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How Artificial Intelligence Can Help Advance Post-Secondary Learning in Emerging Markets

By Baloko Makala, Maud Schmitt, and Alejandro Caballero

Tertiary and vocational learning is widely recognized as critical for all countries' economic success. While progress has been made toward achieving the 4th United Nations' Sustainable Development Goal (SDG 4) by 2030—"Ensure Inclusive and Equitable Quality Education and Promote Lifelong Learning for All"—a 2019 UN report shows that some 750 million adults are functionally illiterate. These statistics illustrate the enormous challenge of adequately preparing the workforce for rapid technological change that will require continual reskilling. Although machines with artificial intelligence are likely to replace millions of workers across the world, AI also has great potential to enable workers to keep up with technological change and remain employable. This note attempts to illustrates how AI can support post-secondary learning across the entire tertiary and vocational education sector in emerging markets.

The crucial role that a well-educated population plays in a country's economic success is demonstrated by the prominence of education on the list of United Nations' 17 Sustainable Development Goals (SDGs) to be achieved by 2030—*Ensure Inclusive and Equitable Quality Education and Promote Lifelong Learning for All*. This is SDG 4.

Globally, some 750 million adults are functionally illiterate, and two-thirds of these are women—half of whom live in Africa or South Asia.[1] These sobering statistics illustrate the enormous challenge to developing well-educated, lifelong learners who can keep up with rapid technological change and remain employable.[2]

In emerging markets, there are significant obstacles to overcome to achieve SDG 4 by 2030. Global youth are of particular concern, as illustrated in Figure 1. Currently, more than 64 million youth are unemployed worldwide. Youth employment remains a global challenge and a top policy concern.[3]

Artificial Intelligence and Automation

By 2030, over 400 million workers across the world are expected to change jobs due to automation and technological advancements. Also, by 2030, an estimated 30 percent of current jobs could be lost due to automation. Women are at even greater risk due to their prevalence in clerical and administrative work, where automation is happening quickly.[4]

Job destruction and creation have occurred in every industrial revolution since the eighteenth century, and artificial intelligence (AI) will have the same impact. AI is a technology that enables machines, and especially computers, to analyze their environment and take action

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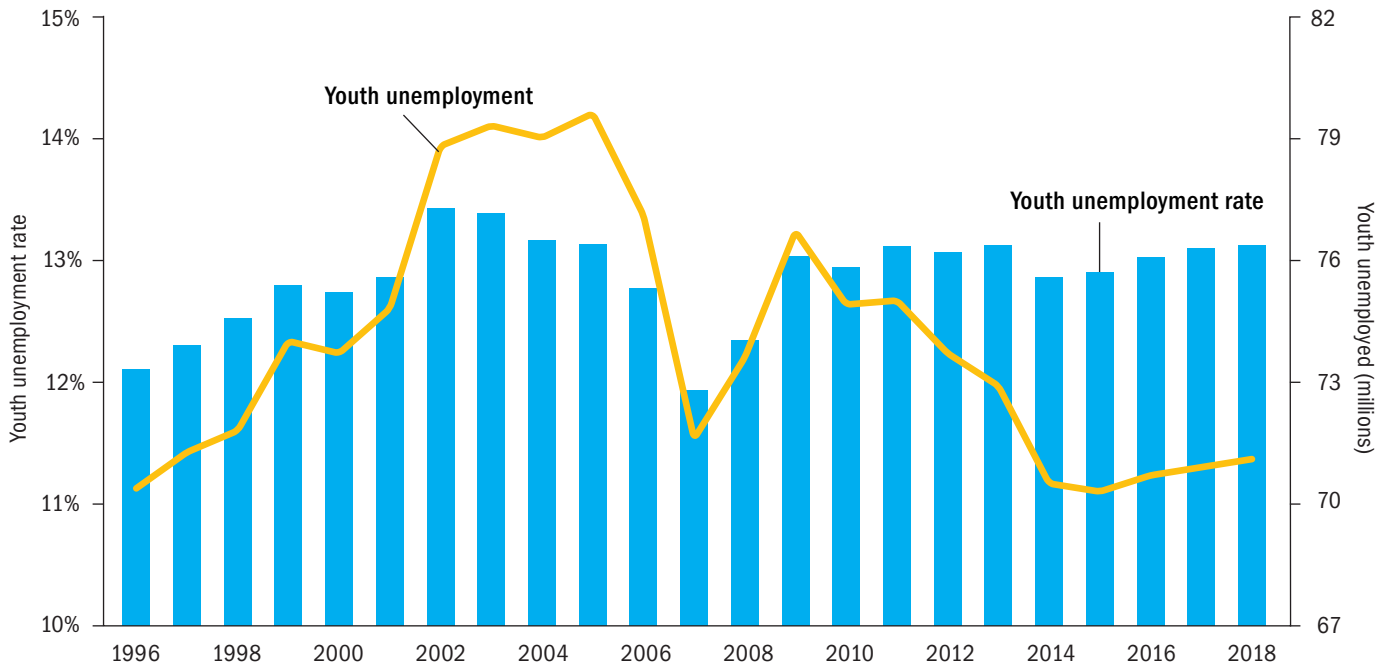

FIGURE 1 Global Youth Unemployment 1998–2018

Source: Calculations based on ILO Trends Econometric Models, April 2017. International Labour Organization. 2017. "Global Employment Trends for Youth." Geneva: International Labour Organization.

with some degree of autonomy. As with earlier industrial transformations, AI is expected to cause social, economic, and political disruptions (Figure 2).

The exact impact that disruptive technologies such as AI will have on work and society is yet to be fully understood. Yet it is very clear that the need for constant reskilling is already an important challenge facing employers and the workforce. And AI presents tremendous opportunities for educational technology (EdTech) providers, as well as for learners and educators at all levels of post-secondary education (Figure 3).

The Promise of Artificial Intelligence in Education

AI is now commonplace in the education ecosystem in advanced economies. From natural language processing to machine learning, AI is contributing to solving educational challenges, including expanding the availability of education, closing achievement gaps by coaching learners, and personalizing learning.

As the education sector adopts new technologies that include AI, the roles of everyone in the post-secondary education ecosystem—including students, teachers, curriculum developers, educational institutions, government agencies, and regulators—are likely to be transformed.

In emerging markets, AI could revolutionize the post-secondary education system by: providing affordable post-secondary education for everyone; making learning more interesting and interactive; individualizing learning so that content is tailored to individual students' needs, enabling them to learn at their own pace; and taking over time-consuming administrative and assessment tasks so that educators can spend more time improving their instructional materials, preparing for classes, and coaching their students.

The global market for AI-based educational products is growing quickly. It was valued at $521 million in 2018 and is projected to reach about $10 billion by 2026, growing at a compound annual rate of 45.1 percent from 2019 to 2026.[5] Although emerging markets are only a small fraction of the global AI market now, several companies have begun to emerge.

Personalized Learning

Daptio, an award-winning South Africa-based e-learning company, uses deep-learning analytics to personalize learning for teachers, students, and content creators across Africa and in other emerging markets.[6] As opposed to the restrictive, traditional approach of providing content to students based on their grade level, Daptio leverages cloud-

based technology and AI to match students' aptitude levels, enabling them to learn at their own pace.

AI education providers like Daptio support students and other education stakeholders, especially those in emerging markets, in acquiring and perfecting the knowledge and skills that young people need to enter the job market successfully.

Online Learning Providers and AI

Coursera and edX, the two most popular online learning platforms worldwide, offer thousands of online courses, certificates, and degrees. They currently use AI to optimize both access to courses and the learning process. As of mid-2019, Coursera, the largest online education provider, was partnering with 192 institutions in 43 countries and offering more than 3,200 courses in multiple languages. Between 2017 and 2019, the platform's learner base grew from 26 million to 40 million. By 2026, Coursera's earnings are projected to be between $43 billion and $65 billion.[7] edX, a non-profit platform launched in 2012 by Harvard University and the Massachusetts Institute of Technology in the United States, is partnering with several major universities and companies worldwide and already has more than 20 million learners. Its goal is to transform traditional education and training by removing the barriers of cost, location, and access.[8]

AI Allows for More Time Spent on Core Educational Tasks

AI can automate many of the time-consuming tasks that post-secondary educators have traditionally had to perform. These include taking attendance by electronically logging in students when they enter the classroom, assessing homework, grading examinations, and keeping student performance records. This gives educators who use AI more time to prepare classes and coach students.

Scoring Systems

Among the AI applications now being used to improve teaching and learning are those that grade essays and help students prepare for national exams.

Gradescope, a California-based startup, offers AI-assisted grading technology that groups similar test answers into batches that a teacher can scan through, review, and grade more efficiently. Gradescope's AI program learns to grade students' submissions based on a small number of answers provided by the teacher. This allows the teacher to only grade those answers that differ from those he or she provided to Gradescope. Since teachers no longer have to grade hundreds of student submissions, they have more time to interact with students to help them to learn.[9]

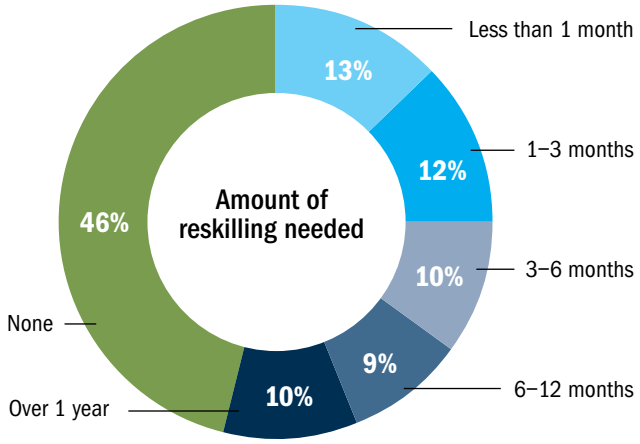

FIGURE 2 Reskilling Needs

Source: World Economic Forum. Menon, Jayant. 2019. "The Fourth Industrial Revolution Could Spell More Jobs – Not Fewer." Weforum.com, September 17, 2019. https://www.weforum.org/agenda/2019/09/fourth-industrial-revolution-jobs/.

Smart Content

Content technology companies are using AI to develop "smart" educational content. For example, Netex Learning, a digital learning company, enables educators to develop electronic curricula for a wide array of devices by leveraging an AI interface. This technology, "smart" classrooms, and other immersive educational experiences provide new and more effective ways to teach science, geography, and other subjects.[10]

Machine learning can also be used to identify students' strengths and learning gaps and adjust the complexity of course content to the individual learner.

For example, Lilishuo, a Chinese EdTech company that employs AI to teach English language skills, is a smartphone app used by over 70 million people in China and in 175 countries around the world.[11]

Virtual Assistants

Cognii is an Edtech company that provides AI-enabled learning that lets students at all levels of education, including university, converse with a chatbot. The company's virtual learning assistant converses with the student and prompts them to construct an answer. The chatbot instantly assesses the student and provides tutoring services using personalized hints and tips that provide

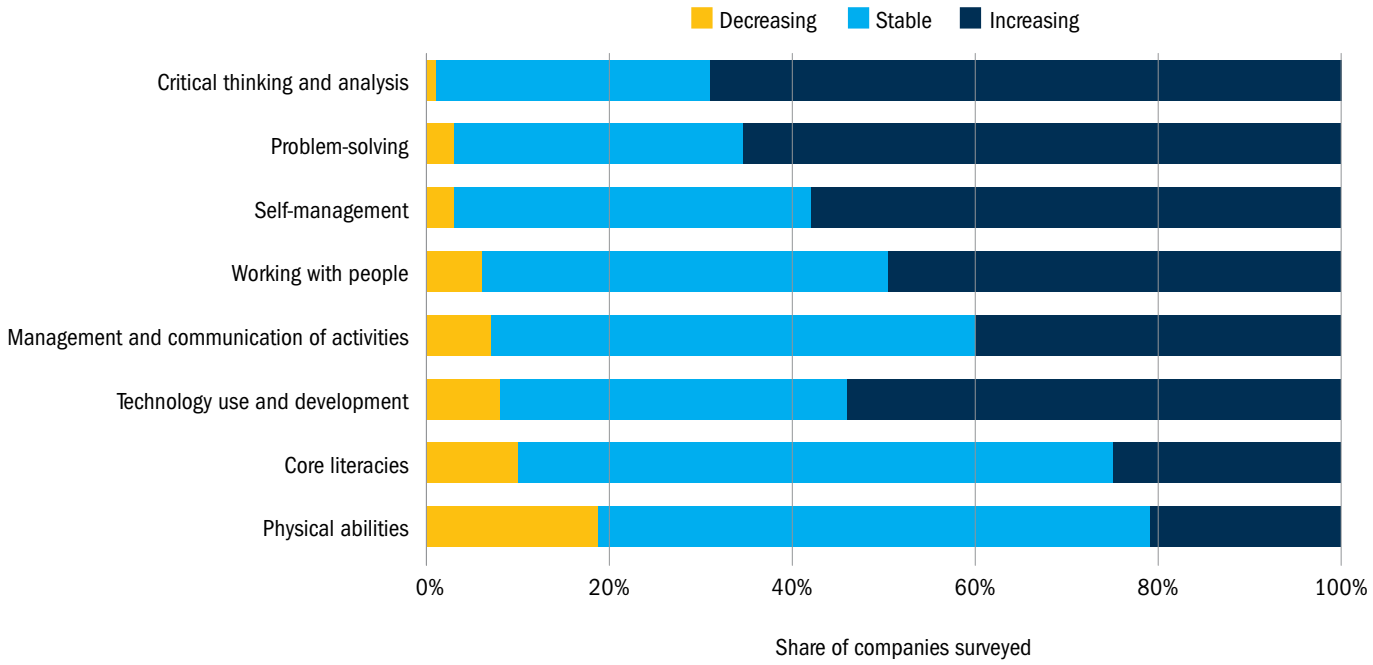

FIGURE 3 Change in demand for core work-related skills (2015–20)

Source: Source: Future of Jobs Survey, World Economic Forum.

guidance toward conceptual mastery. The company also offers a similar virtual assistant for educators.[12]

How Mobile Phones Can Support E-Learning

Globally there are over five billion mobile phone users, making that technology nearly universal in both developed and emerging markets. And mobile phones are an efficient mode of delivery for educational programs. With the anticipated widespread adoption of 5G cellular communication, mobile phones hold even greater promise for delivering education and training. 5G delivers what 4G LTE currently does, but at far higher speeds with greater reliability and without noticeable delays. 5G also connects far more devices. While a 4G LTE tower can connect 2,000 devices per square kilometer, a 5G tower can support over a million devices in the same area.

However, the true potential of 5G in education will only be realized when it is combined with AI. For example, smart classrooms using 5G and AI will be able to deliver rich content (including video, audio, and other elements) that encourages users on a multitude of devices to interact and engage at the same time, with no drops in connectivity.

While the rollout of 5G is currently underway in most advanced economies, 5G connectivity remains a more distant prospect in emerging markets, mainly because mobile communications providers have yet to fully exploit 4G LTE and recoup their investments. Nevertheless, the lack of 5G in emerging markets should not impede the use of AI in education. AI can be effectively used with 4G LTE, as well as slower cellular technologies. For example, M-Shule is an e-learning platform developed in Kenya that uses AI and SMS text messaging to deliver personalized, accessible education to primary school students across Africa, including those who do not have access to the Internet but have use of mobile phones.

AI EdTech Adoption in Emerging Markets

EdTech initiatives in emerging markets provide digitally-registered students with individually tailored curricula. This allows students to perfect their skills and advance at their own pace. By using AI, even schools with large classes can provide excellent and engaging learning support for students.

In Latin America, governments have been investing heavily in Edtech, and as a result, AI systems are already widely used in the region's education systems. This support ranges from classroom support to online learning, early childhood education, language learning, and career development.[13]

Edoome, an EdTech company with a large presence in Latin America, provides higher education faculty with the tools to create online classrooms and share documents, assignments, and tests, and to record grades.[14]

Coursera and edX are both widely used by governments for career development in Latin America. The Peruvian platform Crehana offers online courses on such diverse topics as graphic design, photography, marketing, and architecture.[15]

Challenges in Implementing AI

Lack of Digital Literacy

Both teachers' and students' digital literacy is a major challenge in some emerging markets, especially in low-income countries. As of January 2019, only 36 percent of the population in Africa and 52 percent in Asia and the Pacific used the Internet.[16] Due to limited Internet access in many parts of these regions, the populations that would most benefit from EdTech are facing yet another challenge. If no public or private sector action is taken to increase Internet access, especially in rural areas, EdTech will only increase existing disparities in educational outcomes.

Lack of Expertise

In comparison to AI use in industry and in agriculture, AI is in its infancy in the education sector in emerging economies. The majority of educational institutions lack a formal data management strategy to support their use of AI capabilities, and educators generally lack the understanding needed to practically implement such a strategy.[17] The lack of technical expertise needed to integrate AI solutions that involve complex algorithms has also hampered the growth of the AI market.

As is often the case with AI technologies, data is the source of discrepancies, due to a lack of diversity in observed populations or groups of populations datasets.[18]

In Implementing AI, Educators Must Remain Central

In order to avoid the AI-associated challenges discussed in this note and reap the benefits of AI in learning, educators need to remain central to the learning process. Furthermore, educators should become mediators between AI platforms and students to enhance learning outcomes.[19] By extension, this educator-technology combination in emerging markets will help deliver the benefits that AI can potentially contribute toward students' successful learning outcomes and develop their capacity to engage in lifelong learning to assure their employment and the economic success of their countries.

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Please see the following additional International Finance Corporation reports and EM Compass Notes on technology and its role in emerging markets:

Artificial Intelligence in Emerging Markets—Opportunities, Trends, and Emerging Business Models (September 2020); *How EdTech Can Disrupt Business Models in Emerging Markets* (Chapter 9 of report *Reinventing Business through Disruptive Technologies – Sector Trends and Investment Opportunities for Firms in Emerging Markets* (March 2019); *What COVID-19 Means for Digital Infrastructure in Emerging Markets* (Note 83, May 2020); *The Role of Artificial Intelligence in Supporting Development in Emerging Markets* (Note 69, July 2019).

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