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Biography: Dr Wayne Holmes is an Assistant Professor in Learning Sciences and Innovation at the Institute of Educational Technology, The Open University (UK). He holds a PhD in Learning and Technology from the University of Oxford, an MSc in Education and an MA in Philosophy. At the Open University, he leads on Artificial intelligence in Education (AIED).

He is also a Visiting Associate Professor at the Universidade de São Paulo (Brazil), a Visiting Research Fellow at the Advanced Innovation Centre for Future Education, Beijing Normal University (China), and a research consultant for the Center for Curriculum Redesign (USA).

He has also co-authored three books about AIED: Intelligence Unleashed: An Argument for Artificial Intelligence in Education (2016), Technology-enhanced Personalised Learning: Untangling the Evidence (2018), and Artificial Intelligence in Education. Promise and Implications for Teaching and Learning (2019); while currently he is co-authoring a chapter on AIED for the forthcoming UNESCO report Global policy guidelines on ICT in Education.

SUMMARY OF EVIDENCE

For me as a learning scientist, to answer the session’s core question it is helpful to see it in its educational context. In fact, the impact of Artificial Intelligence (AI) on education is more complex than often portrayed. To begin with, at least three dimensions need to be considered: learning about AI, learning with AI, and learning for AI. Learning about AI involves learning what AI actually means (what it can do as well as what it cannot do), while dispelling the many myths that have grown up around it (for example, countering the popular discourse that suggests machine learning from big data is the only valid approach to AI). It also involves learning how to develop AI, training the future AI engineers, and inspiring children and young adults to explore AI programming (for example, see “Teens In AI”).

On the other hand, learning with AI, AI tools designed to support learning, is probably what most people think of when they consider the application of AI in education (AIED).
There are increasing numbers of student-facing AIED tools – such as the many ‘personalised learning’ adaptive systems. Yet again, things get complicated. While personalised learning sounds an obvious win, the benefits depend on the motivations. Personalisation can mean many different things. For example, it can mean the personalisation of learning pathways, enabling students to learn efficiently the same pre-set content; but it can also mean the personalisation of learning outcomes, giving students agency over their own learning, enabling them to self-actualise, to achieve their fullest individual potential. Most AIED personalised learning tools take the first approach, they focus on efficient individualised learning, removed from the influence of human teachers or human peers, preparing the students to sit standard examinations. But rather than prioritising efficiency, and automating existing practices, surely we should be developing AIED tools that help our students to become the best version of themselves that they can be? In any case, we also need to think about both the ethics and the practical implications of these pedagogical choices. In particular, we need to move from questions of “verification” (e.g., did I build the system right?) to “validation” (did I build the right system?): instead of asking whether the adaptive tool operates ethically, we need to ask whether adaptive tools are ethically justifiable.

The final dimension of AI and education is learning for AI, learning to exist in an AI-rich world, which is the most pertinent dimension for the APPG evidence meeting on education skills. In fact, while the meeting focuses on younger people, learning how to exist with AI is critical for everyone. How this can be achieved needs to begin with what’s known as Moravec’s paradox: while AI is strong at processes that can be challenging for humans (such as large scale mathematics, pattern discovery, and statistical reasoning), AI is weak at other processes that humans find relatively easy (such as self-directed learning, common sense, and value judgements).

This suggests that, for our increasingly AI-rich future, we need to focus on what makes us essentially human, on what we can do that computers cannot. In particular, If we are to going to live successfully in a world that is increasingly dominated by AI, we need to go beyond simplistic approaches to education that prioritise knowledge acquisition and computational skills, as is typical of exam-focused classroom practices and is replicated by most AIED tools, because these are the skills in which AI is strong. Instead, everyone needs to strengthen those human skills in which AI remains relatively weak, such as critical thinking, creativity, collaboration, communication, literacy, flexibility, social skills, and common sense. Although sometimes AI can imitate these so-called 21st century skills, it is unlikely to be able to accomplish them to human levels anytime soon. In other words, instead of humans trying to compete with AI on its terms, AI might be recast in a supporting role (as augmented rather than artificial intelligence). All of this will require alternative classroom practices, moving away from didactic instruction and standardised testing, to focus on active learning, project-based learning, collaborative problem-solving, and productive failure, all supported judiciously by appropriate guidance and occasional instruction.

In summary, the skills that all of our citizens, young and old, will need to survive and thrive in an AI-rich world are those skills that make us essentially human, the skills that computers don’t have, and won’t have in the foreseeable future. These are the so-called 21st century skills of critical thinking, creativity, collaboration, communication,
literacy, flexibility, and social skills, all of which can best be fostered by guided active learning, potentially supported by AI. These are also the skills that many of the world’s leading companies increasingly demand, the skills that AI is a long way from being able to automate, and the skills that make us essentially human. Achieving this will require the involvement of many stakeholders. In particular, we need government to recognise that AI’s huge potential is being wasted if all we are doing is reinforcing, albeit making more efficient, existing classroom practices. We also need government to foster an AI for education eco-system that involves educators and learning scientists as well as computer scientists and entrepreneurs, which includes funding for research specifically at the intersection of AI and education, and in which researchers and developers can begin to explore more innovative approaches to teaching and learning.