CONSTRUCTIVISM VERSUS OBJECTIVISM: IMPLICATIONS FOR INTERACTION, COURSE DESIGN, AND EVALUATION IN DISTANCE EDUCATION.

Charalambos Vrasidas
Center for the Application of information Technologies
Western Illinois University

Abstract

This paper discusses the basic philosophical assumptions of objectivism and constructivism including their implications for course design, interaction, and evaluation in distance education. First, I provide a brief overview of the construct of interaction as it is used in the field of distance education. Second, I address the major philosophical ideas of objectivism and constructivism as they relate to education. Third, I discuss how curriculum designers from each paradigm design a distance education course. Finally, I compare and contrast the two approaches to distance education course design and provide suggestions for practitioners.

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Introduction

With the rapid growth of computer networks and advances in telecommunications, distance education has become a major venue for delivering instruction. In the early days, distance education was predominantly delivered via correspondence and pre-packaged material. Such approaches used in distance education emphasized a linear and objectivist approach to learning and teaching, which derived from a long tradition of programmed instruction (Garrison, 1993). Several practitioners entering the field of distance education in the 1980s were carrying with them their objectivist assumptions and beliefs, which were reflected in their practice (Jonassen, Davidson, Collins, Campbell, & Haag, 1995).

With the development of new technologies, such as interactive television and computer conferencing, distance educators can approach the design of courses and delivery of curricula following a less objectivist and a more constructivist approach (Dede, 1996; Eastmond & Ziegahn, 1996; Tuckey, 1993). As Harasim (1996) argued, online education shifts "the focus from knowledge transmission to knowledge building" (p. 205). Computer networks shift the role of the teacher from knowledge transmitter to that of a facilitator who provides ample opportunities for interaction and meaning-making to all learners. Before discussing the two philosophical paradigms of objectivism and constructivism, I will discuss the construct of interaction as it relates to distance education.

Interaction: A fundamental process for learning

Interaction is one of the most important components of any learning experience (Dewey, 1938; Vygotsky, 1978) and it has been identified as one of the major constructs in distance education research (McIsaac & Gunawardena, 1996; Moore, 1989; Wagner, 1994). Dewey (1938) argued that education is based on the interaction of an individual's external and internal conditions. Interaction and the situation during which one experiences the world cannot be separated because the context of interaction is provided by the situation. He postulated that "An experience is always what it is because of a transaction taking place between an individual and what, at the time, constitutes his environment..." (p. 43). The idea of transaction suggests the intersubjectivity between the individual herself, other people, and her surrounding environment.

Simpson and Galbo (1986) argued that interaction is an important component of the learning process. They defined interaction as

> ...behavior in which individuals and groups act upon each other. The essential characteristic [of

> interaction] is reciprocity in actions and responses in an infinite variety of relationships: verbal and nonverbal, conscious and nonconscious, enduring and casual. Interaction is seen as a continually emerging process, as communication in its most inclusive sense (p. 38)

Moore (1989) made the distinction between three types of interaction in distance education: learner-teacher, learner-content, and learner-learner. Learner-content is the fundamental form of interaction on which all education is based. Learning occurs when learners interact with some content—whether learning is defined as change in behavior, creation or modification of cognitive structures, or construction of shared meaning. Content is found in books, objects from the environment, abstract ideas, videotapes, computer programs, and websites, among others. The learner-teacher interaction can take the form of the teacher delivering instruction, lecturing, providing feedback, and encouraging the learner. In addition, learners might be interacting with the teacher by asking questions, submitting homework, and discussing problems with the teacher. The learner-learner interaction is what Moore called "a challenge to our thinking and practice in the 1990s" (p. 4). Learners collaborate with peers on projects, assignments, discussions, exchange ideas, and interact on topics that relate to the course.

Hillman, Willis, and Gunawardena (1994) argued that past discussions of interaction failed to acknowledge the fact that in distance education, all interaction is mediated via a medium. In order for any of the three types of interaction to take place, the learner has to interact with the medium. Therefore, they proposed a fourth kind of interaction, the learner-interface interaction. They based their argument on Salomon's (1974) symbol attributes theory according to which each medium employs different symbol systems to convey a message. The message conveyed by a medium is colored by the medium's attributes. Therefore, the learner's skills in using technology to communicate will influence success in distance education.

I will first discuss the major philosophical assumptions of the two paradigms and then place them on a continuum with constructivism on the left end and objectivism on the right end (see Figure 1). For the purpose of this paper, and while discussing the two ends of the continuum, I will focus on the extreme ends of the continuum in order to illustrate their differences. After reviewing the two ends of the continuum I will discuss how an objectivist distance educator structures a course to promote interaction and learning. Then, I will discuss how a constructivist structures a similar distance education course. Finally, I will discuss the two approaches and provide suggestions for practitioners.

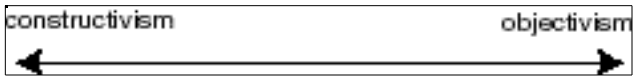

Figure 1. The constructivism-objectivism continuum.

Objectivism

Objectivism has dominated the field of education for several years. Most of the traditional approaches to learning and teaching that are based on behavioristic and cognitive theories, share philosophical assumptions that are fundamental in objectivism. Lakoff (1987), in his classic book *Women, fire, and dangerous things: What categories reveal about the mind*, argued that objectivism is "one version of basic realism" according to which reality exists independent of humans (p. 158). The major assumptions of objectivism are: (1) There is a

real world consisting of entities structured according to their properties and relations. Categorization of these entities is based on their properties. (2) The real world is fully and correctly structured so that it can be modeled. (3) Symbols are representations of reality and can only be meaningful to the degree that they correspond to reality. (4) The human mind processes abstract symbols in a computer-like fashion so that it mirrors nature. (5) Human thought is symbol-manipulation and it is independent of the human organism. (6) The meaning of the world exists objectively, independent of the human mind and it is external to the knower (Jonassen, 1992a; Lakoff, 1987).

An objectivist educator believes that there is one *true* and *correct* reality, which we can come to know following the objective methods of science. By studying the world we can identify its structure and entities with their properties and relations, which we can then represent, using theoretical models and abstract symbols. These models and abstract symbols we can then map on the learner's mind. The learner's thought processes will manipulate those abstract symbols and she will come to know the world, only when her mind mirrors reality. In Lakoff's (1987) words "knowledge consists in correctly conceptualizing and categorizing things in the world and grasping the objective connections among those things and those categories" (p. 163). Knowledge and learning are achieved when the abstract symbols that the learner came to know correspond to the one and only real world. There is one correct understanding of any topic. Learning is simply defined as change in behavior and/or change in the learner's cognitive structures. Therefore, instruction should be designed to effectively transfer the objective knowledge in the learner's head.

The long tradition of an objectivist approach in education has its roots in Taylor's ideas on scientific management (Callahan, 1962). The mechanisms of scientific management, such as standardization and task analysis, were developed to ensure the most efficient production in business and industry. The standardization mechanisms attempted to ensure that all jobs and products matched the objectively and scientifically identified standards. Punishment and rewards systems were activated depending on the workers' success in completing the task. Curriculum theorists like Bobbitt (1918) and Tyler (1949) were influenced by Taylor and argued that schools needed to be more like businesses in order to be efficient. They saw the need to identify clear-cut standards for the product of education throughout all the stages of "production." Rigorous standards ensure accountability by allowing the teacher to know the results of her teaching, the supervisors to make sure teachers are completing their tasks that their schools are compared well with other schools, and the state to know that tax payers' money is spent well.

Tyler (1949), who is regarded as the father of the linear model of curriculum development, developed a model based on the objectivist paradigm. Tyler's approach consists of four major steps. These steps are fixed, rigid, and must be followed in the correct sequence: (1) Identify the objectives of instruction, (2) Select the useful learning experiences, (3) Organize the learning experiences in the best possible manner, and (4) Evaluate learning. There is always alignment among the four steps. For example, instructional objectives should always match the learning experiences and evaluation component. The objectives will drive the whole curriculum development process. For Tyler, a good curriculum developer knows the correct sequence of learning experiences and how they should be organized to maximize learning for the largest

number of students. An important characteristic of Tyler's approach is that effective instruction will take place only when all four steps are in complete alignment.

Models of instructional design that are based on objectivist philosophy (Dick & Carey, 1996; Gagne & Briggs, 1974; Smith & Ragan, 1993) and behaviorist learning theories, follow the Tyler (1949) approach. This approach is represented by the input-process-output model. The four steps identified by Tyler are often condensed to three (see Figure 2). The selection and organization of experiences falls within the box labeled "process." Before designing instruction for a given topic, the teacher will identify the knowledge he wants to transfer into the learner's mind. He then proceeds by stating that knowledge into specific behavioral objectives. Extra care is taken to ensure that objectives are framed using specific and objective language so that it is clear beforehand what the learner will be expected to do by the end of instruction. All learners are expected to achieve those objectives and behavior in the same manner. Objective evaluation procedures will be used to determine whether objectives are met and to what degree.

Figure 2. The Input-Process-Output model of instructional design.

An objectivist approach to distance education course design

Several instructional design models that are based on an objectivist paradigm emphasize a sequence of several steps in designing instruction (Dick & Carey, 1996; Gagne & Briggs, 1974; Smith & Ragan, 1993; Wagner, 1990). These steps are arranged in ways that their time sequence is important. For example, you cannot proceed to the Process step, until the Input step is completed (see Figure 2). This sequence of steps is rigid. For the purpose of this paper I will discuss the components that are most important in illustrating the differences between the two approaches. I will discuss issues relating to content, goals, objectives, learner characteristics, strategies for promoting interaction, assessment, and evaluation. To illustrate these issues, I will be using the hypothetical graduate level distance education course with title *Telecommunications for learning and instruction*. A teacher preparation program at a major university offers this course. The course is supported with computer conferencing software and a website that has information about assignments, schedule, and resources. Some of the topics to be covered in the course include computer-conferencing technologies, issues of access and equity, virtual universities and accreditation, trends in education and implications for the future of formal education and schooling.

Input

When designing a course, one of the first steps of the instructional design process in a traditional objectivist approach is content analysis. During content analysis the distance educator breaks down the content in small chunks, analyzes it, and identifies the major issues. Is the content relevant to the overall goal of the department offering the course? What are the important components and specific knowledge from this specific domain that should be taught to the learner? What are the important aspects of telecommunications technologies and how can they be used for teaching and learning? Clearly specified boundaries are set for what is relevant in the course and those decisions are made by the teacher and imposed on the learners. The teacher is the expert and it is his job to identify what is relevant to the subject

matter of instruction. Content analysis helps the teacher modularize the content into small manageable pieces and identify the specific prerequisites and skills that the learner will need to successfully complete the course.

In addition to content analysis, the teacher conducts a task analysis. Task analysis determines the tasks that the learner is expected to perform during, and at the end of instruction. There is one correct and efficient way of performing each task and the teacher identifies that in advance and employs strategies that map those steps in the correct sequence on the learner's mind. Task analysis, like most of the components in a linear approach to instructional design, derived from principles of scientific management and the stop-watch standard (Callahan, 1962). The stop-watch technique was used to identify the least time necessary to perform a specific task in order to increase production and efficiency in industrial settings. An observer observed and timed the most experienced workers in order to identify the least time needed to complete a task. Under the objectivist paradigm the same principle is applied to education. What is the best approach in solving a mathematical problem? What are the specific steps and in what sequence should they be examined and taught? Those steps are also identified and taught to the learners.

Another component of the input step of instructional design is learner analysis. After identifying the tasks and prerequisites, the designer will need to analyze the potential learners. Distance educators should be aware of learners' characteristics, prior knowledge, skills, and gaps between prerequisites and current knowledge and skills that the learner possesses (Wagner, 1990). Often times pre-tests are administered in order to identify possible gaps in the learners' prior knowledge and skills.

The last and most important step of the input component is the formulation of performance objectives. The objectives will derive from the content analysis and they are propositional statements that indicate explicitly what specific knowledge the learner will acquire at the end of the course. Extra care is taken to make sure that these objectives are very specific and they make clear what all students will learn (Mager, 1962). For an objectivist instructional designer, learning can only be demonstrated in observable behavior. Therefore, objectives are phrased so that they indicate specific observable behavior under certain conditions (Mager, 1962; Sullivan & Higgins, 1983; Tyler, 1949). An example of such an objective is the following: Given Tyler’s four steps for curriculum development, the learner will be able to place them in the correct sequence. Specific objectives formulated during the input step guide subsequent assessment and evaluation of student learning.

Process

During the process component of an objectivist instructional design model, the designer constructs a comprehensive plan for instruction. What are the strategies that the distance educator will employ so that the maximum number of students will achieve the maximum number of objectives? If a distance educator subscribes to the objectivist paradigm, then she does not really value the learner's interaction with peers. From all four types of interaction identified in distance education literature, the two most valued by an objectivist distance educator are the learner-teacher and learner-content interaction. Therefore, in designing a distance education course, the distance educator will structure the course so that there is a lot of learner-content and learner-teacher interaction. Emphasis is placed on the organization and sequencing of learning

experiences in ways that will be most efficient and effective in meeting the prespecified learning outcomes.

To promote learner-content interaction, the teacher assigns readings, literature reviews, reaction papers, asks specific questions about the content, and the like. There is a set of predetermined assignments, readings, and deadlines for submitting homework. The learner-teacher interaction is manifested when the teacher asks or answers questions using electronic messages, two-way video and two-way audio technologies, or via phone. The teacher invites the learner in a real-time chat and discusses with her issues relating to the course. Another form of learner-teacher interaction takes place when the teacher provides feedback on learners' work. Still, the teacher in the objectivist paradigm is seen as the authority figure and the transmitter of information. In cases that the teacher assigns some collaborative work to promote learner-learner interaction, all parameters of collaboration and group work are determined by the teacher, who is always in control of the situation. All these strategies for promoting interaction are imposed on the learners and decided by the teacher without negotiation.

Output

Evaluation in an objectivist approach is goal-driven. The very first step of the evaluation process begins with the specification of objectives, which indicate the expected observable behavior from the part of the learner. Then, the teacher identifies the specific situation in which the learner will demonstrate the particular behavior. The major question asked at the end of instruction is the following: Did the learner meet the objectives? Did the learning experiences render the expected outcomes? An objectivist teacher, after specifying the objectives and before selecting the strategies, builds the evaluation components (Tyler, 1949). How is the learner going to be assessed? Immediately following the specification of objectives, the teacher builds the assessment measures, which are criterion referenced. For example, one of the objectives may read: "By the end of instruction, the learner will be able to identify the four major steps for course design." This objective will be measured using test items that ask the learner to demonstrate knowledge of the steps in course design and their correct sequence. A question item that would be a part of assessment could either provide a list of possible steps and ask the learner to mark the correct ones, or ask the learner to write those steps in empty boxes in the sequence they occur. Evaluation is criterion referenced, that is the learner will be evaluated on how well she does on the test and not on how she ranks among her peers. Other sources of evaluation data could also be used such as essay questions, student presentations, and observations of students while at work (Tyler, 1949). However, the emphasis is on reducing possible bias from the evaluation procedure to ensure that the evaluation results are objective. The focus is more on documenting change of student behavior and cognitive structures, not meaning-making and understanding. This should not suggest that objectivist teachers are not interested in their students gaining understanding of the topics under study. Most of today’s teachers employ some form of constructivist strategies. As Perkins (1998) argued, “virtually all contemporary approaches to teaching and learning have a constructivist cast” (p. 55). However, under the traditional approach to instructional design, and which is based on an objectivist epistemology, the predominant goal of instruction is to map the one external reality and the *one correct understanding* into the learner’s mind.

Constructivism

On the opposite end of the continuum is constructivism. The basic and most fundamental assumption of constructivism is

that knowledge does not exist independent of the learner, knowledge is constructed. Several philosophers and educators are associated with constructivism. Among the most prominent ones are Piaget (1970), Blumer (1969), Kuhn (1996), von Glasersfeld (1989), and Vygotsky (1978). The major philosophical and epistemological assumptions of constructivism are: (1) There is a real world that sets boundaries to what we can experience. However, reality is local and there are multiple realities. (2) The structure of the world is created in the mind through interaction with the world and is based on interpretation. Symbols are products of culture and they are used to construct reality. (3) The mind creates symbols by perceiving and interpreting the world. (4) Human thought is imaginative and develops out of perception, sensory experiences, and social interaction. (5) Meaning is a result of an interpretive process and it depends on the knowers' experiences and understanding (Cobb, 1994; Jonassen, 1992a; Philips, 1995).

Von Glasersfeld (1989), one of the radical constructivists, traces the origins of constructivism to the Neapolitan philosopher Giambattista Vico. Vico argued that one can only know what he constructed. God created the real world, so only God can know the real world. Man constructs reality so man can only know that he constructed. He argued that knowledge never represents the real world and any knowledge that is constructed does not correspond to the external reality. All we can know is the knowledge we construct and not the external real world constructed by God.

There are several schools of thought within the constructivist paradigm (Cobb, 1994; Prawat & Floden, 1994). The two most prominent ones are personal constructivism and social or sociocultural constructivism. Their major difference has to do with the locus of knowledge construction. For the personal constructivists knowledge is constructed in the head of the learner while she is re-organizing her experiences and cognitive structures (Piaget, 1970; Von Glasersfeld, 1989). For the social constructivists, knowledge is constructed in communities of practice through social interaction (Brown, Collins, Duguid, 1989; Kuhn, 1996; Lave & Wenger, 1991; Vygotsky, 1978). Cobb (1994) argues that the two approaches cannot be separated because both complement each other. While discussing specifically mathematics education he argued that "mathematical learning should be viewed as both a process of active individual construction and a process of enculturation into the mathematical practices of wider society" (p. 13). For the purpose of this paper, the author will follow Cobb's theoretical ideas, according to which knowledge is constructed through social interaction and in the learner's mind. This paper argues that knowledge is both individual and shared. Unless the socially constructed knowledge is being processed in the individual's mind and related to her experiences, it will not be meaningful.

The assumptions set forth by constructivist epistemology have several implications for the nature of learning and instruction that are antithetical to objectivist approaches. Since constructivists believe that there are multiple truths and realities, education should be encouraging multiple perspectives. Learners interpret their world and educators have to account for the meaning-perspectives of the learners and for their interpretations of the world. Constructivism does not reject the idea that a real world exists. But, what it argues is that the world can never become known in one single way. The physical world sets certain boundaries within which multiple perspectives can be negotiated and constructed. For constructivists, learning is meaning-making. People create meaningful interpretations of their environment by taking

action and reinterpreting the world (Blumer, 1969). Human choices and actions are a result of interpretation of the world. The implications of constructivism for education will be discussed in detail while addressing the design of a distance education course.

A constructivist approach to distance education course design

Analysis

The process of development in a constructivist paradigm does not consist of clearly distinct phases. The three major phases of curriculum development of analysis, design, and evaluation, overlap and they are ongoing (see Figure 3). One of the components of the first phase is content analysis. Content areas do not have strict boundaries since relevancy can be found in multiple disciplines. The teacher can define a major content domain but she cannot limit its scope with arbitrary boundaries. Clear-cut boundaries of relevancy are impossible to set in online courses that use extensively the Web. The interactive nature of the Web allows learners to explore a variety of resources and establish connections with other knowledge domains that are meaningful to them (Dede, 1996; Jonassen, 1996).

Context and content are crucial in a constructivist approach and they determine the method and strategies employed in a course. Learning is situated in rich contexts and knowledge gained from a given domain has particular relevance to that domain (Suchman, 1987). Therefore, the goal of constructivist educators is to guide students to think and act like experts (Bednar, Cunningham, Duffy, & Perry, 1992; Brown et al, 1989; Resnick, 1987). What do experts in their domains do in their everyday work? For example, in the online course *Telecommunications for learning and instruction*, the goal is not to simply teach the basic technology systems, teaching methods, and learning principles. Instead, the goal is to provide students with opportunities to think like experts in making decisions about selecting such systems for appropriate use, structuring learning activities, and employing sound pedagogical strategies in real-life contexts.

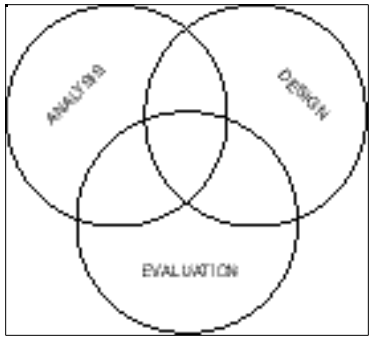

Figure 3. The constructivist approach to instructional design.

Constructivists are also interested in the learner's prior knowledge. However, the emphasis is not on the learner's prior knowledge but on his cognitive processes, self-reflective skills, and the learning process itself. The goal is to cultivate the learners' thinking and knowledge construction skills. How is knowledge and meaning constructed in given situations? How can the learning environment be arranged to facilitate the learning and knowledge construction processes? Although there is an extensive amount of literature that discusses the idea of learner control in distance education (Baynton, 1992; Moore, 1994), objectivist distance educators do not account for that. Garrison and Baynton (1987) argued that the concept of control consists of three major components: independence, power, and support. Therefore, control should be examined as

the balancing result among these three factors. Independence is defined as the degree to which the learner is free to make choices within a program. Power refers to the abilities and competencies of the learner to engage in learning experiences. Support refers to the resources available to learners that will enable them to successfully participate in a learning environment. In a constructivist course, the learner has a lot of control over her own learning and is given the opportunity to negotiate content, assignments, procedures, and deadlines. In addition, learners should be provided with the tools, resources, and support necessary to manage their own learning and assigned tasks. The role of the teacher in constructivist settings changes from authority figure to that of a coach and partner in learning.

The constructivist teacher does not expect that all students learn the exact same thing. Cziko (1989) argued that it is impossible to control variables such as motivation, intelligence and background knowledge. The course *Telecommunications for learning and instruction* can have some general prespecified general goals but its structure will be flexible to allow for goals to emerge from the content and student activities. The teacher cannot know in advance all the specific knowledge that each student will construct. What she can know is the broad area of knowledge and provide for opportunities for learners to develop the skills necessary to further explore a given domain.

Design

Since learning outcomes are not "clearly" defined in advance, the question is how do distance educators structure their courses and what strategies do they employ to ensure that learners will construct knowledge and meaning in a course? Constructivist teaching places major importance on interaction with the environment and peers in real-life contexts. Several constructivist approaches are based on ideas of situated cognition, cognitive apprenticeship, anchored instruction and cooperative learning (Bransford, Sherwood, Hasselbring, Kinzer, & Williams, 1990; Brown et al. 1989; Lave & Wenger, 1991; Spiro, Feltovich, Jacobson, & Coulson, 1992).

Brown et al. (1989) proposed the concept of situated cognition and argued that activities during which knowledge is constructed constitute an integral part of that knowledge. They postulated that language is indexical and as such, the context within which is used is crucial to the meaning assigned to words. For example, the word *now* can only be understood in the context of when that word is used. If I say *now* today, it means a different day than it would have meant had I said *now* yesterday. Taking this a step further, they argue that knowledge is also indexical. Therefore, the situation in which knowledge is constructed is an integral part of the learning process. Learning becomes a process of enculturation as learners are immersed in real life situation and act as experts (Lave & Wenger, 1991).

Tasks, activities, and assignments that students are engaged in should be parts of a broader scope that ties all the little tasks together. For example, an organized discussion on virtual universities will not simply ask students to identify advantages and disadvantages of such institutions. The constructivist teacher can select a specific case of a virtual institution, such as the Western Governors University (WGU). Then the teacher can structure activities, which will deal with WGU. Students can work in teams to build arguments, debate over advantages and disadvantages of WGU, discuss reasons behind their choices, and address issues relating to teaching and learning as they relate to WGU and its context. No clear boundaries should be set for the discussion to just the domains identified by the teacher. Several other important issues might

emerge as they are relevant to students' experiences and interests.

Another example of a constructivist activity is to present students with a case study in which a specific higher education institution is interested in developing distance education curricula and joining WGU. Students can work in groups and examine the context of the school, resources available, and budget. They can then develop proposals on how to proceed for incorporating distance education in that particular school. Their proposal can be addressing issues such as technology selection, course design, audience, budget, and staff. They can present their work in class for discussion. This can be done synchronously or asynchronously. Each group can post their work online. Then the whole class can meet synchronously online for discussion.

Similar to the idea of situated cognition is the work of Bransford et al. (1990) on anchored instruction. The goal of the model of anchored instruction is to help students "develop useful knowledge rather than inert knowledge" (p. 123). The anchor is used to focus attention on a particular case and provide a concrete example of the subject studied. In the example provided above, the anchor is the case study of WGU. By working on a concrete case, learning becomes more meaningful for the students, who engage in social interaction by working in groups to prepare their cases, discuss them online, and justify their positions. The idea of social interaction is fundamental to psychological development and learning in the constructivist paradigm (Vygotsky, 1978). A major goal of a constructivist approach is to promote the construction of multiple perspectives in various domains. One way of achieving this is by using cooperative learning strategies where learners work with peers, discuss different viewpoints, and negotiate positions.

Vygotsky (1978) introduced the concept of the Zone of Proximal Development (ZPD) to explain the importance of social interaction for psychological development. In his own words, ZPD is "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (p. 86). Students can always reach a higher level of development when they collaborate with others that are already at a higher level of development. Having students to work in groups to moderate discussions, organize debates, summarize points, and share results will help them achieve their full potential.

Another strategy that is often used in constructivist environments is cognitive apprenticeship. The constructivist teacher structures the learning environment so that she will have the opportunity to model expert behavior to students in the related subject. Therefore, it is important that the teacher or instructional designer is a content expert as well (Bednar et al., 1992), because only then can she model to the students expert behavior in a domain. For example, in a discussion of moderating online debates the teacher will model that behavior and emphasize the strategies she employs while moderating. Then, she can ask students to reflect on that process and discuss it so students can have a concrete example of how to moderate discussions. In addition, the teacher can group together students with different knowledge levels and technology skills. Such groupings can allow for less competent students to get help from more expert peers and progress along with the rest of the group.

All the strategies discussed so far address issues relating to learner-teacher, learner-content, and learner-learner interactions. In distance education settings, the learner-

technology interaction is also very important for constructivism. The use of technology and other cultural tools to communicate, exchange information, and construct knowledge is fundamental in constructivism (Bruner, 1966; Jonassen, 1996; Vygotsky, 1978). Jonassen (1992a) argued that the emphasis in constructivist learning environments is not on identifying specific knowledge, but to identify tools necessary that learners will need to construct knowledge. Strategies are not chosen to facilitate transfer of knowledge from the world to the learner's head, but to provide tools the learner will use to create meaning. Students in an online course will learn to use the technology to create meaning. For example, students can learn how to create websites with images, video, audio, and links to other sites, which will allow them to represent their knowledge in multiple ways.

Evaluation

In the objectivist paradigm, when assessing learning the teacher looks for learner behavior that indicates whether learners met the objectives. Evaluation based on objectivist assumptions is goal-driven. In constructivist environments the teacher does not identify specific objectives. Evaluation in constructivist settings is goal-free (Jonassen, 1992b). The concept of goal-free evaluation was developed by Scriven (1983) who argued that by evaluating programs one should not take into account the goals of the program because that might contaminate the findings and prevent the evaluator from identifying unexpected consequences and effects of a program. In addition, evaluation in constructivist environments is context dependent. That is, the context within which knowledge is constructed is taken into consideration during evaluation.

Constructivist environments promote the creation of multiple perspectives within a variety of contexts. There is not *one correct* understanding and there is not one correct way of solving a problem. Students are encouraged to utilize multiple ways of solving problems and justify their solutions. The creation of multiple perspectives and viewpoints calls for multiple assessment methods. In addition, constructivists are more concerned with assessing the knowledge construction process and not as much concerned with assessing knowledge. Multiple evaluation methods are employed to document the learners' growth and look for changes in their thinking and learning skills.

Traditional tests are also used but they are not the sole method of evaluation (Cunningham, 1992). Using portfolios and authentic assessment are evaluation techniques suggested by several scholars as appropriate methods to evaluate constructivist learning (Duffy & Cunningham, 1996; Eisner, 1994; Jonassen, 1992b). In a distance education course, a variety of assessment techniques should be employed that will provide information about the learners' ability to perform in real-world situations, thinking processes, and self-reflective skills. Evaluation in the *Telecommunications for learning and instruction* course, can be based on information gathered from the following: student reflection papers, student participation in online discussions, student moderation of online discussions, student self-reflective journals, weekly assignments, team projects, student presentations, observations and interviews with students, and student evaluations of their peers' work.

Reflection papers and student's self-reflective journals can provide evidence about students' thinking and learning processes. Students are asked to reflect on the process they followed while solving a problem, or while developing a proposal. More insights on students' knowledge construction processes can also come from discussions and interviews with students. Learners should be evaluated while attempting to solve real world authentic tasks, which are meaningful in the

context they appear. Romberg, Zarinnia, and Collis (1990) argued that "there is a need for tools that document the production of knowledge, and not merely the proxies that contribute to the process, such as time spent learning or the quality of the teaching staff" (p. 29). They discussed alternative assessment procedures that take place in Great Britain where researchers, in addition to the use of paper and pencil tests, they interview students and observe them while solving problems. Such approaches provide detailed information on the knowledge construction processes of students. Shavelson, Baxter, and Pine (1992) argued that alternative assessment methods that rely on constructivists principles should be based on the learners' ability to perform specific tasks. Assessment should not just look for the correct response but for the "reasonableness" of the student's approach in solving problems and performing tasks (p. 22).

Another important aspect of evaluation in constructivist approaches is the idea of negotiation. When students negotiate among themselves and with the teacher issues relating to content, objectives, expectations, and evaluation components, they are more likely to embrace them and be responsible for accomplishing the tasks. Constructivist teachers allow learners to have an active role in the evaluation process (Jonassen, 1992b). Allowing learners to evaluate their own work, provides them the opportunity to gain ownership of the evaluation process, thus making them accountable for their own learning (Lake & Tessner; 1997; Posner, 1995). In addition, evaluation of one's own work promotes self-reflexive processes, which is another goal of constructivist learning.

Evaluation in a constructivist distance education course is ongoing. It is not a separate step coming at the end of the process of development and implementation. In constructivist environments evaluation is constant and part of the learning experience and it is used to provide feedback to both the learner and the teacher. Shifting the focus from abstract tests to concrete problem solving requires a re-examination of ones philosophical assumptions. Constructivist assessment and evaluation do not look for whether the learner obtained the one and only correct *truth*. Instead, its focus is on the ability of the learner to solve problems and on the knowledge construction process. However, Linn, Baker, and Dunbar (1991) argued that alternative assessment should be used carefully. There is a need for validation of alternative assessments that will provide evidence on issues such as transferability, fairness, complexity, content coverage, and cost-efficiency.

Discussion

The objectivist paradigm is based on the assumption that there is a real world and the purpose of education is to map the entities of that world on the learner's mind. The constructivist paradigm is based on the idea that reality is constructed during interaction with the environment and peers and that knowledge is both individual and communal. Therefore, in a constructivist course the major goal is to cultivate the learners' thinking and knowledge construction skills. Radicals of each camp argue that is impossible to mix the two paradigms. You can either be an objectivist or a constructivist instructional designer because philosophical assumptions of each paradigm are contradicting each other (Bednar et al., 1992).

However, dominant paradigms, in both the physical and social sciences, rarely replace each other by falsification (Erickson, 1986; Lakatos, 1978). Instead they tend to co-exist and are used whenever they are appropriate. For example, quantitative and qualitative research methods are based on different epistemological assumptions. They coexist and they are used when they are appropriate. Some research questions lend themselves more to be examined using quantitative

methods whereas some other questions lend themselves more to qualitative methods.

This paper argues that reality is constructed in the mind through social interaction. Knowledge is both individual and shared. There is an objective world that shapes our experience and places constraints on our interpretations and meanings. As an instructional designer, the author rejects idealism, according to which everyone constructs his or her own reality. There is a shared reality and some interpretations of experience are more robust and plausible than others. Different approaches to instructional design and curriculum development should be seen as a set of tools from which educators can choose the most appropriate for a given purpose. Posner (1995) refers to this approach as “reflective eclecticism” (p. 4). Specifically, he argued that “different situations require different practices” (p. 4). This is a pragmatic view of curriculum development.

One of the weaknesses and criticisms of the constructivist approach is its inability to evaluate learning (Prawat & Floden, 1994). How can the teacher know what to teach when there are no clear-cut defined performance objectives? How can the teacher evaluate and assess student learning without having concrete criteria and objectives to refer to? Eisner (1994) argues that in some instances specifying objectives is very useful and appropriate, but in most cases those objectives will emerge from the class activities. In his own words, “I believe behavioral objectives to be appropriate for some types of educational aims, even though I recognize that they are in no way adequate for conceptualizing most of our most cherished educational aspirations” (p. 45). In some instances it is appropriate to be more linear. For example, in teaching someone how to use a computer, the teacher can allow her to experiment and explore it for a while. But, there will be a time that, unless the teacher presents specific steps for her to follow and have her practice those steps, it is very likely that the student will get frustrated and discouraged.

There are instances that one needs to be more linear and instances when one needs to be more holistic. The nature and structure of constructivist learning activities are more likely to stimulate students to engage in learning. Using authentic tasks in real-life situations increases the likelihood that learners will invest the effort and time to construct their understandings on a topic. Perkins (1992), however, while addressing the demands that a constructivist approach places on the learner, argued that learners will have to take control of their own learning, otherwise, they will never be able to become "autonomous thinkers" (p. 163). Therefore, one skill that the learner will have to develop is task-management. When learners become efficient in managing their learning in constructivist environments, they are more likely to be accountable for it. Nevertheless, not all learners come into a constructivist distance education course with the necessary task management skills. Perkins argued that "it is the job of the constructivist teacher (or interactive technology) to hold learners in their 'zone of proximal development' by providing just enough help and guidance, but not too much" (p. 163). Therefore, the teacher should coach the learners to manage their tasks and help them take control of their learning.

Constructivist approaches rely heavily on learners to manage their learning tasks and engage in interaction with their peers and content. In order for learners to manage their learning, structure is crucial for providing the guidelines and skills necessary to succeed in distance education courses (Vrasidas & McIsaac, 1999). In face-to-face traditional classrooms, it is easier to allow students to engage in activities that are open-ended with no clearly defined objectives. When misunderstandings and confusions arise, they can easily be

resolved. At a distance, if there is confusion, it is difficult to resolve it in a timely manner. Therefore, distance education courses require clear and specific structure in order to be successful. Structure, however, does not necessarily suggest an objectivist approach to instructional design. Good planning is a characteristic of good teaching regardless of philosophical paradigm. Clearly defined activities, student role, homework submission guidelines, course expectations, and evaluation procedures are characteristics of any well-prepared course.

Conclusion

Depending on the paradigm to which a distance educator subscribes, her teaching beliefs will be shaped accordingly. Instructional designers should always be aware of their epistemological and philosophical assumptions because those assumptions will guide their teaching and evaluation practices. When as a teacher I situate myself on the continuum, I avoid the two extreme ends. I believe that there are times that a more objectivist approach is appropriate and there are other times that a more constructivist is appropriate. It always depends on the context, content, resources, and learners. Learning theories and epistemological assumptions of different instructional design paradigms are tools which educators can use to make informed instructional decisions as they undertake the task of developing curricula and designing instruction.

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