Commonwealth of Learning (COL) Chair Presentation

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INTRODUCTION

• Information on Commonwealth of Learning (COL)
• Information on COL Chairs
• Progress report on two projects
• Introduction to AI-empowered tutoring system
• Implications for AU
• Discussion and questions
The Commonwealth of Learning (COL) is an intergovernmental organisation created by Commonwealth Heads of Government in 1987 to promote the development and sharing of open learning and distance education knowledge, resources, and technologies.
53 countries working together to:

- Protect human rights
- Regenerate the environment
- Celebrate diversity
- Strengthen governance
- Create prosperity
- Boost trade
- Amplify the voices of small States
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• **Professor Mohamed Ally**, Faculty of Humanities and Social Sciences, Athabasca University (Canada)

• **Professor Mpine Makoe**, Institute for Open and Distance Learning, University of South Africa – UNISA (South Africa)

• **Professor Tadinada Venkata Prabhakar**, Department of Computer Science, Indian Institute of Technology Kanpur (India)
ISO COMMITTEES

- ISO/SC 42 – Artificial Intelligence
- ISO/SC36 – Mobile learning in education and training
UNESCO CONFERENCE

Artificial Intelligence for Sustainable Development

Programme

4-8 March 2019
UNESCO, Paris
# UN Conference on AI and Education

**International Conference on Artificial Intelligence and Education**

*Planning Education in the AI Era: Lead the Leap*

## Provisional Programme

**Beijing**

**People's Republic of China**

**16 – 18 May 2019**

### Day One: Thursday, 16 May 2019

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| 09:15 – 10:00 | **Opening Ceremony**  
Grand Ballroom (1st Floor of Building C)  
Chair: Hon. Mr CHEN Bacsheng, Minister of Education, People's Republic of China  
Speakers:  
- Mr CHEN Jining, Mayor, Beijing Municipal Government, People's Republic of China (TBC)  
- Ms Audrey Azoulay, Director-General, UNESCO  
- State leader of the Government of the People's Republic of China |
| 10:00 – 10:15 | **Break**                                                                |
| 10:15 – 12:15 | **Ministers’ Forum: Emerging policies and strategies for leveraging AI to achieve SDG 4** |
BEIJING CONSENSUS ON ARTIFICIAL INTELLIGENCE AND EDUCATION
We, the participants of the International Conference on Artificial Intelligence (AI) and Education, including 50 government ministers and vice ministers, as well as around 500 international representatives from more than 100 Member States, United Nations agencies, academic institutions, civil society, and the private sector, met in Beijing, People’s Republic of China, from 16 to 18 May 2019.
7. We also affirm that the development of AI should be human-controlled and centred on people; that the deployment of AI should be in the service of people to enhance human capacities; that AI should be designed in an ethical, non-discriminatory, equitable, transparent, and auditable manner.

10. Consider integrating or developing AI technologies and tools that are relevant for upgrading education management information systems (EMIS) in order to enhance data collection and processing, making education management and provision more equitable, inclusive, open, and personalized.
11. Consider also introducing new models for delivering education and training in different learning institutions and settings that can be enabled by the use of AI, in order to serve different actors such as students, teaching staff, parents and communities.

13. Dynamically review and define teachers’ roles and required competencies in the context of teacher policies, strengthen teacher training institutions, and develop appropriate capacity-building programmes to prepare teachers to work effectively in AI-rich education settings.
15. Support school-wide pilot tests on the use of AI to facilitate innovation in teaching and learning, drawing lessons from successful cases and scaling up evidence-based practices.

18. Be cognizant of the emergence of a set of AI literacy skills required for effective human–machine collaboration.

19. Set up mid- or long-term plans and take urgent actions to support higher education and research institutions in developing or enhancing courses and research programmes to develop local AI talent, in order to create a massive pool of local AI professionals who have the expertise to design, programme and develop AI systems.
• 29. Test and adopt emerging AI technologies and tools for ensuring teachers’ and learners’ data privacy protection and data security.

• 31. Support research, innovation and analysis on the effects of AI on learning practices and learning outcomes, and on the emergence and validation of new forms of learning.

• 42. Support the integration of AI skills into ICT competency frameworks for teachers and support countries in training teaching staff on working in AI-rich education settings.
The 4IR, AI, and Emerging Technologies: Sustainable Development and New Literacy Skills for Educators and Learners

Commonwealth of Learning Projects Update
What is the Fourth Industrial Revolution?

The Fourth Industrial Revolution (4IR) is changing the world because of new technologies that are combining the physical, digital, and biological worlds and impacting all disciplines, economies, and industries.
• Humans and machines becoming one being

• Super Human, Super Tutor/Teacher, Super Student

SINGULARITY
AREAS ASSOCIATED WITH 4IR

- Robotics
- Artificial intelligence
- Genomics – a genome is an individual complete set of DNA
- Autonomous vehicles/devices
- Mobile/ubiquitous computing
- Analytics
- Virtual/augmented/mixed reality
- Internet of things
- Metadata
- Blockchain
- Others – not yet identified
INDUSTRIAL REVOLUTIONS VS EDUCATIONAL REVOLUTIONS

1st IR

2nd IR

3rd IR

4th IR

Educ 1.0

Educ 1.0

Educ 1.0/2.0

Educ 4.0
4IR/AI AROUND THE WORLD

• United Arab Emirates (Minister of State for Artificial Intelligence)

• UNESCO – two conferences in 2019 dedicated to AI for sustainable development and education

• China has a plan to be the world leader in AI by 2030

• Countries developing smart cities using 4IR technologies (e.g., Barcelona)

• Smart colleges and universities (e.g., University of Texas at Austin)
PROJECTS

PROJECT 1. The 4IR, AI, and Emerging Technologies: Sustainable Development

And

PROJECT 2. The 4IR, AI, and Emerging Technologies: New Literacy Skills for Educators and Learners
INTRODUCTION

Urgency to adopt fourth industrial revolution (4IR) technologies in all sectors, including education

Lack direction on
- Technologies to use
- Integration of technologies
- Impact of technologies on education

Definitions & examples
- **4IR**: A digital revolution combining the physical, digital, and biological facets impacting the world
- **Education 4.0**: New era of education employing 4IR technologies that enable personalized, on-demand learning
- 4IR technology examples: Artificial intelligence (AI), augmented, virtual, and mixed reality (AR, VR, MR), big data/data analytics, blockchain, cloud computing, cyber-physical systems, Internet of Services (IoS), Interoperability, Internet of Things (IoT), mobile learning, smart/teaching factories
Project 1: Sustainability

Research questions

1. What role can the 4IR and AI play in future COL and global projects?
   A. What are the emerging 4IR and AI technologies?
   B. How can these emerging technologies be used to educate COL and global citizens?

2. What role can the 4IR and AI play in Sustainable Development for the COL and other countries of the world?
   A. What emerging 4IR and AI technologies can contribute to Sustainable Development for COL and other world countries?
   B. How can these technologies be used to provide services to COL and global citizens?
RESEARCH METHODOLOGY

Project 2: Knowledge and Literacy Skills for Educators and Learners

Research questions

1. What emerging 4IR and AI technologies knowledge and literacy skills do educators and teachers need to participate in projects in education?

2. What emerging 4IR and AI technologies knowledge and literacy skills do educators and teachers need to teach students?

3. What emerging 4IR and AI technologies knowledge and literacy skills do learners need to learn and work in the 4IR era?
Method

Qualitative study; three phases

1. Thematic review of relevant literature
   - Used university meta-database search engine
   - English language peer-reviewed journal articles
   - January, 2017 to June, 2019
   - Full text searches: keyword combinations for 4IR technologies, SD, and education

   Yielded
   - 374 unique titles
   - Full-text review using research questions
     = 98 articles for project

2. Interviews with emergent 4IR technology experts across the globe
   - academia, business/industry, government, civil service sectors

3. Review of interviewees’ recommended resources
RESEARCH METHODOLOGY

Data Analyses

1. Literature review
   – Synthesis of key themes related to research questions (completed)

2. Interviews
   – Potential respondent pool = 48; 12 completed interview process (25% response rate)
   – Co-coding of initial interviews to establish codebook, coding protocols, intercoder reliability (in progress; Nvivo 12 Plus software)
   – Co-coding of final interview to establish intracoder reliability (to do)

3. Relevant information drawn from interviewees’ recommended resources to
   – Add to literature review themes (to do)
   – Help build educator/learner competency profiles
   – Provide case study examples of emergent technologies for SDGs, etc.
RESEARCH METHODOLOGY

General Information on Interviewees

Countries
• Austria, Canada, Germany, Greece, India, Malaysia, Singapore, South Africa, UK, USA

Roles
• Canada Research Chairs, Corporate Business/Private Enterprise Founders, Government Officials, International NGO Representatives, Professors, UNESCO Commissioned Projects Representatives
PRELIMINARY RESULTS AND DISCUSSION

PROJECT 1

THE 4IR, AI, AND EMERGING TECHNOLOGIES:
SUSTAINABLE DEVELOPMENT
Preliminary Results and Discussion

4IR Technologies Listed in Articles and Interviews

AI; augmented, mixed, remote augmented, and virtual reality (AR, MR, RAR, and VR); big data; blockchain; cloud computing/technology; cyber-physical systems; deep learning; information and communication technologies (ICTs); intelligent tutoring systems (ITS); Internet of services (IoS); interoperability; Internet of things (IoT); machine learning; mobile learning; networking; robotics (including drones/UAVs); semantic web; Smart Factory; smart sensors; Teaching Factories; web of things (WoT)
Beneficial Technologies for SD

Blockchain - reduces reliance on human resources, improves efficient and effective delivery of services, as well as provides reliability, verifiability, transparency, and improved trust among all parties.

*Example from the literature:* Blockchain using smart cards to facilitate increasing migration to large urban centers (Hughes et al., 2019)

Smart buildings, cities, and other infrastructures employ IoT technologies to help achieve SDGs.

*Example from the literature:* Hangzhou, China is leveraging the Alibaba-Cloud ET City brain to forecast traffic patterns, detect incidents, and optimize traffic flow (Lou, 2018)
PRELIMINARY RESULTS AND DISCUSSION

PROJECT 2

THE 4IR, AI, AND EMERGING TECHNOLOGIES:
NEW LITERACY SKILLS FOR EDUCATORS AND LEARNERS
PRELIMINARY RESULTS AND DISCUSSION

Education 4.0

- Paradigm shift from 3IR to 4IR educational paradigm (Education 3.0 to Education 4.0)
- Holistic immersive real and virtual world learning environments developing numeracy, literacy, digital, social, critical thinking, moral, and creative problem-solving capacities
Beneficial 4IR Technologies for Learning

AI

- AI machine/deep learning to provide personalized learning; match learner to appropriate, just-in-time human and non-human learning resources
- Relieve tutor of mundane tasks (e.g., notifications and reminders, record-keeping)
Beneficial 4IR Technologies for Learning

IoT/IoS

- Learner use of information technologies and information systems without human intervention
Beneficial 4IR Technologies for Learning

Robotics (including drones or unmanned aerial vehicles; UAVs)

- Develop individualized learner programs and motor skills
- Adopt various roles – tutor, support worker, companion, learner
- Allow learner to program/manipulate robot at a distance using remote systems
Beneficial 4IR Technologies for Learning

AR/MR/RAR/VR

- Provide real-life situational experiences; enhance learner motivation, engagement, and interaction yielding deep, meaningful learning
Challenges for Implementing 4IR Technologies in Learning and Education

- The 4IR will lead to the demise of the traditional educational paradigm
- Formal education cannot keep pace with new technologies; impractical to focus on specific technologies due to rapid obsoletion
- Teacher illiteracy with 4IR technologies; what emerging 4IR technology knowledge and skills are most needed?
CONCLUSION

• Need to use 4IR technologies for “good”
• Education will play a pivotal role in the transition into the 4IR era
• Education 4.0 = personalized on-demand learning in dynamic, holistic, immersive learning environments
• Online/mobile learning will increase in 4IR era
• The 4IR will lead to the demise of the traditional educational paradigm
HOW AI/4IR RELATE TO AU STRATEGIC DIRECTION

- Beyond Open
- Beyond Place
- Beyond Now
- Beyond Norm
MOVING BEYOND THE NORM
Adopting Innovative Ideas, Taking Calculated Risks

• Our future is limited only by our imagination. We build on our rich history by embracing new possibilities and streamlining our existing processes for the betterment of our learners, ourselves, and our partners. We continue to embrace emergent technologies in recognition that technologies enable us to create access and enhance open and distributed learning environments of the highest quality. We take risks, seek out ideas, and adopt innovations to create clearly defined value-added outcomes. A culture of innovation and creativity in action will be the norm. External communities will look to Athabasca University for leadership in accessible, inclusive, innovative, and digitally enabled distributed learning.
Disruptive pedagogies advance pedagogical theory and practice by calling into question traditional views of education and training, including commonly held assumptions about how people learn and how learning can be nurtured and measured. This theme embraces a diverse spectrum of topics, including but not limited to best practices in the design and delivery of open, digital, distributed, and blended learning across educational settings and learners’ lifespans, with a particular emphasis on the measurement of learning outcomes and the use of non-traditional means to credential learning. It also addresses emerging technologies (e.g., artificial intelligence; augmented reality; immersive learning; gaming; learning analytics; robotics; virtual reality) and their potential for personalizing individual’s learning experiences, based on their specific learning styles and needs.
Create a Research Institute (Centre of Excellence) on “4IR technologies/AI in Online and Open Education”

Potential research areas:
  – AI for Good
  – 4IR technologies to reach the unreachable
  – Developing hands-on skills at a distance
  – Personalized learning
  – Remote labs
  – Intelligent (Smart) MOOCs (next generation MOOCs)
  – Others

Could help to stimulate research on “4IR technologies/AI in Online and Open Education”

Assist in getting research grants
Thank You

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