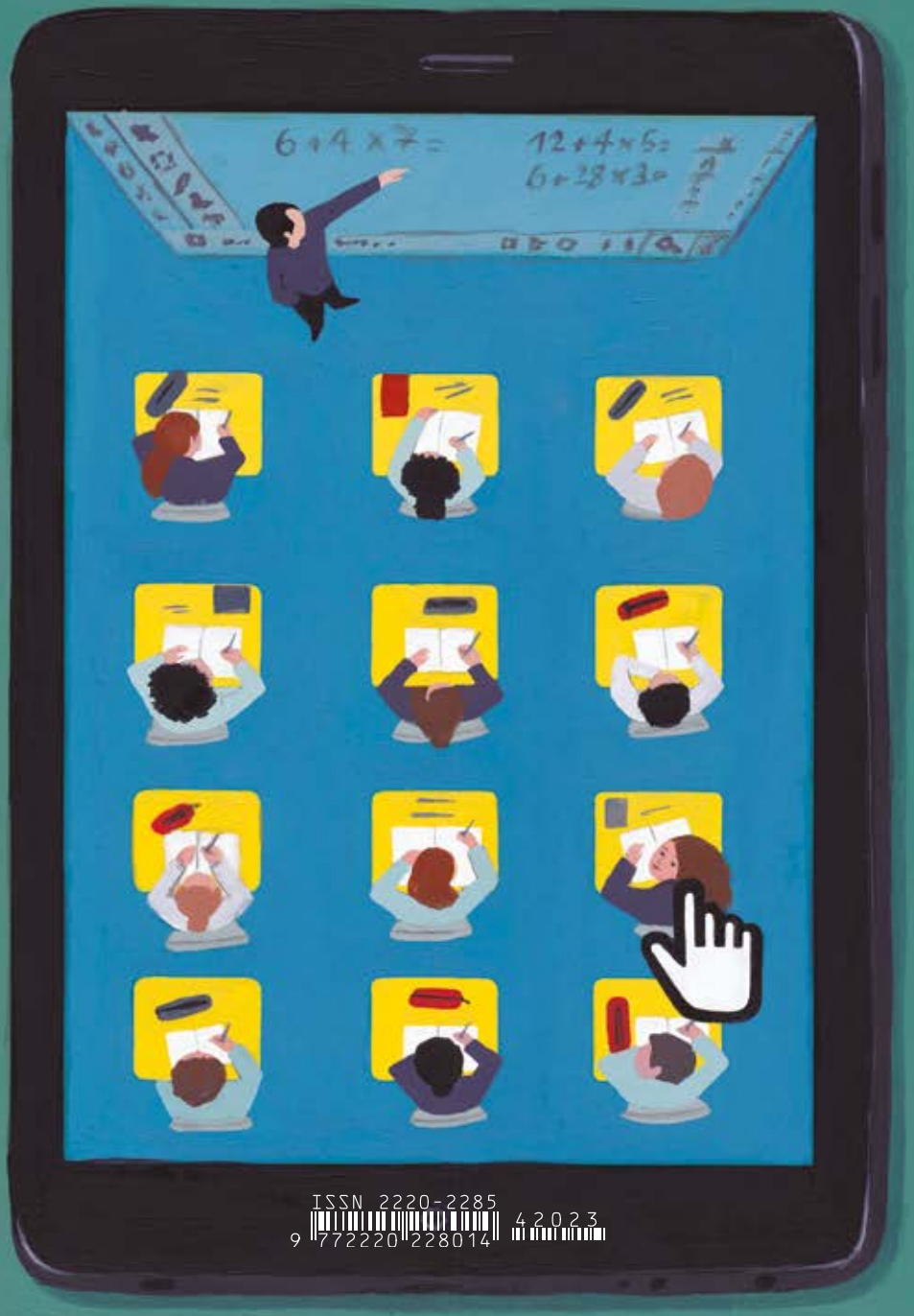
Education in the age of artificial intelligence



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Associate Editor: Katerina Markelova

Section Editor: Chen Xiaorong

Promotion: Laetitia Kaci

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Digital edition: Mila Ibrahimova

Photographs and illustrations: Danica Bijeljac

Translation co-ordination:
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Administrative and editorial assistance:
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Production:
Eric Frogé, Senior Production Assistant

Translation: Peter Coles, Gina Doubleday, Cathy Nolan

Design: Jacqueline Gensollen-Bloch

Cover illustration:
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Printing: UNESCO

Intern: Wang Wenjin

Co-editions:
• **Catalan:** Jean-Michel Armengol
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THE UNESCO Courier

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Editorial

Since ChatGPT pushed generative artificial intelligence into the public awareness in late 2022, many journalists and ministers of education have asked me: "Is digital technology a good or a bad thing for education?"

The answer is complex. Technological change is inevitable: six hundred years ago, the print press revolutionized the way we transmitted knowledge. Radio, television, personal computers, the Internet and social media opened new horizons for education but have also been a source of concern. Each disruption needs to be carefully evaluated to ensure that they benefit teachers and learners.

Digital technology provides real opportunities. It can help reach the most marginalized learners, those with disabilities, or those from linguistic and cultural minority communities. It can facilitate the delivery of more personalized learning and allow for more flexible school systems. And it can be used to overcome boundaries of place and time to create immersive learning experiences.

However, there are dangers too. Digital poverty is worsening with each new technology. A staggering 31 per cent of students globally were unable to access online learning during the COVID-19 pandemic. The spread of misinformation and hate speech is on the rise and online resources ignore 95 per cent of living human languages. Generative AI, with the power to imitate human capabilities to produce text, images, videos, music and software codes, is even forcing us to redefine the uniqueness of human intelligence, with far-reaching implications for what, how and even why we learn.

We must not only look at what is happening today with these technologies but also project ourselves 20 or 30 years into the future. How do we balance the need to equip young people for a human-machine society, without undermining the human mind as we outsource certain cognitive functions? We cannot afford to experiment on a whole generation.

Digital innovations can – and must – be designed to protect human agency. This is why UNESCO is urging caution while regulation, teacher training and curricula are put in place to protect our learners and education systems. As our 2023 Global Monitoring Education Report concluded: *Some* technology supports *some* learning in *some* contexts. And technology must never replace well-trained, human teachers who guide their students in their holistic development, as individuals and members of society. To unlock the promise of digital opportunities for all, we must steer technology in education on our terms, guided by the principles of inclusion, equity, quality and accessibility.

Stefania Giannini
UNESCO Assistant Director-General for Education

Education in the age of artificial intelligence

"At a time when the field of education is in worldwide ferment, a single instructional phenomenon has captured the attention not only of professionals but of laymen." Does the innovation in question refer to artificial intelligence (AI), or to the use of augmented reality in the classroom? Neither one. This quote is from an article in *The UNESCO Courier* about "teaching machines", a set of programmes developed in the USA to guide students in their learning. It dates back to… March 1965.

Which just goes to show that pondering the role of computers in learning is nothing new. Whether lauded or decried, technologies are increasingly part of the school landscape, at least in industrialized countries. Digital learning games, online tutorials or massive open online courses (MOOCs) have become a reality for a growing number of pupils and students. The COVID-19 pandemic has only accelerated the phenomenon, spurring the rise, including in Africa, of companies specializing in digital educational services, the so-called "edtechs".

Yet no matter how sophisticated these technologies may be, they have not challenged the founding principle of a teacher giving a class simultaneously to a group of students. Artificial intelligence could be a game-changer. Does the arrival of content-generating tools like ChatGPT and intelligent tutorials mean the oft-heralded revolution has started? In any case, the use of generative AI in learning presents unprecedented challenges to education systems.

As UNESCO's Global Education Monitoring Report 2023 highlights, these new tools can prove invaluable in providing personalized support for students, particularly those with disabilities or living in remote areas. But they also raise questions about the digital divide, data confidentiality and the preponderance of major global corporations in this sector. And for the moment, safeguards are lacking.

It is therefore urgent that regulations be adopted to ensure the use of AI in education remains human-centred, in the best interests of students. To support this, UNESCO published in September 2023 the first-ever *Guidance for generative AI in education and research*, designed to address the disruptions caused by these technologies. It complements other tools produced by the Organization, including the *Recommendation on the ethics of artificial intelligence* and a guidance for policy-makers on AI and education, both published in 2021.

Ben Williamson

Senior lecturer and co-director of the Centre for Research in Digital Education at the University of Edinburgh (United Kingdom), Ben Williamson is the author of Big Data in Education: The Digital Future of Learning, Policy and Practice *(2017), as well as* Digitalisation of Education in the Era of Algorithms, Automation and Artificial Intelligence *(forthcoming 2024).*

AI must be kept in check at school

The use of artificial intelligence in education needs to be subject to supervision and independent evaluations. Only then, argues Ben Williamson, will schools be able to maintain their mission of developing critical thinking and shaping the citizens of tomorrow.

A global experiment with artificial intelligence is currently taking place in schools. Since ChatGPT was released late 2022, followed swiftly by other "large language models", hype and concern about AI's possible impact on education has flooded the media. In response to "generative AI" applications arriving in schools, the Assistant Director-General of Education at UNESCO, Stefania Giannini, wrote that "The speed at which generative AI technologies are being integrated into education systems in the absence of checks, rules or regulations, is astonishing".

Her assessment was blunt. "Education, given its function to protect as well as facilitate development and learning, has a special obligation to be finely attuned to the risks of AI – both the known risks and those only just coming into view", Giannini wrote. "But too often we are ignoring the risks".

In fact, little assessment exists of those risks. The education community needs much better support in understanding them – and measures put in place to better protect schools from the harms it could cause.

Mechanical teaching

Many of the risks and harms of AI have been widely reported. They include bias and discrimination as a result of training systems on historic datasets. These are serious issues that should give schools and governments good reason to question hyperbolic claims about AI. There are also more specific challenges facing education.

> **"The views on AI and education tend to overlook the importance of fostering critical thought and engaged citizenship**

One of the challenges concerns the role of teachers. AI optimists often claim that it won't replace teachers with automated instructors. The pitch is that AI will save them time, reduce workload, and take on a range of routine tasks. The risk of mechanizing teaching is that AI will demand additional forms of labour. Educators will be required to adapt their pedagogic approaches to work with automated technologies. Teachers might not be replaced by robots, but AI could robotize the role of the human teacher by doing their lesson planning, preparing materials, providing feedback to students, and assessing assignments.

As the American writer Audrey Watters showed in the book *Teaching Machines*, arguments that automation can streamline teaching, "personalize" learning, and save educators time have a history stretching back a century. Mechanical teaching, Watters argued, is not informed by educational vision, but rather an industrial fantasy of super-efficient schooling.

Misleading content

Many of the most spectacular examples of AI for schools are also based on narrow views of learning. AI scientists and company executives often invoke a famous 1960s study showing that one-to-one tutoring leads to better student outcomes than whole group instruction. Its famous statistical "achievement effect" finding is cited to support the idea of individualized instruction by automated "tutorbots". It's also a limited view of the purpose of education as improving individuals' measurable results.

Absent from such ideas about AI in education are questions about the wider purposes of education in terms of cultivating independent critical thought, personal growth, and the capacities of engaged citizenship. Mechanical instruction targeted at improving basic measures of individual learning is not suited to addressing these wider aims and values of public education.

© Nadia Diz Grana for *The UNESCO Courier*

Forms of mechanical teaching enabled by AI are not as reliable as often claimed either. Applications like ChatGPT or Google's Bard are prone to producing factually inaccurate content. At a basic technical level they simply predict the next word in a sequence, and automatically generate content in response to a user prompt. While technically impressive, this can lead to the production of false or misleading content.

The technology critic Matthew Kirschenbaum has memorably imagined a coming "textpocalypse" as the web is flooded with false information. The use of such technologies might then pollute educational materials, or at the least demand laborious and time-consuming efforts by teachers to check and correct them for accuracy.

Paying for access

AI can be used for purposes of censoring educational content too. In one notable example, a US school district used ChatGPT to identify books to ban from the library in order to satisfy new conservative laws on educational content. Far from being neutral gateways to knowledge and understanding, generative AI can help to enforce reactionary and regressive social policies and restrict access to diverse cultural materials.

Besides these examples, the rush to embed AI in schools is driven less by explicit educational purposes and more by the visions and financial interests of the AI industry. AI technologies are extremely expensive to run, but AI in education is reckoned to be highly profitable. Schools or even parents and students themselves are expected →

to pay for access to AI applications, which is driving up the market value of education companies that have a deal with a major AI operator.

The result is that schools or districts will end up paying for services through contracts that enable the AI provider to offset the operating costs. Ultimately, public educational funds will be extracted from schools to keep global AI companies profitable.

At the same time, schools may become dependent on technology companies and lose their autonomy over everyday routine functions, with the result that public education becomes conditional on unaccountable private technical systems. Additionally, AI is enormously demanding of energy resources. Running AI in schools worldwide will likely contribute to further environmental degradation.

> **“Schools worldwide need informed advice and guidance on how to engage with AI**

Auditing AI in education

AI in education raises a range of critical issues for educators and system leaders to confront. Schools worldwide need informed advice and guidance on how to engage with AI based on clearly articulated educational purposes and assessments of risk. International bodies have already engaged significantly in major efforts to shape ethical and regulatory frameworks related to AI. It's crucial to ensure that education is equally protected.

Besides regulatory instruments, national bodies and officials should also consider establishing new forms of oversight for AI in education. In the United Kingdom, the Digital Futures Commission has recently proposed an educational technology certification program. It would require companies to demonstrate clear evidence of educational benefit alongside strong protections for children before they could operate in schools.

With the arrival of AI, organizations that could undertake independent "algorithmic auditing" – evaluations of the harms that automated systems might cause – could prevent AI being dropped into schools without the necessary checks, rules or regulations. Putting such protections in place will require political will in government departments and external pressure from influential international organizations. In the face of unchecked AI expansion, independent evaluation and certification may be the best way to protect schools from becoming sites of ongoing technological experimentation. ■

Guidance for regulating AI in education

A minimum age limit of 13 for the use of AI in the classroom, adoption of data protection and privacy standards, and organization of specific teacher training are among the recommendations of the first-ever global *Guidance on Generative AI* published by UNESCO on 7 September 2023.

As generative AI systems are rapidly emerging, the Organization calls on governments to regulate their use in schools to ensure a human-centred approach to using generative AI in education.

The guidance explains the techniques used by generative AI and their implications for education. It proposes key steps for governments to establish regulations and policy frameworks for their ethical use in education.

The publication warns that generative AI systems could worsen digital data divides and calls on policy makers to address this. Indeed, current ChatGPT models are trained on data from online users which reflect the values and dominant social norms of the Global North.

Generative AI hit public awareness in November 2022 with the launch of ChatGPT, which became the fastest growing app in history. With the power to generate outputs such as text, images, videos, music and software codes, generative AI tools have far-reaching implications for education and research. In June 2023 UNESCO warned that its use in schools was being rolled out at too rapid a pace, with a worrying lack of checks, rules or regulations.

The education sector is largely unprepared for the ethical and pedagogical integration of these rapidly evolving tools. A recent UNESCO global survey of over 450 schools and universities showed that less than 10 per cent of them had institutional policies and/or formal guidance concerning the use of generative AI applications, largely due to the absence of national regulations.

François
Hume-Ferkatadji

Journalist in Abidjan, Côte d'Ivoire

Africa emerges as the hotbed for edtech

The health crisis linked to the COVID-19 pandemic has accelerated the use of new educational technologies on the continent. While they open up new possibilities, these innovative solutions come up against inequalities in digital access.

April 2020. Illuminated by spotlights, a mathematics teacher lectures in front of three cameras and… a row of empty desks. The scene is the Lycée Classique in Abidjan, a high school in the heart of the capital. A renowned film director has been dispatched specially for the occasion.

We are in the early days of a global health crisis that resulted in the closure of most schools around the world. Côte d'Ivoire was not spared. The government set about rapidly producing a digital database of teaching programs: hundreds of hours of lessons were filmed off the cuff, for all levels from primary to secondary school.

Initially broadcast every evening on RTI, the national television station, the lessons were then put online on a learning platform hosted by the Ministry of Education. "That was when we realized the country had qualified and competent human resources in the field of educational technology," remembers Joseph Guede Biagne,

In Brazzaville (Congo), pupils study under public lights due to power cuts. Photo from the series "Les fantômes de corniches" [The corniche ghosts] by Baudouin Mouanda (DRC).

National Coordinator of UNICEF's Education Program between 2004 and 2020.

New prospects

Côte d'Ivoire is not an isolated case. In several African countries, the difficulties caused by the COVID-19 pandemic have given rise to rapid developments in the education sector, thanks in particular to the emergence of "edtechs", technologies at the service of education.

This is not the first time that a health crisis has triggered innovative solutions in the sector. During the Ebola epidemic in Sierra Leone between 2014 and 2016, radio was used massively to allow students to pursue their education. Today, many professionals in the sector are prioritizing the use of educational technologies to train teachers rather than pupils.

In Sierra Leone, the NGO EducAid has partnered with FabData, a company specializing in data analysis in the education sector, to create an artificial intelligence device available on WhatsApp. "This is a very powerful tool to support teachers in their practice," comments Miriam Mason, director of EducAid in Sierra Leone. "The teacher can ask the server to suggest pedagogical avenues, and the AI will come up with them."

In this small West African country, where more than half the population is under eighteen, the shortage of teachers is critical. In many cases, the quality of teaching also leaves much to be desired. Many young teachers are catapulted in front of pupils without any training, in order to fill vacant posts. "It's not uncommon for a chemistry teacher to have very little knowledge of chemistry, and the same can be said in all subjects," laments Mason.

Lack of teacher training is a challenge for much of the continent. According to the 2023 edition of UNESCO's Education for All Global Education Monitoring Report, only 64 per cent of primary school teachers and 50 per cent of secondary school teachers in sub-Saharan Africa have received the minimal training required. Given the situation, the use of artificial intelligence seems an effective way to help teachers find pedagogical solutions and build courses adapted to students' needs. No fewer than 1,500 teachers have already signed up for the Sierra Leone program.

Innovative companies offering services for students have also emerged, such as the Kenyan platform Eneza Education, which specializes in tutoring for primary and secondary school pupils, accessible via cell phone. These

> **"The use of artificial intelligence seems an effective way to help teachers find pedagogical solutions**

Who's in charge? A UNESCO report on technology in education

Although during the pandemic it played a vital role in keeping students from a complete break from school, technology applied to education is not a miracle cure. The 2023 version of UNESCO's Global Education Monitoring Report, called *Technology in Education: a tool on whose terms?*, shows the advances but also highlights the limits of the digital revolution at work.

It's undeniable that online teaching mitigated the collapse of education during the school closures linked to the COVID-19 pandemic, allowing nearly half a billion students to follow their lessons. Digital technologies also improved access to education resources benefiting handicapped students and those living in remote areas. In Mexico, a programme of televised lessons combined with in-class support increased secondary school enrolment by 21 per cent. It also opened new possibilities to handicapped learners.

But these technologies are far from being available to everyone and in certain cases, their use can be questionable. The report stresses that the right to an education is more and more synonymous with the right to a reliable Internet connection. Yet one primary school in four has no electricity and only 40 per cent of primary schools in the world are connected. Moreover, many teachers feel they are ill prepared to use these new tools. Another hurdle is that online content is developed without sufficient control of its quality and diversity. An example: 92 per cent of the resources of the world library of the Open Educational Resources Commons exist only in English.

The Report, which also draws attention to the very high cost of equipment for educational systems, makes the case for improved regulation of such technologies and encourages countries to adopt regulations to guarantee that such advances benefit students and support the work of teachers.

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During the COVID-19 lockdown Ghanaian pupils could follow lessons via the Internet, television and radio.

new services have the potential to reach populations living in remote areas with limited Internet access. Higher education is also gradually converting to digital technology. With over 60,000 students, the Université Numérique Cheikh Hamidou Kane is now the second largest university in Senegal.

Unequal access

Better teaching, for more pupils: edtechs can enhance learning, but they come up against disparities in access to technology. "In Sierra Leone, the vast majority of teachers don't have laptops or even smartphones, and we also face connectivity problems," points out Mason. "The weakness of the Internet network in rural areas and the high cost of Internet data remain major obstacles," agrees Guede Biagne. The UNESCO report indicates that in sub-Saharan Africa, 89 per cent of learners do not have access to a computer at home, and 82 per cent do not have access to an Internet connection at home.

Inequalities in cultural capital within families are another major obstacle to equal opportunities. "Even with a solid, accessible education bank, the supervision and monitoring of pupils' work is highly differentiated depending on whether they come from literate or non-literate families," insists Guede Biagne. In Côte d'Ivoire, the illiteracy rate stood officially at 43.7 per cent in 2019.

Beyond these challenges, the effectiveness of edtechs, whether virtual reality, educational robotics or online courses, remains to be assessed. In Africa, as elsewhere, there is a lack of data in this area. At the beginning of 2022, the American organization IPA, Innovations for Poverty Action, coordinated a study in Kigoma, Tanzania using two tablet-based learning programs for children at an elementary school in a refugee camp.

"By carrying out three randomized evaluations with groups of 300 students, they found that tablet-based teaching significantly improved maths skills and literacy in general," explains Laura Castro, program officer at IPA. According to the NGO, this example underlines the transformative potential of educational technologies in contexts where resources are limited.

But these initiatives still need to be monitored and sustained; otherwise, warn some actors in the field, they run the risk of falling by the wayside. "They are often scattered initiatives, or limited to one region," notes Mason. "Providing students with tablets is extremely costly and unsustainable," she continues. "What is the lifespan of a tablet that is passed from student to student? How can they be repaired? Will they have to be constantly replaced?"

Generally speaking, education specialists agree that "all-digital" is not a desirable horizon, and that children's exposure to screens needs to be controlled. "We must never forget the human side," insists Mason. "We can't replace teachers with technology." ■

Interview by
Anuliina Savolainen
UNESCO

Sal Khan: "I see AI as an additional tool, but a very powerful one"

Since March 2023, Khan Academy, a non-profit organization offering free online education, has been piloting a teaching assistant powered by artificial intelligence (AI) called Khanmigo. Khan Academy's founder Sal Khan is convinced that, when properly supervised, this tool can help students consolidate their learning and improve their self-esteem.

Your AI-powered tutoring tool is currently being tested in schools in the United States and online. Can you share with us some early impressions from students and teachers?

We launched Khanmigo on 15 March 2023, as part of the general launch of GPT-4. It was immediately used by several thousand people, including students and teachers in Khan Lab School in Mountain View, California, in Khan World School (online) as well as in mainstream public schools in Newark in New Jersey and Hobart in Indiana. Now, as we go to this school year, around 11,000 students and teachers are going to be using it in a formal classroom setting in the United States.

> **"Students really appreciated being able to ask Khanmigo questions right in the moment**

We first wanted to capture people's immediate reactions and to make sure we weren't causing any harm. Right out of the gate we heard very positive feedback from both teachers and students. We also have some preliminary data showing that it's definitely not doing harm.

The students really appreciated being able to ask Khanmigo questions right in the moment. We've all forgotten things and felt embarrassed to ask someone else – an on-demand video or AI tutor can feel less intimidating.

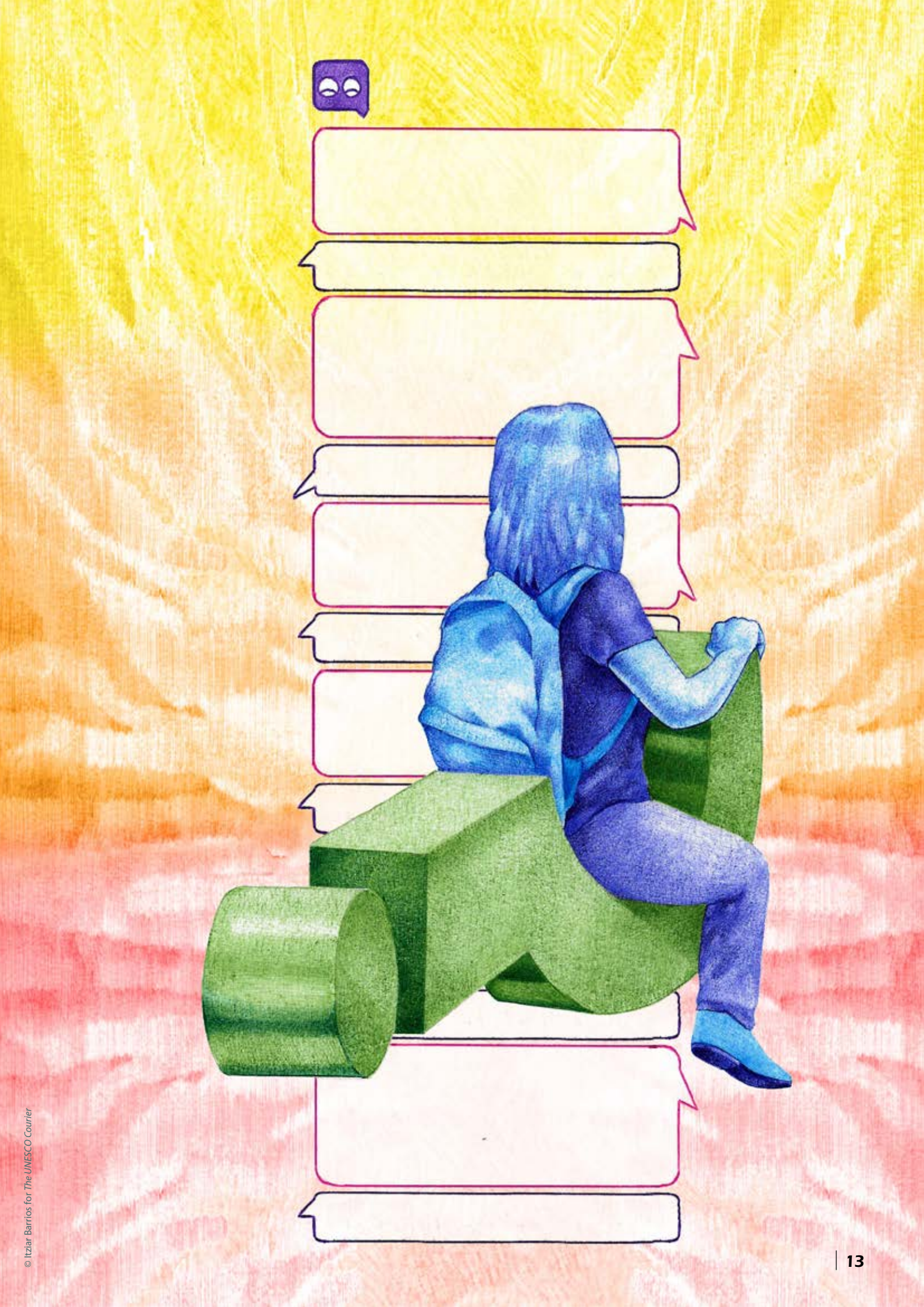
The number of questions students were afraid to ask in class surprised teachers. They said it was useful to get a report back on these questions, so they could ensure such concepts were covered in more depth. They also appreciated using the tool for things like creating lesson plans and assignments.

Another thing that teachers and students have enjoyed is Khanmigo's feature where students can talk to simulations of a historical or literary character. Debating with AI allows kids to fine-tune their arguments in a safe environment before going back to class and entering discussion.

By the end of the school year we'll have some real data on what it is doing to students' learning outcomes. A recent study indicates that mainstream →

Founded by Sal Khan in 2008, Khan Academy is an American nonprofit educational organization supported primarily by philanthropy and individual donations. It offers learners online exercises, instructional videos, and a personalized dashboard. In addition to maths, Khan Academy provides free lessons in the sciences and humanities.

Available in more than 50 languages and used in more than 190 countries, Khan Academy has over 150 million registered users. As of today, more than 500 public school districts and schools across the United States partner with the organization.



school students using Khan Academy for 18 hours over one year see their level growing 30 to 50 per cent faster compared to a typical student. We'll see what we can do with Khanmigo.

> **Every interaction a student under the age of eighteen has with the tool is logged and accessible to parents and teachers**

Amid fears of AI taking over education, how can you ensure that the environment you have introduced is safe and under meaningful human control?

The first immediate fear that people have with generative AI is that it can be used to cheat. This is one of the reasons why we use GPT-4 and not GPT-3.5, the technology behind ChatGPT. No matter how we tried to steer some of the earlier models, they would always just give the answer, and sometimes an incorrect one. Using GPT-4, we've been able to make Khanmigo act like a Socratic tutor.

Every interaction a student under the age of eighteen has with the tool is logged and accessible to parents and teachers. A second AI is monitoring the conversations and if they go into any 'dangerous places', the AI will not allow that conversation to go on and it will notify parents and teachers. We also make sure that any personally identifiable information like names or addresses is anonymized. We are not using student data to train the AI.

Generative AI is not always right, and it can sometimes make up facts. This is why most of the interactions that students have with Khanmigo are anchored on Khan Academy information, reducing the likelihood that it would go beyond that. On the maths side, we've done a lot of work to make it less overconfident. Khanmigo tries to find the answer on its own behind the scenes, and then compares it with that of the student. If the answers are different, it won't immediately say, 'You're wrong', but instead, something like, 'Hmm, I got a different answer. Can you explain your reasoning?'.

The last guardrail is making sure that the users, both students and teachers, are educated on what this technology is, what it can and cannot do, when you can rely on it and when you should double check its work.

Khan Academy promotes an "open access free world-class education for anyone anywhere". Khanmigo, however, is neither free nor yet accessible worldwide. What can be done to ensure that these tools also reach people living in remote areas and those with low income?

Today anyone in the US can sign up to Khanmigo. I think in the next few months we're going to be able to give access to it to anyone in the world who pays.

The generative AI costs depend on how much it's used, but the average cost today is around 9-10 dollars per user per month. I predict that in the next year the cost will be at least half, maybe one quarter of what it is today. For rich countries like the United States, where the public school system spends between US$10,000 and US$40,000 per student per year, this is a very valuable thing – and hopefully the students will get it for free. But even if you think about the cost of education in other parts of the world, like India or Africa, I believe it becomes interesting. My hope is that in five years we can afford to give it for free or almost free to most of the world.

I see Khanmigo as an additional tool, but a very powerful one. In its current state, it works very well for curious students who want to make sure they have their conceptual gaps filled in. But hopefully it's also going to help disengaged students set and reach their goals. If you go to a school that has more resources, the teacher can sit one-on-one and do this. But in a traditional public school, where you don't get that type of extra attention, at least the AI can sit with you.

I do this with my own kids. I make sure that every day they get a little bit of supplemental learning. We want AI to get proactive like that. It's texting you, eventually it's going to call you up on the phone and say, 'Hey, I see you're not working today. What's going on? What can I do to get you working?' As long as it's transparent, I think it can actually get students to engage.

Introducing Khanmigo

Khanmigo is an AI-powered (GPT-4) teaching assistant launched in March 2023. It is currently in the pilot phase in the United States. At this stage, Khan Academy is gathering feedback from users to further develop the tool.

Designed to provide assistance to students like a thoughtful tutor, Khanmigo can be used to help with maths, prepare for exams, practice new vocabulary, learn computer programming and debate topics, among other things. It can also assist teachers with administrative tasks.

Su Peng

Journalist for The Southern Weekend (Nanfang Zhoumo) in China

In China, online tools to level up learning in remote areas

The use of new technologies can improve learning opportunities in rural schools and help expand children's horizons.

Every Thursday a meeting room is booked for He Jialuo near the tech hub of Zhongguancun in Beijing, China. As she opens her laptop's camera at 1:30 p.m., thirteen students from Songping Elementary School, located 1,500 kilometres away in Longnan, Gansu province, appear on the screen holding tambourines, ready for their online music class.

When the 32-year-old Chinese art and literature specialist, who gives music lessons as a voluntary teacher, prepares her class and adds course materials, the AI-powered lesson preparation system not only filters inappropriate content, such as violent material, but also generates post-class tasks and might even suggest improvements, saying, for instance, "You may consider adding class interaction such as a knowledge quiz".

Songping Elementary School is situated in a rural village. According to 2021 data from the Chinese Ministry of Education, there are 81,547 similar elementary schools in China. Rural schools continue to decline as urbanization accelerates and the number of students keeps falling. In most cases,

© Eman School in Danzhou (Hainan Province)

Students make kaleidoscopes with the help of a remote volunteer teacher at the rural Eman School in Danzhou City (Hainan, China).

one teacher is responsible for teaching all subjects. Providing quality arts, music, and information technology courses becomes challenging, resulting in an increasing educational gap between urban and rural areas.

Connection to the outside world

The digital volunteer teaching project that He Jialuo has joined as a voluntary teacher is an attempt to change this situation. In recent years, the Chinese government and businesses have been leveraging digital technology to provide quality education to remote regions. A "networked, digitalized, intelligent, personalized, and lifelong education system" is the goal of the Education Informatization 2.0 Action Plan of the Ministry of Education.

Corporations have initiated public welfare initiatives that use digital technology to improve rural education. The digital volunteer teaching project, developed by the Chinese company Tencent, is one of them. The project has recruited over 10,000 persons to provide "online volunteer teaching" to more than 1,000 rural schools so far.

Similar to Songping Elementary School, Zuoluo Elementary School in Honghe, Yunnan province, is located in a rural western region of China. With 151 students and only ten teachers managing seven classes, the school is strapped for educational resources. The Honghe Prefecture, in which it is located, is surrounded by mountains, karst plateaus and basins, and is home to 2.41 million ethnic minority people.

Jiyue Yan, an employee of Tencent's Digital Volunteer Teaching Lab, tells us that children there lack knowledge about the outside world. "They're living in an ill-informed environment. Most of them dream about going away to work when they grow up." Zuoluo Elementary School teacher Li Xiufang recalls that, when asked about the cities in China, out of 691 cities, they only knew Beijing.

Virtual classes

In contrast to the scarcity of teachers in rural areas, many people in Chinese cities are eager to participate in volunteer teaching. However, due to the long distance or conflicting schedules, they are unable to teach on-site. The digital volunteer teaching addresses this practical problem by focusing on recruiting students from Chinese universities as well as experienced unpaid volunteers. After being trained and evaluated, they constitute the project's volunteer base.

The project also includes a digital platform with functions such as volunteer recruitment, curriculum planning, and teaching and administrative scheduling. It enables the simultaneous provision of high-quality digital classes for thousands of rural schools.

According to Li Xiufang, the program has helped relieve pressure on teachers and improve efficiency. This initiative has also helped students broaden their horizons. Some of them now aspire to become architects, programmers, astronauts or scientists, inspired by volunteer teachers from all walks of life and from across the country. The research data from Feng Xiaoying, a professor at Beijing Normal University's School of Educational Technology, shows significant improvements in children's subject knowledge and higher-order thinking skills.

Continuous training

Although educational informatization can boost fair and equitable education in rural China, implementing digital technology poses various challenges for rural teachers. "The digital infrastructure in rural areas in China has been underutilized for a long time," Feng Xiaoying observes, adding that many rural school teachers use electronic screens merely as slide projectors.

Governments and enterprises are trying to address this issue together. For instance, the "Intelligent Teaching Assistant Solution" developed by the Chinese online education company Onion Academy, explores "human-machine co-teaching and human-machine co-education", with the aim of enriching teaching content and assisting rural teachers in improving their abilities. Another example comes from Kunming, Yunnan Province, where the Basic Education Research and Development Institute of Wuhua District has uploaded, as of October 2022, more than 500,000 course examples and teacher training resources into an AI platform for sharing among all the schools in the district.

> **"The digital volunteer teaching programme provides quality education in arts and information technology to rural schools**

Professor Feng believes that the challenges can also be addressed through the "dual-teacher classroom" model: in the digital volunteer teaching project, online teachers and local teachers cooperate with each other. Such a model can also provide local teachers with opportunities to enhance their technical literacy and explore a new teaching and research model with online teachers. Furthermore, with the help of AI, an employee of the project can analyze interactions and presentation effects in a class by recording key phrases, which facilitates subsequent performance evaluations.

"Now we pay more attention to 'digital intelligence'. In the past, in the face of rapid technological development, we needed to bring in experts for assessing classroom performance and students' learning status," Feng Xiaoying explains, adding that today the systems are advanced enough to assist with these tasks. "With the help of big data and AI, digital technology not only brings changes in teaching models but also reshapes the concept of educational governance." ■

Interview by
Anuliina Savolainen

UNESCO

Stuart J. Russell:
"Teachers' work may change but we will always need them"

Capable not only of providing content but also of interacting with students, generative artificial intelligence (AI) can be an excellent aid to teachers, as long as its development is controlled and supervised, explains Stuart J. Russell, professor of computer science at the University of Berkeley (United States) and co-author with Peter Norvig of the reference book *Artificial Intelligence: A Modern Approach*.

Technology has truly made its way into the education sector in recent years, especially since the pandemic. In what way is the arrival of ChatGPT and other generative AI technologies a turning point?

During COVID-19 we found out that it's possible to deliver education via the Internet. More recently, large language models have had a huge impact on the public perception of AI – there has been a revolution since ChatGPT was launched in late 2022.

We know that learning with a human tutor can be two to three times more effective than traditional classroom learning. We have worked on AI tutoring systems for about 60 years, but until recently two problems prevented those systems from being as effective as a human tutor. Firstly, they cannot – or could not – have a conversation with the student, answer questions or develop a relationship. Another problem is that AI tutoring systems do not understand the content they teach. They might present content about chemistry, but they don't understand chemistry, which means that even if they were able to have a conversation with the student, they couldn't answer questions properly.

With the advent of large language models, both of those things have now changed to some extent. You can have a coherent conversation in quite a few languages. The systems are also rather reliable when it comes to answering questions on content. There are still weaknesses that need to be addressed, but I believe that with a reasonable amount of effort, we should be able to deliver a tutor for most subjects, at least through the end of high school.

To some extent people now have got a flavour of what it would be like to live in a world where you could just tap into an arbitrary amount of intelligence to solve any problem. However, it's a little misleading because it isn't really *general* intelligence we're dealing with. There's a lot of appearance of intelligence coming from the fact that the systems use a very fluent language – but what they produce doesn't always make sense.

This year is a turning point. There will be a huge rolling out of technology and variants of it, but we still have much more work to do. And all this pales in comparison to what will happen when artificial general intelligence (AGI) – intelligent systems whose breadth of applicability is at least comparable to the range of tasks that humans can address – becomes available. I believe that we will be able to deliver education for every child in the world by the end of the decade.

What will become of teachers in the face of these new developments?

Although their job will change, teachers will still be needed. One of the current challenges is to get the AI tutoring systems to understand the specific nature of the pedagogical role: rather than always being right or having all the answers, they must help the students find the answers themselves. There are already some quite impressive demonstrations of how generic language models can be trained with examples of how to be a teacher.

Humans will still be needed to figure out how each pupil interacts with the system. Are they getting what they need? What are they failing to understand? What would be a good path for them to follow? Students must also learn to work together and to function in a social environment, for which they need adult guides. The model could be that a teacher works with eight to ten students and spends a lot of time with them individually, a bit like an intellectual guide. In this case we might actually end up with more teachers, not less.

> **“Getting AI tutoring systems to understand the pedagogical role is one of the major challenges**

In the traditional education system, there is underachievement at all levels. There are kids who are bored because they're much more capable. And then there are kids who don't follow and who quickly lose motivation. It's terrible that we still have children who make it all the way through the school system and remain illiterate. This is clearly a problem of the system not caring about how the individual student is doing. In addition, our educational system does not really take into account the variety of learning styles – a good AI teaching system should be able to adapt very quickly to the individual learner. However, we're not there yet.

The pandemic also revealed a digital divide in the world. Why should it be any different with these latest-generation technologies?

The situation is certainly very different for economically advanced countries and countries that don't really have an education system in place. I think that this technology will have the biggest impact in countries that currently can't afford to have a primary and secondary education system at all. Obviously, there are still children who don't have access to phones or the Internet. But I believe that this is moving relatively fast as tens of millions a month are gaining Internet access globally. AI tutoring models also require much less bandwidth than a video call with a teacher.

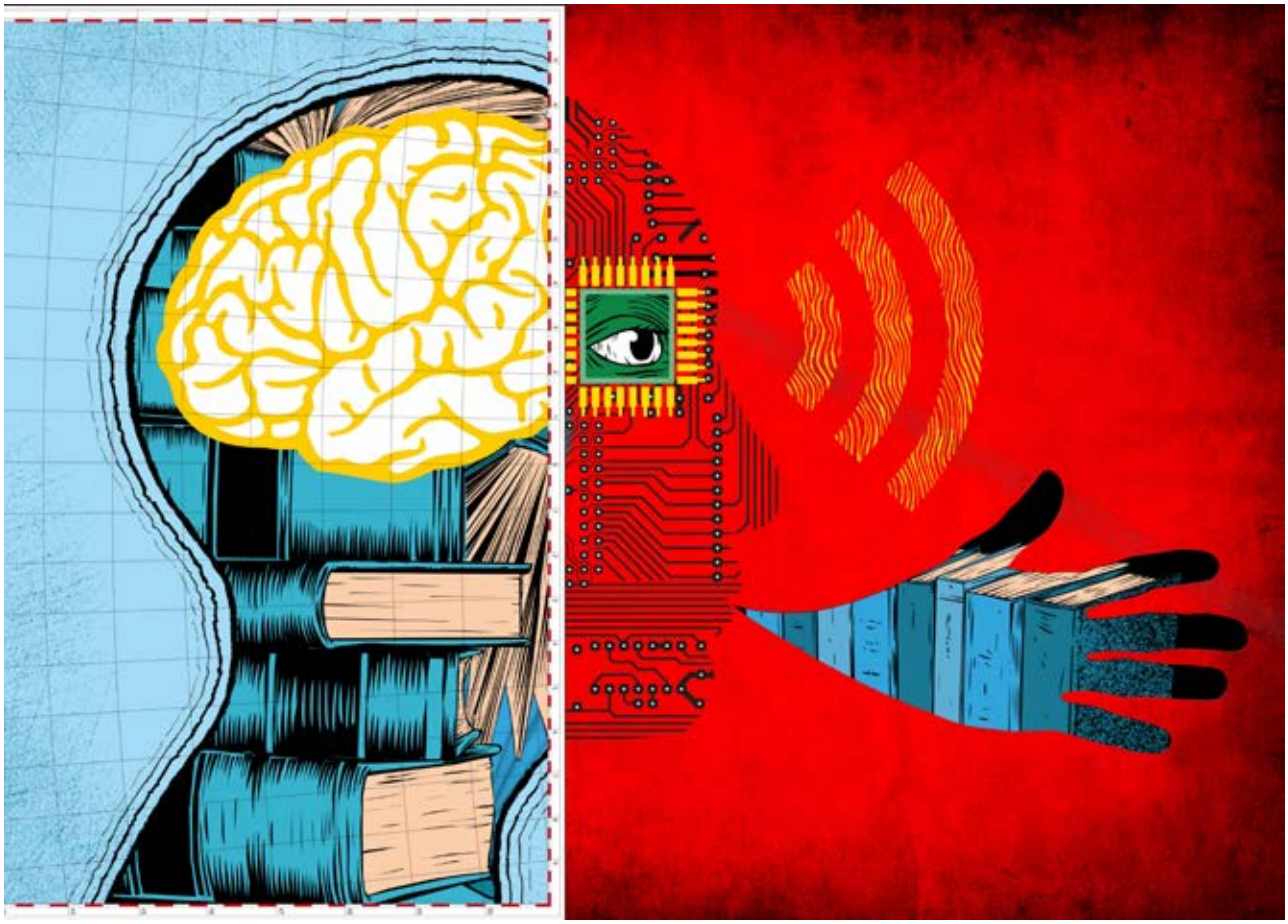
The bottleneck will likely be the effort required to create customized content and tutors for each culture and language. Developing these technologies is expensive. Historically education hasn't been viewed as a particularly desirable area for the tech industry. To ensure worldwide reach, we would probably need either a public or a private sector process that is incentivized and facilitated by governments. Maybe a part of foreign aid could be used to create effective education systems. It would be a tragedy if this failed to happen because of greed on the part of corporations or mistrust on the part of governments – or for any other reason.

“Tell me, Inge”, an immersion in the life of a Holocaust survivor

Launched in September 2023, “Tell me, Inge” is an immersive educational tool that brings the Holocaust survivor Inge Auerbacher's experience to virtual reality (VR). Young learners are able to directly engage in a conversation with Auerbacher by asking her questions about her memories. Born in Germany in 1934, Inge Auerbacher was deported, at the age of seven, to the Theresienstadt ghetto in Czechoslovakia. She was one of its few child survivors.

Developed by technology companies Storyfile and Meta in partnership with UNESCO, the World Jewish Congress, and the Claims Conference, the experience combines conversational video artificial intelligence (AI) technology and hand-drawn 3D-animations.

By continuing to carry the voices of Holocaust survivors through cutting-edge technology, “Tell me, Inge” contributes to bringing historically accurate information about the Holocaust to broad audiences. The experience is available for free in English and German.



© Boris Séméniako for *The UNESCO Courier*

> **To ensure worldwide reach, we would probably need either a public or a private sector process incentivized and facilitated by governments**

The development of these new applications needs to be regulated, as many technology players acknowledge. Do you see this regulation of generative AI taking shape?

Many regulation initiatives are being developed around AI. In the policy world, the open letter calling for all AI labs to pause the training of AI systems more powerful than GPT-4, signed by tech experts and published in March 2023, seemed to precipitate the policy response. UNESCO reacted right away, calling on its member states to adopt safeguards and ensure that AI is developed in accordance with ethical principles. Among others, the Chinese government, the American government, the European Union, and tech companies have woken up to the need to do something.

In the area of education, evaluation is of particular concern, considered by many as a high-risk area.

Data protection and privacy is going to become a more serious issue with AI. There should be strict rules about privacy. The data could be open to the teacher and possibly to administrators in case of any disciplinary issues or such.

Another issue is that we don't know how to prevent the AI systems from having inappropriate conversations with underage children. There must be strict limitations on the topics AI can discuss with humans. However, systems like ChatGPT operate in a black box with a trillion parameters and we don't really know how it works. Lots of people are trying to figure this out; my view is that it may not be possible.

I think regulation will force the development of better technology. Regulators must not accept as an excuse that 'we don't know how to do that'. If you were a nuclear regulator and the nuclear power plant operator said that they didn't know how to stop it from exploding, you wouldn't say, Ok, that's fine'. Instead, you would tell them that they cannot use the system until the problem is solved.

Nevertheless, in the long run, I'm optimistic that we'll be able to develop technology that we do understand and can control.

Marielle Vitureau

Journalist in Tallinn, Estonia

Estonia, an early convert to digital technology

For over twenty years, Estonia has been betting on technology, particularly in the education sector. A gamble that is paying off.

Henrik Salum stopped using blackboards and chalk a long time ago. After teaching English for many years at Tallinn's Gustav Adolf secondary school, where he is Headmaster, he soon became a fan of the smart board, a screen that can display videos and documents and which pupils can access via their laptops.

Henrik Salum is a long-standing convert to information technology (IT), having used it since he started teaching 20 years ago. He began by keeping a digital class notebook, a minor revolution at the time, then gradually extended this as the school's facilities got better.

Gustav Adolf, the capital's oldest school, is not an isolated example. In Estonia, pupils are encouraged to use digital tools from an early age. "Digital skills," explains Helle Hallik, a specialist at the Ministry of Education, "are an integral part of the curriculum," alongside literacy, mathematics and languages.

Digital technology is not necessarily taught as a separate course, but is often integrated into other subjects, as at Gustav Adolf School. "We try to use IT in our teaching," explains Henrik Salum. In English lessons, for example, pupils are encouraged to make on-screen presentations, while in maths they learn to use spreadsheets.

The Gustav Adolf School in Tallinn uses smart boards.

The "Tiger Leap"

In 1997, this country of 1.3 million inhabitants took the "Tiger Leap", the name given to the government's programme to equip the country's schools with computers. To help them, the government paid half the cost of the equipment in the first year. "The authorities pulled off a masterstroke," remembers Mart Laanpere, who now teaches mathematics and computer science at Tallinn University. "In the early 1990s, Estonia was a very poor country with limited natural resources. The government invested in smart technology to catch up," he recalls.

> **"In Estonia, basic programming skills are taught already in nursery school**

The conversion to digital technology was rapid. Four years after the programme was launched, all the country's schools were connected to the Internet. Even nursery schools now have digital literacy programmes, and virtually all of them are applying them. Children learn the basics of

© Kristi Salum

Primary school students learning robotics (Gustav Adolf School).

programming through games of logic or by building little robots that they can control using tablets.

Of course, there are disparities between schools. In Estonia, schools have a great deal of autonomy and choose for themselves how to achieve the required skills. Henrik Salum admits that in his school, for example, some teachers continue to use printed textbooks.

But measures have been taken to ensure the continuity and sustainability of this policy, with a particular focus on teacher training.

According to figures from the Estonian Ministry of Education, 20 per cent of general education teachers receive digital training every year.

The successful conversion of schools to digital technology also relies on the recruitment of teachers specialized in the new technologies – who then support other teachers. The presence of such skills within schools greatly facilitated distance learning during the COVID-19 pandemic in 2020.

A strategy that is paying off

The strategy, adopted over the last twenty years, has paid off, even if it is difficult to quantify the contribution of digital technology to the high performance of Estonian pupils. For several years now, Estonia has been top of the Programme for International Student Assessment (PISA) league table of educational performance, published by the Organisation for Economic Co-operation and Development (OECD).

This "Tiger Leap" has also led to a change of mindset in Estonia that goes far beyond education. The so-called "X road" platform, launched in 1999, provides access to a wide range of state and municipal services online. Since 2007 it has been possible to vote online in Estonian national elections. Today, the government is considering making it possible to vote from a mobile phone.

While some countries are currently concerned about the negative effects of screens on pupils – Sweden recently reversed its position on the use of tablets and screens in the classroom, deemed to be responsible for a drop in academic standards – this is not the case in Estonia. On the contrary, the school curricula that will come into force at the start of the 2024 school year will place even greater emphasis on digital skills.

In fact, the country is confident about the introduction of next-generation technologies. The next revolution should be in digital school textbooks that are adapted to the abilities of individual pupils. "They will become personalized," says Mart Laanpere. University researchers are already looking into this. The arrival of content-generating artificial intelligence (AI) tools doesn't seem to frighten educationalists either. "The only question I ask," says the Head of Gustav Adolf School, "is how useful they can be for teaching." ■

Natalia Páez

Journalist in Buenos Aires, Argentina

An algorithm to combat school dropout in Argentina

Since 2022, schools in the province of Mendoza have been using artificial intelligence to detect the pupils most likely to drop out early.

At the foot of the Andean Precordillera mountains, in the Argentinian city of Mendoza, almost a thousand kilometres west of Buenos Aires, lies the Victoria Ocampo secondary school. This state school, located in the working-class district of Brasil de Villa Hipódromo, is surrounded by makeshift housing.

"La Ocampo", as it is known locally, is one of the schools taking part in a pilot study for an early warning system that uses artificial intelligence (AI) software to prevent children dropping out of school.

Launched in 2022, this initiative is funded by the US-based Tinker Foundation. The system, designed by the Applied Artificial Intelligence Laboratory at the University of Buenos Aires, sends alerts if a drop-out is detected and then takes action. The initiative covers all secondary school pupils in the province of Mendoza.

Dashboard

The algorithm requires the existence of a database that is at least two years old, which is the case in the western province of the country. The system provides schools with precise information on the situation of their pupils. "When a head teacher opens the module, a 'dashboard' appears. This shows a plan of their classes and a list of the students. Next to each name, an indicator light signals their risk of dropping out. The algorithm measures four variables: results, absences, the family's level of education and any age-grade gap," explains Juan Cruz Perusia, a specialist at the Centre for the Implementation of Public Policies for Equity and Growth.

> "Three out of ten secondary school pupils in Argentina do not complete their education

When Manuel Giménez, headmaster of the Ocampo school, consulted his dashboard, he noticed that the brothers Esteban and Rodrigo – aged thirteen and fourteen and in their first and second year of secondary school – were particularly at risk of dropping out of school. "These pupils – I have changed their names – come from a family that does not consider their education a priority. They live in one of the livestock farming areas in the foothills, and their attendance record is almost zero. So we decided to use other tools to turn the situation around. For example, the 'protected schooling system' allows us to design a curriculum that is adapted to the particular situation of each pupil," explains the headmaster.

Identifying the causes

According to data from the Permanent Household Survey in Argentina, there is a 30 per cent drop-out rate in secondary education. Three out of ten students do not complete their schooling. When this project was launched in 2022, Argentina did not have a universal system with databases listing the names, background, results, absences, etc., of pupils.

"The consolidation of a database of all school enrolments is not yet complete. However, with nearly eight million pupils registered, the system already covers 80 per cent of enrolments and should be extended to cover the entire country in the coming months," says Jaime Perczyk, Argentina's Minister of Education.

School drop-out is not only linked to socio-economic problems. Francisco, a seventeen-year-old teenager, attends the José Patrocinio Dávila school in the Las Heras district of Mendoza. Enrolled in the fourth year of secondary school, he is behind in his studies due to a long course of medical treatment. When his file number triggered an alert, headmistress Eliana Moreira and her team took steps to make contact.

But the method has its limits. "He's not motivated and doesn't want to go to lessons, so what more can we do for him?" the team wonders.

Emotional involvement

For José Thomás, Director General of Schools for the province of Mendoza, the initiative is nevertheless proving to be a success. "I was surprised by the way the teachers accepted the use of the AI software. What's more, it gets the headteacher emotionally involved. They have the information they need to establish an emotional bond, which is essential in this type of situation. The Head knows whether the problem is due to a lack of support for the pupil, whether they need to do something to help their family, or whether the student is having difficulty in certain subjects."

Once the data has been collected from the schools, it is passed on to the provincial authorities. "The challenge is then to use it in a relevant way, to implement appropriate policies and obtain the necessary budget," stresses José Thomás.

At this stage, the project has not been running long enough to assess its effectiveness. But the head of the Ocampo school, which has a high drop-out rate, is optimistic. "The availability of tools like this helps us a lot. It keeps us on our toes. We don't just fill in figures for administrative purposes; we also apply a coherent approach to what's happening in our school. The figures stop being figures and become stories." ■

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The luminous winters of Klavdij Sluban

Photos:
Klavdij Sluban

Text: Agnès Bardon,
UNESCO

Hokkaido, Japan (2016).

It's a story that began long ago, in another lifetime. Snow – *sneg* in Slovenian, the mother tongue of Klavdij Sluban – has marked the work of this traveling photographer for 25 years. Like a dotted line going back to his childhood, it connects him to Slovenia, his home country, which he left at eight years old.

The photos in the series *Sneg* were taken in China, Estonia, Finland, Mongolia, Russia and Slovenia. But the first territory they belong to is the imagination. Snow, like the night, has the power to blur borders, make certainties waver and give dreaming free rein. From the chiaroscuro of his images emerge dreamed lives, the possible hinted at by an emerging face, a trace left on asphalt, a fogged glass.

A living substance, changing, organic, through his lens snow is "this thing, agile and so trifling, like a feathering of eyelashes" as described by the the French poet Saint-John Perse in *Neiges* [Snows] and a heavy overcoat which covers everything. More rare today than in the past, it is also a "white leprosy" whose "silence has become oppressive", in the words of the Italian writer Erri De Luca.

The recipient of several awards, Klavdij Sluban has exhibited his work in institutions around the world including the National Museum of Singapore, the Museum of Photography in Helsinki (Finland), the Guangdong Museum of Art in Guangzhou (China); the Metropolitan Museum of Photography of Tokyo (Japan), the National Museum of Modern Art (Guatemala) and the Centre Pompidou (France).

Ukraine (1998).

Hokkaido, Japan (2016).

◥ *Kaliningrad, Russian Federation.*

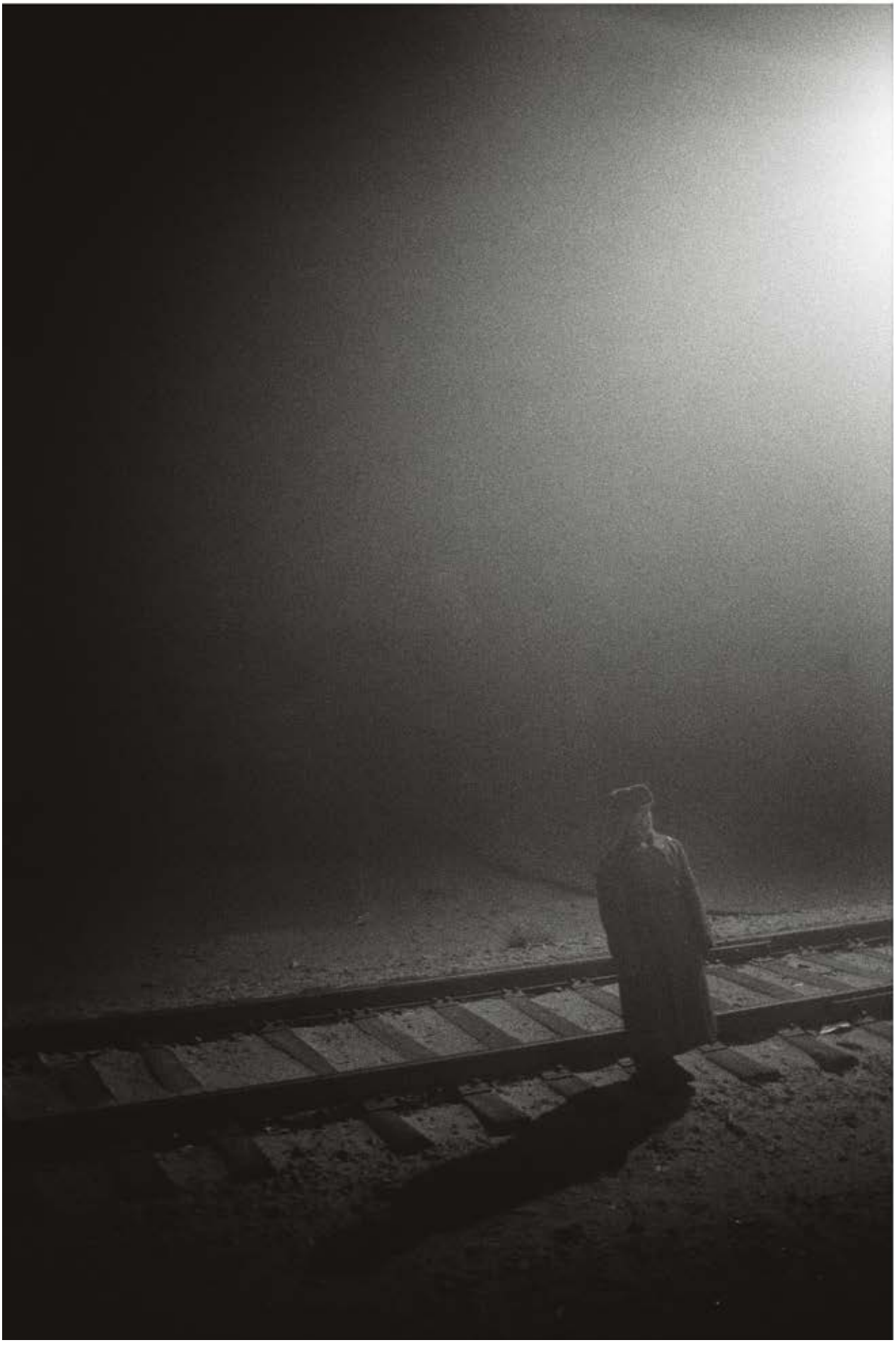
◥ *Hokkaido, Japan (2017).*

Latvia (2004).

The Arctic Circle, Rovaniemi, Finland (2004).

◥ *Latvia (2005).*

Estonia (2002).



◥ *Between China and Mongolia, Trans-Siberian journey (2006).*

Odessa, Ukraine (1998).

Hokkaido, Japan (2016).

◥ *Poland (2005).*

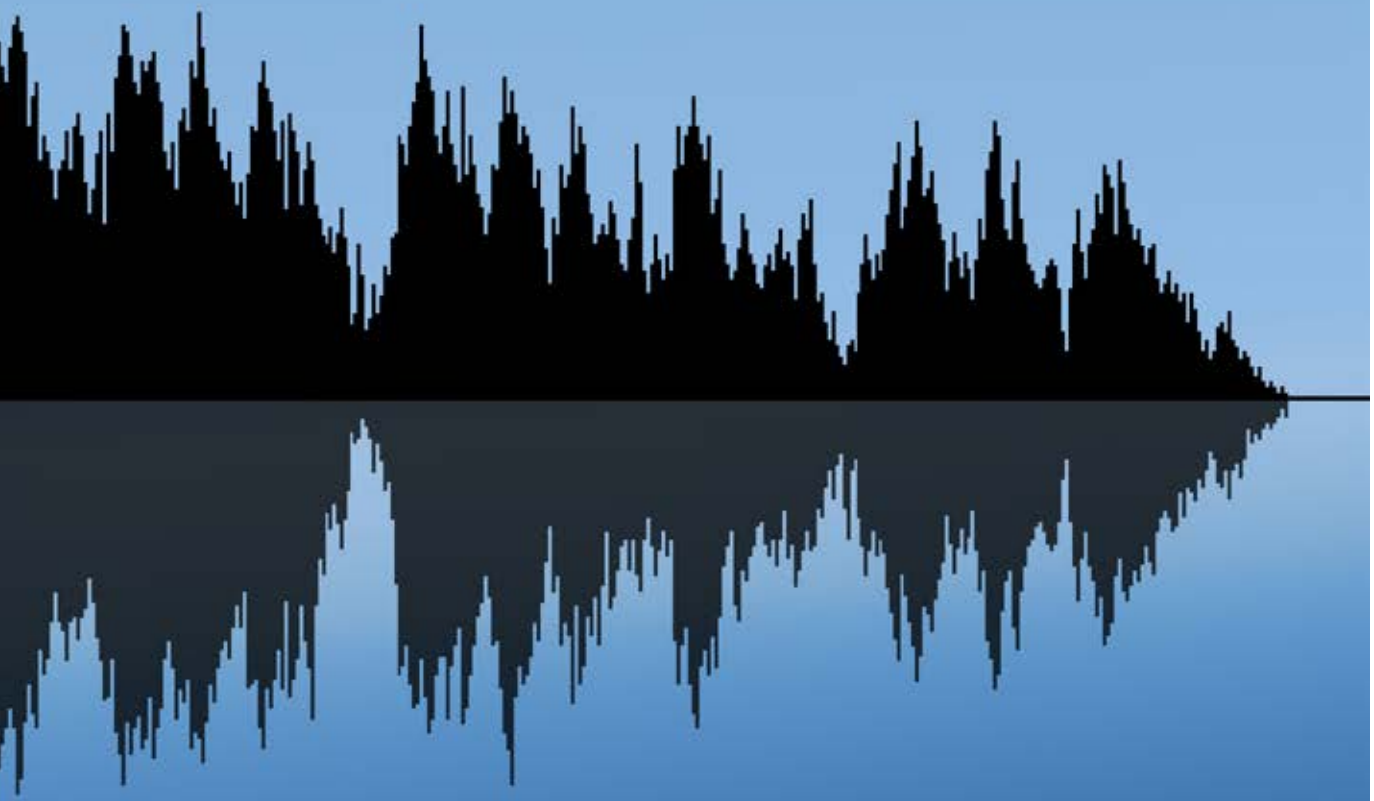
◥ *Poland (2004).*

Tuning in to nature

Bryan C. Pijanowski

Professor in the Department of Forestry and Natural Resources, Purdue University (United States), and director of the Center for Global Soundscapes.

Birds are not the only creatures that produce music for the planet's soundtrack. A huge number of species use sound to communicate, move around, or find food. Soundscape ecology is a new field of science that allows us to better understand and measure the acoustic universe of nature and also to assess the extent of biodiversity loss.



Work by Ukrainian artist Anna Marinenko, from the series "Nature Sound Wave", 2014.

Sounds are everywhere. Animals, especially birds, create tailored calls to find mates, to alert others of predators, and to establish territories. Insects, such as crickets, cicadas and grasshoppers, are present in nearly all ecosystems, and typically keep the "rhythm" of a place through their pulsating sound production. Amphibians also contribute to the rhythm of nature; in some places, they do so in such large numbers that it becomes deafening.

Even fish, and other animal life in water, use sound as a means for individuals to locate one another or to navigate. For instance, sounds enable the young of many fish and crustacean species to orient themselves toward coral reefs and the resources they contain. On land, many bird species in tropical rainforests will use the sounds of a river to locate their nesting places along stream banks.

Scientists are now discovering that night-time biological sounds are more common and more complex than previously acknowledged. As many terrestrial and marine animals are active during the dark hours of the day, sound becomes a major way to sense how the environment is changing, how to communicate with one another, and to find food. Nocturnal foragers must prioritize sound and smell.

Bat echolocation

Humans can only hear some sounds in their midst. Sounds above the human threshold of hearing (or "ultrasonic sounds") occupy a sonic space that many animals use. Scientists continue to discover species that communicate with one another using this sonic space, including many insect and tropical frog species.

Perhaps most famously, bats rely on ultrasound through their use of echolocation. They emit acoustic signals that are used to locate objects, like mosquitoes flying in the air. Those acoustic signals bounce off the object, and the timing of the echo is used to determine its proximity.

Sounds below the threshold of human hearing are called "infrasonic". Many large animals, such as elephants, hippopotamuses, rhinoceroses and whales, but also octopuses and squid, communicate in this sonic space. A handful of smaller species, including pigeons, fowl and fish, also use infrasound.

> "In remote areas biodiversity can be monitored with acoustic sensors

Among all existing species, it is likely that more than half use some form of acoustics to either produce sounds or to use sound to sense how their environment is changing.

Acoustic sensors

Why is all this information so important?

As scientists, we grapple with how to monitor the current biodiversity crisis and assess the extent of species loss. It's a tricky mission because monitoring animals is so difficult – we need to seek clues in hard-to-reach places like dense tropical rainforests and deserts, during the day and night, and for long periods of time.

With recent advances in technology, however, we can position acoustic sensors in large networks. The sensors are equipped to operate continuously and over long periods and across large areas, in deserts and rainforests, and especially in biodiversity hotspots like coral reefs. We can also record sounds in the ultrasonic and infrasonic ranges. This technology allows scientists to track animal activity and biodiversity to establish an acoustic record of biological sounds. Artificial intelligence (AI) tools are used to extract and identify sounds in these complex, digital audio recordings; scientists can "teach" computers about the sources of specific sounds, allowing us to develop a catalogue of species for any location.

My research has focused on a new field of science called soundscape ecology, which studies how sound from animals can be used to measure changes in animal biodiversity and to create an archive of all of Earth's major biomes – sets of ecosystems characteristic of a given biogeographical area – in the most remote places in the world. As part of this "Mission to Record the Earth", 29 of the planet's 32 major land and aquatic biomes have been completed so far.

Acoustic diversity in forests

What the community of soundscape ecologists has found is revolutionizing our understanding of current trends in biodiversity. For example, the sounds of an old-growth forest are often the most diverse, as it supports a huge diversity of animals: birds, insects, mammals, and amphibians. In the Midwestern United States, several ongoing soundscape studies are finding that the greatest animal acoustic diversity occurs late in the summer, after many insects emerge and "mix" with the sounds of birds and frogs, which have been singing since spring. Young-growth forests have much less acoustic diversity than old-growth forests, and the sounds of landscapes dominated by human food production lack biological sounds, especially at night.

I am often interested in capturing what a scientific researcher calls "baseline" or "reference condition" information. That implies going to locations that are least disturbed by humans to deploy an array of sensors, to study how the most "pristine" paleotropical rainforests sound. In general, it takes one year to identify such a location and find a colleague

> "Landscapes dominated by food production lack biological sounds

Recording soundscapes in Mongolia.

with whom to collaborate. Travelling there can also be long and complicated.

To reach the eastern province of Brunei on the island of Borneo, we travelled by plane, truck, boat, and foot, for days. The acoustic diversity of this place is staggering! Nearly 100 frog species, over 390 bird species, and dozens of species of cicadas create a biological diversity so complex and crowded that some species, such as the six o'clock cicada, have to select a specific time of day to sing. These limited "acoustic niches" mean that many species have to find unique ways to communicate with members of their own species.

As a result, the soundscapes vary widely by place and time of day. The sounds of Borneo are truly ancient; the subcontinent land masses have barely shifted over the past 300 million years, imparting a "prehistoric" quality. Such soundscapes allow our research community to ask: "What acoustic gaps exist and what kind of animal, based on body size, might be missing from this biophony?" Blending ecological theory with technology helps us find answers.

Spiritual echoes

Visiting and listening to these remote places on Earth has filled me with deep emotions about what I call "the awe of nature".

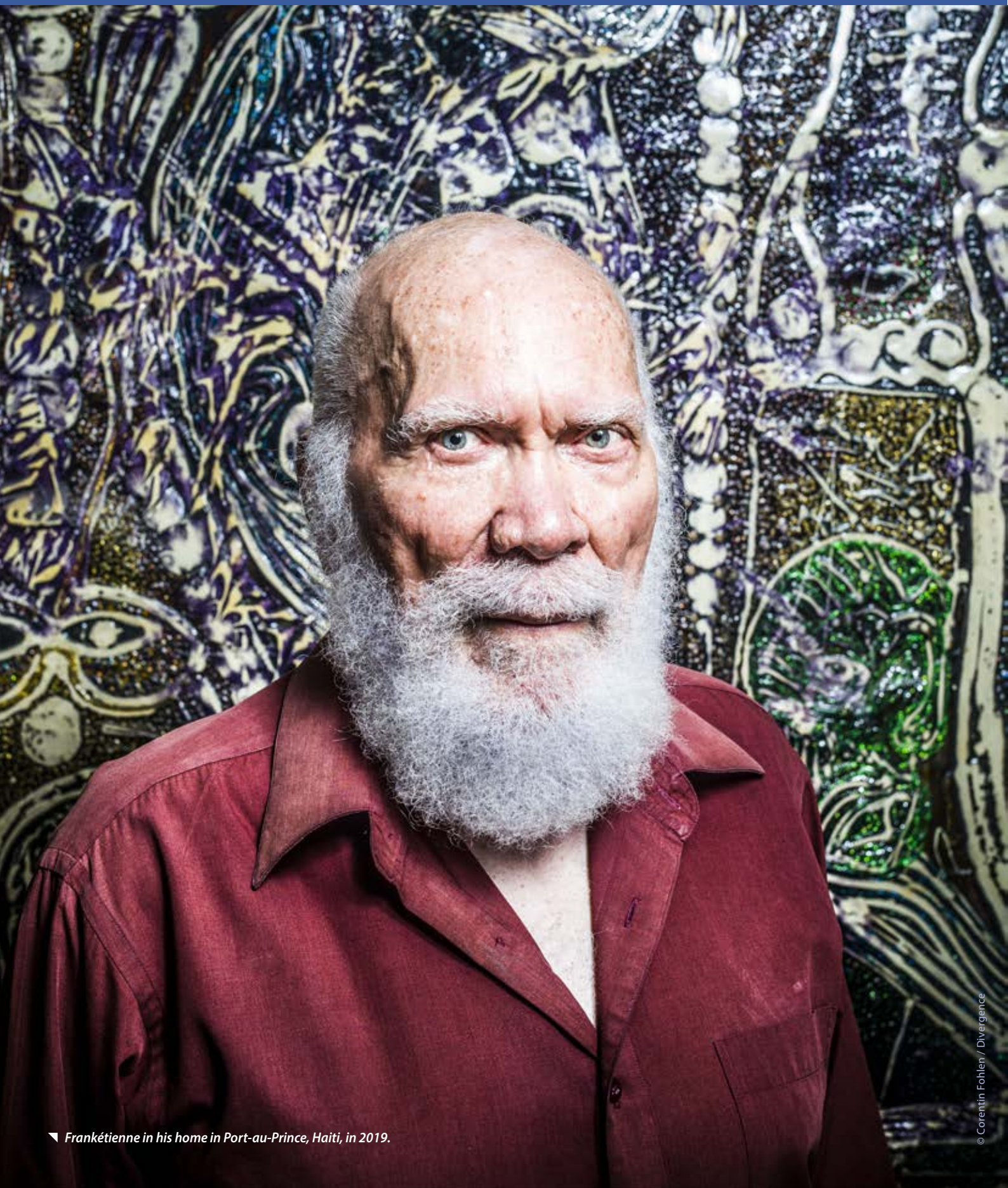
Take, for instance, the research station where my formative project in Borneo was completed. A nearby tourist park boasted a 90-metre observation tower, and I had the urge to hear what the forest sounded like from this perch.

I was astounded! At sundown, gibbons were barking across the valley below, followed by a multi-species concert with tropical frogs at the forefront, before a long chorus of crickets. Occasionally, high-frequency bat sounds would also pass into my awareness. Oddly, these soundscapes seemed familiar to me. In fact, the sounds were very similar to those of wetlands back home in Michigan. The top of a rainforest supported the same kinds of animals as a wetland in the Midwestern United States: insects and frogs with occasional birds that are active at night.

Indigenous peoples have long used sound to understand changes in their environment but also to relate themselves to nature and the afterlife. Nature's sounds and spiritual world are often inextricably linked. In Mongolia, I am collaborating with social scientists and scholars in the humanities to understand how nomadic herders use, in their songs and sonic practices, sounds of the cuckoo, of ice breaking and rustling of rivers, etc. – to sing praise to nature. To understand more deeply what these sounds mean to them, I once asked a Mongolian herder what he thought would be the consequences of the loss of the sounds of the natural world around him. Without hesitation, he answered "We'd no longer be human". ■

OUR GUEST

Frankétienne :



Frankétienne in his home in Port-au-Prince, Haiti, in 2019.

Interview by
Agnès Bardon

"Creation is an odyssey with no stopovers"

A poet, playwright, novelist, painter and actor, Frankétienne is a major figure in Haitian literature. The author of a prolific body of work, he writes in both Haitian Creole and French. He is one of the founders of Spiralism, a literary and aesthetic movement that seeks to express the fecundity of chaos through writing that combines verbal invention and transgression of the classical rules of narrative. Since 2010, he has been a UNESCO Artist for Peace.

You were born Jean-Pierre Dantor Basilic Franck Etienne d'Argent in Ravine Sèche, in Haiti's Artibonite province. How did you become Frankétienne?

I was born on April 12, 1936 in a Rural Section called RAVINE-SÈCHE*, where Vodou was the dominant religion at the time. My grandmother Anne Etienne and my mother Annette Etienne decided to give me a rosary of valiant names, with mystical and baroque resonance, likely to protect the little *"petit blanc"* against the mischief and evil spells of any sorcerers. This was easy for them to do, simply because they had no one to answer to, as my biological father, Benjamin Lyles, an American billionaire, never took responsibility for me. To avoid the malicious mockery I received from my classmates, my mother decided to consult a registrar to shorten my excessively long nominal identification. And so, at the age of seventeen, I became simply Franck Étienne. When I officially entered the field of artistic and literary creation, I became Frankétienne in one fell swoop. Much later, I discovered that 'Frankétienne' sounded bizarrely like 'Frankenstein'. A peculiar mystery linked to the Spiral and the unsettling nature of my work.

You grew up in a Creole-speaking milieu and learned French at school. As a writer, you have published works in both languages, including *Dézafi*, your first novel in Haitian Creole. How do you navigate between these two languages?

Having lived for almost half a century in a Creole-speaking working-class environment close to my rural roots, I soon sensed and penetrated the essence, nuances and profound beauty of my mother tongue. Through the Larousse dictionary, classic works and narrative novels, I began learning FRENCH. And I produced my first literary works in French. I had to wait until 1975 to produce *DÉZAFI*, which was the first real novel in the Creole language in general, in terms of its authenticity and modernity, given that *ATIPA*, by the Guyanese writer Alfred *Parepou*, is closer to the traditional narrative. I have been able to create novels, poetry and plays in both French and Creole without difficulty, without rupture, without trauma, even though I was sometimes addressing two different audiences. There was simply a phenomenon of interaction and enrichment using these two linguistic instruments with their differences, specificities and affinities.

In the course of your life, you have survived poverty and dictatorship, and overcome many hardships. Were books your salvation?

Obviously, painting, literary production and my theatrical activities (as a playwright and actor) contributed greatly to my salvation, enabling me to overcome the many trials that disrupted my existence "on that long, untranquil river that is LIFE".

A communist activist until the age of 40 in the face of the ferocious DUVALIER dictatorship, I was gradually steered by the events of Haitian history and my personal experiences towards a move away from the Communist Party and Marxist ideology. Yet I didn't become religious. I'm Christic, because of my faith in the exceptional mythology of Christ, who humbly transcended all human stupidity to gain early access to the Sublime and Pathetic Divine Nature. For me, GOD is Source Energy, bursting forth and present in the smallest particles of the INFINITE UNIVERSE. My current trajectory is dominated by a spiritual sensibility found in quarks, leptons, hadrons, quanta and all elementary particles that are psycho-matter endowed with a form of intelligence.

→

You've always chosen to live in Haiti. What does your writing owe to this tumultuous island?

Through the enigmatic, chaotic and mysterious massif of HAITI, the Divine Intelligence of Universal Energy has given me everything, from my obscure birth to my dazzling 87th birthday.

It was fortunate that my biological father gave nothing to my mother, the little peasant girl, nor to me, the brilliant reject, the atypical writer-artist chosen by the Light and Breath of the Absolute Spirit. Otherwise, there wouldn't have been the 60-odd books I've written or the five thousand paintings I've done in 60 years of intensive labour. This has made me an original madman who must have disturbed any number of 'normal' people.

I'll never stop thinking joyfully of the famous Aimé Césaire who, on the day he welcomed me for the first time at the town hall in Fort-de-France, exclaimed in his soft voice: "At last, I receive Mister Haiti!" That was in 1994, some fifteen years before his death.

Your first novel, *Mûr à crever* [Ready to Burst], published in 1968, laid the foundations for Spiralism. How would you describe this literary movement, founded with other Haitian writers, namely Jean-Claude Fignolé and René Philoctète?

René Philoctète, Jean-Claude Fignolé and I laid the foundations of the literary movement called Spiralisme. And I carried on, notably by writing *Mûr à crever*.

I invested myself totally and alone in the fabulous adventure of SPIRALISM. I've never bothered to plan ahead or to know where I'll be landing. In fact, I've never landed anywhere. I'm here in my country and in every corner of the world. I've always been on the move, in search of new things. Permanent creation is an odyssey with no stopovers, which continues through multiple pitfalls (storms, tempests, tornadoes, hurricanes, torments) and all kinds of unpredictable dangers, apart from a few rare stretches of illusory happiness.

Often, the creator crosses an immense desert where he suddenly discovers the intensity and beauty of solitude as much as the plenitude of silence, on the fringes of the clichés, stereotypes, sterile landscapes and worn, outdated, sclerotic formulas. I've never claimed to be a historian, chronicler, sociologist or anthropologist. However, I am pathetically aware of having produced, in an exceptional and painful context, an artistic and literary work with an inescapable innovative dimension.

As the future unfolds, the fate of my work depends neither on me nor on anyone else. Quite simply, I'll take responsibility for my creative madness and my sublime solitude to the end. Through the *Corde et Miséricorde* spiral, the ultimate literary experience of my writing career, I have felt no shame in speaking poetically of my weaknesses and my strengths, my illusions and my disappointments, my fleeting pains and joys, my celebrations and my defeats.

> **"Often, the creator crosses an immense desert where he suddenly discovers the intensity and beauty of solitude**

I danced my tormented life on a mysterious pommel horse with my voice shaken by intense, dense cries, often in the middle of an immense desert. Courageously, I took on the Spiral aesthetic to the end, and through my eruptive, whirling writing, it enabled me to explore the complexity of our Universe and its mysterious energy in perpetual vibratory, gyratory and gravitational motion. In every field (literary, artistic, scientific), authenticity is paramount. Innovation remains a gamble, a challenge, a folly involving the leap of risk, the leap of faith. With my eyes closed, I continue to leap on a journey full of uncertainties, without questioning whether there is a mat or a cushion ready to receive me and soften my fall. I'll jump until my last breath.

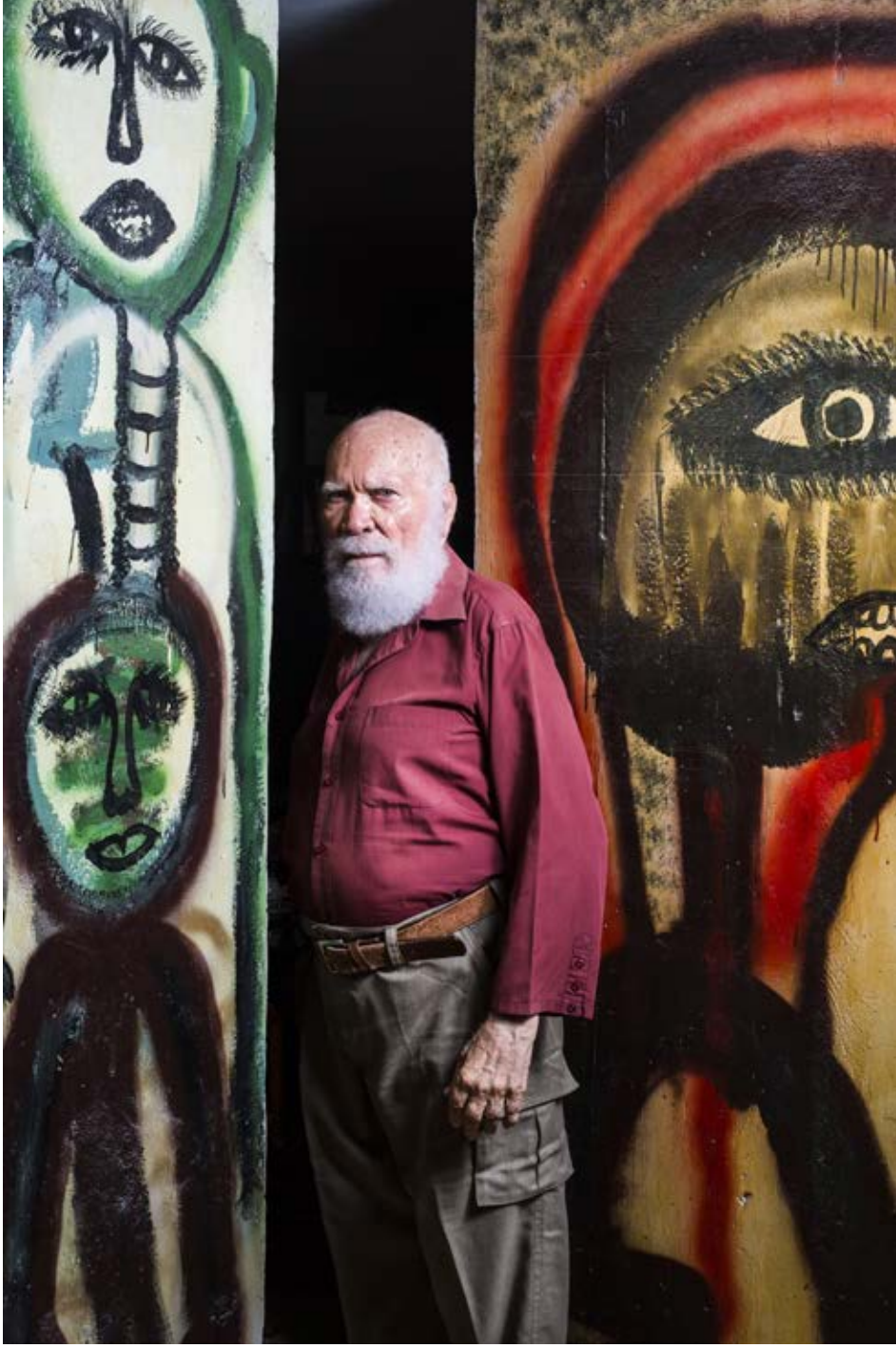
In Port-au-Prince, you founded a school and taught for many years, mathematics in particular. What did you learn from this experience?

I'm multidimensional, having taught Haitian Literature, French Literature, Social Sciences, Physics, Mathematics and Philosophy. This has enabled me to realize that we live in a Universe of Mysterious Energy, and that all the elements of this strange UNIVERSE are permanently interconnected. The UNIVERSE is holistic, yet marked by diversity, unity, symbiosis, synergy, polyphony, infinity and, paradoxically, also by the fragile, the vulnerable and the ephemeral. Everything is linked and connected in the infinite beats of the DIVINE Mystery, elusive, indecipherable, untranslatable and unpredictable within a fertile chaotic matrix where Light and Darkness intertwine and interpenetrate for the emergence of the FUTURE in an unpredictable world.

Do you see a link between mathematics and poetry?

There are many affinities between Mathematics and Poetry, especially at the level of signs, symbols, the imaginary, the concrete, the intangible, the real and the virtual. Mathematical language and poetic language often transport us beyond the tangible and visible. Poetic metaphors are not far removed from the utopian and fabulous journeys of hypothetical and phantasmagorical signs that weave, intertwine and intermingle in the field of mathematical beings. Poetry often reveals itself as the musical magic of waves, vibrations and gravitational spirals teeming with signs, curves and numbers, impossibly fleeting in the miraculous harmony of incompatibles.

> **The Spiral aesthetic enabled me to explore the complexity of our Universe and its mysterious energy in perpetual vibratory, gyratory and gravitational motion**



© Corentin Fohlen / Divergence

◥ *Frankétienne in his Port-au-Prince home, which remained intact after the 2010 earthquake. The pillar on the right depicts a scene of the disaster, painted by him.*

Your play *Melovivi ou Le piège*, published in 2010 but written in 2009, features two characters confronted with chaos in the aftermath of an earthquake, a few months before the earthquake that struck Haiti in January 2010. Is a writer necessarily something of a visionary?

Not all writers are visionaries. But there are rare poet-prophets who, nourished by the Breath of the Imagination, the Sap of the Word and the Light of the Spirit, manage to glimpse, perceive and feel the palpitations and vibrations of the future world. The infinite antennae of the human soul are fed by spiritual energy, which often projects us beyond the visible. What we don't perceive is undeniably richer, more complex and even much truer than the flat reality of visible, palpable things.

You are a poet, playwright and novelist. Your books often combine text, drawing and collage. Are you in search of a total language?

Certainly, total language remains the ideal spiral path that offers us the chance to discover the opulence of vital movement. Everything is spiral, global, total, capital and holistic.

Spiral aesthetics feed on total language to explore galaxies, black holes, stars, planets, supernovae, comets, asteroids, the Infinite Universe as well as infinitely small corpuscles. Creative and innovative writing is linked to total language. It's a poetic, spiritual, metaphysical and scientific quest.

You're also a painter. How does painting relate to writing?

Painting, through the interweaving and amalgamation of pigments, offers greater freedom and enjoyment than literary creation, which is trapped, managed, enslaved, asphyxiated and impoverished by too many academic, traditional, rigid and restrictive standards. In the act of painting, every gesture is significant and allows for all kinds of journeys, even the wildest. I often suffer mentally, psychologically and intellectually when I write, whereas the playful, joyful and liberal dimension is manifest, explosive, luminous and concrete in the inextinguishable fire of polyphonic and 'chaophonic' colours and forms. ■

*Following Frankétienne's request, certain words are capitalized in this interview.

Mila Ibrahimova
UNESCO

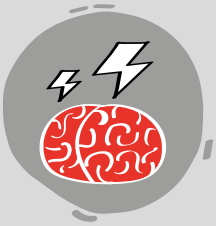
Unveiling hate speech in the digital world

Hate speech is nothing new, but the phenomenon is spreading at an unprecedented rate and scale in the age of social media. Both online and offline, it targets a person or a group on the basis of who they are. Hate speech not only causes harm at the personal level; it also undermines social cohesion. In response to this alarming trend, the United Nations proclaimed, in 2022, 18 June as the International Day for Countering Hate Speech. UNESCO, actively engaged in the fight against online hate speech through education, emphasizes the urgent need for common principles worldwide to improve the reliability of information while protecting human rights. ■

HATE SPEECH HARMS people and strips us of **our humanity. It can lead to:**

Fear of identifying with one's ethnicity or religion

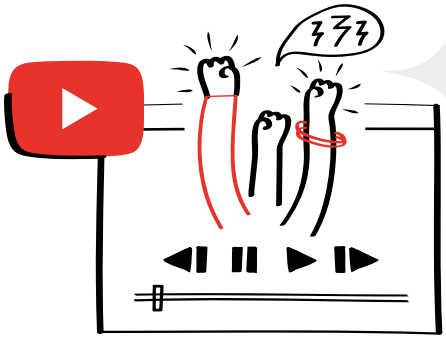
Psychological distress



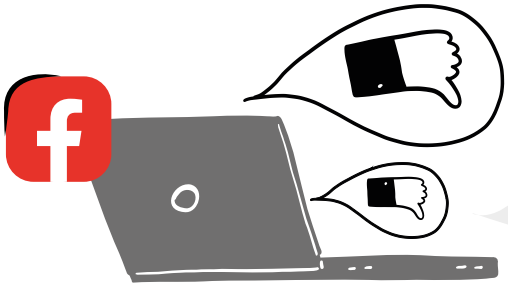
Disempowering victims

Power imbalances maintained

4.7 MILLION
PIECES OF HATE SPEECH CONTENT removed from Instagram (4th quarter 2022)



85,247
VIDEOS REMOVED by Youtube for hate speech policy violation (Jan-March 2021)



35.1 MILLION
PIECES OF HATE SPEECH CONTENT removed from Facebook (2022)

+300,000

VIDEOS REMOVED
in only 2 months for violating TikTok's policy on violent extremism (2021)

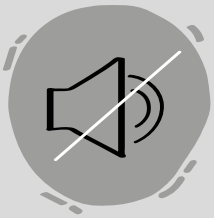
TWITTER REPORTED

1,628,281

PIECES OF CONTENT
that violated their hate speech policy (2022)

Restrictions of freedom of expression and association

Outgroup prejudice



Silencing and subjection

UNESCO in action

700
organizations have joined the UNESCO Media and Information Literacy Alliance, building resilience to hate speech

80
civil society organizations trained to counter the spread of harmful content on social media and promote peace

More about our work:

Addressing hate speech through education: a guide for policy-makers

Social Media 4 Peace project

Guidelines for Regulating Digital Platforms

Source: Companies report, CABC, Cooper Gatewood et al.

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Global Education Monitoring Report 2023

Technology in education: a tool on whose terms?

Technology's role in education has been sparking intense debate for a long time. Does it democratize knowledge or threaten democracy by allowing a select few to control information? Does it offer boundless opportunities or lead towards a technology-dependent future with no return? Does it level the playing field or exacerbate inequality? Should it be used in teaching young children or is there a risk to their development?

The debate has been fueled by the COVID-19 school closures and the emergence of generative artificial intelligence.

This new report recommends that technology should be introduced into education on the basis of evidence showing that it would be appropriate, equitable, scalable and sustainable. In other words, its use should be in learners' best interests and should complement face-to-face interaction with teachers. It should be seen as a tool to be used on these terms.

Read the publication in open access

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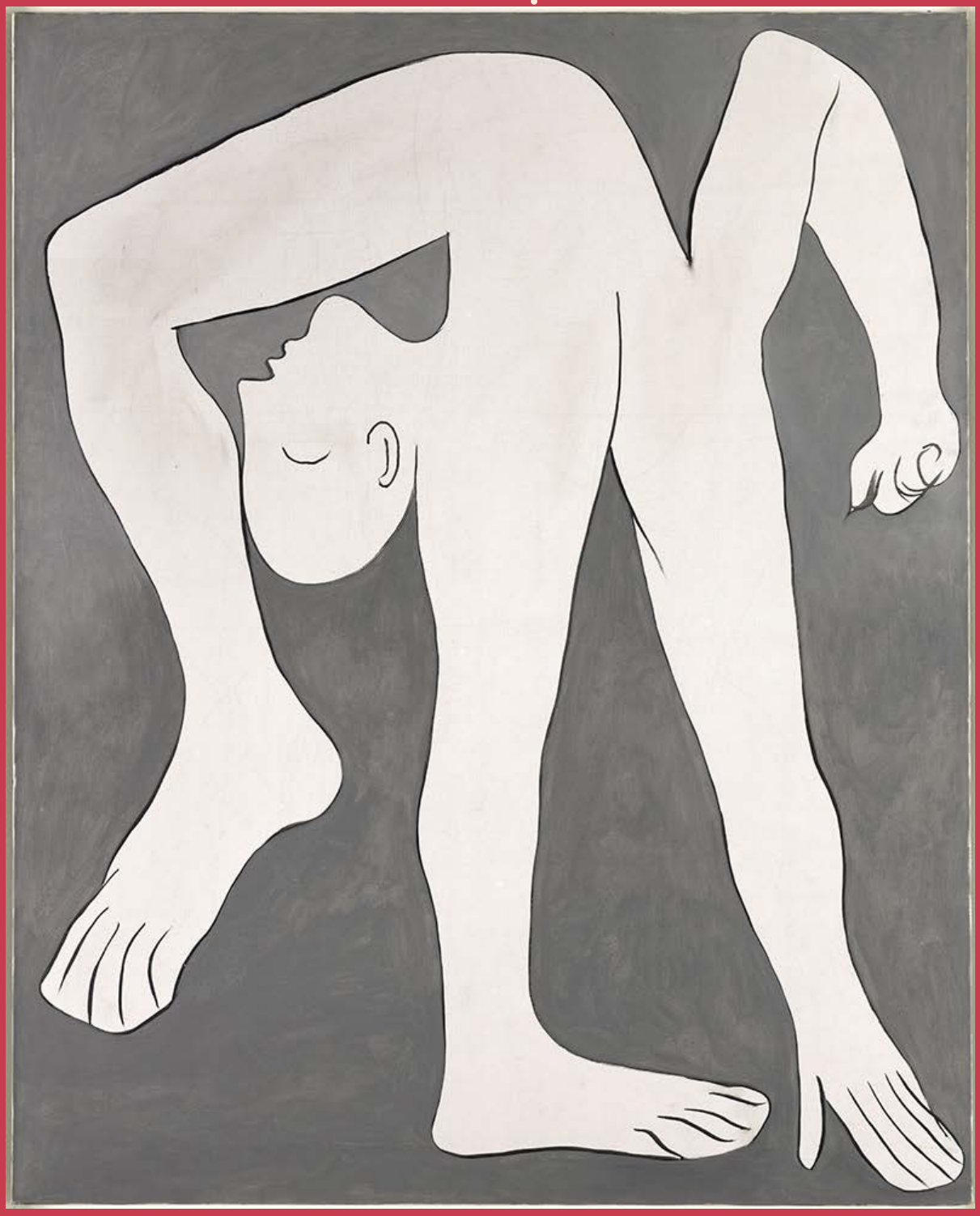
International Symposium of the Musée Picasso-Paris commemorating the **50th anniversary of Pablo Picasso's passing 1973-2023**

7-8 December 2023 at the UNESCO Headquarters

1973-2023

A partnership between UNESCO and the Musée national Picasso-Paris



The Acrobat, oil on canvas, Pablo Picasso, 1930, Musée national Picasso-Paris

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