Foreword

Transformation often comes when educators have little choice: the current model of schooling cannot be sustained and something radically different is required. As this book describes, in tactically moving teaching online because of the COVID-19 pandemic we have the strategic opportunity to develop new models of education that realize the potential of next-generation methods of technology-based instruction and assessment (National Academy of Sciences, Engineering and Medicine, 2018) to focus on learning that is lifelong, lifewide, and lifedeep (Bélanger, 2016).

The chapters describe progress across the world on innovative models of E-learning that can help to realize this opportunity. These innovations are all contextualized in Badrul Khan's Framework for E-learning. This multi-dimensional conceptual structure enables a rich set of cross-case comparisons about how each initiative is responding to the crisis of COVID-19. The Framework empowers a discussion of synergistic improvements; each dimension, when done well, interacts with the other dimensions to make the whole system far more than the sum of its parts.

What I find most valuable about the chapters is their illustrations of transformed learning: not "just doing things better" with innovations around the edges of our traditional approaches, but "doing better things" in effectiveness, efficiency, access, scale, and personalization. We are just at the beginning of these new models of E-learning, because powerful technologies are emerging to greatly increase our capabilities. For example, Ashok Goel's work on AI-based instructional assistants, discussed in Khan's Chapter 1, enable human instructors to amplify and augment their interactions with students. Experiencing these AI-based systems also helps to prepare students for work after graduation, in which up to 60% of occupations will involve partnerships between people and machine-learning devices that enable "intelligence augmentation" (Dede, 2020).

The ability to "engineer" E-learning is another powerful capability on the technological horizon (Dede, 2019). Both online teaching and blended instruction (online plus face-to-face) are good venues for improving and personalizing learning because the digital media used automatically generate rich, time-stamped logfiles documenting each student's interactions with curricular materials, peers, and instructor. The evidence that guides constant, rapid cycles of improvement in learning engineering comes from this wealth of process data coupled with high quality outcome evidence (both near- and long-term. Soon, the models described in this book's chapters will be able to conduct continuous design-based research to better understand how students learn, what instructional strategies enable optimal learning, and how to gather valid, reliable evidence about learners' mastery of intended outcomes.

This book's worldwide scope on E-learning is important because many exciting innovations are occurring in Global South countries. At the onset of the pandemic, I was one of six faculty members who co-founded an unsponsored initiative, *Silver Lining for Learning* (https://silverliningforlearning.org),

that is documenting and celebrating transformational learning all across the world. Developed nations have much to learn from countries who are reaching marginalized and underserved populations with low levels of resources.

I hope you are inspired by the "lighthouse" examples in this book to join the exciting work emerging in E-learning!

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