The Constructivist Theory and Educational Technology

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Abstract

This paper will look at online learning and the important role that the Constructivist Learning Theory has played in its development. We will consider why Instructional Designers need to utilize theories when designing curriculum. After that, we will apply the knowledge of theory to a study of the Constructivist Learning Theory within the field of Educational Technology. We will then narrow the focus to look at some specific examples of the Constructivist Learning Theory and its application in a variety of educational settings.

Keywords: Educational Technology, Constructivism, Instructional Design, Learning Theory.

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Theory is an essential component to education because it allows educators, in a variety of contexts, to reflect on research completed by others, design experiments to test the theories, and explain the things that affect a student's learning. These processes, in turn, helps educational technologists to improve the quality of learning. Additionally, as Koetting says, "We are shaped by the world, and we help to shape the world." The social process of theorizing is a social construction, which in turn rises from people's desire to explain, understand, or change the human condition (1991, p.4). In their article, Isroff and Scanlon make the the point that theories and models allow instructional designers and educational technologists to design, redesign, and validate learning technology as well as provide the opportunity to better understand the experiences of users (2002, p. 11). It is important to have the ability to analyze learning situations, and a learning theory, properly written and analyzed, can provide that opportunity. A well written theory will be descriptive and provide a record of a student's learning experience that is supported by observations. It will provide a design for learning that will help obtain a different response towards learning. The need for theory further arises when there are multiple understanding for the same reality. How do we separate out the theoretical stance that makes sense within our own experience? (Koetting, 1991, p. 6) This is why we are going to take the time to use theory and examine what it means to utilize the Constructivist Learning Theory within the Educational Technology setting and examine the implications of its use in a variety of settings. According to Issroff and Scanlon (2002), it is important that educational technologists take a multi-leveled approach to understanding different learning situations. It is important to consider the institution, the culture, the curriculum, and the technology itself (p.10). Throughout recent history, the Constructivist approach has been popular due to its focus on thinking about how knowledge is developed and the how the learner's experience impacts their learning.

In defining constructivism, it is important to consider what learning is, what the learning process consists of, what the teacher's role is in the classroom, and what the teacher can do to

carry out that role. The essential premise to defining learning within the Constructivist theory is that it is personal. The learner constructs understanding and meaning from experience. The constructivist perspective describes learning as a change in meaning constructed from experience. "Constructivists believe that "knowledge and truth are constructed by people and do not exist outside the human mind" (Tam, 2000, p.51). The learning process in the Constructivist process is both simple and complex. It requires the learner to take an active role in their learning, as understanding comes from within. Although a learner's experiences outside of the learning environment may affect their immediate understanding of a problem, learners are encouraged to collaborate and create a community of learning. A learner may come up with a different understanding of a given problem, but they must be able to justify their position. Within the constructivist classroom, there is always a meaningful goal for learning and students are asked to solve meaningful problems that are stimulating and interesting to all students. The teacher plays a very important role within the classroom, although it is not usually front and center, as in many traditional classrooms. The role of the teacher is to guide learning. To ask meaningful questions that will drive student learning and understanding. The teacher helps students to engage in their learning while challenging, and helping them, to complete tasks that may otherwise be just outside of their range. The Constructivist teacher walks a fine line of guiding while allowing students to work through a problem so that they can construct their own meaning. To facilitate this, the teacher can do things like share his/her own experiences, encourage students to ask questions, and provide students with the opportunity to build meaningful relationships with their peers.

Constructivism plays an important role in the development of educational technology and the associated design practices. It emphasizes the "need to embed learning into authentic and meaningful contexts" (Tam, 2000, p.56). While at first glance it may seem that the computer-based learning might isolate students, combining technology with the Constructivist approach allows students to have a richer social experience where they can access peer tutoring, email,

discussion groups, and contact with students in other cultural contexts. As evidenced by numerous case studies conducted, the Constructivist process brings learners with different backgrounds, experiences, knowledge, and learning styles together to create a learning environment where people can interact with and work together to solve a problem and share experiences. The teacher plays the role of facilitator, or guide, and encourages discussion and learning from a variety of perspectives. The value of the Constructivist Theory within the field of Educational Technology is incredible as students build understanding through an extended network of peers.

   Constructivism is a highly effective theory in the development of technology-based learning environments. In examining this environment, which is blog-based, it is possible to see the direct application of the Constructivist Theory to a real learning environment. In a study of a blog-based learning environment, the authors, Kang, Bonk, and Kim, discovered that the discussion in the blog formed a "multi-dimensional and multi-layered interactivity among the team," as well as allowed the instructors and students to experience "decentralized relationships" (2011, p.227). The blog was decentralized, as opposed to the centralized environments found on learning systems such as Blackboard, or email. This allowed students to increase communication, interaction, and collaboration in order to solve problems together. To conduct the study, the researchers followed two graduate classes at Kyung Hee University in Seoul, Korea during the fall semester of 2009. Each class was taught by the same instructor (Kang). One of the classes was an educational technology class and the other was a museum education class and both classes were new to "educational blogging" (Kang et al., 2011, p. 229). According to the authors,

> The instructor utilized blogs for her class assignments, class reflections, and journal entries as a way of extending discussion, showing self-identity, and fostering collaboration among the students. The students were required to acquire, report, and share information related to both informal and formal activities in their own blogs....An

>online class one week was followed by an off-line class meeting the following week. During the semester, three group projects (mostly analysis papers) were assigned to students in each class. Each student had to submit reflective journals three times after presenting each project as an individual assignment for the class. The students were required to submit both individual and team outputs on the instructor's blog using the trackback function in her blog. The trackback procedure gave the instructor easy access to individual student blogs. To enhance active team discussion and participation among the students, project-based learning was employed as a learning framework to guide these two classes. (2011, p. 231)

The purpose of the study was to determine if blog-based instruction was an effective learning environment. More specifically, according to Kang, et al. the research was intended to determine whether blogging can be differentiated from other forms of Web-based instruction, such as Moodle. The results showed that the organization that occurred through the "trackback" structure allowed more people to be introduced to the conversation, increased connectivity, and interaction. These things "enhance(d) the sense of community and feeling of shared learning responsibility among the students and the faculty member..(which) was rarely detected in previous Web-based discussions and course activities." (Kang, et al., 2011, p. 230-231). In further discussion of the blog-based classroom the authors emphasize the connection between this type of technological learning and the Constructivist Learning Theory.

>With such tools, the learners can gain a sense of co-participation and negotiation of ideas, while sensing that there are others beyond themselves who are building, reflecting on, and refining ideas and insights. It is, in a real sense, a community of learners who are wrestling as a team or group with various key course issues and forming the multi-layered interactivity. (Kang et al, 2011, p. 231)

The result of this learning is a summary of the very purpose of the Constructivist approach and demonstrates the usefulness in the development of an interactive and social technology based

learning environment. This study demonstrates a practical application of the Constructivist

Learning Theory to the blog-based learning environment. In an effort to demonstrate its useful

application in a variety of environments, we will next consider the application of the

Constructivist Theory to a 1:1 an e-learning environment in Malaysia.

The Malaysian study utilized classrooms in Malaysia with a 1:1 computer to student

ratio, as well as all the necessary e-learning devices to give them access to the most up-to-date

information, which would not otherwise be available in textbooks. In describing the program, the

authors, Sultan, Wood, and Koo say:

> The concept of Information & Communication technology (ICT) comes as a part of
>
> the Malaysian Information Technology (IT) agenda that exposes all field players
>
> starting from students, teachers, administrators and parents to fully utilize IT in
>
> every aspect of education at the administrative and classroom levels. School
>
> classrooms in this program feature such technology-enablers as laptops personal
>
> computers, multimedia computer laboratories, video
>
> conferencing systems and high-speed Internet connections. This is done by
>
> providing each student with a laptop, providing teacher training to promote project
>
> based learning as well as principal training on ICT implementation and
>
> development plan. (2011, p. 150)

These factors combine to create an extensive environment in which students have access to the

technology necessary to create an environment for Constructivist Learning. As the

Constructivist Theory states, and the authors point out, "Individuals in an e-learning environment

based on constructivist views are forced to use creative thinking to build their knowledge base

for meaningful interpretation and reflection of knowledge" (Sultan et al., 2011, p. 149). This

study seeks to evaluate the gaps between Constructivist Theory and classroom practices, the

success of students practicing the Constructivist approach, and develop a conceptual

framework model based on students communication in a Constructivist learning environment (CLE). The authors created four hypotheses to test for this study. They are:

    H1:Students' 'Personal relevance' understanding of constructivist practices using e-learning resources is positively related to their 'Perceived e-learning outcome'.

    H2: Students' 'Uncertainty' understanding of constructivist practices using e-learning resources is positively related to their 'Perceived e-learning outcome'.

    H3: Students' 'Critical voice' understanding of constructivist practices using e-learning resources is positively related to their 'Perceived e-learning outcome'.

    H4: Students' 'Shared control' understanding of constructivist practices using e-learning resources is positively related to their 'Perceived e-learning outcome'.

    H5: 'Student' negotiation' understanding of constructivist practices using e-learning resources is positively related to their 'Perceived e-learning outcome'.   (Sultan et al., 2011, p. 153)

Throughout the study, the authors were able to identify the results of their hypotheses. The first hypothesis, having to do with personal relevance, was supported by the findings of the study. The implications are that the students learning outcomes are enhanced if there is more personal relevance and they are able to express ideas in regards to issues related to their studies. The second hypothesis, having to do with the uncertainty surrounding the Constructivist process, was also supported by the research. The authors discussed that within the right context, and with the correct amount of instruction, which takes a highly skilled teacher, the uncertainty that might surround a problem, particularly science, is okay because it allows students to "share aspects of learning science with their teachers and express their doubts about specific science topics" (Sultan et al., 2011, p.157). The third hypothesis, having to do with a student's critical voice, was not supported by the study. The authors suggest that the reason for this has to do with several factors, including the need to increase social and cultural presence so that students can feel connected to their environment. Additionally, students need more

opportunities to interact and share ideas about course work, and increase connections between students. These are basic premises of the Constructivist Theory and suggest that in this learning environment, this is where a gap exists between the theory and the practical classroom application. The fourth hypothesis, having to do with shared control, was strongly supported by the study, showing that "there is a need to

effectively develop shared control strategies in the learning environment that will allow students to be adept members of today's multi-literate society" (Sultan et al., 2011, p.157). This study, as well as other studies, have indicated there is a need for teachers to share the process of establishing learning goals, as well as learning activities, with their students. The final hypothesis, student negotiation, is an important one, and was supported by the findings of the study. The authors claim that student negotiation is one of the "most influential perspectives that directly affects students' knowledge, ideas, attitudes, and values when these students interact with each other" (Sultan et al., 2011, p.158). Students are able to utilize important skills such as negotiation, cooperation, conflict, rhetoric, and roles to create their knowledge. This study provided valuable information in regards to the combination of a Constructivist classroom utilizing technological tools. The researchers were able to pull five main premises of the Constructivist methods and turn them into hypotheses to study within a classroom environment. What they proved was that the Constructivist method within the context of a technology-centered classroom was highly effective. There are essential factors that combine to make it successful, and they were identified so that they can be applied in other contexts.

Although there are a great number of learning theories that have been developed in relationship to education, and more specifically, technology, Constructivism is one that has been at the forefront for many years. It's main premises are designed to help students develop needed critical thinking and problem solving skills, the theory is well defined, and it has been proven to work in a variety of settings. Constructivism is valuable in helping teachers to develop classroom practices that make learning meaningful and interesting for learners from any

background. Additionally, it can be seen that theory is an essential component to education

because it allows educators, in a variety of contexts, to reflect on research completed by others,

design experiments to test the theories, and explain the things that affect a student's learning.

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