ONLINE LEARNING CHALLENGES: NEED FOR EVOLVING MODELS

David T. Bentz, PhD
Director of Distance Education,
Central Wyoming College, Riverton, Wyoming, USA
Bojan Lazarevic, PhD
Assistant Professor of Informational Technology,
Mount Saint Mary College, Newburgh, York, USA

Abstract

This paper proposes that online learning theory can be enhanced by looking at research outside of education.Models such as the Community of Inquiry and the Transactional Distance Theoretical Model provide a utility toward structuring, conceptualizing, understanding, and analyzing online education. The ongoing research based on these models continues to explore and recommend as practice that the instructor holds "the keys" as to how the online learning environment will be formulated, shaped, and conducted. The assertion from this perspective continues that instructors through proper or improper structuring, guidance, and/or facilitation and design of their online learning environments may or may not be successful in their teaching. Research outside of education explores implications for online education from a biological and human behavior perspective, which includes analysis of innate brain wiring and emergent research regarding student emotional responses. If we think in terms of the online learning context and the apparent innate desire by all while learning to "connect" to one another, mirroring neurons and the advancement of their understanding could and should be monitored closely as more information and evidence emerges that may have valuable revelations about improving learning and learning outcomes within asynchronous learning environments. "Setting up" the space for learning is not enough for an online educator to understand. Having insight into one's own and others' personal relational dynamics and group dynamics is critical in facilitating online learning environments. Understanding the psyche of individuals and having the ability to intuit human behavior is equally important.

Introduction

Showing a dramatic upward trend over the past decade, universities across the United States have not only increased their online course offering, but enrollments as well. Enrollments of students taking at least one online course rose from 1.6 million to 6.7 million during the ten-year period from 2002 to 2012(Allen and Seaman, 2013). Undoubtedly, by any standards these are dramatic increases, which signal a clear shift in how postsecondary students are learning in the U.S. With these dramatic increases in online enrollments, researchers have been attempting to respond to demands placed on them to help guide educators and administrators alike with classroom and learning dynamics issues, budgetary, institutional change, management and policy making issues. For all intertwined with online education, especially students, face a myriad of challenges. With the maturation of online

learning and its subsequent research still in its earliest stages, current research models need refinement and new horizons of exploration to advance the understanding of the educational transactions presented within the virtual learning environment. New demands, such as those mentioned previously, and rapidly evolving technologies impose an almost constant state of change upon virtual learning environments, which present a profound impact on the online educational process, and likewise, subsequently challenge the online learning research community, as well.

Multiple Perspectives

From a student's perspective, participating in online learning environments through the use of 21st century technologies and the flexibility of "anytime, anywhere" accessibility has many advantages. Through online enrollment, students can chose when and where to participate in their learning. The continuous accessibility to any given learning environment or set of materials without the need to report to a physical location provides many opportunities to the learner. All of these advances maximize the flexibility in accommodating many students' increasingly busy and hectic lifestyles.

Even with these advances and advantages, online learning has not been without its critics. For years online learning has come under fire from naysayers as lacking the ability for social exchange and all of the positive attributes that have been postulated that come with the social aspects of classroom learning. On the opposite side of this conundrum is the distance issue for all participants, both in time and proximal distance created by these virtual learning environments. The latter perspective being the one that critics have honed in upon often contends that online students lack the immediacy and interactions that occur between students and also between educators alike due to this distant nature both in time and space. In fact, fifteen years prior to this writing, research by Bullen (1998), found that some students felt detached from other students or isolated while learning online. Further, this research also identified that students often felt as if the delay in online communications reduced the dynamics of online discussions.

When surveying the literature regarding online learning, by and large it is fairly easy to identify that this research to this point has worked to address students' needs as a means of resolving online classroom dynamics and practices issues from an educator's perspective by which instructional input adjustments are codified to aid or guide students' learning and engagement. In other words, from this research perspective the instructor is often regarded as to having the sole responsibility and control for whether or not students have the ability to navigate their learning environment, construct the learning materials in a meaningful way, and to attain new knowledge, or not.

As noted in O'Regan (2003) asynchronous learning research has in part sought to explore other students' centric needs, such as emotions, while learning. More recently these notions have been evolved through studies by contemporary researchers (Cleveland-Innes and Campbell, 2012; Berenson, Boyles, and Weaver, 2008; Lee, 2012; Shen, Wang, and Shen, 2009; Van Raaij and Schepers, 2008). As these authors' have uncovered, clearly, there is much more to be learned about online learning when considering students' perspectives, needs, and desires.

Purpose and Study Method

This paper attempts to thread current research, both from within online education, as well as outside the online educational realm that may enhance current models and thinking in an attempt to aid in the formulation of new perspectives toward expanding both the body of ideas and knowledge toward virtual learning environments. Furthermore, the intent of this paper is to expand the vision and scope of online learning research by suggesting it be more

exploratory, interdisciplinary, and inclusive in its vision toward other of bodies of research that abound outside of its domain. Finally, this paper also sheds light on research from neuroscience, cognitive science, and eye tracking studies and provides notions for assimilation toward online learning research as new and fertile ground toward broadening concepts and future research regarding learner dynamics and asynchronous learning environments.

Exploration of online learning challenges in the 21st century and needs for creating or evolving current online educational models requires extensive insight into the body of knowledge surrounding virtual education research. An in-depth content analysis was conducted in order to identify major determinants, which have not been taken into consideration with respect to online learning practice and research. Some of these determinants were discussed in educational, as well as science-related research, but have not heretofore been associated and applied in the area of online learning. These factors will be carefully examined in this paper as they play an important role in the evolution of education and learning research. Specifically, in this paper the authors utilized both conceptual and relational content analysis. The conceptual content analysis was used to identify elements which may be an additional determinant to the online learning process. By using relational analysis, the authors went one step further and examined a qualitative relationship among the identified concepts and prominent current models of distance and online learning. In addition, to secure the objectivity of the findings, the method was combined with professional observations and experiential knowledge. The applied methods are primarily aimed to answer "what" questions, that is, what elements/concepts may be added to advance current models. Their main limitation is the inability to detect causal ("why" questions) links among explored elements.

The explored issues along with the discussion highlights in this paper may be beneficial to educators who seek to extend the teaching experience beyond the traditional understanding of the online learning approach. These study results may also provide school administrators valuable insight about difficulties and challenges that online instructors and students face. Finally, the authors believe the significance of this paper lies in its discovery and linkage of determinants that are not postulated with regards to online learning environments. Therefore, this paper both fills gaps and expands the current body of literature in the domain of online learning.

Prominent Models

Within the last century, a cadre of educational models have been conceptualized, theorized, researched, and implemented (e.g. Bloom's Taxonomy, Vygotsky's Zone of Proximal Development, constructivism, humanism, etc.). Most of these models address learning from an instructor centric perspective whereby the instructor serves as the head of the learning environment, thereby having the sole onus of addressing students' learning as a one-to-one or one-to-many exchange. Likewise, though correspondence, telecommunication, and later Internet-based education have been present throughout the last fifty-plus years or so, much of today's online learning emerged with wide public adoption and availability of the Internet through the World Wide Web in the mid-1990s. Along with this, educational research began to emerge and solidify to address these new electronic mediated learning environments for many and all ages. Most, if not all of today's online learning are derived from, or to some extent, in part from these many established traditional classroom frameworks, models, principles of design, or theories.

A prime example of this would be Garrison, Archer and Anderson's (2000) Community of Inquiry (CoI) model. In an attempt to refine and explain the educational and transactional issues in online learning environments, these researchers postulated a model for

conceptualizing online learning environments. In their model, the authors theorized asynchronous learning environments consist of three learning domains: (1) social presence, (2) teaching presence, and (3) cognitive presence. At its core, the CoI's constructivist approach was distilled from prior research by Henri (1992), as well as those from Chickering and Gamson's (1987) findings and recommendations. With specificity, the CoI model and the authors' ideas for further evolution will be discussed further, later within this paper.

Likewise, an older but equally prominent theoretical model regarding critical aspects of distance education is Moore's Transactional Distance Theoretical Model (TDT). TDT and the research associated with it emphasizes the importance of knowing the nature of transactional distance for the implementation of educational activities, especially collaborative learning in the online environment. Looking at this model's history, a first comprehensive attempt to set the fundamentals of distance education and the theory of transactional distance was made by Moore in the early 1970's (Moore, 1972). According to Moore, transactional distance is "…not simply geographical separation of learners and teachers, but more importantly, it is a pedagogical concept. It is a concept describing the universe of teacher-learner relationships that exist when learners and instructors are separated by space and/or time" (Moore, 1993, p. 22).

As it has been conceptualized, the nature of TDT is determined by three interdependent elements. These three are not technologically related elements/issues, but elements that underlie fundamentals of the teaching and learning process. Moore named the elements as: (1) dialog, (2) structure, and (3) learner autonomy. This initial theoretical framework has gradually evolved with its structure and coherency becoming more transparent (Shank, 2006; Lemark, Shin, Reed & Montgomery, 2005; Wikeley&Muschamp, 2004). In order to realize the TDT model's evolution, it is important to recall Moore's first conceptualizations. Moore introduced three key elements which he based his theory upon. He analyzed possible interactions in distance education at the time and classified them into three types: (1) the interaction between learners and teachers, (2) the interaction between students themselves, and (3) the interaction that takes place between students and subject content (Moore, 1989).

Due to the development of communicational technology and Web-based learning, Hillman and Wills (1994) enriched Moore's typology with an additional type of interaction: learners interface/technology interaction. By doing so, these two authors highlighted the significance of knowing how to use technology as an intermediary factor in interaction with the teachers, students, and educational material.

While models such as the CoI and TDT provide a tremendous utility toward structuring, conceptualizing, understanding, and analyzing online education, much of online learning theory and research to date utilizing these conceptualized models, as mentioned previously, has centered upon the constructs and facilitations of the online learning environment by the instructor to address online learners' needs. That is, that the ongoing research continues by and large to explore and recommend as practice that the instructor holds "the keys" as to how the online learning environment will be formulated, shaped, conducted, and learning amongst participants will proceed. Additionally, the assertion from this perspective continues, that instructors through proper or improper structuring, guidance, and/or facilitation and design of their online learning environments may or may not be successful in their teaching.

Research Outside of Education

Understanding how students learn in both asynchronous learning environments, while mediated, and through the use of academic technologies is crucial toward addressing their needs. Knowledge regarding these issues provides us a basis by which we can assume the

majority of our students will respond toward designed learning materials and interactions. However, emerging research outside of the domain of education may provide cause for online learning researchers and educators to take notice. This research explores implications for online education from a biological and human behavior perspective which includes analysis of innate brain wiring and emergent research regarding online student emotional responses. Within the following section the authors will attempt to identify emergent research from a variety of other fields of study that the authors believe holds promise toward evolving current online educational models, research concepts and perspectives toward online learning.

Mirroring

Perhaps one of the brightest spots for online learning researchers resides within today's neuroscience research. Fairly recent discoveries in monkey and later human brain function have uncovered the presence of what are called mirroring neurons. These unique neurons seem to fire in different regions of the brain while an individual is either acting and/or observing actions of another, hence the term "mirroring neurons." Is this an important discovery? Though research regarding mirroring neurons is still in its early stages, many neuroscientists seem to think so as indicated by the following, "...mirroring neurons evolved in humans so we can learn from observation and learning" (Ehrenfeld, 2011).

Though the discovery of these neurons has been noted, much about them has yet to be uncovered. At present much speculation about their purpose and function continues to exist within the neuroscience community. From their 1998 research, Gallese and Goldman speculated upon mirroring neuron's purpose and function by stating "Detecting another agent's goals and/or inner states can be useful to an observer because it helps him anticipate the agent's future actions, which might be cooperative, non-cooperative, or even threatening. Accurate understanding and anticipation enable the observer to adjust his responses appropriately (Gallese and Goldman, 1998, pp. 495-496)."

Additional subsequent research from Fogassi, et al. (2005), as stated in Iacoboni's (2008) study Mirroring People: The New Science of How We Connect With Others, makes pointed statements toward the intent of our mirroring neurons by stating: "...strongly support the hypothesis that we understand the mental states of others by simulating them in our brain, and we achieve this end by way of mirror neurons" (p. 34). Further, Iacoboni himself (2008) states: "We 'share' this same space and thereby get literally closer to each other. I think one of the primary goals of imitation may actually be the facilitation of an embodied 'intimacy' between the self and others during social relations" (p. 69), referring to mirroring neuron's role when two individuals face each other to communicate and inadvertently imitate one another's physical behaviors (e.g. hand gestures, stance, facial cues, etc.).

Studies of human nonverbal imitation behaviors have been well researched over the years. However, one study in particular by LaFrance (1982) looked at teachers and students' arm and torso positioning within traditional face-to-face classroom settings classifying when students used their opposite arm (teacher's right arm, student's left arm) as mimicking and when teachers and students used their anatomically correct arm (teacher's right arm, student's right arm) as mirroring. When correlated, this research found that higher rapport occurred when students mirrored their instructors, as opposed to mimicking them. Again, Iacoboni hypothesizes, "The intimacy of self and other that imitation and mirror neurons facilitate may be the first steps toward empathy, a building block of social cognition..." (Iacoboni, 2008, p. 70).

Though controversial, one such mirroring neuron researcher has gone so far as to posit from their discovery that most major advances in human history can in some way be attributed to these important neurons (Ramachandran, 2000). While other researchers hold a somewhat more conservative viewpoint of mirroring neuron's related roles in human's social

cognition and learning, "When mirror neurons are understood to come from associative learning, they are no longer mesmerizing, but they continue to raise important questions about both the psychology of science and the neural bases of social cognition" (Heyes, 2010, p.789).

Perception and Cognition

Cognitive load, limitations of short-term memory, and dual coding of audio/pictorial stimuli are also worth mentioning and are additionally fairly unexplored, but significant determinants of learning in an online environment. Educational research regarding the mental mechanics of learning and learning material design within virtual learning environments has produced materials focusing upon issues such as cognitive load and positive principles of instructional design (Sweller, 1988; Sweller, Van Merrienboer&Paas, 1998; Paas, Renkl, &Sweller, 2003). In Clark, Nguyen, and Sweller (2006), the researchers view cognitive load as refers to the capacity of human working memory (or short-term memory) and its ability to simultaneously process information as part of the multimedia learning process.

Within the context of online learning, there is little argument that online learning is not highly associated with multimedia. According to the above-mentioned authors, extraneous cognitive load imposed by the design of multimedia learning materials and an LMS interface (i.e. visual/audio elements that the learner perceived from the screen) can significantly reduce the learner's capacity to process, organize, and store new information. Extraneous cognitive load refers to the design of instructional or presentation media, and it directly relates to a learner's ability to keep one chunk of information in working memory while searching for another chunk of information. Research about the limited capacity of short-term memory strongly supports these claims. Numerous empirical studies since the late 50's (Miller, 1956; Shiffrin, and Nosofsky, 1994; Baddeley, 1992) suggest that capacity of short-term memory to process new information is quite limited. More specifically, an average human working memory can process up to seven pieces or chunks of information simultaneously.

Therefore, online students report that they are frequently overwhelmed by the amount of items (links, visuals, navigation, activities, resources, etc.) displayed on the screen. Rubel and Wallence (2013), stated that "in the online environment the variety, quantity, and complexity of course design has a direct correlation with the online learner's cognitive load and performance in the online environment" (p.10). In the same vain the author Zhang (2013), in the study focused on web-based language learning, suggested " the more links [the] learning interface includes, the more cognitive efforts learners will have to pay; the more the relationship of web browser is complicated, the more the learners need to spend time understanding or memorizing those learning paths, and the cognitive load becomes higher and higher " (p.137). Undoubtedly, multiple sources of information including rich multimedia increase the extent of cognitive lead which our students are experiencing during the process of online learning. Based on dual-coding theory and findings regarding limited capacity of working memory, Mayer and Moreno (2003) proposed the entire set of principles for reducing cognitive overload during the process of multimedia learning. Principles such as segmenting, eliminating redundancy of information, signaling or weeding help instructional designers to design more effective instructional materials and multimedia learning environments.

Finally, a new avenue of recent research focused on eye tracking casts interesting facts regarding online learning behavior. Innovative eye-tracking technology is used to track eye movement and map the area or screen or multimedia elements that attract the learners' attention. Studies conducted by various researchers (Rehder, and Hoffman, 2005; Mayer, 2010; Hyona, 2010) indicated that empirical findings regarding eye tracking may provide valuable insights about online learning environments. However, contemporary online

learning concepts and theories pay little or no attention to these novelties.

Emotional Learning

Converse to the sundry of virtual learning models and frameworks, resides plain and simple, students' emotions--How students perceive their online learning experience. There is a rich body of literature that indicates the importance of emotions in learning and education in general. We as authors believe that developing the emotional aspects of learning is even more significant in a virtual environment due to lack of immediate contact amongst students. Within the substructure of online learning research, the importance of understanding students' learning needs for a humanizing sense of connectedness within their learning environment is beginning to emerge. For example, in Enbody and Severance (1998), the researchers explored the link between types of delivery media, teaching presence, and learning in an online environment. Based on observations or qualitative findings, these authors argue that the utilization of a variety of multimedia (e.g. video) contribute to the process of humanizing distance education and developing students' emotional presence in a virtual learning environment. Also, as discussed in Campbell and Cleveland's (2005) findings, brain science research has indicated that emotion has a significant impact on learning processes and outcomes. These authors concluded in their research that "it seems reasonable to suggest that a learner's ability to construct and confirm meaning, and indeed engage in reflection and discourse, may be enabled or constrained by emotion" (p. 4). It is also from this stance that Campbell and Cleveland argue for a revision of the CoI model. In their view, the CoI should integrate an additional fourth component along with social, cognitive, and teaching presence: emotional presence.

Clearly the intent of any learning environment is centered upon the primary transactional exchange between student and educator regarding what is to be learned. Without this exchange, learning is hindered or arguably nonexistent. Collaboration between the learner and the instructor is known as immediacy. Some of the earliest research on teaching immediacy was conducted in the 60's by Mehrabian (1967, 1969), which suggested that nonverbal behaviors helped to reduce the physical and psychological distance between teachers and students. A plethora of subsequent research conducted by Andersen (1979); Anderson, Norton and Nussbaum (1981); Gorham and Zakahi (1990); and Christophel (1990) all reaffirm positive student outcomes exist when the teacher is at the center of the students' attention and engaging students during the learning process and exchange.

CoI teaching presence research by Sheridan, Kelly, and Bentz (2012) noted the distinction between an instructor being present within an online learning environment and projecting a presence toward the learners. Additionally, this study identified that the top five instructor behaviors elicited by both graduate and undergraduate online learners as most important for their success in online classes were: (1) fluid communication, (2) instructor disposition, (3) quality materials, (4) clarity in instruction, and (5) timely feedback. Items such as communication and clarity were consistent with prior research by Durrington, Berryhill, and Swafford (2006) and White, Roberts, and Brannan (2003). While instructor disposition and the emotional components students defined, such as an instructor possessing or expressing toward students understanding, humor, empathy, enthusiasm, a positive attitude, etc., suggest a desire for students wanting to establish some emotional and/or trust connection toward their instructor. Additional research by Cleveland-Innes and Campbell (2012) and others (Derks, Fischer, &Bos, 2007; Marchand& Gutierrez, 2011; O'Regan, 2003; Lehman, 2006; Perry & Edwards, 2005) similarly realized a variety of emotional components within online learning communities.

In Cleveland-Innes and Campbell's (2012), as noted previously, the researchers expressed that identifying which emotions are present in common human exchange and then

identifying which are present in online learning environments is vital toward understanding online learning environments. Likewise, these researchers argue that "unexamined, seemingly visceral and unconscious" emotions are not appropriate in reflective pedagogical design (p. 285). Furthermore, they recommend that online instructors realize their ability to understand and reflect upon their own emotions while learning and to use these insights in their online classroom management behaviors. These findings, though somewhat differing from Sheridan, Kelly and Bentz's (2012), reflect the concept that instructors need to communicate and project more of themselves and their personal dispositions in online learning settings than simply structuring the learning environment and facilitating activities and discussions. While Derks, Fischer, and Bos, (2007) stated, stated, "...we argue that emotional experiences in reaction to online others may have the same quality, but have a lower duration than in F2F (face-to-face) situations. (p.16.)" From this view online educational research needs to be more inclusive and thoughtful with respect toward all individuals' humanizing and emotional needs when interacting online with one another.

Final Thoughts and Conclusion

▪ Each person associated with the online learning environment faces the challenge of learning while mediated from one another. Online learning environments often are highly, or totally asynchronous, in which all interactions typically take place through various forms of technologies. These technologies are used by both students and the instructor to communicate both course information and content, as well as often times used to facilitate discussion between all parties. The requirement to master one or more technologies initially in order to access materials, along with the standard of not being able to communicate live in real time often must be overcome prior to the learner having the ability to address the learning content properly.

If we think in terms of the online learning context and the apparent innate desire by all within an online learning environment to "connect" to one another, as noted in similar prior "presence" research by Burgoon, Buller, Hale, and deTurck (1984) and Gunawardena (1995), mirroring neurons and the advancement of their understanding could and should be monitored closely as more information and evidence emerges that may have valuable revelations about improving learning and learning outcomes within asynchronous learning environments.

Human gesture and nonverbal communication behaviors have been widely studied (Napier, 1980; McNeil, 1992; Goldin-Meadow, 1998, and McNeil, 2000). Now, consider the research by Sheridan, et al., (2012), which found students strongly desire an instructor that projected humanistic or (instructor) dispositional behaviors into an online learning environment. One solution, the use of video, appears to be reaffirmed in Lazarevic (2010) when thinking about how to solve both the mediation of the communications and constructing online presence. In this research, online students who were presented with short video introductions to weekly assigned learning tasks were found to have a greater perception of facilitated teaching presence than their counterparts within a control group. Additionally, in Lazarevic's research, students were also found to have a higher retention and recall when it came to assignment instructions if they also viewed a similar descriptive explanatory video.

All my online courses so far, make you feel... you know, you are an independent for the most part. And you do not have so much teacher interaction; in fact for most of the teachers, I even do not know what they look like when I take an online course. So when she comes on (the Instructor for ENTO 115), it kind of gives some extra sense, how am I gonna put this, you do a work because the teacher is kind of there with you, you know what it is she looks like... It adds another sense of learning. You can hear and see it. It is kind of like when you move to the college, your mom is not there to tell you what to do all the time. But when

she comes over to your apartment, she is actually there, and you want to make sure that it does look good. It is just like the parent figure or big brother or something. She is out there. Getting done with the assignment is definitely increased by seeing her (Lazarevic, 2010, p. 140).

As well, Bickmore& Picard, (2005) found the following when researching human-computer relationships: Meta-relational communication – being very clear up front about the roles of each of the parties in a human-computer relationship, and checking in from time-to-time to see how everything is going and making adjustments as needed – is very important for managing user expectations and making them feel understood and cared for. Being conscious of the use of social deixis in the interface, including such language features as politeness and forms of address, allows the design of more consistent interfaces and interfaces which are more tailored to individual users or classes of users.

And, as noted by Klein (Klein, Moon, & Picard, 2002), appropriate use of empathy by a computer can go a long way towards making them feel understood and alleviating negative emotional states such as frustration.

Perhaps most importantly, thinking about human-computer interactions as relationships allows designers to take a long-term view of these collaborations and the ways in which these relationships should unfold over time. While reliability and consistency are highly prized in most aspects of interface design, there are some applications areas in which variability is important for keeping the user engaged in the task (Section 7.2 Lessons for the HCI Practitioner, para. 3)

"Setting up" the space for learning is not enough for an online educator to understand. Having insight into one's own and others' personal relational dynamics and group dynamics is critical in facilitating online learning environments. Understanding the psyche of individuals and having the ability to intuit human behavior is equally important.

References:
Allen, Elaine, and Seaman, Jeff: Changing Course: Ten Years of Tracking Online Education in the United States. ERIC, 2013.
Andersen, Janis: Teacher immediacy as a predictor of teaching effectiveness. Communication Yearbook, 3(543-559), 1979.
Anderson, Janis, Norton, Robert, & Nussbaum, Jon. (1981). Three investigations exploring relationships among perceived communication style, perceived teacher immediacy, teaching effectiveness and student learning. Communication Education, 30, 377–392.
Baddeley, Allen: Working memory, Science 255 (5044): 556–9, 1992.
Berenson, Robin, Boyles, Gary, & Weaver, Ann. (2008). Emotional intelligence as a predictor of success in online learning.The International Review of Research in Open and Distance Learning, 9(2).
Bickmore, Timothy, and Picard, Rosalind: Establishing and maintaining long-term human-computer relationships. ACM Transactions on Computer-Human Interaction (TOCHI), 12(2), 293–327, 2005.
Bullen, Mark: Participation and critical thinking in online university distance education. Journal of Distance Education, 13(2), 1–32, 1998.
Burgoon, Judee, Buller, David, Hale, Jerold, and deTurck, Mark: Relational messages associated with nonverbal behaviors. Human Communication Research, 10(3), 351–378, 1984.
Campbell, Prisca, & Cleveland-Innes, Martha. (2005). Educational presence in community of inquiry model: A student's viewpoint. In Proceedings from 21st Annual Conference on Distance Teaching and Learning. Retrieved from http://www.uwex.edu/disted/conference/Resource_library/proceedings/05_2024.pdf

Chickering, Arthur, and Gamson, Zelda: Seven principles for good practice in undergraduate education. American Association for Higher Education Bulletin, 39, 3–7, 1987.

Christophel, Diane: The relationships among teacher immediacy behaviors, student motivation, and learning. Communication Education, 39(4), 323–40, 1990.

Clark, Ruth, Nguyen, Frank, and Sweller, John: Efficiency in learning: Evidence-based guidelines to manage cognitive load. San Francisco, CA: John Wiley & Sons, 2006.

Cleveland-Innes, Marti, and Campbell, Prisca: Emotional presence, learning, and the online learning environment. The International Review of Research in Open and Distance Learning, 13(4), 269–292, 2012.

Derks, Daantje, Fischer, Agneta, and Bos, Arjan: The role of emotion in computer-mediated communication: A review. Computers in Human Behavior, 24(3), 766–785, 2007.

Durrington, Vance, Berryhill, Amy, and Swafford, Jeanne: Strategies for enhancing student interactivity in an online environment. College Teaching, 54(1), 190–193, 2006.

Ehrenfeld, Temma: (2011). Reflections on Mirror Neurons.Observer, 24(3). 2011.

Enbody, Richard, and Severance, Charls: Using asynchronous, web-based, video to humanize distance education. NSF/EHR/DUE CCLI-EMD Educational Materials Development 11/98, 1998.

Fogassi, Leonardo, et al.: Parietal lobe: from action organization to intention understanding. Science, 308(5722), 662–667, 2005.

Gallese, Vittorio, and Goldman, Alvin: Mirror neurons and the simulation theory of mind-reading. Trends in cognitive sciences, 2(12), 493–501, 1998.

Garrison, Randy, Anderson, Terry, and Archer, Walter: Critical inquiry in a text-based environment: Computer conferencing in higher education. The Internet and Higher Education, 2(2-3), 87–105, 2000.

Goldin-Meadow, Susan: When gestures and words speak differently. Current Directions in Psychological Science, 6(5), 138–143, 1997.

Gorham, Joan, and Zakahi, Walter: A comparison of teacher and student perceptions of immediacy and learning: Monitoring process and product. Communication Education, 39(4), 354–68, 1990.

Gunawardena, Charlotte: Social presence theory and implications for interaction and collaborative learning in computer conferences. International Journal of Educational Telecommunications, 1(2/3), 147–166, 1995.

Henri, France: Computer conferencing and content analysis. In A. Kaye (Ed.), Collaborative learning through computer conferencing: The Najadeen papers (pp. 117–136). London, England: Springer-Verlag, 1992.

Heyes, Cecilia: Where do mirror neurons come from? Neuroscience &Biobehavioral Reviews, 34(4), 575–583, 2010.

Hillman, Daniel, Willis, Deborah, and Gunawardena, Charlotte: Learner-interface interaction in distance education: An extension of contemporary models and strategies for practitioners. The American Journal of Distance Education, 8(2), 30-42. 1994.

HyonaJukka: The use of eye movements in the study of multimedia learning. Learning and Instruction 20, 172-176, 2010.

Iacoboni, Marko: Mirroring people: The new science of how we connect with others. Macmillan, 2008.

Klein, Jonathan, Moon, Y, and Picard, Rosalind: This computer responds to user frustration: Theory, design, and results. Interacting with computers, 14(2), 119–140. 2002.

La France, Marianne. (1982). Interaction rhythms: Periodicity in communicative behavior. In M. Davis (Ed.), Posture mirroring and rapport. New York, NY: Human Sciences Press, Inc.

Lazarevic, Bojan: Being a Teacher in Online Instruction: Promoting Teaching Presence Through Video Technology. Saarbrücken, Lambert Academic Publishing, 2011.

Lehman, Rosemary: The role of emotion in creating instructor and learner presence in the distance education experience. Journal of Cognitive Affective Learning, 2(2), 12–26, 2006.

Lemak, J. David, Shin, SJ., Reed, R., and Montgomery, J.C. : Technology, transactional distance, and Instructor effectiveness: An empirical investigation. Academy of Management Learning and Education, 4: 150-159, 2005.

Marchand, Gwen, and Gutierrez, Antonio: The role of emotion in the learning process: Comparisons between online and face-to-face learning settings. The Internet and Higher Education, 15(3), 150–160, 2011.

Mayer, Richard, and Moreno, Roxana: Nine ways to reduce cognitive load in multimedia learning. Educational Psychologist 38(1), 43 -52, 2003.

Mayer, Richard: Unique contributions of eye-tracking research to the study of learning with graphics, Learning and Instruction 20. 167-171, 2010.

McNeill, David: Hand and mind: What gestures reveal about thought. University of Chicago Press, 1992.

McNeill, David: Language and gesture (Vol. 2). Cambridge University Press, 2000.

Mehrabian, Albert. (1967). Orientation behaviors and nonverbal attitude communication.Journal of communication, 17, 324–332.

Mehrabian, Albert. (1969). Some referents and measures of nonverbal behavior. Behavior Research Methods and Instrumentation, 1(6), 205–207.

Miller, Georg: The magical number seven, plus or minus two: Some limits on our capacity for processing information, Psychological Review 63 (2): 81–97, 1956.

Moore, Michael: Learner autonomy: The second dimension of independent learning. Convergence, 5(3), 67-88, 1972.

Moore, Michael: Theory of Transaction Distance, In: Keegan, D. (ed.), Theorethical Principles of Distance Education. Routledge, New York, 1993.

Moore, Michael: Three types of interaction. The American Journal of Distance Education, 3(2), 1-6, 1989.

Napier, John: Hands. Princeton, NJ: Princeton University Press, 1980.

O'Regan, Kerry: Emotion and e-learning. Journal of Asynchronous learning networks, 7(3), 78–92, 2003.

Paas, Fred, Renkl, Alexander, and Sweller, John: Cognitive load theory and instructional design: Recent developments. Educational Psychologist, 38(1), 1–4, 2003.

Perry, Beth, and Edwards, Margaret: Exemplary online educators: Creating a community of inquiry. Turkish Online Journal of Distance Education, 6(2), 46–54, 2005.

Ramachandran, Vilayanur: Mirror neurons and imitation learning as the driving force behind "the great leap forward" in human evolution. The Edge. Online Journal, 5(31), 2000.

Rehder, Bob, and Hoffman, Aaron: Eye-tracking and selective attention in category learning, Cognitive Psychology 51, 1–41, 2005.

Rubel, Carlo, and Wallace, Marie: Cognitive load and online learning: When is working memory capacity exceeded?.In . Jan Herrington et al. (Eds.), Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2013 (pp. 1130-1141). Chesapeake, VA: AACE, 2013.

Shank Patti: Activities aren't optional. Online Classroom, 4-5, 2006.

Shen, Liping, Wang, Minjuan, &Shen, Ruimin. (2009). Affective e-learning: Using" emotional" data to improve learning in pervasive learning environment. Educational Technology & Society, 12(2), 176–189.

Sheridan, Kathleen, Kelly, Mellisa, and Bentz, David: A follow-up study of the indicators of teaching presence critical to students in online courses. In Z. Aykol& D. Garrison (Eds.), Educational Communities of Inquiry: Theoretical Framework, Research and Practice (pp. 67-83). Hershey, PA, 2012.

Shiffrin, Richard, and Robert Nosofsky: Seven plus or minus two: A commentary on capacity limitations, Psychological Review. 2 101, 357–361, 1994.

Sweller , John, . vanMerrienboer, Jeroen, and Pass, Fred: Cognitive Architecture and Instructional Design, Educational Psychology Review, 10(3), 251-296, 1998.

Sweller, John: Cognitive load during problem solving: Effects on learning, Cognitive Science, 12, 257-285, 1988.

Van Raaij, Erik M., &Schepers, Jeroen. J. L. (2008). The acceptance and use of a virtual learning environment in China. Computers & Education, 50(3), 838–852.

White, Anne, Roberts, Vanice, and Brannan, Jane: Returning nurses to the workforce: Developing an online refresher course. The Journal of Continuing Education in Nursing, 34(3), 59, 2003.

Wikeley, Felicity, and Muschamp, Yolande: Pedagogical implication of working with doctoral students at a distance, Distance Education, 25(1), 125-142, 2004.

Zhang, Jianfeng: Decreasing cognitive load for learners: Strategy of web-based foreign language learning. International Education Studies, 6(4), 134-139, 2013.