Virtual Conference on AI and Education and Training

Topic at a Glance

A considerable amount of attention has been placed on Artificial Intelligence (AI), its impacts on innovations in various sectors, and its implications for the transformation of both the workforce and the labour market. One of the immediately obvious shifts created by AI in the workforce is towards higher-skill occupations, a trend that has been observable for some time in higher-income country contexts. Current shifts and future projections of job growth indicate a 'hollowing out' of certain skill level professions, with growth in both low-skill and high-skill employment far outstripping intermediate-skill labour demand (Autor, 2010). Workers with intermediate-level skills are at particular risk because technologies that can replace them generate considerable cost savings for employers. Expert observers foresee increased polarization of labour markets as the middle-income jobs assumed by intermediate skilled workers become increasingly scarce, a process that is well underway in many countries (World Bank, 2016; 2019).

Intermediate-skill occupations are located at skill level 2 as elucidated by the International Labour Organization (ILO)[1]. Occupations at skill level 2 typically involve tasks such as operating machinery, driving vehicles, maintenance and repair of electrical or mechanical equipment and manipulation or storage of information. Most of these occupations require relatively advanced literacy and numeracy for the purposes of reading instruction manuals, recording information or events and performing routine calculations. Educational requirements generally include completion of the first stage of secondary education, with many also requiring specialized vocational education and on-the-job training.

In other words, many of the professions most likely to be affected by AI transformation of the labour market are integrally linked with technical and vocational education and training. While some jobs will be completely automated, many more will incorporate some degree of automation. An estimated 61% of the jobs are comprised by medium or high (above 30%) volume of tasks that are susceptible to automation. This trend is more easily perceivable in the middle-skills jobs, whose routine-oriented work, repetitive tasks and predictable environment can be easily replaced by machines. This speaks to the changing set of skills, including improved digital and transversal skills, which institutions must develop in order to ensure continued employability of their students.

An education system which is responsive to labour market demands will incorporate AI both in its own systems and in the education and training provided to students. In fact, a large part of Sustainable Development Goal 4 on Quality Education has to do with an education system's responsiveness to both social and labour market demands in order to produce citizens who are socially and economically active within their societies.

This virtual conference will focus on the latter aspect, with relation to particularly the ability of TVET systems to both leverage AI to maximise their own systems and processes, including teaching and learning, and to ensure students are adequately prepared for the current labour market. This was also stressed in the Beijing Consensus on Artificial Intelligence and Education, adopted at the International Conference on Artificial Intelligence and Education held in Beijing, China, this year. In the field of education, AI offers opportunities to improve governance, delivery and alignment to other sectors. Many educational institutions are already leveraging AI in various ways to meet their objectives.

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[1] International Labour Organization. (2012). *International Standard Classification of Occupations: ISCO-08 Volume 1*. Geneva: ILO
The ILO skill levels are based on the nature of the work performed, the level of formal education and the amount of informal or on-the-job training and experience required for competent performance.

Figure 1. ILO International Standard Classification of Occupations

Skill level	Description
Skill level 1	Occupations at skill level one typically involve the performance of simple/routine physical or manual tasks. Basic literacy and numeracy may be included but would not be a major part of the work. Educational requirements may be primary education or the first stage of basic education, and/or a short period of on-the-job training. Examples include office cleaners, kitchen assistants, freight handlers, etc.
Skill level 2	Occupations at skill level two typically involve tasks such as operating machinery, driving vehicles, maintenance and repair of electrical or mechanical equipment and manipulation/storage of information. Generally, these occupations require relatively advanced literacy and numeracy for the purposes of reading instruction manuals, recording information or events and performing routine calculations. Educational requirements generally include completion of the first stage of secondary education, with many also requiring specialised vocational education and on-the-job training. Examples include butchers, secretaries, police officers, hairdressers, etc.
Skill level 3	Occupations at skill level three typically involve the performance of complex and practical tasks requiring an extensive body of knowledge in a specific field. These occupations require a high level of literacy and numeracy and well-developed interpersonal skills. Educational requirements usually include completion of secondary education and 1-3 years of study at a higher education institution and/or prolonged on-the-job training or experience. Examples include shop managers, technicians in various fields, legal secretaries, etc.
Skill level 4	Occupations at skill level four typically involve complex problem solving, decision-making and creativity based on an extensive body of knowledge in a specific field. These occupations require extended levels of literacy and numeracy. Educational requirements generally include 3-6 years of study at a higher education institution and the award of an associated qualification. Examples include managers, engineers, medical practitioners, musicians, teachers/lecturers, etc.

Structure and expected outcomes

This virtual conference is an opportunity for participants to:

- Better understand the link between Artificial Intelligence and TVET
- Discuss the impact Artificial Intelligence on intermediate skills or occupations
- Explore the role of national legal frameworks and policies/strategies that promote the improvement of the quality of TVET through Artificial Intelligence
- Identify obstacles to harnessing Artificial Intelligence in TVET
- Determine examples and practices of Artificial Intelligences impact on TVET, with a particular focus on intermediate skills and occupations

Insights gained from the conference will be incorporated into a discussion paper for further dialogue at the 2020 Mobile Learning Week conference.

The following threads will be opened for discussion and will remain open through the virtual conference period:

Thursday, 7 November	Thread 1	Impact of AI on the labour market and skills
Monday, 11 November	Thread 2	Innovative education and training pathways
Tuesday, 12 November	Thread 3	Innovative AI practices in education and training
Thursday, 14 November	Thread 4	Role of partnership in AI for education and training
Friday, 15 November	Thread 5	Barriers and enablers to AI implementation in education and training programmes

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Threads and leading questions

Thread 1: The impact of AI on the labour market and skills

Intermediate-skill occupations are occupations that generally require some level of post-secondary education and training, and include many of the occupations included in technical and vocational curricula. This thread seeks to collect views and evidence on how policy-makers and TVET institutions understand, track and interact with labour market shifts in relation to intermediate skill occupations. It will seek to gather information on contextual factors such as the data on which curriculum and programme decisions are made and the policy frameworks in which TVET institutions operate.

Leading questions:
- How are intermediate-skill occupations being affected by AI?
- What are the prominent shifts in the labour market being observed in developed and developing contexts due to the widespread use of AI? What are commonalities and points of divergence in these contexts?
- What data is available to policy makers on labour market shifts (training-to-work transition, work-to-work transition) and specifically the influence of AI on occupations? Please share examples, website or databases where possible.
- Does your country have a policy/national strategy that addresses AI and labour market shifts? What types of policy responses are being/should be pursued in the education and training space in response to AI and labour market shifts?
- How are governing structures of AI involved in reskilling efforts for the current and previous workforce?

Learning materials:
- NBER. 2019. *The Wrong Kind of AI? Artificial Intelligence and the Future of Labor Demand.* https://www.nber.org/papers/w25682.pdf
- MGI. 2018. *Skill Shift: Automation and the Future of the Workforce.* https://www.mckinsey.com/~/media/McKinsey/Featured%20Insights/Future%20of%20Organizations/Skill%20shift%20Automation%20and%20the%20future%20of%20the%20workforce/MGI-Skill-Shift-Automation-and-future-of-the-workforce-May-2018.ashx
- Nedelkoska, L. and Quintini, G. 2018. *Automation, skills use and training*. OECD Social, Employment and Migration Working Papers, No. 202, OECD Publishing, Paris. https://www.oecd-ilibrary.org/employment/automation-skills-use-and-training_2e2f4eea-en

Thread 2: Innovative education and training pathways

The field of education and training is changing with new and innovative offerings such as MOOCs and other forms of combined or distance education. Innovations are further being made in the areas of recognition of knowledge, skills and competencies, recruitment practices and links between jobs and people. Today, we see the strong presence of qualifications frameworks across more than 140 countries, and with at least 4 regional qualifications frameworks at different levels of development, not to mention the move towards the development of a continental qualifications framework for Africa (CEDEFOP, 2018). Slowly but surely, qualifications frameworks are being impacted by new thinking on digital credentials (Keevy and Chakroun, 2018) and also by emerging platforms that enable more authentic validation of learning records (Shiohira and Dale-Jones, 2019).

This thread seeks to determine the ways in which the TVET sector is responding to these changes, and to gather participant views and experiences with regard to new and emerging education and training pathways, including the influence of digital credentials, micro-credentials, MOOCs, skills development platforms and other similar initiatives.

Leading questions:
- How are/should education and training institutions developing curricula responsive to labour needs? What constitutes an "adequate timeline" for developing responsive curricula?
- How is the role of formal and informal learning changing in the era of AI?
- How are learners, employers and industries benefitting from new and emerging education and training pathways?

Learning materials:
- UNESCO. 2018. *Digital credentialing*: *Implications for the recognition of learning across borders.* https://unesdoc.unesco.org/ark:/48223/pf0000264428
- *AI's Impact on Education, Training, and Learning: Potential and Limitations.* https://www.youtube.com/watch?v=UmBQONLoIso

Thread 3: Innovative AI practices in education and training

AI has been used in education to improve administration and to augment teaching and learning. AI is built on databases that can include historical and current data; the algorithms identify trends based on this data that may not always be apparent to human examinations. Examples of AI applications in the education sector include predictive building maintenance, predictive enrolment, monitoring labour market trends and targeted learner support.

This thread seeks to understand how participants are currently or are planning to engage AI in their institutions; to identify success factors and obstacles in engaging with AI; and to determine how AI influences effectiveness and cost in these institutions.

Leading questions:
- What types of AI are currently employed by education and training institutions? What AI is employed by education policy-makers at the system level?
- What are the perceived/realized benefits and limitations of using AI in education and training?
- How is/can AI be leveraged for skills development, curriculum planning and training delivery/provision at the institution level?
- What kind of changes and/or differences have been observed in education and training outcomes between using AI and without using AI (or before and after using AI)?
- What kind of changes and/or differences have been observed in the cost of education and between using AI and without using AI (or before and after using AI)?

Learning materials:
- Popenici, S. and Kerr, S. 2017. *Exploring the impact of artificial intelligence on teaching and learning in higher education.* https://www.researchgate.net/publication/321258756_Exploring_the_impact_of_artificial_intelligence_on_teaching_and_learning_in_higher_education
- International Task Force on Teachers for Education 2030. 2019. *Exploring the use of Artificial Intelligence to support teachers and teacher development.*
- Gloss, A., Foster, L., Behrend, T., Blustein, D. and Chakroun, B. *Big data and ICTs for human-capabilities: Opportunities and challenges for skills- and human-development through the use of information & communication technologies (ICTs) and data-intensive science (big data) in TVET and the world of work.*

Thread 4: The role of partnership in AI for education and training

This thread seeks to understand the roles of different players in supporting the use of AI in education and training, and to what extent and how education and training institutions and policy-makers leverage partnerships in the integration of AI into their systems and processes. AI is an area with scarce skills, and practitioners are in high demand. As a result, they are difficult to draw to academia. This discussion will centre on what partnerships have been formed to improve the availability and use of AI for education and training.

Leading questions:
- What are the perceived and actual roles of different sectors (government, academia, third sector, private sector [chambers of commerce, industries, employers, trade unions, enterprises], learners, households, communities) in realising the benefits of AI in education and training?
- What kind of partnerships do education and training institutions develop with industries and employers?
- What partnerships have been formed between government, industry, academia, the private sector and/or third sector organizations in order to enhance or leverage the use of AI in education and training? What are the goals of these partnerships? Please provide examples where possible.
- What benefits do learners, employers and industries gain from partnerships? What benefits to direct and indirect beneficiaries result from partnership approaches?

Thread 5: Barriers and enablers to AI implementation in education and training programmes (including training at institutions and the workplace)

AI has uses both within and across institutions, including for system administration and governance, teaching and learning, and work-based components of education and training. This thread will discuss the enabling conditions and barriers to implementation experienced at the different levels at which AI is or could be applied.

Leading questions:
- What are some of the challenges institutions and education/training systems face in attempting to integrate AI into system and institution-level administration and teaching and learning (on training components at institution, at workplace)?
- What are critical success factors/enablers for integrating AI into systems and institutional practices?
- What ethical concerns are raised in the incorporation of AI into institutional and system practices? How can these concerns be addressed or mitigated?

Learning materials:
- World Bank. 2016. World development report 2016: *Digital dividends.*
  https://www.worldbank.org/en/publication/wdr2016
- UNESCO. *Artificial Intelligence in education: Challenges and opportunities for sustainable development.*
  https://unesdoc.unesco.org/ark:/48223/pf0000366994?posInSet=1&queryId=ab0a611c-407f-4704-97a9-33ec5788d3c8
- Furman, J. 2016. *Is this time different? The opportunities and challenges of Artificial Intelligence.*
  https://obamawhitehouse.archives.gov/sites/default/files/page/files/20161212_cea_nas_ai_furman.pdf

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About the moderators

Dr James Keevy is the Chief Executive Officer at JET Education Services, an independent public benefit organisation located in Johannesburg, South Africa. James is a policy researcher working in the education and training sector, and particularly in the post-school and technical and vocation education and training areas. He has conducted and overseen various initiatives related to national, regional and international qualifications frameworks in Africa and further afield. His research into qualifications, the recognition of learning, and the professionalisation and migration of teachers has been widely published and presented. He has represented JET in various international fora; for example, the 2019 TVET Sub-Regional Forum for Eastern Africa, "Skills for Youth Employment and Entrepreneurship" held in the Seychelles and supported by UNESCO-UNEVOC International Centre. James was part of the external peer review panel for the Guidelines for the Quality Assurance of TVET Qualifications in the Asia-Pacific Region developed and published by UNESCO Bangkok, working with Member States in the Asia-Pacific region. He contributed a chapter to the recently published Workforce Readiness and the Future of Work, edited by Fred Oswald, Tara S. Behrend, and Lori Foster. Under James's leadership, JET has maintained its status as one of the few non-governmental organisations recognised as a UNEVOC Centre.

Kelly Shiohira has worked internationally in the fields of language and literacy acquisition, teacher development and technology for educational improvement, and has applied these areas of expertise to curriculum and policy design, research design and implementation, strategic planning and monitoring and evaluation in the education sector. Kelly's recent work includes contributions to the UNESCO publication Artificial Intelligence in Education Compendium of Promising Initiatives and lead authorship of Interoperable Data Ecosystems: An International Review to inform a South African Innovation, published by JET Education Services. Kelly has widely presented at conferences on topics including curriculum design, integrating ICT into the classroom, AI and skills development, AI for teacher development, differential education in second-language learning, cultural adaptation, materials development in indigenous languages and evaluating the impact of ICT in the classroom. In 2019, Kelly represented JET Education Services at UNESCO's Mobile Learning Week and the International Conference on Artificial Intelligence and Education, where she presented on the intersection of AI and intermediate skills.