Chapter 1
Situated Learning and Educational Technologies: Theory and Practice

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1.1 Introduction

Whilst focusing on how new and emerging technologies are being implemented and researched in medical and health sciences education contexts, conceptually this collection is drawn together by a common interest in situated learning which creates an apprenticeship in thinking (Lave & Wenger, 1991). Key to situated learning is the *authenticity of the learning context*—be it simulated as in PBL discussions in university classrooms or applied as in patient diagnosis and treatment in clinical settings. Collins and Kapur (2014) view situated learning as one of the key themes in research on cognitive apprenticeship and describe it as occurring in environments, be they real or simulated, where "learners are given real-world tasks and the scaffolding they need to carry out such tasks" (p. 117). As such, the focus is on helping students to both accomplish tasks and learn from them. The key here is the authenticity of the learning environments. For students in problem and case-based inquiry, the real-world relevance of the scenario or case leads to heightened engagement and deep approaches to learning (Biggs & Tang, 2011; Prosser & Trigwell, 1999). When adopting deep approaches, students work at a more conceptual level to achieve academically challenging learning outcomes. They engage in critically reviewing and

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synthesizing new information with prior and current knowledge in order to creatively apply new understandings to novel situations. In a situated view of learning, these novel situations are authentic and related to current life worlds or future professional practice. The view taken in this collection is that, by infusing educational technologies into situated learning contexts, there is potential to enhance authenticity as well as support the scaffolding of the development of both knowledge and practical skills.

Also critical to the concept of situated learning is the *social dimension* of this authentic, context-based learning. As the studies in this volume describe, problem-based and clinical learning is situated in small groups under guidance from tutors and clinicians thus providing authentic, culturally relevant and socially complex learning environments. In the process of collaborative knowledge building and creation (Scardemalia & Bereiter, 2014) these mentored learning communities evolve into productive teams which develop not only the necessary knowledge but also the attributes of their developing professional identities. Deep approaches to learning are a desired effect of situated learning. This is actualized not only through the integration of authentic tasks embedded in a philosophy of inquiry but also through the development of social attributes necessary for the profession.

The chapters in this book, therefore, have a common interest not only in the technologies that can be developed for education per se, but in researching technology-enhanced education in the medical and health professions. The shared goal is to ascertain how the potentials of these technologies are productively harnessed to support and scaffold student learning in these complex contexts. In Part 1, the range of PBL contexts examined includes problem and case scenarios ranging from the broad and largely hypothetical to those drawing on real patient cases. In Part 2, the clinical contexts include learning in clinical rotations and clerkships. Both are focused on "active engagement" in "accessible forms of authentic disciplinary practices", notions supported by learning sciences research into student learning outcomes (Nathan & Sawyer, 2014, p. 34). Further, when considering inducting learners into the "epistemology of the discipline—the ways knowledge in a field is structured and produced" (ibid), the evidence provided across the variety of studies in this collection is that educational technologies hold a critical role in supporting this process of induction or "cognitive apprenticeship" (Brown, Collins, & Duguid, 1989).

Research from a situated learning perspective has been conducted on practical placements in nurse education (Cope, Cuthbertson, & Stoddart, 2000) and found that mentoring approaches were associated with situated learning and cognitive apprenticeship in clinical nursing. Situated learning with new technologies in clinical dental education has drawn upon multimodal literacies whereby students develop authentic digital tasks and peer-review them in closed online communities. This project also found mentors to take a key role in shaping and engaging in multiple overlapping communities of practice (Bridges, Chang, Chu, & Gardner, 2014; Gardner, Bridges, & Walmsley, 2012). For professional development of academics teaching across the medical and health sciences, online mentorship in the form of a peer-reviewed resource bank of learning and teaching materials, the MedEdPORTAL

also echoes the notions of community of practice and authentic learning (Association of American Medical Colleges, 2015).

We see the following chapters in this volume as contributing to this body of research and shared practice by providing insights into cutting edge practices in health sciences education. In structuring the volume, we have taken a situated approach by delineating two contexts—problem-based learning and clinical learning. Although this is a convenient way to structure the volume, we did not see these contexts as separate. Research has shown that disciplinary knowledge building across these contexts is mutually informative and iterative, even more so in integrated curriculum designs (Lu, Bridges, & Hmelo-Silver, 2014). We trust that our readers will enjoy this rich sampling of current research into educational technologies in health sciences education.

1.2 Part 1. Exploring Educational Technologies in Problem-based Contexts

The chapters in this section considered how educational technologies are used in PBL contexts. In the chapter "How E-learning Can Support PBL Groups: A Literature Review" the authors engaged in a systematic review to explore the research on how technology has been used to support PBL in both face-to-face and online group with a focus on tools that create context and support communication (or both). This theme of context setting and communication tools continues over the next three chapters. The next chapter, "Technology and group processes in PBL tutorials: An ethnographic study" takes a deep dive into how technology affects group dynamics in PBL by studying the effects of an interactive whiteboard and how that leads to new learning practices. In "Video as Context and Conduit for Problem-based Learning" the authors examine how video can be used to set an emotionally laden context and using video conferencing as a communication tool in a cross cultural setting to create a community of inquiry. The chapter "What is real? Using problem-based learning in virtual worlds" also investigates using virtual world technology to create contexts and provide communication spaces to create "collaborative immersive tutorials". The final two chapters focus on both how students see technology being useful and how online resources might be helpful. Taking the student perspective in, "How do health sciences students use their mobile devices in problem-based learning?", Chan and colleagues examine data from student surveys about how they use their mobile devices in PBL tutorials and what might and might not be appropriate. One of those uses is to look for information. In "Are Wikipedia Articles Reliable Learning Resources in Problem-Based Learning Curricula?", the author examined the quality of information in Wikipedia articles related to the nervous system and raises some concerns in this regard. Together these chapters consider technology as it provides context, spaces, and tools for communication, and information sources that can support online and face-to-face PBL.

1.3   Part 2. Exploring Educational Technologies in Clinical Contexts

The chapters in this section explored how educational technologies can support learners' transitions to the clinical care of their patients. In the chapter "Dealing with different perspectives: Technologies for health sciences education", the authors examined how wiki and online forums can help students develop skills for communicating adequately with colleagues and patients who have different therapeutic health concepts. In the chapter "Utilising Mobile Electronic Health Records in Clinical Education", the authors investigated students' learning of skills needed in the use of Electronic Health Records (EHR) in clinical environment. They also examined the use of a mobile EHR system as a learning tool in an undergraduate medical programme. In general, students were quite positive on using the mobile EHR system, because it helps them in taking and organizing the history, links easily to drug information, and prompts students to reflect. However, they also found students would avoid using them in front of the patient and that most records were created at home. The findings of these authors on the use of technologies in the clinical learning context can potentially inform teachers in pedagogical design.

The use of technology also makes it possible to probe into learning in clinical contexts in ways not possible before. In the chapter "Measuring emotions in medicine: Methodological and technological advances within authentic medical learning environments", the authors discussed the methods and technologies for measuring emotions, which can have an important but rather unexplored functional role in learning and performance, especially in medicine and health sciences. Such data allow educators, teachers, and researchers to look at learning in clinical contexts with a new set of lenses.

Although educational technologies offer so many new possibilities, we are also in a race with them, which perhaps can be called the "Red Queen Effect", a term borrowed from evolutionary studies hypothesizing that organism must keep evolving in order to survive in competition with other evolving organisms. The terms came from the Red Queen in Lewis Carroll's "Through the Looking-Glass", who said that "Now, *here*, you see, it takes all the running you can do, to keep in the same place". Educators must also be flexible in the adoption of new technologies, not only because technology is moving fast, but also because the students are moving fast too in the technology landscape. Therefore in the chapter "The Deteriorating Patient Smartphone App: Towards Serious Game Design" the authors described the evolution of the pedagogy used in learning the management of deteriorating patients, from live face-to-face, to web-based, to a mobile app. In the chapter "Mobile Just-in-time Situated Learning Resources for Surgical Clerkships", the authors described the development of a surgical anatomy review resource in multiple formats (as webpages for viewing in web browsers on PC, as ebook, mobile apps, as well as printed book). The key message is the need for technological flexibility in developing electronic learning resources because of the rapid evolution of electronic platforms on

which these resources can be presented to support student learning. Trelease, the author of that chapter said it well: "The challenge thus continues for medical educators and instructional designers to evolve and to assess new appropriate methods for using changing learning technologies to address societal needs for training more physicians most effectively in time- and cost-effective ways".

1.4 Conclusions

This innovative collection of contributions provides a unique view of research activity across both problem-based classroom and clinical spaces of learning. What we have learnt from the authors is that educational technologies, indeed, retain the potential to engage and motivate medical and health sciences students as 21st century learners. More than this, however, by drawing these studies into one coherent volume, we feel that we have achieved a new, collective, and more holistic understanding of how embedding educational technologies across all aspects of health sciences curricula is accomplished. Conceptually, this is framed in terms of supporting authentic learning in context—a technology enabled vision of situated learning.

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