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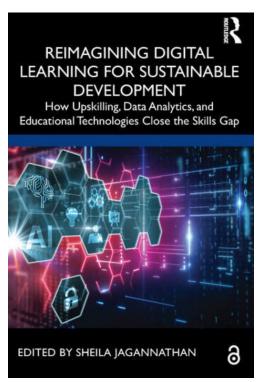
Book Review: Reimagining Digital Learning for Sustainable Development: How Upskilling, Data Analytics, and Educational Technologies Close the Skill Gap

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The intent and content of this book are clearly reflected in the book title—and this straightforward style is appreciated. I have seen some of the recently published books related to education and development, information and communication technologies (ICT) for development, digitalization and development, and other related themes. This is the first book to cover a broad spectrum of the area of digital education for sustainable development, effectively and systematically collating the areas of education and learning, digitalization, and sustainable development. Some books have gone into critical discourses (I would say critical romanticization) on these areas of contemporary concern, but this book judiciously combines theories and practices within the most urgent practical concern of sustainable development. The editor, Dr. Sheila Jagannathan, is a well-known global practitioner, staff developer, and policy influencer in this area which is of significant concern among national governments and global multinational organizations, as well as teachers, trainers, and other practitioners. Dr. Jagannathan has brought together experts in the field to reflect and focus on their themes, combining theories and translating discourse into practical applications and further reflections. The 27-chapter book has been organized into 8 themes—learning in the 21st century, innovative pedagogies, new models for deeper learning, cases of digital and blended learning, open resources, smart technologies and tools, data analytics and credentials, partnerships. The book is enhanced by the editor's thought-provoking conclusion.

In the first section, Theme 1 deals appropriately with 21st century learning through four chapters, the first two written by Dr. Jagannathan. In the first chapter, she highlights the deeper concerns of global learning poverty and the need for strengthening learning and learning skills as well as reskilling and upskilling vis-a-vis the United Nations' fourth sustainable development goal. This warrants massive institutional and individual capacity building, as well as involvement of other stakeholders noting that "leveraging technology is the only solution possible to provide high-quality learning (skilling) at a massive scale" (p. 13). In the second chapter, Jagannathan argues for the necessity of more educational technology innovation and digital learning. The unprecedented phenomenon of COVID-19 has demonstrated the need to go beyond Zoom and Google approaches to that of collaborative, engaging, and reflective learning. The author appropriately argues for blended learning, active learning, connected learning, and virtual facilitation of learning, which can facilitate the reduction of skill gaps while building appropriate skills and competencies to deal with the changing nature of work, jobs, and careers.

In the third chapter, Dede and McGivney analyze lifelong learning for jobs that, while yet to come, are clearly present at the border of centre stage. The authors plead for going beyond educational silos to more lifelong learning beyond formal educational training as well as the training provided by the employers. Some of the examples of technology-enabled learning opportunities and sites should be handy for readers.

The last chapter in this section by Ryan Watkins describes various types of diverse decisions that leaders, academics, staff, and other stakeholders make regarding impacts, outcomes, and outputs so that effective digital transformation of learning can occur. The author provides an implementation pathway comprising: (a) assess and analyze-design; (b) develop-implement; (c) improve-manage; and (d) support. The provision of short example cases and guidelines stress the need to change mindsets and make forward-looking choices.

In the second section, four chapters, written by specialized scholars in the field, focus on innovative pedagogies. Jagannathan takes the lead by appropriately collating a conversational dialogue on pedagogy for the digital age with Tony Bates, who argues that teaching methods do not depend on delivery modes and technology deployed, though each media and technology has its own language. Appropriate media selection could be guided by the SECTIONS model (revised from ACTIONS): students, ease of use, costs, teaching functions, interaction, organizational issues, networking, and security/privacy. Bates posits that effective and judicious blended learning could be qualitatively more enriching than a single or supplementary mode of delivery. In the next chapter, Som and Sharishna present the case for effective pedagogic interventions to develop practitioners' skills, based on cases from the South Pacific. These authors argue for and describe three pedagogic choreographies related to models of learning and teaching, approaches for assessing learning outcomes, and institutional accreditation and certification. They stress scenario- and problem-based learning, to which project-based learning may be added.

In the seventh chapter, Ehlers focuses on the issue of quality, discusses various quality standards in digital learning, and argues that there should be congruence between quality standards and "requirements of learning in new digital culture" (p. 82). Technology provides for immense learning opportunities and processes. Readers should consider some of the good practices outlined in the chapter—self-evaluation, e-portfolios, peer reflection, peer assistance—and the suggestion that economics of quality assurance should not neglect the requirements of quality standards. In the last chapter in this section, Peter Evans critically

reflects on capacity building in complex digital education, with due consideration to the digital environment itself, digital equity, digital credentialing, and use of artificial intelligence for capacity building, using the case of *Manifesto for Teaching Online* developed by the University of Edinburgh.

The third section, with three chapters, deals with various contemporary models for deeper learning, focusing specifically on massive open online courses (MOOCs), game machines, and immersive virtual reality. Lee Rubenstein discusses how MOOCs, as well as new credentials like MicroBachelors® and alternative credentials, address new demands for micro-learning and flexible new learning requirements of students, workforces, and managers. Blended learning has emerged as the preferred and most effective strategy for corporations, as well as government and non-government sectors to address the SDGs through MOOCs. In the next chapter, John Traxler discusses an emerging area of game mechanics for digital learning. Based on a critical analysis of mobile learning, e-moderating, curation, heutagogy, and learner-generated content, Traxler discusses game mechanics. This strategy, in which a community of learners can engage in collaborative and reflective learning in digital learning spaces, also aligns technologies and pedagogies with the experiences and expectations of community members. The last chapter in this section by Anders Gronstedt is focused on immersive learning—games, simulations, and virtual reality. The author applies developments in cognitive science to virtual reality, through the example case of *Novartis VR Simulatio*n conducted in the Novartis VR lab. Gronstedt argues that the future of virtual learning is through augmented reality and artificial intelligence; "VR can take one to any place; AR can bring anything to the learner" (p. 143).

The fourth section presents five studies of cases and good practice of digital and blended learning. Laura Ruiz Perez analyses the case of Tecnologico de Monterrey from Mexico, which offers blended and peer-to-peer approaches to education in Mexico and Latin America through various innovations and entrepreneurship, as well as flexible educational solutions. This case exposes us to excellent practices in online ecosystems and communities of practice. Ansari Ahmed, in the next chapter, presents the Malaysian experience of national partnerships and alliances for successful e-learning. The best example is the Asia e University (AeU), based on experiences gained from the Universiti Sains Malaysia and the Open University of Malaysia, and partnered with other countries and institutions to offer programs and courses in over 80 countries. In Chapter 14, Edgar Gonzales, Stella Porto, and Xemia Coton present the case of the Inter-American Institute for Economic and Social Development (established by the Inter-American Development Bank) for enhancing capacity and employability through e-learning. The e-learning ecosystem comprises (a) governments and international agencies; (b) schools, colleges, ICT providers, and NGOs; (c) networks and industries; and (d) learners. Their pedagogies and e-learning innovations considered operational relevance, appropriate modes of learning, personalization, and socialization. The authors suggest that appropriate policy formulations and involvement of various stakeholders are necessary for effective implementation of an e-learning ecosystem.

In the next case study on China, authors Huang, Wang, Lu, Gao, Li, and Tlili discuss two national educational technology initiatives that use a holistic approach to digital learning for capacity building (cloud-based courses by China Construction Bank University) and AI and gamification to promote digital learning in Internet companies (Net Dragon University). The authors reflect on innovative pedagogical methods, integrating of digital learning formats, leveraging digital learning, and using a new set of metrics

to measure the impact of digital learning. They suggest the need for continuous engagement with online learning strategies regarding online safety, online bullying and fraud, and dealing with constantly changing Web-based technologies. The last national case study addresses the federal Ministry of Skill Development and Entrepreneurship's National Skill Development Corporation (NSDC) under the Skill India Mission. Manish Kumar presents the strategies adopted by the NSDC in skilling and upskilling workforce students and trainers in a variety of areas based on 10 levels—from schooling, through higher education, to the level of research degrees. Various partnerships are explained, including funding and non-funding partnerships, innovative partnerships, corporate green channel partnerships, and skill loan financing. Implementation through various sector skills councils, and with the help of qualification packs and national occupational standards, has significantly contributed to training millions of people in various sector skills relating to national, regional, as well as industry and business occupational needs. The author underlines technological interventions for lifelong skilling management, and cost-efficiency in technology-enabled skill development investment.

The next section on the future of content development contains only one chapter on OER policy and capacity building for sustainable development. Sanjaya Mishra critically analyses the identification of OER, the use of OER for teaching and learning, and presents guidelines for OER policy development and capacity building. Two small case studies on effective implementation of OER policy and practice, namely *ICT in Education Policy and Strategy*, and *Understanding Open Educational Resources*, both by the Commonwealth of Learning are discussed. Mishra suggests five important ideas to take forward for further reflection and consideration. A second chapter in this section, dealing with integrating OER with technology-enabled learning as well as open pedagogy and open educational practices, will enhance readers' understanding and reflection on the effective use of OER for sustainable development.

Section six of the book, with four chapters, is devoted to smart technologies and tools. Martin Dougiamas, the founder of MOODLE, provides a detailed explanation of Moodle and its effective use, along with the Moodle Educator certification and the future of open education relating to OER, open education technology, and open recognition. A key concern is that of transferring recognized skills (credentials) across organizations and institutions, including the issue of open badges. Dougiamas is "excited for the future and to be a part of helping it to happen" (p. 231). In the next chapter, Balaji and Carr analyze the power of artificial intelligence, blockchain, and 5G in leveraging education, upskilling, and lifelong learning. They point out that though machine learning and deep learning are generally considered within AI, today we see the application of artificial narrow intelligence, with artificial general intelligence in the near future. The technology practices during the COVID-19 pandemic have induced us to consider more AI, blockchain, and 5G "to increase flexibility in learning and cross-border recognition of achievements, and to create personalized learning experiences for all learners" (p. 242).

In chapter 20, David Guralnick describes real world experiences of artificial intelligence vis-a-vis virtual reality, augmented reality, holograms, Internet of things, blockchain, 5G, and neurohead sets. Guralnick's explanations in relation to underlying pedagogies of active learning, learning by doing, situated learning, constructivism and constructionism, and user-centred design are very useful. Irrespective of delivery mode, whether face-to-face, distance, online, or blended, the important consideration is that of learning experiences. The author suggests we consider learning by doing and critical thinking in any learning design

with technology. Experiences work better when they are personalized, interactive and immersive, framed by micro-learning, and skill based. In the last chapter in this section, Abtar Singh and others present a framework of using smart mobile learning for training trainers. Their SCALED framework comprises stakeholders, competencies, affordances, learners, evaluation, and design intentions. The authors exemplify the application of the framework through a few case studies of programs; these should be helpful to trainers across the educational spectrum.

The seventh section with three chapters focuses on learning measurement, evaluation, and credentialing in the contexts of digital learning, learning analytics, and open digital credentials and badges. In Chapter 22, Guerra-Lopez focuses on the impact of digital learning. The indicators for the five-stage framework cover (a) stakeholders and purpose, (b) evaluation design, (c) evaluation deliverables, (d) dissemination, and (e) continual improvement. Regarding learning analytics, Gary Natriello, in Chapter 23, discusses the use of learning analytics for accelerating change in educational systems and operations. Data assumes importance in this process including data related to learning, learners, programs, instruction, social interactions, resources, and engagement. Two related issues assume considerable importance—capacity building and ethical issues—which system leaders need to address in order for learning analytics embedded in programs, instructor and learner involvement, and learning analytics to become part of educational practice. Hickey and Buchem, in the final chapter of this section, focus on open digital credentials and badges to advance sustainable educational ecosystems. They discuss the limitations of traditional credentials and the functions of open digital badges including finding, capturing, recognizing, motivating, and endorsing learning. In respect to making and recognizing learning, the authors suggest we "think big, start small, work fast" (p. 305).

The final section, with two chapters, is devoted to partnerships and support pathways. In Chapter 25, Shafika Isaacs analyses the lessons learned from partnerships in educational technology for sustainable development. Eight levels of partnerships, with corresponding features and examples, are discussed, followed by challenges and required competencies. Isaacs provides useful guidelines for forming learning partnerships. In Chapter 26, the editor gives a detailed account of accelerating digital learning for achieving SDGs as evidenced by learning practitioners in the field. Jagannathan emphasizes innovations by youth and fostering a culture of innovative mindsets (evidenced at the time of COVID-19) to further advance partnerships and learning outcomes.

In the last chapter, Jagannathan presents a workable roadmap based on the critical discussions undertaken in the preceding 26 chapters. She notes that "if you have reached this last chapter, then you must be serious about your intent to transform traditional 'brick-and-mortar' learning organizations to digital and blended ecosystems to join the global movement of digitization to stay relevant in the 21st century" (p. 337). The seven indicators or steps on the roadmap to transformation as theory of change are very useful. Her recap of the eight important themes provides the basis for a conclusive discussion: (a) 21st century learning skills, (b) innovative pedagogies, (c) deeper learning models, (d) good practices of digital and blended learning, (e) open resources, (f) smart technologies and tools, (g) data analytics, and (h) partnerships. Analysis of the seven conditions for success should be useful to education and training policy-makers and practitioners at all levels, namely (a) equity and inclusion, (b) multi-stakeholder partnerships, (c) learning providers, (d) curating digital learning assets, (e) evidence-based data and decision-making, (f) frequent communication

of change, and (g) futurist thinking. Very useful as well are Jagannathan's critically reflected suggestions for the future.

To conclude, this book represents the latest ideas, research, practices, innovations, and future projections in this multidisciplinary field of digital learning for sustainable development. I was looking forward to a chapter providing a critical review of research in this area as well as suggestions for future research. However, even in the absence of such a review, each chapter covers an important area of digital learning, and the thematic organization of the chapters is sound, logical, orderly, reflective, and readable. I highly recommend this book to policy-makers, specialists in international agencies, leaders, practitioners, researchers, as well as to critics of digital learning for development.

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