Constructivism and Integrating Technology in the Classroom

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Abstract

Technology is increasing and impacting schools throughout the United States. Teachers are learning the technology, and implementing it in their classrooms to better the students' knowledge. The process of implementing an innovation in a constructivist classroom can take time and effort, but can show great effectiveness in the classroom upon proper implementation.

This paper is about the constructivist theory and what it states with regards to the educational setting. Also, the paper takes an in-depth look at how educators hold strong to the roots of the constructivist theory while integrating new technologies to keep up with the demands of our educational system.

Technology integration has developed drastically over the last three decades. Instructional technology was meant for two uses in schools: learning about computers and using them to create basic skills. As this was being developed in schools, it turned more into computer literacy, where students learned many different things about the computer, including: terminology, programming, ethical and social uses of computing and much more. In order to implement this technology, the teacher's and aide's had to be trained in the technology first, in order for their students to learn. Applying the constructivist theory with technology integration can allow students to work to their fullest potential.

The constructivist theory states that students are given tools to construct their own knowledge. Constructivist learning wants the educators to adopt the idea that each learner will construct, obtain, and interpret their own knowledge differently. Constructivism is an active process and allows the students to make sense of their world (Adams, 2006).

When it comes to integrating technology into classrooms, constructivism has not always been the root theory. Previously, the philosophy of technology instruction followed the idea of Instructivism. Instructivists argued that using an instructional system design model could be useful to identify what is to be taught, determine how it will be taught, and evaluate the instruction to determine if it is effective. Although this could be effective as far as evaluation, the constructivist point of view has also developed and is now considered when integrating technology instruction. Constructivist's consider three main questions when it comes to any type of instruction: One, What does it mean to

know something? Two, How do we come to know it? Three, How does this knowledge influence our thinking processes? The constructivists argue that the 'systematic' process offered by instructionalists is a problem; there is nothing systematic about how we learn or construct knowledge. Constructivists believe that knowledge is constructed socially; using language and everyone has different social experiences resulting in multiple realities (Kanuka & Anderson, 1999). This is important when maintaining a constructivist classroom while integrating technology. Educators need to understand that learners will require a variety of different experiences. Also, activities need to be incorporated so that learners experience real world relevance while using technology. One benefit of using technology for instruction in today's world is that communication technology has allowed for constructivists principles to still be maintained; constructivists see technology as a powerful learning tool.

As educators hold strong to their learning theory beliefs and design their classroom around those theories, it is important to note that technology is not an instructional choice anymore, but a necessity in today's classrooms. Global competition is making technological skills a requirement for the work force we are preparing our students to enter in to. This can be a hindrance to most school settings, where technology equipment is costly, training required, and implementation takes time and effort from all involved. One way that teacher's can use technology and that is inexpensive and easy to implement is through the Internet. A teacher could take a web design class or learn on their own, and learn the basics to create a webpage. The teacher can put assignments, resources, pictures, articles, and much more on the Internet for their students to use either at school or at home. As history has shown, technology instruction began in higher level

settings, beginning in the Business world, then moving downward to secondary education. Now, technology is becoming a priority in all levels, especially showing a shift to the lower grades. As quoted by Semple,

> For several decades electronic technology has made an impact on every aspect of society and culture. Computers make it possible to access huge amounts of information and to process it almost immediately. Communication over great distances can occur almost immediately. Interactive technology is now found in shopping malls, libraries, arcades, museums and living rooms. Children are used to controlling and manipulating such an environment (Semple, 2000).

When the time comes for an educator to integrate the use of technology into their classroom, many factors need to be kept in mind. Research has shown that teachers have the most impact on the quality of technology used in schools (Levin & Waldmany, 2008). Teacher willingness and commitment to integrating technology is the first must. To be more specific, teachers need to be involved in two changes. They must first learn how to use technology themselves, and second, they must fundamentally change how they teach. Once an educator has made this commitment, they must consider many aspects when choosing specific technology. To coincide with the constructivist theory, higher order thinking skills must be supported at all times. The educator must organize and support appropriate learning environments according to the student's cognitive state, from concrete to abstract. Semple states that,

> Though, how successful technology-mediated learning activities will be at facilitating higher order thinking skills will be dependent upon the approach taken to the design, delivery, selection, and utilization of appropriate and effective technologies with a support structure to maintain and sustain the learning transactions (Semple, 2000).

Once the technology is chosen for a particular constructivist classroom, and the teachers are willing to learn and commit to implementing it, the designers can begin their process. Most educators accept the constructivist view that learners approach tasks with prior knowledge and expectations based on the student's knowledge of the real world. Since that conclusion, constructivist educational technologists have been guided to create 'authentic' environments for learning; environments that correspond to the real world. When applying the constructivist theory, educational technologists should contextualize learning and 'pre-authenticate' it or make learning materials and environments that correspond with real world situations prior to the learner's interaction (Petraglia,1998). The guiding principle for many technologists concludes that "instruction should take place in rich contexts that reflect the real world and are closely related as possible to contexts in which this knowledge would subsequently be used" (Dunn, 1994).

Apprenticeship has served as the foundation for most education in the west. The relationship between apprenticeship and the constructivist theory lies in the acknowledgement that mental abilities and knowledge are deeply embedded in social contexts in which they are used, and that less experienced learners are guided through complex problem solving by more experienced peers or mentors. Apprenticeship is

linked to authentic learning in a way such as the learner-tutor understanding (Petraglia, 1998).

Educational technologists need to be able to provide goal-based scenarios that can be used as a type of learning environment. These goal-based scenarios must be "authentic" enough so that knowledge can readily be gained by the student. If the learning environment is authentic to those students, then learning will be gained and the goal will be met. Constructivists have come to understand authenticity as a precondition for learning. However, there is a problem that the constructivist theory says our experiences and authenticity cannot be predetermined. Educational technologists have responded to this dilemma and they start to construct authenticity that has more than a single dimension. Anchored instruction is authentic because it uses real facts and data. Also, it is authentic in that the tasks that individuals are asked to perform are those that could reasonably be completed if found in that situation. Anchoring instruction, creating apprenticeships, and gaining information can facilitate learning (Petraglia, 1998).

Besides setting up the learning environment based on the student's real world situations, an educational technologist must be able to implement the instructional design. Technologists must decide what the best technology would be to integrate into the classroom. They must come up with new materials, new insights, and new ways of engaging learners. The design aspect of things becomes more difficult because they need to design the materials for teachers so they can implement it in their classrooms with ease. The implementation process must be given a lot of thought and attention if the innovation is going to be successful (Smith & Ragan, 2005).

Timing is another factor that needs to be considered when implementing technology into the classroom. One should follow the 'integrated model' when deciding on the best time to implement technology. This model describes the potential to improve project quality by increasing attention to context factors which concern with implementation can provide, potential reduction of time from project inception to full implementation, and evenly distribute effort throughout the cycle (Smith & Ragan, 2005).

The developmental process of implementation involves six stages, which are awareness, interest, evaluation, trial, adoption, and integration. One must be aware of a need for innovation before anything can change. Once that is determined then interest takes place. Interest results in active information seeking about the innovation. One needs to decide if the change in innovation will bring a positive or negative outcome. After that, one does a mental trial with the new innovation and evaluates whether or not they should put effort into the innovation. Then, the trial period, which is usually done in a small group before implementing it in the classroom. This way they can decide whether this is a good idea for positive innovation. If the change is positive then the adoption process takes place. Finally, the integration process starts. Integration is the use of an innovation until it becomes routine (Smith & Ragan, 2005).

It is likely that the implementation strategies for diffusion and dissemination have more effect on the adoption and continued use of learning environments and instructional materials that the products themselves. To have a positive implementation process there needs to be encouragement throughout staff and in the classroom. The first thing educators need to understand is that implementation needs to happen. There are general

rules one must follow during the implementation process. There are many changes in the implementation process even the structure of the classroom. The principles for encouraging implementation are general rules, the adopting process, people, the instructional material, awareness, trials, and teacher/trainer training (Smith & Ragan, 2005).

The next part of the implementation process is the adoptive system. The adoptive system determines the decision-making structure, rules and instructional materials, and resources available. This system needs to be in place in order for a positive process for implementation (Smith & Ragan, 2005).

People are the next key in the implementation process. People must be willing to change and willing to accept the process that they will take. Everyone that is involved in the process of implementation will be affected, and everyone needs to be represented for and support each other. When implementing anything in to the classroom there needs to be communication and team support. Relationships need to be made and kept; a give and take approach may work with individuals as well (Smith & Ragan, 2005).

The instructional materials need to be made and need to be explained to the users. Things need to be properly labeled, and the teachers need instruction on how to use particular learning materials. It is also important that the innovation is achievable and clear, so everyone has ease with the implementation process (Smith & Ragan, 2005).

When implementing technology-based instruction, teachers need to be aware of everything before the implementation occurs. The most common error by developers is

that they begin awareness too soon, and end up implementing things when they aren't ready. This can cause confusion and tension for staff (Smith & Ragan, 2005).

Field testing must be done as the dissemination process and the design process. This process is known as trials. Those that can pick up on the implementation process faster than the average person should be involved in the field testing. This can make the trial period go by faster and possibly make it more successful (Smith & Ragan, 2005).

Teacher/trainer trainings is the last part of the implementation process. It is important to give teachers enough time to look at their materials and explain everything. Trainers need to check in with the teachers and talk to them about everything they will be receiving. There should be staff development trainings several times to check on how everyone is doing with the process (Smith & Ragan, 2005).

The constructivist theory takes a key role in integrating technology. As stated, by Berryman (1994) "one aspect of constructivism is the social collaboration that takes place. Collaboration is a key in applying constructivist principles, whether the collaboration take place between teacher and student, or student to student." The teacher provides the scaffolding and support for students to acquire the appropriate skill. Collaboration is also not limited to one physical classroom. With the World Wide Web, collaboration can occur online, where students view peers as resources for support as well. In any classroom, each student brings different skills, including computer-based skills, and unique learning styles to the learning process. Each individual can support the unique thinking and learning skills of another. Multimedia has the ability to cater to individual preferences and support what can be described as constructivist pedagogy in a

number of ways. The use of multimedia tools is entirely compatible with the open-ended, non-linear, constructivist model of learning. The technologies allow teachers and students to create interactive lessons, presentations and projects through the integration of images, graphics, text, animation, audio and motion video. Learning is enhanced by communication, resulting in new knowledge, re-organized knowledge or additional understanding, with groups of students learning how to use the tools of their culture in a collaborative learning environment.

All in all, the constructivism theory does support the integration of technology when done with the correct approach in mind. This approach is to maintain a constructivist classroom by supporting higher order thinking skills, and by making any learning connectable to the real life situations of the given students. The integration of technology is now becoming a necessity for all of those in the work force, including education. Our purpose as educators and/or support staff, is to prepare our students to be active participants in the working community. Technology is now an intricate part of that community. The key to making this integration successful, is that educators, whether in the classroom or supporting the teachers themselves, learn the technology and integrate it with commitment to students learning.

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