Home
Contents

Teaching for Engagement: Part 1: Constructivist Principles, Case-Based Teaching, and Active Learning

By Bill Hunter

Introduction

In the Winter, 2015, issue of The College Quarterly, Donovan McFarlane provided some guidelines for the use of case studies in college teaching based in part on his own experience and in part on the published literature. This was not the first time that case-based teaching was the focus of work in the College Quarterly. Skliarenko & Bhardwaj (2004) provided a very brief introduction to case-based teaching, but their article was primarily focused on providing a highly detailed business teaching case focused on Bombardier Inc. The case was meant to be of value in teaching about market research and market analysis. The article really did not deal with the way that case (or cases in general) would/could/should be used in teaching. McFarlane's (2015) critique and guidelines caused me to think that there might be more that CQ readers would like to know about case-based teaching.

As Skliarenko and Bhardwaj (2004) pointed out, the history of case based teaching can be traced to the business school at Harvard University in 1910 with a book of cases appearing in 1922. According to the Harvard Business School (HBS) website, in 1924 the case method was established as the primary method of instruction at HBS. The Harvard Business Review continues to publish cases categorised into 18 sub-disciplines and also provides extensive support for faculty wanting to use the cases—including a start-up kit, advice on case-based teaching methods, tip sheets and much more (see link in reference list). Other business schools also have their own case repositories—a particularly good example may be Western University's Ivey School of Business with over 30,000 cases in 11 theme areas and a tool for matching cases to textbooks (https://www.iveycases.com/Default.aspx).

Part of McFarlane's (2015) concern was that many college and university faculty might make ineffective use of cases due to insufficient understanding of the process. He particularly noted that the available cases, including some of those from Harvard, were too long and/or too complex to work well in many classrooms. His paper included suggestions for how to make more effective use of cases in teaching. It is my intention here to build upon and extend the advice McFarlane provided. I will do this in a series of articles dealing with research on and resources for a variety of active learning models, including case-based teaching. The current article provides some relevant theory and research on constructivist learning, the principles of which underlie all of the active learning models. The second article in the series will discuss the fit between active learning and the use of media and technology in teaching and learning. The third article will focus on practical ideas and resources for implementing active learning models in postsecondary settings.

In a separate article in this issue of The College Quarterly, Schultz

addresses the apparent conflict between the student-centred approaches that arise out of constructivist models of learning and societal demands for accountability that focus on “predetermined curriculum and instructional plans.” I believe the ideas presented in this series of articles are consistent with the idea of “pragmatic constructivism” that Schultz regards as a resolution of the student-centred vs. “predetermined” approach to instruction. At various points in the articles, the reader will find text-boxes that provide specific suggestions for how to involve students as “partners in education”—a concept promoted by Healey, Flint, and Harrington (2014) in a report for the United Kingdom’s Higher Education Academy. The full partnership model has four components but the articles in this series are concerned only with the one called “subject-based research and inquiry.” The Healey et al. 2014 paper argued that all postsecondary education students should be engaged in active learning of this type.

It is now over a century since the HBS introduced case-based teaching and the environment around the use of case-based teaching methods has changed markedly. There is now a much broader body of theory and research that has implications for case-based teaching and a much richer array of media to be used in presenting cases and in working with them. Before offering some ideas on the educational use of cases, I will review these two environmental changes.

Relevant Theory and Research

Constructivism

The general idea that students learn by constructing their own mental representations and/or organisations of a body of knowledge has a long history dating back to such thinkers as Piaget, Dewey, and Vygotsky. For example, Dewey (1910) argued that a child who engages the world of adults “…exercise(s) the imagination in constructing an experience of wider value than any the child has yet mastered” (p. 166). This emphasis on learning as construction of knowledge grew throughout the 20th century with the emergence of instructional models based on these ideas, (e.g., discovery learning [Bruner, 1960], cooperative learning [Johnson & Johnson, 1999], and inquiry-based-learning [Schwab, 1960]), to name just a few. Later, researchers began to examine ways in which constructivist approaches could be supported by the use of technology. Papert (1980) was among the first to make this link explicit, but there has been a wealth of work in this area (e.g., Jonassen, 2000; Wilson, 1996; Becker & Riel, 1999; Becker, 2000).

In a work primarily devoted to methods of qualitative research, Lincoln, Lynham, and Guba (2011) discussed the theoretical bases for constructivism, particularly focussing on the nature of truth claims and their implications for research methods. They describe a practical view of validity and say that “Agreements about truth may be the subject of community negotiations regarding what will be accepted as truth…” (p. 120), emphasis in original or “agreements may eventuate as the result of a dialogue that moves arguments about truth claims or validity past the warring camps of objectivity and relativity” (p. 120) towards a communal agreement founded in discourse. This focus on discourse, on the communal struggle for truth, is thus a defining feature of constructivism. It is also why “social constructivism”—the communal creation of knowledge—relies so heavily on

the exchange of information between learners as the basis for learning. As we shall see, dialogue and group discussion are central to the active learning methods being discussed in this series and that is why an understanding of constructivism is critical for the arguments being made here.

However, constructivism is not really a single, clear learning theory complete with testable hypotheses (as critics are wont to note—see, for example, Kirschner, Sweller and Clark [2006]). Rather, it could be described as a collection of ideas about how learning occurs and how best to foster it. Yet there is a common perception that constructivist views, with their emphasis on the individual learner's role in shaping his or her own knowledge, preclude the possibility of a constructivist approach to instructional design since the design process involves the instructor in advance preparation for students in general. This argument was rejected by Karagiorgi and Symeou (2005) who indicate that there is ample room for design principles in "practical constructivist" approaches to learning that emphasise the importance of authentic experiences and structure activities that promote situated cognition. In an earlier work, Wilson (1996) put together a collection of cases that portray constructivist instructional design as a matter of creating learning environments (e.g., computer "microworlds").

Baker and Wedman (2000) looked at how a variety of theories could be used to explain the experiences they had had with case-based teaching for undergraduate education students. In general, their findings suggest that in practice the theoretical explanations are useful but they miss the nuances of teacher and student experience. I have found few instructors at any level who see themselves as servants of any one theoretical perspective. Teaching is a practice based on theory and informed by research, but its practitioners generally adopt an eclectic approach that allows them to adapt to different content, circumstances, and students.

So, on a practical level, Cunningham, Duffy, and Knuth (1993) developed a set of characteristics that they believe described constructivist learning environments. Table 1 shows how I see those characteristics in relation to case-based teaching.

Table 1. Case-based teaching and characteristics of constructivism.

Characteristics of a constructivist learning environment (Cunningham, Duffy, & Knuth, 1993) A constructivist learning environment should...	How each characteristic plays out in case-based teaching
provide experience in the knowledge construction process	Learners must actively seek information in the case, organise it, analyse it, interpret it and draw conclusions or recommendations based on this process
learners must actively seek information in the case, organise it,	Well-written cases should frame a problem that is open to

analyse it, interpret it and draw conclusions or recommendations based on this process	interpretation and describe perspectives on that problem
embed learning in realistic and relevant contexts	This is the principal purpose of using cases in teaching—albeit the contexts may be either real or fictional
encourage ownership and voice in the learning process	Learners working with cases must reach and defend conclusions of their own
embed learning in social experience	While cases might be used as assignments for individual learning, the usual process involves some form of group collaboration
encourage the use of multiple modes of representation	Case methods often include a presentation which may be structured to allow for varying modes
encourage self-awareness in the knowledge construction process	This is not an explicit or necessary element of case-based methods, but it may often be a fortuitous outcome

With Table 1, I am trying to make the case that case-based teaching aligns nicely with perspectives on teaching and learning that strongly emphasise giving learners opportunities to build their own understanding of a body of knowledge based on experiences structured by a knowledgeable teacher. It is worth examining a few specific examples of how this works in practice.

Situated Cognition/Situated Learning

Brown, Collins, and Duguid (1989) addressed the “breach” in learning between knowing something and using that knowledge (which they said is akin to the vernacular “know what” vs. “know how”). They cited language research that indicated students often learn vocabulary words but misapply them when creating sentences. This issue in learning, they said, is analogous to the difference between having a tool and using the tool:

> People who use tools actively rather than just acquire them, by contrast, build an increasingly rich implicit understanding of the world in which they use the tools and of the tools themselves. The understanding, both of the world and of the tool, continually changes as a result of their interaction. (p. 33)

That is to say, rich understanding develops in contexts in which the learning is situated in an environment where the new learning is put to use. Brown et al. advocated “cognitive apprenticeship” as a teaching strategy that would enable situated cognition: “Cognitive apprenticeship methods try to enculturate students into authentic practices through activity and social interaction in a way similar to that evident—and evidently successful—in

craft apprenticeship" (p. 37).

For Brown et al. (1989), then, learning proceeds from a process of enculturation and it can benefit from group processes that include: 1) collective problem solving, 2) displaying multiple roles, 3) confronting ineffective strategies, and 4) providing collaborative work skills. Iterative engagement with new knowledge and skills through these processes is the mechanism for developing understanding. Later writers, notably Lave and Wenger (1991) referred to this social learning environment as a "community of practice."

Throughout this series, I will write about different models of active learning and I will focus on the features that the various models have in common. Purists who advocate any one of these models will no doubt think I should have paid more attention to the differences between the models. While that approach has academic merit, especially for testing the hypotheses and predictions of different models, my purpose here is to focus on more practical matters of classroom instruction and for that purpose, I think the distinctions are less important than the commonalities. Readers who would like to know more about the details that distinguish one active learning model from another might find what they need in Savery (2015).

It is not my intent to comprehensively review the research literature regarding situated learning, but I do want to refer to some recent works in order to add context to the explanation of the model. One area in which situated cognition has proven to be an attractive model for explaining learning and developing teaching methods is second language learning. For example, using an experimental design, Hwang, Chen, Shadiev, Huang, and Chen (2014) compared the English language writing of students who were assigned writing tasks using a mobile device in three different physical environments ("classroom, meal and playground") to another group whose writing was paper-based and who were provided only pictures of the environments. They found that the students in the technology-supported situational learning group wrote more sentences and developed better writing skills. McNeil (2013) found that teachers learning to use Computer-Assisted Language Learning (CALL) tended to have a better understanding of and appreciation for situated learning if they also had a strong understanding of CALL. McNeil's work includes an extensive review of the literature on CALL and situated learning that generally supports the idea that it is difficult to separate the two in practice. CALL may indeed constitute a form of situated learning since it engages learners in active language use.

Teacher education and technology use were also the foci of work by Bell, Maeng, and Binns (2013) whose case study of student teachers in science classrooms showed very high levels of technology integration for students whose academic program stressed inquiry approaches and situated cognition. Interestingly, Bell et al. (2013) attributed this level of integration, at least in part, to the fact that the students had learned about using technology in teaching in science-specific teaching methodology courses.

Students as partners—situated cognition

- Ask students to describe life situations that involved the learning concepts they are working on.
- Ask students to identify real life learning situations they would like to explore.
- Invite students to demonstrate events that might test their new knowledge.
- Have students write draft cases for future classes based on their situated learning experiences.

When Vázquez et al. (2012) developed “writing-to-teach” as a situated learning approach to the teaching of quantum mechanics, they may have managed to capitalise on the perceived subject area appropriateness of situated learning in CALL (Hwang et al., 2014; McNeil, 2013) and in science education (Bell et al., 2013). They created a writing studio in which second year chemistry students worked collaboratively to write explanations of important quantum mechanics concepts for inclusion in a supplemental text to be used by future students. Independent judges rated the later writing (on examinations) of writing-to-teach learners as consistently better than that of peers who did not participate in the program. The authors also observed that the writing-to-teach students included substantially more visual material as part of their written responses.

Educators in the health sciences have also examined the benefits of situated learning approaches (see, e.g., Durning, Artino, Boulet, Dorrance, van der Vleuten, & Schuwirth, 2012, Standal & Jesperson, 2008, and Field, 2004). Field’s (2004) argument for the value of practical learning in developing expertise in student nurses also includes a good review of the literature on situated learning in practical contexts.

Anchored Instruction

Situational learning argues for the value of real or authentic experience as a basis for developing deeper, more nuanced and more useful understanding. It was developed in contrast to the didactic and text-based teaching often characterised as traditional instruction (e.g., Brown et al., 1989). One might reasonably say that situational learning involves anchoring the learning experience in real-life situations. However, it would also be reasonable to ask whether the didactic presentation vs. real world distinction is a false or misleading dichotomy. In the simplest case, a lecturer might call on learners to engage in a thought experiment or other imaginative exercise. In so doing, couldn’t the learner be said to be involved in a mental re-creation of a real world situation? If the lecturer then engaged the students in other activities that used this imaginative experience in 1) collective problem solving, 2) displaying multiple roles, 3) confronting ineffective strategies, and 4) providing collaborative work skills (Collins et al., 1989), could we say that their learning was “anchored” in the imaginative experience? Taken a step further, suppose the learners were engaged in the examination of a carefully constructed video that outlined a real-life problem and provided a context for engaging in problem solving, wouldn’t that be another step on a continuum of experience that might also (now) include simulations, games and virtual environments, That kind of

experience was the basis for the development of anchored instruction (Cognition and Technology Group at Vanderbilt, 1990). Indeed, these authors summarised their work saying, in part, “We argued that the situated cognition perspective discussed by Brown et al. (1989) provided a useful framework for deriving principles of anchored instruction” (p. 8).

The CTGV group (Cognition and Technology Group at Vanderbilt, 1990) included descriptions of the kinds of activities involved in anchored instruction. Specifically, they had students watch commercial videos based on Sherlock Holmes and Oliver Twist and then engage in group activities related to the analysis of story structures, checking the historical accuracy of the videos, and determining issues they thought worthy of further exploration. At one point, they asked rhetorically of these activities: “Are these anything other than arbitrary, school-like tasks?” (Cognition and Technology Group at Vanderbilt, 1990, p. 7). They go on to argue that the activities are authentic because they are analogous to the kinds of work done by movie producers and that they therefore constitute the kind of cognitive apprenticeship that Brown et al. (1989) advocated. They also described a series of videos they were developing under the name of The Jasper Project. In this work, they were specifically designing videos to present stories that would engage the characters (and thus the viewer) in learning activities that were authentic versions of the kinds of work done by mathematicians, scientists and other scholars.

Students as partners—anchored instruction

- Ask students to discuss feature films that involve problems like those they are studying.
- Encourage students to search for possible instructional videos on YouTube or other web sites.
- Engage students in the production of “home videos” that deal with issues of importance to your course.

Problem-based Learning

One might regard the real-world situations of situated learning or the instructional media in anchored instruction as setting the stage for students to engage proactively in learning to solve problems presented by the instructor or identified by the learners themselves. In the case of problem-based learning (PBL), the “problem” is the point of initiation of the process of inquiry. Students are given a problem (more on that below), invited to discuss it and to share any prior knowledge they have that might relate to the problem and then to develop strategies for acquiring the knowledge and skills necessary to solve the problem. This model was developed by the medical faculty at McMaster University in the 1960s (a brief overview and description of that model was given by Barrows, 1996) but has since been applied in many different learning environments (Loyens, Kirschner, & Paas, 2011).

Loyens et al. (2011) provide a thorough introduction to PBL and to research on the model. Some key elements of the model as they describe it are:

- The need for an ill-defined problem (i.e., one for which no single clearly best solution is obvious - in order to stimulate discussion, encourage the search for a wide range of resources and information, and encourage creative thinking)
- The systematic effort to engage learners in formalising their prior knowledge and its applicability to the problem
- The provision for (requirement of) group discussion as part of the learning process
- The provision of a broad range of learning resources, including access to a tutor whose role is largely to support the process
- The use of problems that relate to the future professional work of the learners (to better motivate them to learn)
- The involvement of the learners in defining the issues to be investigated and in directing their own learning

Students as partners--problem-based learning—anchored instruction

---

- Have students review potential learning problems using the criteria above.
- Have students engage in analyses of real-life work sites and propose new problems based on their observations and discussions.
- Have students make videos of their own PBL group discussions and get other groups to offer suggestions for improvement.

Problems may be presented in a variety of ways, e.g., as text descriptions, as live issues, as portfolios of problem-related documentation, or through video, or other media. The merits of these varying methods have been the focus of considerable research, much of it discussed in Loyens et al. (2011).

Cooperative Learning

Cooperative learning (Johnson & Johnson, 1999) is not really a model of teaching that addresses the manner of presentation of a body of information to engage learners in the same way that situated cognition, anchored instruction, or problem-based learning are, but each of these involves systematic use of group work as a key part of the learning process. Cooperative learning is all about the effective use of groups in teaching and learning, so I have included it here as an aide to working with the other models described. It includes strategies for organising groups, advice on size of groups, ways to ensure learner involvement, the role of individual accountability in group work ,and the assessment of group (and much more). Cooperative learning is one of the most thoroughly studied approaches to classroom research over the past thirty years or more. To do this work justice would require far more space than this article can allow, however, I would encourage anyone not familiar with cooperative learning to visit some of the following sites (URLs in reference list):

- Johnson, Johnson & Smith (1991) prepared a report for the U.S. Office of Educational Research that laid out the case for using cooperative education techniques at the

college level—and provide a good discussion of how and why that should be done.

- The Cooperative Learning Institute (nd) has a web site with a good overview of cooperative learning and links to recent research.
- Stahl (1994) prepared an ERIC Digest that gives bullet point summaries of key cooperative learning concepts with the intention of enabling instructors to use them to enhance active college learning
- Arendale (2007) provides summaries of six ongoing institution-wide postsecondary cooperative education programs and also an annotated bibliography of research in the area
- Stanford University (1999) provides specific guidance on how to work with small groups as well as links to other sources of advice and support.

The principal point in understanding cooperative learning is that it is simply not sufficient to ask students to get together in groups to discuss an idea, topic, paper, case, or problem. To be effective, groups should be carefully structured in terms of size (generally 4-8 members) and composition (diversity is an asset) and they should have a specific learning goal/outcome that they work toward cooperatively—that is, the emphasis is on producing the outcome together. Nevertheless, individual group members must be accountable for their contributions. The dynamic of being individually accountable while working cooperatively is generally referred to as “positive interdependence” a term coined by Deutsch (1949). The resources listed above are meant to give interested readers much more information on structuring and implementing cooperative groups.

Conclusion

Not all of the work cited above was directly based on research on adults or postsecondary students, but much of it was. Tellingly, in a 2003 study of mature adults returning to (or beginning) undergraduate study, Kasworm tried to identify the ways in which such students perceived the relationship between academic knowledge and real-world knowledge. She found several distinct patterns, but those she characterised as having an “outside voice”—whose knowledge system was “anchored in the knowledge of work, family, and personal life,” (p.90) were students who valued faculty that “…used in classroom discussions, small-group applications, case studies, projects, and other types of activities that connected the students’ adult lives (and most often their work lives) with the classroom knowledge.” For these students, at least, the kinds of active learning activities being discussed in this series were precisely what they valued from postsecondary instructors.

Over time, our understanding of what it means to be a literate person has changed markedly. Venezky (1991) traced the development of this concept in western societies over the past millennium noting the changing influences of the church, the economy, technology ,and a range of other factors, but it is well understood that to be literate in an industrialised nation today requires, at a minimum, fluency and comprehension in both writing and reading. I believe we are now at a point in time in which it is reasonable to begin considering how our views are changing about what it means to be a learned person. For centuries, the key to being regarded as

learned was the ability to demonstrate recollection of vast quantities of information, whether that information be the oral histories of a given culture, the Latin names used in anatomy or a massive set of precedents in case law. Amazingly, this view of what it means to be learned persisted long after relatively cheap printing made it feasible, even necessary to store such information in books or other documents. The faster and more flexible information retrieval that has characterised the information age allows us to think differently about what it means to be learned. We can think of it as having the skills necessary to identify good questions; to locate useful information; to analyse that information according to the practices of some discipline, trade, or profession; to devise and test answers to their questions ,and to effectively communicate their conclusions. It is that kind of learned-ness that active learning in all of its manifestations is meant to support.

Since I think that media and technology are shaping our understanding of what it means to be learned, the next piece in this series will focus on the interaction of active learning methods with media and technology

References (for the series)

Anderson, T. (2008). *The theory and practice of online learning.* Athabasca University Press.

Arendale, D. R. (2005). Postsecondary Peer Cooperative Learning Programs: Annotated Bibliography. Online Submission. Retrieved from: http://www.tc.umn.edu/~arend011/Peerbib03.pdf

Baker, E., & Wedman, J. (2000). Preservice Literacy Teachers, Digital Literacy Portfolios, and Multimedia Case-Based Instruction: Examining the Theoretical Basis for Case-Based Instruction. SITE Conference proceedings. Retrieved from: http://www.editlib.org/p/15903/

Barrows, H. S. (1996). Problem based learning in medicine and beyond: A brief overview. *New directions for teaching and learning, 1996*(68), 3-12. . Retrieved from: http://onlinelibrary.wiley.com/doi/10.1002/tl.37219966804/epdf

Becker, H.J. (2000). The "exemplary teacher" paper—how it arose and how it changed its author's research program. *Contemporary Issues in Technology and Teacher Education, 1* (2). Retrieved from: http://www.citejournal.org/vol1/iss2/seminal/article2.htm

Becker, H.J., & Riel, M.M. (1999). Teacher professionalism and the emergence of constructivist-compatible pedagogies. Paper presented at the American Educational Researchers Association. . [On-line]. Retrieved from: http://www.crito.uci.edu/TLC/findings/special_report2/index.htm

Bell, R. L., Maeng, J. L., & Binns, I. C. (2013). Learning in context: Technology integration in a teacher preparation program informed by situated learning theory. Journal of Research in Science Teaching, 50(3), 348-37.

Brown, J.S., Collins, A., & Duguid, P. (1989).Situated cognition and the culture of learning. *Educational Researcher*, 18, pp. 32-41. Retrieved

from:
http://people.ucsc.edu/~gwells/Files/Courses_Folder/ED%20261%20Papers/Situated%20Cognition.pdf

Brualdi Timmins, Amy C. (1998). Implementing performance assessment in the classroom. *Practical Assessment, Research & Evaluation,* 6(2). Retrieved from: http://PAREonline.net/getvn.asp?v=6&n=2

Brualdi Timmins, Amy C. (1998). Implementing performance assessment in the classroom. Practical Assessment, Research & Evaluation, 6(2). Retrieved from: http://PAREonline.net/getvn.asp?v=6&n=2

Conole, G. and Dyke, M. 2004. What are the affordances of information and communication technologies? *ALT-J, Research in Learning Technology.* 12(2), 113-124. Available:
http://repository.alt.ac.uk/596/1/ALT_J_Vol12_No2_2004_What%20are%20the%20affordances%20of%20in.pdf

Connolly, T. M., Boyle, E. A., MacArthur, E., Hainey, T., & Boyle, J. M. (2012). A systematic literature review of empirical evidence on computer games and serious games. *Computers & Education*, 59(2), 661-686.

Cooperative Learning Institute (nd). Website: http://www.co-operation.org/ Cunningham, D., Duffy, T. M., & Knuth, R. (1993).Textbook of the Future. In C. McKnight (Ed.)

Deutsch, M. (1949). A theory of cooperation and competition. *Human Relations*, 2, 129-152.

Dewey, J. (1910). *How we think*. New York: D.C. Heath. Retrieved from: http://www.gutenberg.org/files/37423/37423-h/37423-h.htm

Durning, S. J., Artino, A. R., Boulet, J. R., Dorrance, K., van der Vleuten, C., & Schuwirth, L. (2012). The impact of selected contextual factors on experts' clinical reasoning performance (does context impact clinical reasoning performance in experts?). *Advances in health sciences education, 17*(1), 65-79.

Fernández, M., Wegerif, R., Mercer, N., & Rojas-Drummond, S. (2001). Re-conceptualizing "scaffolding" and the Zone of Proximal Development in the context of symmetrical collaborative learning. *Journal of Classroom Interaction, 36*(2), 40-54. Retrieved from http://elac.ex.ac.uk/dialogiceducation/userfiles/JCI2_Fernandez.pdf

Field, D. E. (2004). Moving from novice to expert–the value of learning in clinical practice: a literature review. *Nurse Education Today, 24*(7), 560-565.

Hakkarainen, P. (2009). Designing and implementing a PBL course on educational digital video production: lessons learned from a design-based research. *Educational Technology Research and Development, 57*(2), 211-228.

Hakkarainen, P., Saarelainen, T., & Ruokamo, H. (2007). Towards meaningful learning through digital video supported, case based teaching. *Australasian Journal of Educational Technology, 23*(1).

Harvard Business Review Case Discussions. Website:

https://cb.hbsp.harvard.edu/cbmp/pages/content/hbrcasestudy (Accessed 19 June, 2015).

Harvard Business School. Website. http://www.hbs.edu/about/facts-and-figures/Pages/history.aspx (Accessed 19 June, 2015).

Healey, M., Flint, A. & Harrington, K. (2014). *Engagement through partnership: students as partners in learning and teaching in higher education.* York, UK: Higher Education Academy. Retrieved from: https://www.heacademy.ac.uk/sites/default/files/resources/engagement_through_partnership.pdf

Hmelo-Silver, C. E., Duncan, R. G., & Chinn, C. A. (2007). Scaffolding and achievement in problem-based and inquiry learning: A response to Kirschner, Sweller, and Clark (2006). *Educational Psychologist, 42*(2), 99-107.

Huff, D. (1993). *How to lie with statistics.* WW Norton & Company. (NOTE: Book was originally published by Norton Publishing in 1954 but has been through many reprints; a 1973 edition published by Penguin is available online at: https://archive.org/details/HowToLieWithStatistics .)

Howard-Jones, P., Holmes, W., Demetriou, S., Jones, C., Tanimoto, E., Morgan, O. & Davies, N. (2015). Neuroeducational research in the design and use of a *learning technology. Learning, Media and Technology, 40*(2), 227-2

Hunter, W. J., (1999).Cases in educational computing. In Sudzina, M. R. (Ed.). (1999). Case study applications for teacher education: *Cases of teaching and learning in the content areas.* Allyn & Bacon. pp. 186-199.

Hunter, W. J. (2011). Use your head: Neuroscience research and teaching. *College Quarterly, 14*(3). Retrieved from: http://collegequarterly.ca/2011-vol14-num03-summer/hunter.html

Hunter, W. J. (2012). Collective disorienting dilemmas: A"Wikid" approach to fostering adult learning. *College Quarterly, 15*(2). Retrieved from: http://collegequarterly.ca/2012-vol15-num02-spring/hunter.html

Hwang, W-Y., Chen, H. S. L., Shadiev, R. Huang, R. Y-M. & Chen, C. Y. (2014). Improving English as a Foreign Language Writing in Elementary Schools Using Mobile Devices in Familiar Situational Contexts. *Computer Assisted Language Learning. 27*(5), 359-378.

Jenson, J., Taylor, N., & de Castell, S. (2007). Shifting design values: A playful approach to serious content. *E-Learning and Digital Media, 4*(4), 497-507.

Jenson, J., Taylor, N., & de Castell, S. (2011). Epidemic: Learning games go viral. *Journal of the Canadian Association for Curriculum Studies, 8*(2), 28-49.

Johnson, D. W., & Johnson, R. (1999). Learning together and alone: Cooperative, competitive, and individualistic learning (5th Ed.). Boston: Allyn & Bacon.

Johnson, D. W., Johnson, R. & Smith, K. (1991). *Cooperative*

Learning: Increasing College Faculty Instructional Productivity. ASHE-ERIC Higher Education Report No. 4, 1991. ASHE-ERIC Higher Education Reports, George Washington University, One Dupont Circle, Suite 630, Washington, DC 20036-1183. Retrieved from: http://files.eric.ed.gov/fulltext/ED343465.pdf

Jonassen, D.H. (2000). *Computers as mindtools for schools: Engaging critical thinking.* Columbus, OH: Prentice-Hall.

Karagiorgi, Y., & Symeou, L. (2005). Translating constructivism into instructional design: Potential and limitations. *Educational Technology & Society, 8*(1), 17-27. Retrieved from: http://www.ifets.info/journals/8_1/5.pdf

Kirschner, P. A., Sweller, J., & Clark, R. E. (2006).Why minimal guidance during instruction does not work: an analysis of the failure of constructivist, discovery, problem-based, experiential, and inquiry-based teaching. *Educational Psychologist, 41 (2)* 75-86. Retrieved from: http://www.cogtech.usc.edu/publications/kirschner_Sweller_Clark.pdf

Kasworm, C. (2003). Adult meaning making in the undergraduate classroom. *Adult Education Quarterly, 53*(2), 81-98. Retrieved from:

Lave, J., & Wenger, E. (1991). Situated learning: Legitimate peripheral participation. Cambridge: Cambridge University Press.

Leow, F. T., & Neo, M. (2015). Redesigning for collaborative learning environment: Study on students' perception and interaction in Web 2.0 tools. *Procedia-Social and Behavioral Sciences, 176,* 186-193.

Lincoln, Y. S., Lynham, S. A., & Guba, E. G. (2011). Paradigmatic controversies, contradictions, and emerging confluences, revisited. *The Sage handbook of qualitative research, 4,* 97-128.

Loyens, S. M. M., Kirschner, P. & Paas, F. (2011). Problem-based Learning. In K. R. Harris, S. Graham & T. Urdan (Eds.), APA Educational Psychology Handbook: Vol 2 (p. a). Washington: American Psychological Association. Retrieved from: http://ro.uow.edu.au/edupapers/1235/

McFarlane, D. (2015). Guidelines for using case studies in the teaching-learning process. College Quarterly, 18(1). Retrieved from: http://www.senecac.on.ca/quarterly/2015-vol18-num01-winter/mcfarlane.html

McNeil, L. (2013). Exploring the relationship between situated activity and CALL learning in teacher education. *ReCALL 25(2),* 215–232.

Mezirow, J. (1997). "Transformative learning: Theory to practice." In P. Cranton (ed.), *Transformative Learning in Action: Insights from Practice.* San Francisco: Jossey-Bass.

Noel, L. (2015). Using blogs to create a constructivist learning environment. *Procedia-Social and Behavioral Sciences, 174,* 617-621.

Oliver, R. & Herrington, J. (2003). Exploring technology-mediated learning from a pedagogical perspective. *Journal of Interactive Learning Environments, 11*(2), 111-126.

Ommundsen, P. (2001). Problem-based learning in biology with 20 case examples. Website: http://capewest.ca/pbl.html

Papert, S. (1980). *Mindstorms: Children, computers and powerful ideas* New York: Basic Books.

Parker, K. & Chao, J. (2007). Wiki as a teaching tool. *Interdisciplinary Journal of Knowledge and Learning Objects,* 3, 57-71.

Pressey, S.L. (1926). A simple apparatus which gives tests and scores - and teaches. *School and Society, 23* (586), 373-376

Pressey, S.L. (1927). A machine for automatic teaching of drill material. *School and Society, 25* (645), 549-552.

Rathnasiri Hewege, C., & Chamila Roshani Perera, L. (2013). Pedagogical significance of wikis: towards gaining effective learning outcomes. *Journal of International Education in Business, 6*(1), 51-70.

Rourke, L., Anderson, T., Garrison, D.R., & Archer. W. (2001). Methodological issues in the content analysis of computer conference transcripts. International *Journal of Artificial Intelligence in Education*, 12, pp.8-22. <hal-00197319> Retrieved from: https://telearn.archives-ouvertes.fr/hal-00197319/document

Salomon, G. (Ed.) (1993). *Distributed cognitions—psychological and educational considerations.* Cambridge, UK: Cambridge University Press.

Savery, J. R. (2015). Overview of problem-based learning: Definitions and distinctions. Essential Readings in Problem-Based Learning: *Exploring and Extending the Legacy of Howard S. Barrows,* 5.

Schwab, J. (1960). Inquiry, the science teacher, and the educator. *The School Review, 68(2)*, 176-195.

Siemens, G., & Tittenberger, P. (2009). *Handbook of emerging technologies for learning.* Manitoba, Canada: University of Manitoba.

Shaffer, D. W. (2006). *How computer games help children learn*. New York: Macmillan. Skliarenko, E. (2004). Case study: Bombardier Inc.: Competitive intelligence report (with special reference to aircraft exports). *College Quarterly, 7(3).* Retrieved from: http://collegequarterly.ca/2004-vol07-num03-summer/skliarenko_bhardwaj.html

Stahl, R. (1994). The essential elements of cooperative learning in the classroom. ERIC Digest. Retrieved from ERIC Documents (ED 370881): http://files.eric.ed.gov/fulltext/ED370881.pdf

Standal, Ø. F., & Jespersen, E. (2008). Peers as resources for learning: a situated learning approach to adapted physical activity in rehabilitation. *Adapted Physical Activity Quarterly, 25*, 208-227

Stanford University. (Winter, 1994). Teaching with case studies. *Speaking of Teaching, 5(2).* Retrieved from: http://web.stanford.edu/dept/CTL/cgi-bin/docs/newsletter/case_studies.pdf

Stanford University. (Winter, 1999). Cooperative learning: Students working in small groups. *Speaking of Teaching, 10(2).* Retrieved from: http://web.stanford.edu/dept/CTL/cgi-bin/docs/newsletter/cooperative.pdf

Stanford University. (Winter, 2001). Problem-based learning. *Speaking of Teaching, 11(1).* Retrieved from: http://web.stanford.edu/dept/CTL/cgi-bin/docs/newsletter/problem_based_learning.pdf

Sudzina, M. R. (1999). *Case study applications for teacher education: Cases of teaching and learning in the content areas.* Allyn & Bacon.

Tiernan, P. (2015). An inquiry into the current and future uses of digital video in University teaching. *Education and Information Technologies, 20*(1), 75-90.

University of Illinois (nd). Online Teaching Activity Index. Website: http://www.ion.uillinois.edu/resources/otai

University of Waterloo Centre for Teaching Excellence. (nd). Implementing group work in the classroom. https://uwaterloo.ca/centre-for-teaching-excellence/teaching-resources/teaching-tips/alternatives-lecturing/group-work/implementing-group-work-classroom

van Oostveen, R., Hunter, W., Kay, R. & Muirhead, W. (2007). Developing Argumentation Skills in High School Students: A Video-based Case Study in Science Education. In C. Montgomerie & J. Seale (Eds.), *Proceedings of EdMedia: World Conference on Educational Media and Technology 2007* (pp. 391-397). Association for the Advancement of Computing in Education (AACE). Retrieved July 7, 2015 from http://www.editlib.org.uproxy.library.dc-uoit.ca/p/25408.

Vázquez, A. V., McLoughlin, K., Sabbagh, M., Runkle, A. C., Simon, J., Coppola, B. P., & Pazicni, S. (2012). Writing-to-teach: A new pedagogical approach to elicit explanative writing from undergraduate chemistry students. *Journal of Chemical Education, 89*(8), 1025-1031

Venezky, R. L. (1991). The development of literacy in the industrialized nations of the West. *Handbook of reading research, 2,* 46-67.

Vygotsky, L. S. (1978). *Mind in society.* Cambridge, MA: Harvard University Press.

Walker, R. A. (2013). Holograms as teaching agents. *Journal of Physics: Conference Series 415*(1), 1-5. Retrieved from: http://iopscience.iop.org/1742-6596/415/1/012076/pdf/1742-6596_415_1_012076.pdf

Waddington, D. I. (2015). Dewey and Video Games: From Education through Occupations to *Education through Simulations. Educational Theory, 65*(1), 1-20.

Wang, Z., Chen, L., & Anderson, T. (2014). A framework for interaction and cognitive engagement in connectivist learning contexts. *The International Review of Research in Open and Distributed Learning, 15*(2). Retrieved from: http://www.irrodl.org/index.php/irrodl/article/view/1709/2886

Wiggins, Grant (1990). The case for authentic assessment. *Practical Assessment, Research & Evaluation*, 2(2). Retrieved from: http://PAREonline.net/getvn.asp?v=2&n=2

Wilson, B. G. (1996). *Constructivist learning environments: Case studies in instructional design.* Englewood Cliffs NJ: Educational Technology Publications.

Wood, D., Bruner, J., & Ross, G. (1976). The role of tutoring in problem-solving. *Journal of Child Psychology and Child Psychiatry, 17*, 89-100.

Bill Hunter is Professor in the Faculty of Education at University of Ontario Institute of Technology in Oshawa, Ontario. He can be reached at bill.hunter@uoit.ca

Contents
