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JOURNAL OF INTERACTIVE MEDIA IN EDUCATION

Book Review – 2021

BOOK AND EBOOK REVIEW

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ABSTRACT

The following publication contains book reviews of these titles:

- Bearman, M., Dawson, P., Ajjawi, R., Tai, J., Boud, D. (eds.) (2020) Re-imagining university assessment in a digital world. The Enabling Power of Assessment 7. Springer, 296 pages, *https://doi.org/10.1007/978-3-030-41956-1_2*
- Yu, S., Ally, M., Tsinakos, A. (eds) (2020) Emerging technologies and pedagogies in the curriculum. London: Routledge, 463 pages, ISBN 978-981-15-0618-5
- Morgana, V., & Kukulska-Hulme, A. (eds.) (2021) Mobile assisted language learning across educational contexts. Routledge, 152 pages, ISBN: 9780367521745
- Holmes, W., Bialik, M., Fadel, C. (2019) Artificial Intelligence in education: Promises and implications for teaching and learning. Boston, MA: Center for Curriculum Redesign, 228 pages, ISBN 1-79429-370-1; 978-1-79429-370-0

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REVIEW 1: *RE-IMAGINING UNIVERSITY ASSESSMENT IN A DIGITAL WORLD. THE ENABLING POWER OF ASSESSMENT 7* (MARGARET BEARMAN, PHILLIP DAWSON, ROLA AJAWI, JOANNA TAI, DAVID BOUD)

Review authored by: Jane Andrews, University of the West of England, UK

Review of: Bearman, M., Dawson, P., Ajjawi, R., Tai, J., Boud, D. (eds.) (2020). *Re-imagining university assessment in a digital world*. The Enabling Power of Assessment, vol 7. Cham: Springer. 296 pages. Print ISBN: 978-3-030-41955-4; Online ISBN: 978-3-030-41956-1.
https://doi.org/10.1007/978-3-030-41956-1_2

This edited collection has twenty chapters covering a wide range of aspects of the title area: "Reimagining university assessment in a digitised world". The authors come from different parts of the world (Australia, UK, USA) and the collection stems from a symposium held in 2017 in Deakin University, Australia. The theoretical and the practical are combined in the collection to create a set of stimulating, critical and future-facing pieces that are likely to resonate with, and offer innovative thinking to, a wide range of higher education practitioners (e.g. lecturers, learning technologists, administrators, leaders of learning and assessment). The areas explored range from those which might be expected in a text dedicated to what digital resources have to offer university assessment practices: big data, learning analytics and AI on the one hand, to reconsiderations of more traditional aspects of assessment, namely peer and self-assessment and dialogic feedback. What makes this collection additionally interesting is the incorporation of issues such as ethics in educational assessment practices, a topic not generally included in research and practice-based work on educational assessment. A common feature of the chapters, also a relative novelty in discussions of digital technologies in education, is a detailed critical examination and problematisation of universities' current practices with existing digital tools.

The twenty chapters in the collection are divided into five sections, with the first and last serving as an introduction and a conclusion. The three central sections each have an orientation explaining the unifying theme for the chapters contained within it. Section 2 explores the changing role of assessment in the digital world and includes both innovative thinking and critique of existing practices. Section 3 is shorter, with 5 chapters, as opposed to the 7 chapters in section 2, and focuses on the role of big data in re-imagining assessment. Section 4 has 7 chapters which are brought together under the heading of "practical exemplars", indicating the commitment of the collection to offer readers insights into what is already being implemented in digital assessment practice. Space will not allow for this review to consider each of the twenty chapters separately so a selection of themes and questions raised across these three central sections are now highlighted, and it is acknowledged that this is a necessarily subjective process based on this reviewer's interests.

The first theme this reviewer is intrigued by is the critical engagement with how universities currently tend to conceptualise and operationalise assessment within programmes of study. A message which occurs several times is that assessment has not tended to keep up with either digital innovations or with developments in teaching and learning theories and practices. In Chapter 16, Cain, Tubino and Krishnan explore how a shift from focusing on students' marks to their outcomes can be facilitated by the web application Doubtfire. Screenshots are included in the chapter showing how this portfolio-based approach can facilitate formative feedback and support students in self-regulated learning. This approach is in direct contrast with what the authors of Chapter 2 refer to as "legacy practices" (p. 7) of assessment, which have a heavy bias towards text-based assessments (e.g., essay writing) in much of the sector. In a further critique of the status quo, in Chapter 1 by Dawson, Ajjawi, Bearman, Boud and Tai, the authors observe that for assessment to be fit for purpose in the digital world within and beyond universities, there need to be assessment practices which do more than merely use digital tools to reproduce the traditional ways of assessing learning. These critiques and exemplars of innovative practice are all signalled in the title of the collection which alerts readers to the necessity of a "reimagining" of assessment.

A second theme which is prominent throughout the collection is the value in prioritising students' agency in their learning and assessment. In Chapter 3, Bearman, Dawson and Tai discuss the ethics of the use of student data in currently-used digital systems. They ask questions such as who owns the digital artefacts produced by students and stored on university servers and is it ethical to preserve such artefacts when they may be accessed for purposes not originally envisaged? The case of fitness to practice is given as an example. The authors propose an approach to enhancing students' own agency within their educational experience to address these ethical questions. They give the example of an assessment task in which students are provided with data which has been gathered on their participation in a particular module and they are asked to provide a reflection on this surveillance of them as learners. The task is designed at one and the same time to expose the power and potential problems of learning analytics data while at the same time making it the object of focus for assessment, thereby serving to build students' critical skills.

A final theme explored in this review is the need for a link between learning and assessment in higher education with life beyond the university, including consideration of employability. The design of university curricula with an emphasis on an employability agenda has been critiqued within the research literature on higher education (see, e.g., Stoten 2018). However, in this collection the benefit of HE assessment remaining aligned with digital practices in workplaces and in wider society is seen as essential. As such, various authors in this collection offer ideas for how digital assessment practices can prepare students for a rapidly changing world. In Chapter 5 by Bearman and Luckin, the authors offer a consideration of what the similarities and differences are between artificial intelligence and human intelligence, exploring what this could mean for the design of digital assessment tasks. The authors note that already in workplaces machine learning is integrated into everyday tasks, with an example given of police using facial recognition software. Given that this integration is already in place, the authors propose that integrating AI into university assessment can provide another form of authentic assessment, a concept explored in the assessment literature although not always tied to digital technologies. In Chapter 1 the idea of students producing social media artefacts as part of an assessment portfolio is proposed in a similar vein, as a way of mirroring the skills and activities in which students will need/want to engage in their life beyond their university studies.

In conclusion, this collection is a stimulating read which should be of interest to a range of professionals involved in the many aspects of digital assessment design and practice in higher education. The editors and authors take care in contextualising their arguments and exemplars while ensuring that readers will be able to apply the thinking and ideas to disciplines beyond the contexts given. The editors make a compelling case for all involved in digital assessment to ensure that our digital practices do not "lock in" (p. 8) traditional ways of conducting assessment. This collection provides a rich array of examples of how we can move towards what is promised in the title, that is to say, a "reimagined" set of HE assessment practices to address the changing digital practices prevalent in the world beyond academia.

REVIEW 2: *EMERGING TECHNOLOGIES AND PEDAGOGIES IN THE CURRICULUM* (SHENGQUAN YU, MOHAMED ALLY, AVGOUSTOS TSINAKOS)

Review authored by: Saswati Chaudhuri, University of Jyväskylä, Finland

Review of: Yu, S., Ally, M., Tsinakos, A. (eds.) (2020). *Emerging technologies and pedagogies in the curriculum*. London: Routledge. 463 pages, ISBN 978-981-15-0618-5

This book perfectly encapsulated the theoretical and research-based views needed to understand emerging technologies in the present day and what needs to improve. In order to access modern emerging technologies in education, both students and teachers need to be abreast with digital skills. In this book review, I have presented some examples and arguments to open discussions about the use of emerging technologies in the classroom.

As Professor Chan mentioned in the foreword, "emerging technologies lead to emerging pedagogies". This statement carries an important fact. When a new technology emerges, education systems must be flexible enough to integrate it into current and future pedagogical

approaches. In the present day, technology is evolving rapidly, and teachers need to keep up with it. In Chapter 1, I agree with Parsons et al., who pointed out that educators find it difficult to foster the digital skills mentioned in the curricula through classroom activities. In continuation, Ilona-Elefteryja, Meletiou-Mavrotheris and Katzis from Chapter 7 highlighted that teachers could face this difficulty due to a lack of confidence, less awareness of the new technologies, and a fear of adapting new technologies, especially those offering student-centered approaches. These challenges could be addressed by involving training in emerging technologies in professional development programmes. An example of a teachers' professional development programme to promote the use of augmented reality (AR) was explained in detail in Chapter 7, demonstrating one way to tackle teachers' awareness issues through hands-on use of AR in the classroom.

As researchers, we often look for information related to theoretical and philosophical foundations of a phenomenon. In this book, Wark and Ally in Chapter 6 gave a detailed description of the evolution of theoretical foundations and paradigm shifts in teaching and learning that accommodate emerging technologies in the curriculum. They explained three main approaches to learning, namely, pedagogy, andragogy, and heutagogy. Pedagogy consists of what to learn, andragogy describes how to learn and heutagogy refers to self-determined learning. In heutagogy, teachers are mere facilitators and learners are responsible for their own learning. The *"paradigm shift model"* suggested that a learner shifts between pedagogical, andragogical and heutagogical environments based on their needs. In addition, learning is neither linear nor hierarchical but a messy, dynamic and complex process. Therefore, the *"paradigm shift framework",* which was a combination of *"paradigm shift model"* and *"omni-tech taxonomy",* could help in identifying the prevalent paradigm and what emerging technologies need to adopt to enable learners to be responsible for their learning outcomes. It seems that as learners we keep switching between pedagogy, andragogy, and heutagogy based on our ability to learn and reflect.

Another noticeable feature of this book is the mention of examples in relation to integration of emerging technologies in the classroom. Nearly all the chapters mentioned practical solutions and suggested improvements in current trends. In Chapter 8, Grimus listed examples that involve emerging technologies. Along with these examples, Grimus discussed the need to re-think the roles of students and teachers in relation to the use of emerging technologies. Today, a teacher practices coaching rather than teaching. With regards to being a good digital citizen, teachers need to discuss how to ensure safety on the internet, identify fake news, and tackle plagiarism. Therefore, in order to stay updated with emerging technology, teacher education needs to change as well to support educators in all the roles that they are required to play.

In my opinion, emerging technologies play a very important role in providing individual instructional support to students in terms of their learning needs and behaviour. In Chapter 9, Poirier and Ally provide in-depth insight into learning styles and how emerging technologies can be useful in managing different learning styles. They highlighted that teachers need to consider students' learning preferences, multiple intelligences and cultural differences to ensure optimal learning conditions in the classrooms. In addition, Buckreus and Ally in Chapter 4 highlighted how new technologies like machine intelligence (MI) are playing an important role in re-shaping teachers' roles. In particular, the teacher is increasingly playing a supportive role to the learners, who are responsible for their own learning through seeking, evaluating and synthesizing knowledge from various sources. In the future, MI must focus on designing machines that can manage complex student modelling and automate personalized learning paths by collecting complex data that informs teachers of the required instructional support and intervention. However, the authors also mentioned that teachers' presence is as essential as ever, even in settings that use MI for planning the interventions for students. Therefore, instead of taking over the whole learning process alone, emerging technologies should become a part of the social environment and contribute to learners' collective and individual knowledge construction.

This book also consists of research-based evidence in relation to the use of virtual reality (VR) in K-12 education. Tilhou, Taylor, and Crompton in Chapter 10 demonstrated the 3D VR facilitated pedagogical approach in inquiry-based learning. This approach resulted in students' improved academic performance, motivation and learning experiences. However, the authors highlighted the need to conduct more research on the use of VR with younger students. Another research-

backed method was shown in Chapter 18 by Meletiou-Mavrotheris, Charalambous and Mavrou, involving cultivating reading literacy with online experience books of "virtual augmentation". In this study, augmented reality was used in a professional development programme called "Augmented Teacher". The aim was to functionally integrate AR technology with teachers' curricular ideas, promoting children's love for reading. The book also provided several research-based articles highlighting the importance of using mobile learning in the classroom. For example, Hanbidge et al. in Chapter 20 provided evidence for improving learning opportunities among undergraduate students on an academic integrity course using mobile technology. In addition, mobile applications are increasingly being used in higher education curricula, for example, teachers are being trained to use *Mobler app* to implement seamless learning in the classroom as shown by Glahn and Gruber in Chapter 2.

Besides highlighting the promise of emerging technologies and providing examples of current best practice, the book provided an easily accessible discussion on issues and opportunities that need to be investigated further. For example, Rizk in Chapter 26 provided an overview of how and why digital tools could transform student engagement in the 21st century. The author pointed out that digital tools alone cannot transform students' engagement. Digital tools need to be integrated in teacher training and teacher pedagogy. In addition, digital tools could create more "isolated rituals" rather than "energized rituals" in group settings. In my opinion, this is a valid concern. Digital tools may not always provide multi-modal support for students. Therefore, it is dependent on the teacher as to how technology is integrated into their teaching practices. The book presents a realistic picture in relation to the struggles of integrating emergent technologies in curricula. Although it is exciting and beneficial to use technology in the classroom, teachers and students need to feel empowered to judge for themselves whether that technology contributes to their goals.

In conclusion, I would like to highlight that this book is a must read for teachers, researchers, policy makers and ed-tech enthusiasts who are keen on integrating emerging technologies to support deep learning. The content provided here is eye-opening and offers multiple well-researched perspectives. The authors of every chapter have provided exhaustive reference lists for further examination of the topics, along with supportive illustrations while explaining theoretical frameworks. I thank the authors and editors for a detailed look at this timely topic.

REVIEW 3: *MOBILE ASSISTED LANGUAGE LEARNING ACROSS EDUCATIONAL CONTEXTS* (VALENTINA MORGANA, AGNES KUKULSKA-HULME)

Review authored by: Lingwang Kong, Elomaan Koulu, Finland

Review of: Morgana, V and Kukulska-Hulme, A. (eds.) (2021). *Mobile assisted language learning across educational contexts*. Abingdon: Routledge. 152 pages. ISBN: 9780367521745.

To begin with, Chapter 1 (*Mobile Assisted Language Learning across Different Educational Settings* by Valentina Morgana) of this book set a solid foundation for Mobile Assisted Language Learning (MALL) with a clear message: growing usage of mobile technologies, such as mobile phones and other portable devices, has proved to be particularly productive in foreign and second language learning. With that in mind, the chapter author makes an important observation, that there is limited research on MALL and its associated methodologies and practices in wide-ranging educational contexts. I absolutely agree with this idea that there is a need to cover a wider range of contexts, including young learners all the way to university students. The book illustrates the potential of MALL in any age range of language learners by providing a wide range of research studies in the remaining chapters. However, while attention has been paid by MALL researchers to a wide variety of contexts, Chapter 1 indicates that the focus of studies is often on learning vocabulary and grammar. As an English as a foreign language (EFL) teacher, I think the field would benefit from more research on the functional parts of language learning and how MALL could help communication and improve cross-cultural competence.

Chapter 2 (*Unreported MALL Studies* by Jack Burston) focuses on MALL meta-analyses and depicts a serious situation, showing how MALL research has been published in journals that

have a focus not tightly linked to the topic, and moreover that MALL remains underrepresented in more related journals. For example, I was astonished when the author observed that in journals that have strong links to MALL (e.g., educational technology-related, mobile technology publications and journals devoted to the teaching of specific languages) the vast majority of publications are loosely or not connected to language learning or teaching. Among these journals, many studies are focused on the technological aspect, such as "application designs, prototype evaluations, mobile app reviews, mobile device ownership" (p. 11). Therefore, as an urgent matter, more research should be done on MALL-related topics. Again, this chapter mentioned how the most common focus of studies has been on vocabulary acquisition. Vocabulary is admittedly one important aspect in language learning, however there are other language learning aspects that need researching. An unintended consequence of the focus of research on vocabulary acquisition is that it is likely these findings will lead to vocabulary-focused teaching practices.

Another important insight from Chapter 2's meta analysis is that, though there are an increasing number of longitudinal studies taking place, shorter MALL studies (less than eight weeks) made up nearly 95% of the field. From the perspective of second language acquisition, language pedagogy, as well as mobile technology use, it is clear that eight weeks are not sufficient to see long-term results, which is the primary goal of many language learners.

Chapter 3 *((Re-)contextualising Storytelling with Children in English L2* by Maria Bortoluzzi, Elisa Bertoldi and Ivana Marenzi) investigates storytelling, which is based on the pedagogies of multiliteracies, mobile assisted language teacher education, and storytelling for children. The chapter first explores how mobile technology has benefited teacher education and then later extends to children who have listened to stories at a distance during the COVID-19 pandemic. As both in-person and online storytellers, student teachers have benefited a lot from mobile technology in terms of their story preparation and implementation. However, the chapter authors also worry that there was a fair amount of time pressure when educators and narrators responded and reacted with mobile communication during the pandemic.

Chapter 4 (*Effects of an Extensive e-Book Reading Programme on Middle School EFL Students* by Morgana and Pavesi) finds that students gained increased vocabulary after an eight month project which involved reading 16 beginner-level e-books (Common European Framework of Reference for Languages, levels A1 and A2) alongside their regular EFL classes. Firstly, the longer duration of this study should be praised. Secondly, however, by looking at the vocabulary gains (average about 7 words, which means less than one word a month), I wonder if it is pedagogically significant considering the long duration and possible time spent on this project? Thirdly, from a method perspective, it would have been interesting to see a comparison group as well as a control group. For example, a group reading the same books but in a paper format. Nevertheless, it was still fascinating to see the rich analysis of "qualitative and quantitative results of vocabulary items" (p. 70) in this study as it provides an in-depth angle of a pedagogical approach to teaching vocabulary.

Chapter 5 (*Participants' Perceptions and Perspectives of Intercultural and Social Inclusion in an Award-Winning Virtual Exchange Project* by Lisa Griggio and Sara Pittarello) discussed a virtual exchange program between universities, where students were given the autonomy to choose the mobile platform they would like to use. It was enjoyable to read that the platform gradually shifted from Facebook and WhatsApp to Skype. Gladly, the study showed students developed linguistic skills and cultural awareness through this virtual program, where the lighter atmosphere allowed participants to be braver and worry less about accurate language communication. This chapter showed how successful MALL could be with adult learners, highlighting the opportunities for learning languages other than English. With the ongoing pandemic situation and a shift for universities to online activities, virtual pair and or small group exchange fits into the current educational context well. As the authors noted, there were dropouts during the courses. Of course, this was not the focus of the study discussed in the chapter. However, it would be extremely interesting to further investigate why some chose to drop out.

Chapter 6 (*Mobile Collaborative Activities and Learner Metacognition* by Peter Ilic) investigated how mobile phones have helped students to use small chunks of time in one of their university courses. Almost everyone in the study gave positive feedback on using their phones for language learning activities. Communication among students with phones was clearly strengthened and

students became more engaged with learning activities as well. Moreover, students' agency was also enhanced, and they could learn more from each other too. However, as a student participant in this chapter mentioned, the mobile phone acted as a reminder for his/her own learning, and it could be that this reminder might be too frequent in their daily lives and become a source of stress. Methodologically, one critique of this chapter was the lack of detail on the data collection process. Considering the Japanese hierarchical culture, participants might have chosen not to voice negative opinions.

To conclude, this book provides us with a great opportunity to understand MALL applications within a large range of educational contexts. It is without any doubt a recommended read for language educators and researchers.

REVIEW 4: *ARTIFICIAL INTELLIGENCE IN EDUCATION: PROMISES AND IMPLICATIONS FOR TEACHING AND LEARNING* (WAYNE HOLMES, MAYA BIALIK, CHARLES FADEL)

Review authored by: Moira Sarsfield, Imperial College London, UK

Review of: Holmes, W., Bialik, M., Fadel, C. (2019). *Artificial Intelligence in education: Promises and implications for teaching and learning.* Boston, MA: Center for Curriculum Redesign. 228 pages. ISBN 1-79429-370-1; 978-1-79429-370-0

Artificial Intelligence in Education: Promises and Implications for Teaching and Learning is a short publication (228 pages in total), which is published by the Center for Curriculum Redesign (CCR), "an international convening body and research center seeking to expand humanity's potential and improve collective prosperity by redesigning K–12 education standards for the twenty-first century" (p. 224). The authors are Dr Wayne Holmes, a faculty member in the Institute of Educational Technology at the The Open University in the UK and a consultant researcher at CCR; Maya Bialik, Research Manager at CCR; and Charles Fadel, founder and chairman of the organisation. These are educational thought leaders, who aim to create a new vision for education in the twenty-first century.

The book begins with a short *Introduction* which asserts that artificial intelligence (AI) will have a significant transformative impact on the world, as evidenced by the growing investment in start-up companies in this field. However, they suggest that, while artificial intelligence in education (AIED) offers profound possibilities, these are currently overhyped. They propose that the book will introduce this topic and "provide the right balance between reality and hype … between true potential and wild extrapolations" (p. 1). They also caution that this is not an academic work, but rather a clear and concise exploration of the current landscape and future possibilities, intended for an audience including policymakers, curriculum designers, teachers and IT specialists.

The main text is divided into two sections that explore respectively *what* curricular changes should be made as a result of developments in AI and *how* AI may be used in education.

The *What* section provides a coherent argument for changes that should be made to curricula to address today's circumstances, where information is ubiquitous, and for a future in which many current tasks will be undertaken by machines. The authors emphasise the need for versatility, and they counsel that education should aim to provide students with a general understanding of concepts in multiple domains and the facility to transfer knowledge from one domain to another. Here they build on the ideas of Perkins (2014: 38), who asserted in his book *Future Wise* that "Basic education should build expert amateurism more than expertise. The expert amateur understands the basics and applies them confidently, correctly, and flexibly."

Given that detailed information on all topics is now readily available and searchable, content delivery is no longer the key requirement of education; concepts are now king. It is therefore suggested that detailed examples should be introduced primarily to explain concepts, with illustrations from multiple disciplines being used to reinforce learning of the key idea and to provide practice in transfer of knowledge between domains. The *What* section of the book follows this approach itself, providing an overview of the ideas surrounding review of the curriculum, illustrated by specific examples drawn from different fields. More detail is provided

in an appendix, which details several cross-curricular 'literacies' that are seen as important to supplement disciplinary understanding. I found these arguments persuasive and well illustrated within the text.

One aspect that is not discussed in the *What* section is the transition from generalist to specialist: how does the 'expert amateur' develop into an expert in a particular discipline, which is a requirement for higher education and practice in specialist fields? This omission may reflect the focus of the CCR on K–12 education. However, many of the concepts that are discussed, such as removal of content and an emphasis on interdisciplinarity, are very relevant to curriculum review in higher education.

The *How* section of the book follows a different approach; rather than focusing on the concepts of artificial intelligence in education, a long section (over 60 pages) describes multiple examples of AIED. This is followed by a shorter section (12 pages in length) that explores the social consequences of AIED, focusing on some key ethical and moral issues. An appendix provides further information on the general techniques of AI, applications outside education, and the stop-start progress of the field since its foundation in the 1950s.

The *How* section covers neither the practical difficulties of developing AI systems for educational use nor the limitations of the technology, and it is unclear throughout the section which tools and technologies mentioned are historical examples, which are prototypes or research tools, and which are products that are available for use in classrooms today. There is also very little detail on evaluation of the technologies described. I was initially concerned that this approach – highlighting the use of AIED without placing it in a conceptual framework and without a concomitant critical analysis – does not provide the reader with the knowledge to evaluate and question the use of these tools. But then I remembered that I (an edtech practitioner working in higher education), and probably most other readers of *JIME*, are not really the intended audience for the book, and the authors have not set out in this work to cover the topic from an academic perspective. Rather they are seeking to demonstrate the potential of the technology to educational stakeholders who are unfamiliar with this area, without burdening these readers with detail and qualifications. But there are footnotes, which provide links to further information for those who wish to delve deeper. These include, for example, an excellent overview of currently available technology-enhanced personalised learning for K–12 education, incorporating details of evaluation (Holmes et al. 2018); a typically challenging article by Audrey Watters (2015) on machines taking over instruction; a description of 'the centaur' – half human/half AI – as an optimal end-point (Case 2018); and a robust questioning of how AI is portrayed to the public (Robitzski 2018).

An interesting aspect of the *How* section, especially in relation to the points raised by Watters, is the discussion of the respective roles of the teacher and the technology in an AI-enhanced classroom. An argument is made for redefining AI as 'Augmented Intelligence' – or perhaps we should adopt IA 'Intelligence Augmention', as coined by Case – because the goal for classroom-based AI is that the machines will augment, but not replace the role of the teacher. Likewise, input from teachers is required on an ongoing basis to define, train and review the AIED technologies.

Assessment of learning is considered only briefly, although it is a key component of AIED. The authors quote the observation of Andreas Schleicher, director of the OECD's Directorate of Education and Skills, that "What is easy to measure is also easy to automate" (p. 6). However, the inverse is not explored: how can we automate aspects of learning that are hard to assess? It is suggested that AIED is currently most prevalent in mathematics, physics and computer science, because these are well-structured and clearly defined disciplines; the same qualities that also make these subjects (relatively) easy to assess, at least at a basic level. To enable wider adoption of AIED, progress will be required in automating assessment techniques for other disciplinary areas and for cross-curricular competencies.

Overall, the authors have produced an accessible overview for their intended audience. However, in my opinion, their aim of presenting a balanced assessment has not been entirely achieved, especially in the discussion of AIED tools.

COMPETING INTERESTS

The authors have no competing interests to declare.

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