Running head: CYBERNETIC DISTANCE LEARNING THEORY

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Abstract

This literature review is focused on the Conversation Learning Theory as it compares to distance learning theories. My personal distance learning theory will be presented at the end of the paper coupled with my ontology, epistemology, and methodology of distance learning design.

Distance Cybernetic Learning Theory

After analyzing five differing Learning Management Systems (LMS), and reading articles and books about distance leaning as well as learning theories, I still feel as though I know very little about this new frontier in education. From my limited perspective on distance learning I choose to delve into this exploration via the literature on conversation learning theories. Conversation learning theories are my springboard into the literature because distance learning relies heavily on communication for the success of any given distance course (Moore & Kearsley, 1996). I will be focusing my studies on three specific learning theories: Advanced Control of Thought - Rational (ACT - R), Cybernetic Conversation Theory, and Learning and Teaching as Communicative Actions (LTCA). I intend to define and give a brief history of each theory. Finally, I am going to state my theory using the three previous learning theories as my guide.

Literature Review

With just a brief dip in the literature pool a vast body of literature on conversation learning theories can be found. Toward the distance-learning end of the pool the depth of literature on conversation learning is shallow. According to Moore and Kearsley, “What determines the success of distance teaching is the extent to which the institution and the individual instructor are able to provide the . . . appropriate quantity and quality of dialog . . .” (1996, p. 206). Due to the high reliance of communication a theory based in communication can help deepen the cognition in the distance learning setting (Salomon, 1985; Klosowksi, 2008). The purpose of this literature review is to find a bridge to connect ACT-R, Cybernetic thinking, and LTCA to the distance learning design.

Adaptive control of thought - rational (ACT-R).

ACT was developed in 1982 by John Anderson as a way to explain all of human cognition. Approximately, ten years later Anderson advanced his cognition theory to the current theory of Adaptive Control of Thought – Rational (ACT-R). The difference between ACT and ACT-R is that the later theory will test every possible cognitive task in the laboratory (Anderson, et. al., 1995; Anderson; et. al., 1997; Ritter, et. al., 2007).

Memory modules. According to Anderson there are two major types of “memory modules”, declarative and procedural. ACT-R defines declarative memory as facts about any given subject (i.e. Austin is the capital of Texas). The process of understanding how something works or how to perform a task (i.e. finding Austin on a map) defines procedural memory. The correlation between declarative and procedural memory is that procedural memory requires knowledge based in declarative memory. For a student to find Austin on the map they must understand maps, what Austin is, where Texas is, etc (Anderson, et.

al., 1995; Anderson; et. al., 1997; Ritter, et. al., 2007). This is a cyclical process that aligns with the communication/cognition theory of Cybernetics.

Principles of ACT-R. There are eight main principles of ACT-R: Principle 1: Represent student competence as a production set; Principle 2: Communicate the goal structure underlying the problem solving; Principle 3: Provide instruction in the problem-solving context; Principle 4: Promote an abstract understanding of the problem- solving knowledge; Principle 5: Minimize working memory load; Principle 6: Provide immediate feedback on errors; Principle 7: Adjust the grain size of instruction with learning; Principle 8: Facilitate successive approximations to the target skill (Anderson, 1995, p. 179). These principles are not only part of the cognition process, but also serve as the tutoring model for research using ACT-R (Anderson, et. al., 1995).

Cybernetic Conversation Theory.

According to Pask, a radical constructionist, communication cognition is an evolutionary, self-organizing process thus defining his Conversation Theory (Fernandez, 2008). This theory was a combination of the philosophies of Grice, Bateson, and Habermas (Scott, 2001). Pask's Conversation Theory will be a converging factor in my overall Cybernetic Distance Learning Theory. Before delving into Pask's Conversation Theory a quick flashback into Cybernetics is in order. According to Scrivener, "Cybernetics is the study of systems which can be mapped using loops (or more complicated looping structures) in the network defining the flow of information" (2002, para. 5)

Cybernetics. First order. The Macy Foundation and specifically Warren McCulloch formed the "first order" of Cyberneticists in the early 1940's (Scott, 2004). This group of "representational realists" cogitated that all disciplines can be related to one another via observed systems. They theorized that systems are

"information tight" meaning that the learner is not given information they gather it through a circular experience of changes via outside influences (Scott, 2004). This "first order" of Cyberneticists applied this theory interdisciplinary (within discipline), transdisciplinary (across disciplines), and metadisciplinary (discipline about disciplines) (Scott, 2001; Scott, 2004). This allowed them to view their pursuits as not only a scientific goal but as art, as Couffignal stated, "*L'art d'assurer l'efficacite´ de l'action*" ("the art of ensuring the effectiveness of the action") (1960, p. 3). The methodology of Cybernetics is that product is formed from process and unrelated to any other factor. "Thus, for example, a control process, whose product is the maintenance of some state of affairs, may be distinguished and modeled as such, irrespective of its particular embodiment as a biological, artificial or social system" (Scott 2004, p. 1368). Cybernetics theory began changing around the 1970's with von Foerster preparing the way for the theory Cybernetics of Cybernetics (Scott, 2004).

Cybernetics. Second order. The "enactive constructivists" of the "second order" of Cyberneticists began to look at the Cybernetics of Cybernetics. Unlike their predecessors they used the theory of Cybernetics for observing systems instead of observed systems (Scott, 2001). von Foerster led the way for "second order" theorists in 1974 by writing, "The environment contains no information; it is as it is" (Scott 2004, p. 1369). This opened the idea for cyclical or "organizationally closed" networks (cite). "Second order" theorists believed that knowledge is not an end product but part of a circular building of logical understanding (von Foerster, 1992). During the 1958 von Foerster developed the Biological Computer Laboratory (BCL) at the University of Illinois. This laboratory was host to a multitude of theorists including Gordon Pask. It was at these meetings at the BCL that Pask developed his Conversation Theory.

Radical constructivism. The lineage of Radical Constructivism (RC) dates back to Piaget but was brought to wide circulation by Ernst von Glasersfeld (Scott, 2004). von Glasersfeld believed that, “knowledge is conceived as a being a representation of an external objective reality” (Scott 2001, p. 344). In von Glasersfeld’s own words, “Language frequently creates the illusion that ideas, concepts and even whole chunks of knowledge are transported from a speaker to a listener ... rather each must abstract meanings, concepts and knowledge from his or her own experience” (von Glasersfeld, 1991, p. xiv). This viewpoint of cognition is what guided Cybernetic thinkers like Pask to believe in the circular nature of conversation (Scott, 2001).

Conversation Theory. Now back to Pask and his theory of conversation and it’s cyclical nature. Appendix A contains Pask’s “skeleton of a conversation” from Scott’s article, “*Gordon Pask’s Conversation Theory: A Domain Independent Constructivist Model of Human Knowing”* (2001, p.8). This model demonstrates the truly cyclical nature of conversation and cognition. Conversation between learner and teacher begins with why questions moving onto how questions. The process is not linear or horizontal it is constantly in flux with both student and teacher trying to gain deeper understanding of the subject (Scott, 2001).

Learning and teaching as communicative actions (LTCA).

In the 1930s Habermas formulated his *Duty in the Discourse Ethics* in Germany. There were two main components to his discourse: instrumental action and social interaction (communicative action). Instrumental action is geared toward, “controlling and predicting objective processes” (Rebore, 2001). According to Habermas communicative action, “relies on a cooperative process of interpretation in which participants relate simultaneously to something in the

objective, the social, and the subjective worlds . . .” (1987, p. 120). Essentially, Habermas is working to improve goal-based communication (Warren, date; Bolton, 2005).

Communicative action. Habermas states three main classes of communicative actions; teleological, normative, and dramaturgical. It appears that these communicative actions developed from his previous notions of “speech acts” consisting of communicatives (basic speech), constatives (claims), regulatives (requests), and expressives (knowing) (Habermas, 1985). Interestingly Habermas seems to have not molded the constative speech act into his communicative action theory, the other three appear transformed. In theory communicative speech acts became teleological action, regulative speech acts switched to normative action, and expressive speech acts transformed into dramaturgical action. Teleological action occurs in the most basic form as an end to a means model. Teleological or strategic communication allows the speaker to make a desired behavior or action occur from the listener (Habermas, 1984; Bolton, 2005; Warren, date). Normative actions are the “rules” by which groups, families, societies, and relationships work can be related to morality (Habermas, 1987). Normative actions can be thought of as “unwritten rules” or “shared habits” that persons involved in a specific assemblage or culture can relate to (Bolton, 2005; Warren, date). Dramaturgical, as compared to teleological or normative actions, deals with how an individual presents him/herself to a larger group. This would be a premeditated presentation of an individuals “expression of truth” (Bolton, 2005; Warren, date). Habermas links dramaturgical action to teleological action via the individuals “expression of truth”. The difference is in the environment that the action is occurring; teleological action would occur in an objective world, while a dramaturgical action would occur in a subjective one

(Habermas, 1987). Scott Warren suggests a fourth aspect to communicative action constative action.

Learning and teaching. Constantive action, as defined by Warren, is, " . . . geared towards allowing students to interactively make and challenge claims to the validity of objective knowledge . . . ((Warren, 2009, p.2). This appears to be the learning and teaching component of the LTCA theory along with an instructor perspective of the other three. Warren uses the educator lens to examine the other three actions. Teleological action in the classroom would consist of students following directions with no input. Normative action can be achieved in the classroom via class-generated rules, social norms, or consensus in the general school setting on policies, some student input can occur. Finally, dramaturgical action in an educational setting might take the form of a creative or artistic action (Warren, 2009; Warren & Stein, 2008).

Cybernetic Distance Learning Theory

My actual theory of distance learning is a conglomerate of the three theories mentioned in my literature review section. My main focus in the theory is that I believe learning is a cyclical process of building on prior knowledge. When designing a distance-learning course I believe that one must consider the way in which student's cognate and communicate.

Cognition.

Epistemologically speaking, my theory is based in the view of ACT-R. I preferred this learning theory above other models because of its intrinsic cyclical nature. The dependence of declarative and procedural memory on one another mimics the ideals of Cybernetics. For one to fully have a procedural understanding of a subject or class one must have some declarative knowledge. Once one has a vague understanding of procedural cognition then one's declarative depth of understanding is increased.

Eight Principles. I find the eight principles of ACT-R to align nicely with distance learning and good teaching in general. As any good communicative learning theorist I am looking at the end then the means to get there. I see these eight principles as a goal for distance learning. With the view of a Cybernetic theorist, we can appreciate the constant evaluation that a distance course requires. The issue for distance learning courses becomes the effectiveness of communication in adjusting within the eight principles to be an effective teacher/learner (Luppicini, 2002).

Communication-participant roles

Ontologically my theory is rooted in the theory of Cybernetics. As stated earlier communication is key to the success in a distance learning class. Communication is the link that each person in the class has with one another. While the communication is artificial it is necessary for the success of learner and teacher (Whipp, 2004). Teachers and students must engage with one another to fully understand what is being conveyed. This process in the virtual world could take many more steps than in a face-to-face meeting (Whipp, 2004; Terry, 2006). I believe that a major challenge for a distance-learning course designer is to overcome the communication barrier with multiple, efficient, modes of synchronous and asynchronous communication.

Communication- participant actions

Methodological conventions in my theory are focused on the actions of the participants in a distance learning class. The LTCA theory places every action that a teacher or student must take in a class into four categories. By focusing on these four categories or strategies teachers may be able to communicate more effectively with their students. This process has potential to alleviate some of the distance “transactional distance” between learner and teacher. Closing the gap

between learner and teacher should be the goal of any distance learning course designer (Nichols, 2008).

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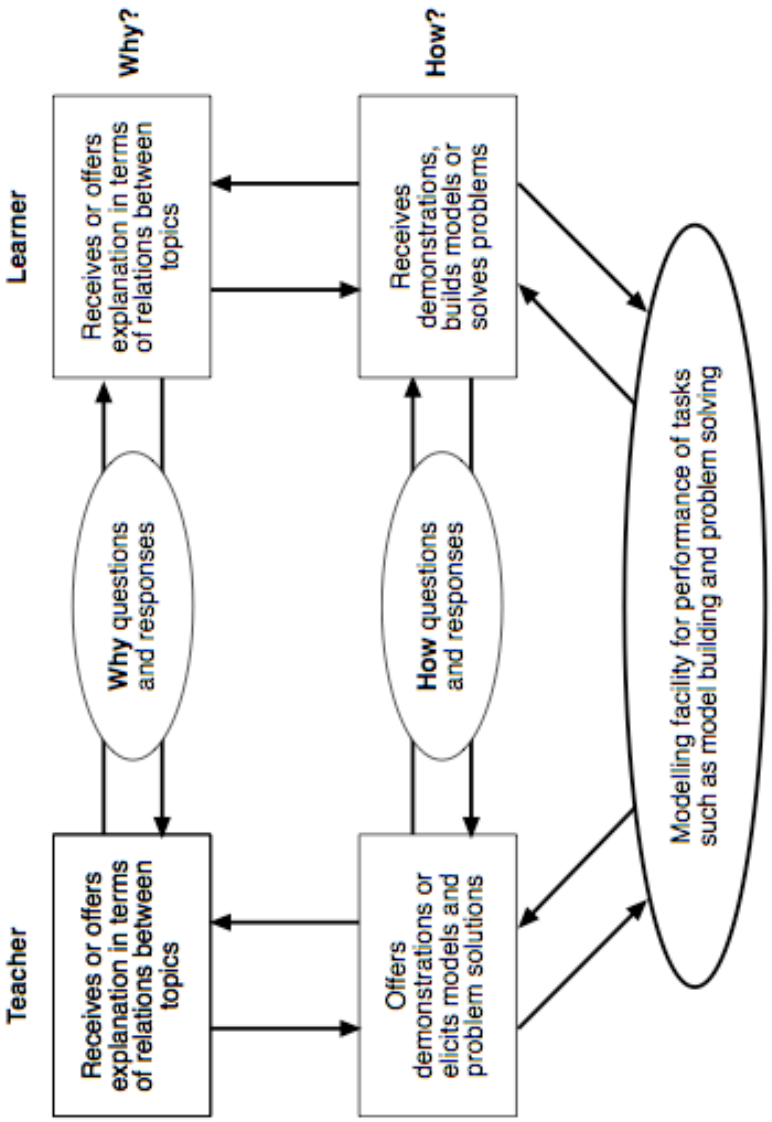
Appendix A



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