

my pleasure to introduce to readers and researchers the topics and research studies that this second issue holds. These appear as follows:

Online Education's Dirty Little Secret

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My claim is that the academy is engaging in marketing online classes without having conducted anything approaching *sufficient* research to determine whether online classes do, indeed, make good on the promise of effective teaching and its corollary, effective learning. (emphasis in original) Bruce Speck (2000)

A corollary is a self-evident implication of already established knowledge; it is a “proposition that naturally follows, or is inferred from, a proved proposition and requires little or no additional proof” I read the article by Speck (2000) that included the above claimed corollary (Business Dictionary, 2007). I grasped the meaning of the intended principle upon which the corollary rested—that part and parcel to the educational institutions’ marketing of online classes exists an implied contract, or promise, that classes will be served by effective teaching. But regardless of the amount of effective teaching promised and delivered by educational programs, an educational institution can not promise effective learning.

No matter how many legislators, parents, and journalists want the above corollary to be true, it isn't so. Many educators, who know better, intuitively believe it to be true that effective teaching causes effective learning. Still, no matter how much it is wanted, the dirty little secret about education is that *effective teaching does not cause effective learning*. We can manipulate the inputs to education—the number of books on the library's shelves, the money spent per student, tuition, standardized test scores for admission/retention, student to instructor ratios, even within which particular classrooms good teachers work can be manipulated. Still there are no guarantees concerning the effectiveness of the learning that takes place. Teaching is done by teachers and learning is done by learners.

Is what I am saying an excuse for condoning poor teaching, whether online or in-person? No. Is what I am suggesting, that good teaching is not only insufficient, but actually an unnecessary element to learning? After all, many students learn *despite* what teachers do in the classroom (Glasser, 1990). No. Obviously, teachers often matter! There are things teachers can do to significantly increase the odds that learners whom they come into contact with will learn. This article discusses some principles and methods teachers can use to increase the probability of learning by students within their online, higher education classrooms. The point is that, while there are no guarantees that learning will occur, there are methods and strategies that good online teachers use to facilitate student learning based on several learning theories. Learning theories specify the conditions under which learning is facilitated or hindered. Following are several learning theories that seem particularly well suited for the way much of the effective online education is designed today.

Cognitive Learning Theories

Education is complex. Education at a distance is no less complex than any other formal education. In fact, distance education is probably more complex, because of the additional layer of technology, and the loss of immediate, non-verbal cues and feedback that are present during in-person classes. The complex, interdisciplinary nature of distance education is part of the reason why it is both difficult to implement and sustain, and why it is difficult to develop a central, theoretical framework on which future distance education development can be based. This should not be surprising as it has also proved difficult to develop one central theoretical framework for classroom education (Berge, 2004). The following theories were selected because they are central to learner-centered, constructivist learning and instruction which is often the prevailing philosophy of online teachers (Berge, 1997; Mclsaac & Gunawardena, 1996). Clearly the theories below do not constitute an exhaustive list, but are meant simply to give the reader an idea of some of the underpinnings of the instructional practices that follow this section.

Engagement Theory

The principles of engagement theory include three components: 1) establishing learner-learner collaborative teams, 2) encompassing a project based learning approach, and 3) designing an authentic learning environment and authentic tasks (Kearsley & Shneiderman, 1998; Shneiderman, 1994). Engagement theory fosters instruction that actively engages the learner and promotes collaboration. Through discussions with each other, students add new perspectives to course topics. For students to take responsibility for their own learning they must invest time and effort. They attend to learning activities that are structured by the instructor, plus they engage in assigned and unassigned readings, discussions, and self-directed activities. These design elements encourage learners to construct

meaningful conceptions, solve problems, think critically, develop higher order thinking skills, make decisions, and apply knowledge (Damoense, 2003; Marshall, 2007; Smith & McCann, 2001).

Experiential Learning

Experiential learning involves learning by doing. Active practice and participate, emphasis on the needs and wants of the learner, and reflection upon these experiences are paramount to experiential learning theory (Curry, n.d.; Hickcox, 2002; Ives & Obenchain, 2006). Rogers (1969) lists these qualities of experiential learning: personal involvement, self-initiated, evaluated by learner, and pervasive effects on learner (Kearsley, n.d.). Carver, King, Hannum, and Fowler (2007) state:

Experiential educators usually exhibit the following characteristics: they are creative in their use of resources (including time, space and authority), conscious of how behavioral norms are established (by modeling and labeling), and consistent in making decisions that reflect a set of values including compassion, communication, critical thinking, creativity, community, and respect for individuals and the environment. As diverse as the examples of experiential education programs are, there is a remarkable consistency in the presence of the above characteristics (Carver, 1998).

Streit (2004) reminds us that it is important to include training activities for educators such as how to integrate technology and various teaching techniques to use experiential learning online.

Situated Learning

Underlying situated learning or situated cognition (Brown, Collins, & Duguid, 1989) are theories from the fields of psychology, anthropology, sociology, and cognitive science. Theorists such

as Jean Lave and Etienne Wenger (1990), Lev Vygotsky (1962; 1978; 1986; Wertsch, 1985), John Dewey (1916), and J. G. Greeno (1989) who are associated with situated learning theory, argue that knowledge must be taught in context rather than in the abstract (Vincini, 2003). In the perspective of this theory, learning normally occurs as a function of activity in the context and culture in which it occurs—that is, it is situated (Ben-Ari, 2005; Brown, Collins, & Duguid, 1989; Conkling, 2007; Herrington & Oliver, 2000; Kearsley, n.d.). Learners should be engaged as apprentices using the same tools as more expert practitioners do. Social interaction is a critical component of situated learning. Interaction can mean a lot of different things to different people. However, a large part of interaction involves the social process of learning. Acquiring knowledge, dispositions, and beliefs must be done in context as “cognitive apprentices” within the community of practice (Collins, Brown, & Newman, 1989).

Social Development

The two major principles of Vygotsky's Social Development Theory are: the More Knowledgeable Other (MKO) and the Zone of Proximal Development (ZPD). Anyone who has a better understanding or higher ability than the learner regarding a particular task, process, or concept is referred to as a MKO. A MKO can be a teacher, older adult, or a coach, but also a peer or even younger person than the learner. The Zone of Proximal Development is the level where a student can perform a task with guidance or collaboration with another person(s) that could not be achieved alone. Thus, the place where Vygotsky believed learning took place was in the ZPD, in other words, with social interaction playing a fundamental role in the development of cognition (Mace, 2005).

Social constructivists see the concept of *scaffolding* as important (Bryceson, 2007; Rogoff, 1990). This is a process of guiding the learner through the knowledge gap that can be described as what is presently known to the goal that is to be known. Through scaffolding, students perform tasks that would normally be somewhat beyond their ability without assistance from someone more knowledgeable or skilled. Thus, scaffolding is an important method used in of constructivist learning and teaching.

Social Learning Theory

The social learning theory of Bandura (1977) emphasizes the importance of observing and modeling the behaviors, attitudes, and emotional reactions of others. There are four processes that form the basis of Social Learning Theory: 1) *attention*, including modeled events such as distinctiveness, complexity, prevalence, functional value; and observer characteristics such as sensory capacities, arousal level, and past reinforcement, 2) *retention*, including symbolic coding, cognitive organization, symbolic rehearsal, motor rehearsal, 3) *motivation*, including external, vicarious and self reinforcement, and 4) *motor reproduction*, including physical capabilities, self-observation of reproduction, accuracy of feedback (Fontaine, 2008; Huitt, 2004; Kearsley, n.d.).

Good Teaching

Essentially, good teachers across settings and subject areas, online or in-person, and at all levels of education have much in common with one another. Good teachers (Chickering & Gamson, 1987; Chickering & Ehrmann, 1996; Hassett, 2000; Yelon, 1996):

- are concerned about their subject matter
- are concerned about their students
- like the job of teaching

- have expectations of success for all students
- demonstrate a willingness to adapt and change to meet student needs
- tolerate ambiguity
- are comfortable with not knowing and respect diverse talents and ways of learning
- encourage interactions among students and between students and instructor
- give prompt, appropriate feedback.

As much of the literature states, Hassett (2000) found that good teachers reflect on their work:

This may be the only infallible, absolute characteristic of all good teachers, because without it, none of the other traits.. can fully mature. **Good teachers routinely think about and reflect on their classes, their students, their methods, and their materials.** They compare and contrast, draw parallels and distinctions, review, remove and restore. Failing to observe what happens in our classes on a daily basis disconnects us from the teaching and learning process, because it's impossible to create connectivity if you've disconnected yourself(p. 4).

Good teachers also put into practice powerful instructional principles to create active learning and build a community of learners online. [What Can Teachers Do to Facilitate Learning Online?](#)

The notion of Fordian education is no longer appropriate in higher education. Distance education is not based on the foundation of mass production but rather individualization. It is no longer possible to simply talk about continuous- or life-long learning as a good idea. It is necessary to implement life-long learning for individuals and societies to remain competitive in the global economy (Berge, 1999).

There are many things an online instructor can do to facilitate learning, such as emphasizing time on task, communicating high expectations, and respecting diverse student talents. But one of the most important is to foster learners becoming actively involved in the learning process (Moore & Kearsley, 2004). This is not always easy. The types of interaction useful to effective learning does not simply occur; it needs to be an intentional part of the learning design.

Additionally, students are often more comfortable in a passive learning role because they are: 1) not comfortable with online environment, and 2) not comfortable in the student-centered learning environment that often is foster in the online classroom (Vonderwell & Savery, 2004). Essentially, students have been trained using a transmission model of education and resist the change to a classroom in which knowledge is transacted among the instructor and students.

Creating Active Learning Online

An active learning environment is designed to encourage students to read, speak, listen, write, and think in deep, meaningful ways (Berge, 2002, p. 183).

Active learning is not the opposite of passive learning. *Passive learning* is use to characterize the student taking in what the instructor teaches. This is said to be less effective than active learning, where students seeks out what is relevant to them. Active learning is said to foster *deep learning* rather than surface learning.

Research into active or deep learning has been shown to have many benefits for learners in online courses (Austin & Mescia, n.d.; Herrington, Oliver, & Reeves, 2003). As Chickering and Ehrmann, (1996) state good practice uses active learning techniques:

Learning is not a spectator sport. Students do not learn much just sitting in classes listening to teachers, memorizing prepackaged assignments, and spitting out answers. They must talk about what they are learning, write reflectively about it, relate it to past experiences, and apply it to their daily lives. They must make what they learn part of themselves (n.p.).

Unlike correspondence education of the past hundred years, or one-way broadcast media used in the past several decades for teaching and learning, the computer-mediated classroom or web-based classroom of today, is a rich environment having the potential for active learning and collaboration among the participants. Unlike in-person education of the past several hundred years, students do not need to reside at the place knowledge and faculty reside—the institution. Resources are now available anytime and anyplace the student has access to the internet.

Engaging students in active learning means fostering involvement in their learning. Active learning is not synonymous with interaction, collaboration, or cooperation, although aspects of each of these concepts can be part of active learning. Student involvement is created through various learning activities and the feedback given to learners. So, when planning a course, the instructor should design assignments and activities that promote learner involvement with such things as learner-learner and learner-faculty interaction, collaboration, and foster communication. Involvement of students in the learning process include such activities as group work, case studies, simulations, peer critiques, web-based field trips, interviews, and student presentations(Lloyd, 2001).

A Shift in Approach

The philosophical perspective in education that incorporates the above shifts in teaching and learning, either in-person and online, has been labeled by many scholars as constructivism.

In the end elearning is not about computer systems any more than in-person classroom teaching is about chalkboards (Clark, 1983). Elearning is about anchoring instructional design within a selected educational framework, recognizing that there are inherent cognitive learning strategies associated with any framework. *What* strategies to use have been enumerated in the past. Examples of *how* to design these strategies for creating an active learning environment has been the focus of this article.

Building a Community of Learners

“Communities of practice, ”communities of inquiry,” ”learning communities,” and “virtual or online communities,” are all concepts receiving increased attention in the literature the past decade. Each type of community has its distinct characteristics, but for our purposes it is the commonality that is the focus. Communities are a group of students, in this case, sharing and collaborating to learn online. Development of community is important to designing an online course that emphasizes student involvement. Often, however, neither the instructor nor students have experience in development online community, and thus are unprepared to foster such activity.

Strategies for Instructional Design

Moving from theory to practice is usually difficult. As mentioned above, education is a complex field and involves many theories, which makes strategies based on these theories that much more difficult upon which to base instruction (Murphy, 1997). A summary of the implications for the design of instruction based on constructivism is:

- Embed learning in a rich, complex, authentic, problem-solving environment
- Enable context-and content dependent knowledge construction rather than focusing on reproduction
- Diagnose learner errors and use feedback to remedy learner errors and misconceptions
- Foster reflective practice
- provide metacognitive and strategic self-regulation by learners and learner control
- Provide experience in and appreciation for multiple perspectives
- Support collaborative construction of knowledge through social negotiation
- Embed learning in social experience (Ernest, 1995; Honebein, 1996; Jonassen 1994; Wilson, 1997; Wilson & Cole, 1991).

That these tenets, used together, can create an environment that will serve education effectively is essentially taken on faith. Still, using the above learning theories and characteristics as guidelines for designing online instruction can produce a more student-centered, collaborative, and immersive learning environment(Herrington, Oliver, Herrington, & Sparrow, 2002). Designers have supported many online learning environments with strategies, assignments, and teaching methods that align with the implications above, including those emphasizing inquiry- or problem-based learning (Orrill, 2001; Savery & Duffy, 1995), collaboration/teamwork (Curtis & Lawson, 2001; Stacey, 1999), self-direction (McLoughlin & Luca, 2000), discussion (Beaudin, 1999; Holt, Kleiber, Swenson, Rees, & Milton, 1998), case study (Rosatelli, 1999), reflection (Schon, 1991), or cognitive apprenticeship(Jarvela, 1995). One critical design strategy is to make sure there is alignment among the learning goals, learning activities, and the evaluation/feedback that students are given (Berge 2002) (Figure 1).

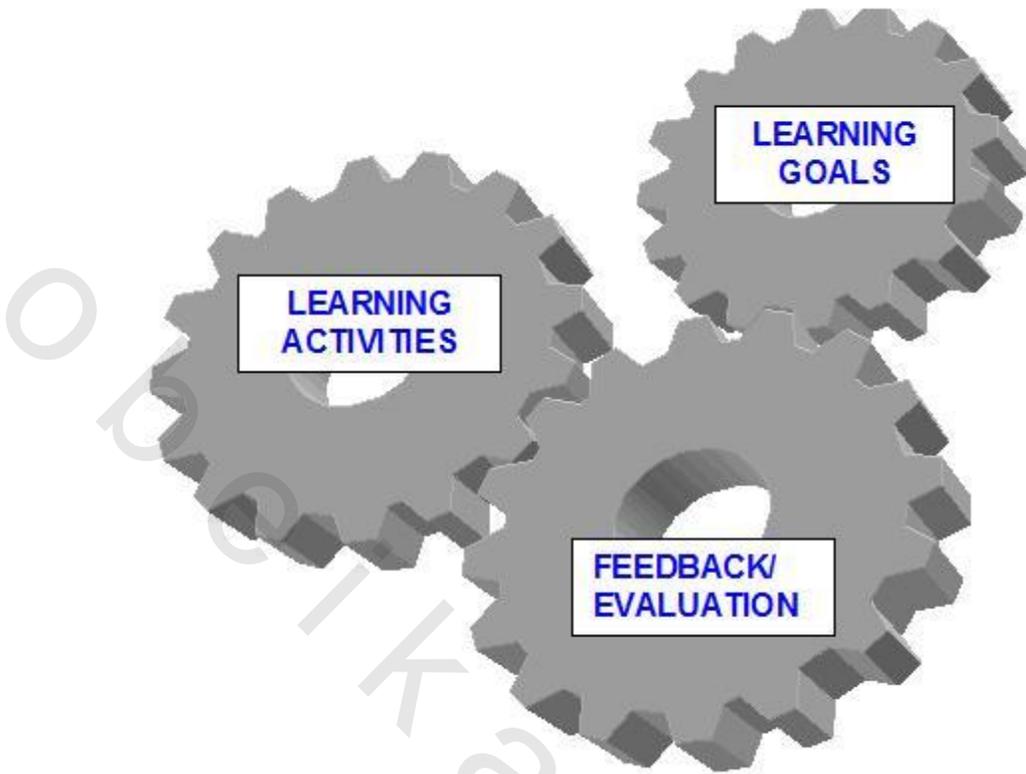


Figure 1. Align learning goals, learning activities, and evaluation / feedback

Conclusions

A paradigmatic shift in education has been occurring the past several decades. This is a philosophical move away from the transfer of knowledge to the constructivist's notions of learners transforming their own mindsets as each constructs knowledge. While many of the tenets found in today's constructivism are not new to education, the emergence of the web and other technological systems have acted as a catalyst for instructors and instructional designers to reexamine the way they structure and design their instructional events. Concomitant with this sea-change are certain theories that are inherent to constructivism. Several of these were chosen to explore

above such as experiential learning, situated learning, lateral thinking, social development, and mental models.

Distance education is convenient for many students in society today. Combining this convenience with effective instructional design may facilitate learning better than in the past. What needs to be guarded against is the notion that a learner-centered, constructivist approach is synonymous with students teaching themselves. It is not. It makes sense that good teaching promotes good learning. Often learning is a process involving the social construction of knowledge situated within a (virtual) community of inquiry. While education's dirty little secret persists—a pound of excellent teaching, with great strategies and methods, is still no promise that an ounce of learning will be produced. At the end of the day, teachers must continue to improve their teaching, and to the extent this is done I suspect learners will improve their learning, too.

References

Austin, D. & Mescia, N.D. (n.d.) Strategies to incorporate active learning into online teaching. Retrieved July 9, 2006 from http://www.icte.org/T01_Library/T01_245.PDF

Bandura, A. (1977). *Social learning theory*. New York: General Learning Press.

[Ben-Ari](#), M. (2005, April). Situated learning in “this high-technology world”. *Science & Education*, 14(3-5) pp: 367-376

Berge, Z.L. (1997). Characteristics of online teaching in post-secondary, formal education. *Educational Technology*, 37(3), 35-47.

Berge, Z.L. (1999). Educational technology in post-industrial society. In J.G. Webster (Ed.) *Wiley Encyclopedia of Electrical and*

Electronics Engineering Volume 6. NY: John Wiley & Sons, Inc., Publishers. pp. 187-197.

Berge, Z.L. (2002). Active, interactive, and reflective elearning. *The Quarterly Review of Distance Education*. 3(2): 181-190.

Berge, Z.L. (2004). Complexity and confusion in distance education. *Distance Learning*. 1(2): 1-6.

Brown, J.S., Collins, A, & Duguid P. (1989, January-February). Situated cognition and the culture of learning. *Educational Researcher*, 18(1), pp. 32-42. Retrieved January 4, 2008 from <http://www.exploratorium.edu/ifi/resources/museumeducation/situated.html>

Bryceson, K. (2007). The online learning environment—A new model using social constructivism and the concept of 'Ba' as a theoretical framework. *Learning Environments Research*, 10, pp: 189-206.

Business Dictionary (2007). Definition of corollary. Retrieved October 17, 2007 from <http://www.businessdictionary.com/definition/html>

Carver, R. (1998). Experiential education in urban community-based organizations (AEE Ref #100798). Boulder: Association for Experiential Education.

Carver, R., King, R., Hannum, W., & Fowler, B. (2007, September). Toward a model of experiential e-learning. *Journal of Online Learning and Teaching*, 3(3). Retrieved January 4, 2008 from <http://jolt.merlot.org/vol3no3/hannum.htm>

Chickering, A. & Ehrmann, S.C. (1996, October), Implementing the seven principles: Technology as lever. *AAHE Bulletin*, pp. 3-6. Retrieved October 15, 2007 from <http://www.tltgroup.org/programs/seven.html>

Chickering, A.W. & Gamson, Z.F. (1987). Seven principles for good practice in undergraduate education. *AAHE Bulletin*, 39(7), 3-7. Retrieved October 15, 2007 from http://honolulu.hawaii.edu/intranet/committees/FacDevCom/guid_ebk/teachtip/7princip.htm

Collins, A., Brown, J.S. & Newman, S.E. (1989). Cognitive apprenticeship: Teaching the craft of reading, writing and mathematics. In L.B. Resnick (Ed.), *Knowing, learning and instruction: Essays in honor of Robert Glaser*. (pp. 453-494). Hillsdale, NJ: Erlbaum.

Conkling, S.W. (2007, January). The possibilities of situated learning for teacher preparation: The professional development partnership. *Music Educators Journal*, 93(3): 44-48.

Curry, D.B. (n.d.). Collaborative, connected, and experiential learning: Reflections of an online learner. Retrieved January 4, 2008 from <http://www.mtsu.edu/~itconf/proceed01/2.html>

Damoense, M.Y. (2003). Online learning: Implications for effective learning for higher education in South Africa. *Australian Journal of Educational Technology*, 19(1), 25-45. Retrieved October 15, 2007 from <http://www.ascilite.org.au/ajet/ajet19/damoense.html>

Dewey, J. (1916). *Democracy and education. An introduction to the philosophy of education* (1966 ed.), New York: Free Press.

Fontaine, R.G. (2008, January). On-line social decision making and antisocial behavior: Some essential but neglected issues. *Clinical Psychology Review*, 28(1): 17-35.

Glasser, W. (1990). The quality school. *Phi Delta Kappan*, 71(6), 424-435.

Greeno, J. G. (1989). A perspective on thinking. *American Psychologist*, 44, 134-141.

Hassett, M.F. (2000, Winter). What makes a good teacher? *SABES Adventures in Assessment*, 12. Jamaica Plains. MA. Retrieved October 15, 2007 from <http://www.dohaiss.net/vb/showthread.php?t=1022>

Herrington, J., & Oliver, R. (2000). An instructional design framework for authentic learning environments.

Educational Technology Research & Development, 48(3), 23-48.

Herrington, J., Oliver, R., Herrington, T., & Sparrow, H. (2002). Towards a new tradition of online instruction: Using situated learning theory to design web-based units. *ASCILITE 2000 Conference*, pp. 1-12. Retrieved January 4, 2008 from http://www.ascilite.org.au/conferences/coffs00/papers/jan_herrington.pdf

Herrington, J., Oliver, R., & Reeves, T.C. (2003). Patterns of engagement in authentic online learning environments. *Australian Journal of Educational Technology*, 19:1. Retrieved October 15, 2007 from <http://www.ascilite.org.au/ajet/ajet19/herrington.html>

Hickcox, L.K. (2002). Personalizing Teaching through Experiential Learning. *College Teaching*, 50

Huitt, W. (2004). Observational (social) learning: An overview. *Educational Psychology Interactive*. Valdosta, GA: Valdosta State University. Retrieved January 4, 2008 from <http://chiron.valdosta.edu/whuitt/col/soccog/soclrn..html>

Ives, B. & Obenchain, K. (2006). Experiential education in the classroom and academic outcomes: For those who want it all. *Journal of Experiential Education*, 29(1), 61-77.

Kearsley, G. & Shneiderman, B. (1998, September-October). Engagement theory: A framework for technology-based teaching and learning. *Educational Technology*, 38(5) p20-23.

Kearsley, G. (n.d.). Experiential learning (C. Rogers). *The Theory Into Practice (TIP) Database*. Retrieved October 15, 2007 from <http://tip.psychology.org/rogers.html>

Lave, J., & Wenger, E. (1990). *Situated learning: Legitimate peripheral participation*. Cambridge, UK: Cambridge University Press.

Lloyd, B.W (Ed.) (2001). *Learner-centered instruction: Inquiry-based, technology-enriched, integrating workplace reality*. Retrieved October 15, 2007 from <http://www.mid.muohio.edu/publications/lciguide/pdf>

Mace, K. (2005). Vygotsky's social development theory. In B. Hoffman (Ed.), *Encyclopedia of Educational Technology*. Retrieved October 15, 2007 from <http://coe.sdsu.edu/eet/articles/sdtheory/start.htm>

Marshall, S. (2007, June 13). Engagement theory, WebCT, and academic writing in Australia. *International Journal of Education and Development using ICT*, 3(2). Retrieved January 3, 2008 from <http://ijedict.dec.uwi.edu/viewarticle.php?id=227>

Mclsaac, M.S. & Gunawardena, C.N. (1996). Distance Education. In D.H. Jonassen, ed. *Handbook of research for educational communications and technology: a project of the Association for Educational Communications and Technology*. 403-437. New York: Simon & Schuster Macmillan. Retrieved October 17, 2007 from <http://seamonkey.ed.asu.edu/~mcisaac/dechapter/index.html>

Moore, M.G. & Kearsley, G. (2004). *Distance education: A systems view*. (2nd Ed.) Wadsworth Publishing.

Murphy, E. (1997). Constructivism: From philosophy to practice. Retrieved October 15, 2007 from <http://www.stemnet.nf.ca/~elmurphy/emurphy/cle.html>

Rogers, C.R. (1969). *Freedom to learn*. Columbus, OH: Merrill.

Rogoff, B. (1990). *Apprenticeship in thinking: Cognitive development in social context*. New York: Oxford University Press.

Shneiderman, B. (1994, April 12). Education by engagement and construction: Can distance learning be better than face-to-face? Institute for Systems Research, University of Maryland, Retrieved October 15, 2007 from <http://www.hitl.washington.edu/scivw/EVE/distance.html>

Smith, B. L. & McCann, J. (Eds.). (2001). *Reinventing ourselves: Interdisciplinary education, collaborative learning, and experimentation in higher education*. Bolton, MA: Anker.

Speck, B.W. (2000). The academy, online classes, and the breach in ethics. In R. Weiss, D. Knowlton, and B. Speck (Eds.) *Principles of effective teaching in the online classroom*. New Directions for Teaching and Learning. San Francisco, CA: Jossey-Bass. pp. 73-81.

Streit, T. (2004, Fall). YouthLearn: Using technology to create meaningful learning experiences for youth. *The Evaluation Exchange* 10(3). Retrieved January from http://www.gse.harvard.edu/eval/issue27/special_feature4.html

Vincini, P. (2003, February). The nature of situated learning. *Innovations in Technology*. Retrieved October 17, 2007 from http://uit.tufts.edu/at/downloads/newsletter_feb_2003.pdf

Vonderwell, S., & Savery, J. (2004). Online learning: Student role and readiness. *The Turkish Online Journal of Educational Technology*. 3(3) article 5. Retrieved July 9, 2006 from <http://www.tojet.net/articles/335.htm>

Vygotsky, L.S. (1962). *Thought and language*. Cambridge, MA: MIT Press.

Vygotsky, L. S. (1978). *Mind in society. The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Vygotsky, L. S. (1986). The genetic roots of thought and speech. In A. Kozulin (Trans. & Ed.), *Thought and language*. Cambridge, MA: MIT Press.

Wertsch, J.V. (1985). *Cultural, communication, and cognition: Vygotskian perspectives*. Cambridge University Press.

Wilson, B. G. (1997) Reflections on constructivism and instructional design. In C. R. Dills and A. A. Romiszowski (Eds.), *Instructional Development Paradigms*. Englewood Cliffs NJ: Educational Technology Publications. Retrieved October 15, 2007 from <http://carbon.cudenver.edu/~bwilson/construct.html>

Wilson, B. & Cole, P. (1991) A review of cognitive teaching models. *Educational Technology Research and Development*, 39(4), 47-64.

Yelon, S. (1996) *Powerful principles of instruction*. New York: Longman.
