Foreword

Who will the learner be in 2035? A recent paper from Contact North describes this future learner as someone who uses MindClock to remind her of upcoming events, uses help from a Holographic Advisor Bot to plan for an assignment, uses advanced communication tools to learn from multiple language materials on the internet, takes several micro-classes simultaneously, and learns from home without attending physical lectures using tools that provide a virtual experience of real time events. This scenario presents a Smart Learning Environment (SLE) powered by Artificial Intelligence (AI), Virtual Reality (VR), Augmented Reality (AR), and robotics.

In the first industrial revolution when the steam engine was invented, higher education made a transition from being elite to one which anyone could aspire to. The second industrial revolution was marked by the assembly line and mass production, when it became possible to produce self-instructional booklets and offer correspondence courses. The rise of the computer and Internet in the third revolution led to the rise of open, distance and online learning. Today in the fourth revolution it is marked by AI and robotics leading to the phenomenal growth of SLEs.

Developments in technology will continue to drive changes in the way we teach and learn. The 2018 Horizon report finds that adaptive and mobile learning will impact higher education in the short term while the Next Generation Digital Learning Environment (NGDLE) and AI will be adopted in the medium and longer terms. The trends emerging from technology adoption will result in blended learning, measuring learning outcomes and re-designing learning spaces.

Already we have witnessed three major developments in the previous decade—Massive Open Online Courses (MOOCs) with their flipped classroom and global reach are disrupting the classroom lecture. Blockchain has the potential to challenge the authority of accreditation bodies and micro-credentials call into question the relevance of full degrees.

Today AI is beginning to create SLEs. An IBM report cites one example of the classic but renewed Intelligent Tutoring System (ITS) which uses AI techniques to simulate one-to-one human tutoring to provide timely feedback, all without the presence of a human teacher. As we know, timely feedback is essential for learner engagement and retention. Another popular example of AI in education is a Virtual Teaching Assistant at the Georgia Institute of Technology. This chatbot named Jill Watson offered personalized assistance to learners in an online course in computer science by using text messages. Throughout the course, the learners believed that this was a very efficient live teacher. Intelligent Textbook, a project at Stanford University, uses Inquire, an iPad App that combines a popular biology textbook with an AI system that answers questions about the content. These three examples represent the different dimensions of an SLE.

If an SLE is to be truly 'smart', it must go beyond technology to embrace the three E's. The first 'E' is equity. The costs and location of the emerging technologies in global centres, disadvantages people in remote areas—what policies and practices do we need to put in place to ensure that we don't widen the existing digital divide? The second is 'ethics'—to what extent will these technologies protect the privacy and safety of our learners? Lastly, as robotics become ubiquitous, how can technologies preserve the human quality of 'empathy' and teach learners this skill required for success in the twenty-first century?

This collection of case studies of SLEs from around the world is a rich source of good practices, options and solutions for both policy makers and practitioners. The valuable expertise and experience of the editors who assisted to collate and synthesize the case studies help us to make better sense of the emerging opportunities and challenges discussed in the case studies. While technologies are important to help create SLEs, it is ultimately the 'smart' teacher who will make the difference!

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