

Assessment in clinical simulation: current practices, changing influences, and the potential role of networked learning in shaping the future

Andrew West

Faculty of Health Sciences, University of Manitoba, andrew.west@umanitoba.ca

Gale Parchoma

College of Education, University of Saskatchewan, gale.parchoma@usask.ca

Abstract

Clinical simulation is a well-established practice in health professional education programs employing technologies to replace or amplify real experiences with guided experiences representing certain key characteristics or behaviours of selected physical or abstract systems. Educators generally employ collaborative debriefing as an integral part of clinical simulation for reflexive and experiential learning. A movement in higher education towards using simulation for competency-based assessment for high stakes testing such as certification or licensure of health professions has been observed. In face of such a complex evolution in educational practice, social practice theory may be useful to gain an understanding of the ways in which contextual factors affect how assessment practices become embedded into higher education contexts. Therefore, in this paper we take a social practice perspective and contend that these pressures are externally derived requirements. We note that in health professional education these requirements are often observed to be mandated by professional regulatory bodies and discipline-specific accrediting agencies.

Debate over the appropriateness of each of the various purposeful approaches to assessment (assessment 'of', 'for', and 'as' learning) are not novel. However, our examination of how a potential move from assessment 'for' and 'as' learning towards adoption assessment 'of' learning practices in clinical simulation brings to light concerns over this contemporary pedagogical movement. To now, the body of literature that demonstrates the pedagogic advantages of employing clinical simulation in health professional education has been informed by research into learning environments that are highly supportive of reflexive and collaborative debriefing. Through review of the literature on assessment in clinical simulation we identify several important social elements of that learning environment, including trust and ontological security. We suggest these social elements may be at risk in the face of these evolving assessment practices, and that they warrant deeper investigation in this context.

Lastly, we compare themes that emerge through this review of the literature with the essential values of networked learning. With connectivity and co-production of knowledge at the fore, the parallels between these themes and values suggest the utility in adoption of networked learning theory as a pedagogical framework in clinical simulation. Networked learning theory offers the area of assessment practices in clinical simulation, an at once undertheorized yet highly technologically enhanced and connected approach to learning, with a pedagogical framework upon which to build deepened understanding of an important social learning phenomenon.

Keywords

Simulation, assessment, debriefing, ontological security, networked learning

Introduction

Clinical simulation is a well-established practice in health professional education employing technologies to replace or amplify real experiences with guided experiences representing certain key characteristics or behaviours of a selected physical or abstract system (Gaba, 2004). Following Vygotsky's description of learning as a largely social process (Vygotsky, 1978), learning is enhanced greatly when learners interact in

authentic contexts supported in performing complex tasks with scaffolding (Jacobsen, Brown, & Lambert, 2013). In the clinical simulation learning environment collaborative learning experiences build rich understanding through the meanings made by each member of the group of learners.

Current assessment practice in clinical simulation is predominantly based in the use of debriefing (Levett-Jones & Lapkin, 2014). It has been suggested that debriefing in the clinical simulation context is associated with improved learning, future performance and improved patient outcomes (Levett-Jones & Lapkin, 2014). While it is widely reported that social elements of the nuanced clinical simulation learning environment have a high degree of impact on its effectiveness, there is very limited understanding of the social aspects of that environment (Dieckmann, Gaba, & Rall, 2007).

A variety of pressures are converging that may prompt a move towards the use of clinical simulation for high stakes examinations of learners in the health professions. In fact, a movement towards using simulation for competency-based assessment for certification or licensure in health professions is emerging in the literature (McGaghie, Isenberg, Petrusa, & Scalese, 2010). We might therefore consider the impact that evolving assessment strategies could have on the social aspects, and hence effectiveness, of the clinical simulation learning environment.

This article will explore contemporary influences on assessment practices in higher education in general, and on the practice of clinical simulation specifically, using a social practice theory perspective. In order to consider how these influences may ultimately have impact on the learning, a discussion of the assessment practices and social environment of the contemporary clinical simulation context will then be presented. A case will then be made for employing networked learning as a pedagogical framework to inform future practice and inquiry into assessment design in clinical simulation.

A Social Practice Theory Perspective on Assessment

Saunders (2011) address the question of how we determine the value of our educational practices. He adopts a social practice perspective to conceptualize and theorize evaluation practices in higher education. Practice, as a key aspect of sociocultural theory, refers to what people do within “clusters of practices in different fields of activity” (Saunders, 2011, p. 2). Adopting a social practice perspective can reframe our unit of analysis towards those clusters of practices rather than taking an either-or perspective of individual agency or social structures. Individuals therefore are seen to engage in practices as part of connected groups, or fields, which are carriers of “routinized” ways of understanding, knowing, and doing (Reckwitz, 2002, p. 258). From this vantage practices can be seen as clusters of behaviours, bound by communities engaged in shared practices, which form ways of undertaking evaluative activities (Saunders, 2011).

While assessment and evaluation sometimes are used interchangeably, Saunders’ (2011) representation of evaluation incorporates collection of evidence to improve effectiveness of programming and practices in higher education. The conceptualization of assessment which we will adopt here is concerned with the relationship between educational practices and student learning (Erwin, 1991). While there is a distinct difference between these two concepts, their use within the context of health professions education are closely related.

Saunders (2011) shows that adopting a social practice theory perspective is useful for gaining appreciation of the ways in which contextual factors affect how evaluative practices become embedded into higher education contexts. A move from a traditionally independent assessment environment in higher education towards one marked by externally derived requirements is noted (Saunders, 2011). In particular, Saunders (2011) brings to light a concern that society’s agencies attribute value to the programming and practices of institutions of higher education. Saunders (2011) posits that assessment in higher education is itself a social practice which can be discerned between four domains: systemic, programmatic, institutional, and self. Recognizing that a similar range of contextual factors influence practices in health professional education, we suggest that adopting a social practice theory may also inform higher education practice on assessment.

In dynamic contexts such as professional education programs which are embedded within a network of social actors (e.g. professional groups, regulatory bodies, and educators) the impact of attributed value on assessment may be powerful. For example, the work of Anderson, Anaya, Bird, and Moore (2005) analyzes the assessment practices in pharmacy education in the United States. Anderson et al. (2005) note that assessment has become “widespread [in pharmacy education] whether motivated by accountability to external forces or by an

institution's own desire to improve services and programs" (p. 85). Anderson et al. (2005) also describe accreditation standards as underpinning the need for assessment in pharmacy education rendering such activities "important and legitimate" (p. 91).

Using a social practice framework we can identify externally derived assessment practices in health professional education, namely professional regulatory bodies and discipline-specific accrediting agencies. Many of these agencies support and/or promote use of clinical simulation for high stakes testing, thus the pressure appears to be driven primarily for assessments used to evaluate readiness of health professional for certification or licensure. There is limited evidence of its utility and some evidence of its emergence in practice (Gaba, 2004; McGaghie et al., 2010). There is also limited empiric evidence available to guide this transition or that describes the impact of transitioning from debriefing to high stakes testing in clinical simulation.

As pressures mount for higher education institutions to adopt more high stakes assessment models to demonstrate professional competency, we might consider the impact such a change has on learning and learning environments. How might this evolving practice be informed by our understanding of existing assessment designs in clinical simulation?

Purposeful Assessment

The idea that assessment is critical to student learning in the classroom and that assessment data could be useful in extending student development and achievement is not new (Bloom, Hastings, & Madeus, 1971). Seminal work by Black and William (1998) challenged the industrialist notion of the 'black box' in education where known inputs are fed into a system reproducing anticipated results (e.g. knowledgeable students). Indeed the notion that such essentialist perspectives may hinder our understanding of the true educational value of new technologies, and that they may prevent the exploration of new areas of research and analysis endure (Hamilton & Friesen, 2013). Black and William (1998) argue that formative assessment in educational practice, using evidence to adapt teaching to meet student needs, is a *prima facie* way of raising standards of achievement. Assured by the strength of evidence on which their claims are based, Black and William (1998) boldly challenge governments, authorities and educators to "study very carefully whether they are seriously interested in raising standards in education" (p. 2).

More recent conceptualizations of assessment move beyond a teacher-centered perspective and extend to models of assessment that are consistent with the aims of knowledge-building environments (Scardamalia, 2002). The framework adopted by the National Academy of Science presents four areas overlapping that need to be flexibly balanced to support learning for engagement in a knowledge society: knowledge-centered, learner-centred, community-centred, and assessment-centred (Scardamalia, Bransford, Kozma, & Qyekknakzm, 2010). Assessment-centred learning is concerned not simply with measuring the achievement of learning outcomes, but that assessment can shape how learners approach the learning process itself. Contemporary research further differentiates between three distinct yet intertwined approaches to assessment.

Earl (2013) posits that assessment interacts with curriculum, learning and teaching as an integral piece of an iterative and cyclical process and promotes three purposeful approaches to assessment: assessment 'of' learning, assessment 'for' learning, and assessment 'as' learning. Assessment of learning refers to evaluating if learners have achieved defined learning outcomes using traditional methods such as grading tests or providing marks. It may be important for confirming what students know, to demonstrate whether or not the students met specified standards and/or show their relative standing compared to others (Earl, 2006). For assessment of learning it is therefore important that assessments result in sound statements of proficiency or competence in order that the results are reliably able to inform decision making (Earl, 2006). We might consider this to indeed be the case in high stakes testing.

Earl (2006) asserts that in contrast, assessment for learning gives teachers insight into what students know and how, when and whether students use what they know. This enables teachers to modify leaning activities to engage learners and to address individual student learning needs. Assessment as learning, a subset of assessment for learning, emphasizes using assessment as a means for developing and supporting metacognition in students (Earl, 2006). Viewing the learner as a connection between assessment and learning, they are encouraged to personally monitor what they are learning and to take responsibility for making adjustments, adaptations and changes to what they understand (Earl, 2006). Through active critical thinking and metacognition, Earl (2006) contends that teachers use assessment for learning "as the vehicle for helping

students develop, practice and become critical thinkers who are comfortable with reflection and the critical analysis of their own learning” (p. 7). Compared to assessment of learning, assessment for learning and assessment as learning strategies are more influential with respect to those interdependent and cyclical learning processes (Earl, 2013).

Despite calls for the use of educational assessment strategies of broad use, the practices of many educators in higher education often rely on traditional approaches of learner assessment, such as standardized information and ideas, and testing of information retention (Jacobsen et al., 2013). One analysis of the conceptions of assessment held by educators in England demonstrated that within an environment characterized by the existence of an objectives-led curriculum and a measurement-driven assessment policy, alternative conceptualizations of assessment may have been repressed (Hargreaves, 2005). It has been suggested that the differentiation between assessment approaches has led to an assumption that one is entirely distinct from the other, thus placing assessment for and as learning in competition with demands for accountability-oriented assessment (Black, 2015). There are also critiques that assessment for learning practices remain teacher-centered and might impact teachers’ workload and hinder students from taking responsibility for their learning (Jonsson, Lundahl, & Holmgren, 2015). It may be that these tensions will only be resolved when assessment strategies are each recognized for their unique value and purpose, and when they are designed and used to complement one another in meaningful ways.

Although 21st century skills (e.g. collaboration, critical thinking, and metacognition) are recognized in many curriculum standards, the focus of assessment standards remains on factual and domain specific knowledge (Scardamalia, Bransford, Kozma, & Quellmalz, 2012). Scardamalia et al., (2012) suggest an interdependence model where 21st century and domain specific skills are combined to constitute a renewed focus in education. With a goal of achieving 21st century learning we might, therefore, consider assessment designs in the clinical simulation environment that ensure their integration with the teaching and learning process.

Assessment Practices in Clinical Simulation

In their critical review of simulation-based medical education research, McGaghie et al. (2010) identify features of simulation which include, among others: feedback, outcomes measurement, simulation fidelity, team training, high-stakes testing, instructor training, and educational and professional context. Many of these findings are relevant to any discussion on the use of debriefing as an assessment as and for learning strategy in clinical simulation environments. Across health sciences disciplines in higher education contexts clinical simulation debriefing is practiced differently (Chronister & Brown, 2012; Neill & Wotton, 2011). However, debriefing is generally defined as:

Reflective practice at its best and a critical element in the learning process. Answering who, what, when, where, and how [questions in the context of collaboratively reflecting on performances during a clinical simulation] to debrief help focus both instructor and learner, while softening judgment... Though there are many avenues now supporting simulation in health care, gaps remain, and the future of outcome-related studies requires analysis. (Mayville, 2011, p. 35)

The practice of collaborative debriefing in simulation-based education has long been situated in assessment as and for learning. Facilitators’ provisions of critically constructive and empathetic feedback, and provisions of opportunities for learners to engage in self- (Wickers, 2010) and peer- assessments (Shahoumian, Saunders, Zenios, Parchoma, & Hanson (2014) to debrief team performances have been examined in relation to learners’ perspectives on the impact of debriefing sessions on their learning. Wickers’ perspective of beginning with learners’ questions in a debriefing session highlights the place of self-assessment in debriefing and links back to McConnell’s (1998) argument on the role of self-assessment across networked learning environments. While McConnell was not theorizing self-assessment in relation to simulation or debriefing, Wicker’s arguments parallel his and link to broader arguments on the purposes and practices of assessment. Engaging learners a debriefing practice that focuses on multiple forms of feedback has the longest historic roots in the practice and is referred to as the most important and frequently cited assessment practice through which to promote effective learning (McGaghie et al., 2010). While McGaghie et al. (2010) report that most feedback in clinical simulation is formative in nature and provided thorough debriefing, it is worth noting that the use of clinical simulation for high stakes testing in the form of the objective structured clinical examination was identified as a newly emerging theme.

In their review of the effectiveness of debriefing clinical simulation for health professional education Levett-Jones and Lapkin (2014) note that the strategy has become a critical part of the simulation process. The findings of the review supported that after simulation with debriefing learners performance on a number of technical and non-technical skills improved, regardless of the debriefing method employed (post-simulation, during the simulation, instructor facilitated with and without video-assistance). These results have been echoed by other recent analyses (Cheng, Eppich, Grant, Sherbino, Zendejas, & Cook, 2014) likely adding to the enthusiasm behind the increasingly rapid uptake of clinical simulation for education of health professionals. Recognizing that debriefing can play such a central role in the clinical simulation context, it is worthwhile considering what practices contribute to effective simulated clinical learning environments. Educators in the health professions generally regard collaborative debriefing as an integral part of reflexive and experiential learning underpinned by constructivist philosophy (Neil & Wotton, 2011). The need for a supportive learning environment for effective simulation debriefing and what contributes to it are widely agreed upon. The review by McGaghie et al. (2010) identified a number of what are described as evidence-based best practices. Among these are several environmental factors that are boost the quality and utility of learner feedback in simulation, including: fostering a supportive learning environment, and ensuring team members feel comfortable.

In their analysis of the use of debriefing in nursing education Neil and Wotton (2011) identify several themes that exist in literature on the topic, though comment that there remains some debate on what might serve as a foundation for a debriefing framework. Faculty were identified as playing a central role in the effectiveness of debriefing. In particular, faculty demeanour “had ramifications for student participation, learning, and feelings of security when openly discussing the experiences that took place” (Neil & Wotton, 2011, p. 167). Guiding questions that are structured and knowledge-building was also perceived positively by learners as a means of facilitating self-directed development of critical thinking and reasoning (Neil & Wotton). Beyond simply ensuring the physical environment is conducive to learning, establishment of trust within the circle of participants is well documented in nursing education as essential in creating an effective debriefing environment (Wickers, 2010).

The concept of trust within the circle of simulation participants can be extended to include the development of trusting relationships between learners and the educator (Wickers, 2010). The McGaghie et al. (2010) review identified the need to ensure educators are prepared in the art and science of leading team debriefs (p. 54). In designing their conceptual framework for promoting a blended approach to debriefing (incorporating scripted elements to debriefing), Eppich and Cheng (2015) describe the process as a conversation between simulation participants and educator(s). In their framework, feedback represents information on observed performance gaps, and acknowledges that the skill required of educators to facilitate reflective discussions of performance gaps with groups can often be overwhelming. Through this discussion we can recognize that learners may feel vulnerable in clinical simulation environments, and that this may be compounded by a lack of familiarity with the debriefing process, relational issues with participants, and the assessment perspective of the facilitator.

Development of Ontological Security

The broad calls for attention to the social aspects of the simulation-based learning environment, in particular with respect to fostering trust, might be further considered in relation to Giddens’ (1990) theoretical basis for understanding social life in the modern world. Giddens (1990) describes the key element of ontological security as:

...the confidence that most human beings have in the continuity of their self-identity and in the constancy of the surrounding social and material environments of action. As sense of the reliability of persons and things, so central to the notion of trust, is basic to feelings of ontological security; hence, the two are psychologically related...it is an emotional, rather than a cognitive, phenomenon (p. 92).

Through this framework the interrelationship of trust and ontological security can be identified. A sense of reliability on others (or other things) is seen as being interdependent with ones sense of confidence and self-perseverance. It may be the case in clinical simulated learning environments that the readiness of learners to deeply reflect through debriefing, and thus learn, is interdependent on confidence in the environment and thus confidence in self. Ontological security, therefore, might be viewed as a function of trust in the simulation environment.

Debriefing activities can therefore be understood as an integral part of the reflexive clinical simulated learning environment, which can be characterized by the social interaction between learners, and between learners and educators (Neil & Wotton, p. 166). These understandings speak to the social nature of simulation as described by Dieckman et al. (2007) who suggest that particular emphasis be placed on the social character of the learning environment. These social aspects are underpinned by an environment of trust and ontological security development with careful attention being made to the type and intensity of debriefing, and the overall style of interactions between participants and educators (Dieckman, et al. 2007).

Returning to the consideration of clinical simulation as a social practice, it was noted that higher education institutions are under pressure to incorporate assessment 'of' learning (through high stakes testing) into clinical simulation. A question that surfaces is how educators might design clinical simulation environments that assure the development of learners' ontological security amid this evolving context.

Networked Learning and Clinical Simulation

Adoption of a pedagogical framework in clinical simulation may be useful for understanding and advancing practice in the face of the contextual pressures presented. Indeed, some parallels can be made between the key pedagogical values that emerged in the proceeding discussion on debriefing in clinical simulation, and those that underpin theories of network learning. To that end I promote the idea that networked learning can serve as a useful framework upon which to conceptualize clinical simulation practice in health professional education. While the pedagogical principles inherent in networked learning are not all espoused equally by practitioners in the field, some commonly held values suggested by Hodgson, McConnell, and Dirckinck-Holmfeld (2012) include: cooperation and collaboration, working in groups and in communities, discussion and dialogue, trust and relationships, reflexivity and investment of self in the networked learning processes, and the role technology plays in connecting and mediation. These values underpin the development of a learning culture in a networked community which "support a collective and shared process of learning" and a pedagogy that can support "teachers who are facilitating the learning process" (Hodson et al., 2012, p. 295). These principles are quite consistent with those that have surfaced in the clinical simulation literature were the technological environment is designed to engage collaborative group reflection through dialogue supported by the development of ontological security within the learning community.

The Tenth International Conference on Networked Learning (2016) provides a definition of networked learning within its call for papers on the topic: "...networked learning ...[is] learning and teaching carried out largely via the Internet/Web which emphasises dialogical learning, collaborative and cooperative learning, group work, interaction with on-line materials, knowledge production and design for learning" (para. 1). While this definition emphasises dialogical, collaborative and cooperative learning, each of which seem relevant to the clinical simulation context, the suggestion that learning must be primarily carried out in the online realm is problematic for application of network learning to clinical simulation.

Though highly technologically enhanced (e.g. high-fidelity mannequins, remote connectivity, and digital video recordings) clinical simulation environments are traditionally conducted face-to-face. However, it has been proposed that "the shared pedagogical values of networked learning can lead to various and different designs, landscapes and spaces (Hodson et al., 2012, p. 294). Indeed Beaty, Cousin, and Hodgson (2010) have called to update the Networked Learning Conference definition by the replacement of 'e-learning' with 'learning' in order to place emphasis on connectivity and co-production of knowledge as key pedagogical features (Beaty, et al., 2010). Such an expanded definition could make room for inclusion of clinical simulation within the realm of networked learning.

While pedagogical values are of paramount importance to this discussion, the mediating role of technology in networked learning is also acknowledged. Accepted definitions promote that technological mediation, human mediated activity, and information and communication technologies emerge as core elements (Jones, 2015). Jones (2015) contends that networked learning was "never conceived of as purely interaction with content available via digital networks" (p. 5) and that "[networked learning] was never tied to any one particular technology, or any specific feature of the available technologies apart from their potential for interactivity" (p. 5). Consistent with this perspective clinical simulation, while not occurring in the online realm, is a mediating technology with a demonstrated potential for interactivity which supports dialogical, collaborative and cooperative learning.

Drawing on their research program into the architecture of learning networks Goodyear, Carvalho, and Bonderup Dohn (2014) offer a distinction between the elements of learning networks that can be designed and those that are emergent. When examining learning networks it is useful to focus on three partially designable aspects: tasks, physical setting, and division of labor, and two emerging aspects: learning outcomes and activities (Carvalho et al., 2014). The authors suggest that architectures are shaped by an assemblage of tasks (epistemic), as well as physical and social entities. Recognizing the inter-reliance of the elements of a learning network architecture, this analytic framework might serve as a useful starting point for considering the social design needs of clinical simulation learning environments in the face of contextual pressures to change assessment practices.

Conclusion

Pressures from regulatory and other legislative bodies are prompting a move towards increasing use of clinical simulation learning environments for high stakes testing. Historically debriefing has been a means of assessment 'for' and 'as' learning in clinical simulation practice, and its effectiveness has relied on the development of trust and ultimately the ontological security of learners. In the face of emerging contextual pressures to incorporate assessment 'of' learning we might carefully consider the impact evolving assessment strategies may have on the social aspects of the learning environment. In effort to inform both theory and practice we might therefore ask: how do learners experience the clinical simulated learning environment when debriefing or high stakes assessment strategies are employed?

Networked learning has been explored as a potential pedagogical framework upon which our understanding of clinical simulation may be advanced, in particular the impact of evolving assessment practices. The principles and values of networked learning are felt to be quite consistent with those reported in the clinical simulation literature, in particular the concepts of collaboration and reflective learning as central concerns in assessment processes.

References

- Anderson, H. M., Anaya, G., Bird, E., & Moore, D. L. (2005). A review of educational assessment. *American Journal of Pharmaceutical Education*, 69(1), 84-100. doi:10.5688/aj690112
- Beatty, L., Cousin, G., & Hodgson, V. (2010). Revisiting the e-quality in networked learning manifesto. In Dickinck-Holmfeld, L., Hodgson, V., Jones, C., McConnell, D., & Ryberg, T. (Eds.), *Proceedings of the 7th International Conference on Networked Learning* (pp. 585-592). Retrieved from: <http://www.lancaster.ac.uk/fss/organisations/netlc/past/nlc2010/abstracts/PDFs/Beatty.pdf>
- Black, P. (2015). Formative Assessment - an Optimistic but Incomplete Vision. *Assessment in Education: Principles, Policy & Practice*, 22(1), 161-177. doi:10.1080/0969594X.2014.999643
- Black, P., & Wiliam, D. (1998). *Inside the black box: Raising standards through classroom assessment*. London: Granada Learning.
- Bloom, B. S., Hastings, J. T., & Madaus, G. F. (1971). *Handbook on formative and summative evaluation of student learning*. New York: McGraw-Hill.
- Cheng, A., Eppich, W., Grant, V., Sherbino, J., Zendejas, B., & Cook, D. A. (2014). Debriefing for technology-enhanced simulation: a systematic review and meta-analysis. *Medical Education*, 48(7), 657-666. doi: 10.1111/medu.12432
- Chronister, C., & Brown, D. (2012). Comparison of debriefing methods. *Clinical Simulation in Nursing*, 8(7), e281-e288. doi: 10.1016/j.ecns.2010.12.005
- Dieckmann, P.D., Gaba, D., & Rall, M. (2007). Deepening the theoretical foundations of patient simulation as social practice. *Simulation in Healthcare*, 2(3), 183-193. doi:10.1097/SIH.0b013e3180f637f5
- Earl, L. (2006). Assessment-a powerful lever for learning. *Brock Education*, 16(1), 1-15. Retrieved from: <http://brock.scholarsportal.info/journals/brocked/home/article/view/29>
- Earl, L. M. (2013). *Assessment as learning: Using classroom assessment to maximize student learning*. 2nd Edition. Thousand Oaks, CA: Corwin Press.
- Eppich, W., & Cheng, A. (2015). Promoting excellence and reflective learning in simulation (PEARLS): development and rationale for a blended approach to health care simulation debriefing. *Simulation in Healthcare*, 10(2), 106-115. doi:10.1097/SIH.0000000000000072
- Erwin, T.D. (1991) *Assessing student learning and development*. San Francisco, CA: Jossey-Bass Publishers.
- Gaba, D. M. (2004). The future vision of simulation in health care. *Quality and Safety in Health Care*, 13(suppl 1), i2-i10. doi:10.1136/qshc.2004.009878

- Giddens, A. (1990). *The consequences of modernity*. Oxford: Polity Press.
- Goodyear, P., Carvalho, L. & Bonderup Dohn, N. (2014). Design for networked learning: Framing relations between participants' activities and the physical setting. In S. Bayne, C. Jones, M. de Laat, T. Ryberg, & C. Sinclair, *Proceedings of the 9th International Conference on Networked Learning* (pp. 137-144). Retrieved from: <http://www.lancaster.ac.uk/fss/organisations/netlc/past/nlc2014/abstracts/pdf/goodyear.pdf>
- Hamilton, E., & Friesen, N. (2013). Online Education: A Science and Technology Studies Perspective. *Canadian Journal of Learning and Technology*, 39(2), 1-21. Retrieved from: <http://www.cjlt.ca/index.php/cjlt/article/view/689/363>
- Hargreaves, E. (2005). Assessment for learning? Thinking outside the (black) box. *Cambridge Journal of Education*, 35(2), 213-224. doi:10.1080/03057640500146880
- Hodgson, V., McConnell, D., & Dirckinck-Holmfeld, L. (2012). The theory, practice and pedagogy of networked learning. In L. Dirckinck-Holmfeld et al. (eds.), *Exploring the theory, pedagogy and practice of networked learning* (pp. 291-305). Springer New York.
- Jacobsen, M., Brown, B., & Lambert, D. (2013). *Technology-Enhanced Learning Environments in Higher Education: A Review of the Literature*. A Literature Review for the Learning Technology Task Force, University of Calgary.
- Jones, C. (2015). *Networked Learning: An Educational Paradigm for the Age of Digital Networks*. Switzerland: Springer.
- Jonsson, A., Lundahl, C., & Holmgren, A. (2015). Evaluating a large-scale implementation of Assessment for Learning in Sweden. *Assessment in Education: Principles, Policy & Practice*, 22(1), 104-121. doi:10.1080/0969594X.2014.1001566
- Levett-Jones, T., & Lapkin, S. (2014). A systematic review of the effectiveness of simulation debriefing in health professional education. *Nurse Education Today*, 34(6), e58-e63. doi:<http://dx.doi.org/10.1016/j.nedt.2013.09.020>
- Mayville, M. L. (2011). Debriefing: The essential step in simulation. *Newborn and Infant Nursing Reviews*, 11(1), 35-39.
- McConnell, D. (1998). Developing self-assessment in networked lifelong learning environments. In *Proceedings of the 1st International Conference on Networked Learning* (pp. 3.66-3.74). Retrieved from: http://www.networkedlearningconference.org.uk/past/nlc1998/Proceedings/McConnell_3.66-3.74.pdf
- McGaghie, W. C., Issenberg, S. B., Petrusa, E. R., & Scalese, R. J. (2010). A critical review of simulation-based medical education research: 2003–2009. *Medical Education*, 44(1), 50-63. doi:10.1111/j.1365-2923.2009.03547.x
- Neill, M. A., & Wotton, K. (2011). High-fidelity simulation debriefing in nursing education: A literature review. *Clinical Simulation in Nursing*, 7(5), e161-e168. doi:<http://dx.doi.org/10.1016/j.ecns.2011.02.001>
- Reckwitz, A. (2002). Toward a Theory of Social Practices. A development in culturist theorizing. *European Journal of Social Theory*, 5(2), 243-263. doi:10.1177/13684310222225432
- Saunders, M. (2011). Setting the scene: The four domains of evaluative practice in higher education. In M. Saunders, P. Trowler, & V. Bamber (Eds.), *Reconceptualizing evaluation in higher education: The practice turn* (pp. 1-17). Maidenhead: McGraw-Hill/Open University Press. Retrieved from: <https://www.mheducation.co.uk/openup/chapters/9780335241613.pdf>
- Scardamalia, M., Bransford, J., Kozma, B. & Qyekknakzm E. (2010). White Paper 4: New assessments and environments for knowledge building. ATCS: Assessment & Teaching of 21st Century Skills. Draft White Papers. Retrieved from: <http://atc21s.org/wp-content/uploads/2011/11/4-Environments.pdf>
- Scardamalia, M., Bransford, J., Kozma, B., & Quellmalz, E. (2012). New assessments and environments for knowledge building. In *Assessment and teaching of 21st century skills* (pp. 231-300). Netherlands: Springer.
- Scardamalia, M. (2002). Collective cognitive responsibility for the advancement of knowledge. In B. Smith (Eds.), *Liberal education in a knowledge society* (pp. 76-98). Chicago: Open Court.
- Shahoumian, A., Sanders, M., Zenios, M., Parchoma, G., & Hanson, J. (2014). Blended simulation based medical education: A complex learning/training opportunity. In P. Zaphris and A. Ioannou (Eds.) *Learning and collaboration technologies: Technology-rich environments for learning and collaboration*, Lecture notes in computer science, 8523 (pp. 478-485). Switzerland: Springer International Publishing.
- Tenth International Conference on Networked Learning (2016). *Conference Themes & Call for Papers*. Retrieved from: <http://www.networkedlearningconference.org.uk/call/themes.htm>
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. (M. Cole, V. John-Steiner, S. Scribner, & Souberman, Eds.). Cambridge, MA: Harvard University press.
- Wickers, M. P. (2010). Establishing the climate for a successful debriefing. *Clinical Simulation in Nursing*, 6(3), e83-e86. doi:<http://dx.doi.org/10.1016/j.ecns.2009.06.003>