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ONLINE COURSE PEDAGOGY AND THE CONSTRUCTIVIST LEARNING MODEL

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ABSTRACT

The constructivist learning model applies well to the current emphasis in business schools to have more experiential learning. Students construct their own knowledge, guided by their instructors, and learn how to create and extend mental processes for solutions to problems. Another aspect of current college students is that they want to consume everything from education to music to social interaction via information technology on an “any time/any place” basis. Online course pedagogy meets the structural needs for students to consume academic coursework any time and place while also developing their analytical skills and extending their communication skills.

Keywords

Pedagogy, online learning, constructivism, learning models

INTRODUCTION

This paper presents the case for online course pedagogy to support the constructivist learning model. An online strategy for the presentation of instruction materials is a good fit for current college students and the technology they use in their daily life as well as their habits for interacting with others. The argument is not that every course should be online or that all students learn best in online courses. The argument is that online courses are effective and support both faculty/student interaction as well as student/student interaction in ways that allow students to construct knowledge and learn to formulate processes for learning new material.

Advancements in technology and the expansion of broadband to a wide audience have made online courses a practical alternative to the traditional face-to-face classroom setting. Most post-secondary institutions offer a variety of online courses as a part of their normal curriculum, giving students the opportunity to take an online course as an alternative to and completely separate from the traditional classroom setting. According to the National Center for Education Studies during the 2006-07 academic year, 66 percent of 2-year and 4-year degree-granting postsecondary institutions reported offering online, hybrid/blended online, or other distance education courses for any level or audience (U.S. Department of Education). A 2009 meta-analysis by the U.S. Department of Education (Means, Toyama, et al) found that online or blended courses produced stronger student learning outcomes (p. 18).

The term “online” has evolved over time. In this article the term “online” describes the entirety of a course. Course materials have to be delivered asynchronously via information technology. There would be little, if any, face-to-face communication between student and instructor in this definition of an online course.

With the increase in online courses has come a debate concerning the educational effectiveness of an online course at the college level compared to that of a traditional face-to-face course. Proponents of online courses argue that an online course can reach a greater number of people more easily and efficiently, particularly individuals who live far away from the university and would not be able to attend a course in the traditional classroom setting. It can be argued that online courses provide an avenue to circumvent the financial barriers (tuition, cost of moving to the city where the university is located, giving up current employment if there are time conflicts, and others) that have restricted some student access to

universities in the past. Although these arguments have merit, they are not arguments to effectiveness but to efficiency. The issue that needs to be debated first is the effectiveness of online courses.

At the core of the debate of online compared to traditional face-to-face courses is the way that each relates to the theories of learning (Leidner and Jarvenpaa, 1995). Two of these learning models, the objectivist learning model and the constructivist learning model, use very different methods to educate students. If students perceive a greater faculty/student interaction and higher effort levels in online courses at the same time they feel they are learning more in a course, then it implies the constructivist learning model is appropriate for online courses. There are other learning modules which offer methods to engage the student to be more involved in their learning. Among these additional models are the behavior, resource based, and active learning theories. The constructivist and objectivist theories will be the focus of comparison here since they represent the clearest contrast in learning theories.

THE OBJECTIVIST LEARNING MODEL

The effectiveness of the educational experience is greatly influenced by instructor/student interaction and how students learn (Leidner and Jarvenpaa, 1995; Frownfelter-Lohrke, 1998). The objectivist learning model is based on Skinner's stimulus-response theory, which states that learning is a change in behavioral disposition that can be shaped by selective reinforcement (Jonassen, 1993). The premise of the objectivist model is that the most effective way for a student to learn subject matter is to "efficiently transmit knowledge from the expert to the learner" and that "presentation is critical" (Leidner and Jarvenpaa, 1995).

When thinking of the practical application of the objectivist model of education within a university, this model very closely relates to the traditional face-to-face lecture courses at the college level. The "experts" of the objectivist model are the college professors who "transmit knowledge" to a class of students. With this style of objectivist education the instructor is in control of the learning process - determining the material to be presented and the pace of instruction. The vast majority of communication is one-way from instructor to student. Students do have the ability to directly ask questions and request that the instructor repeat information or slow down when necessary. Objectivists believe that this method of transferring knowledge is superior to constructivist models that allow the student more control of his or her learning process. I.e. the instructor is the expert in disseminating knowledge and should control the process.

The lecture method is the most frequently used instructional method in higher education (McKeachie, 1990). Why is the objectivist model so popular at the college level? It is likely that universities follow a more objective style of education because of cost efficiencies. Financial constraints force universities to limit the number of professors that they can hire, generally resulting in a higher student-to-faculty ratio. One should not assume that universities prefer objectivist learning to constructivist on an ideological basis. Objectivist teaching may be more cost effective in the classroom environment where one professor must teach large groups of students. Improved technology at a reduced price may make constructivist models of teaching more cost effective.

There has been some movement with online courses to offer them following the objectivist model. For example, an outstanding lecturer or professor in the discipline is recorded in a lecture hall setting and these 'recordings' become the backbone for additional units of the course. Many instructors of management information systems have shown or referenced Thomas Friedman's lecture on "The World is Flat" that he presented at the Massachusetts Institute of Technology (<http://ttv.mit.edu/videos/16332-the-world-is-flat-3-0>). The MIT OpenCourseWare (ocw.mit.edu) is an example of a repository containing a number of courses with video and/or audio content (ocw.mit.edu/courses/audio-video-courses).

Traditional face-to-face courses tend to have two primary means of transferring knowledge to the student: instructor lectures and textbook information. Students generally learn course material by listening and taking notes during lectures as well as by reading the textbook. Even if material is accessed via the Internet or other information technologies, if the student consumes the materials in a passive, solitary method then the materials can still be considered as "textbook" material.

THE CONSTRUCTIVIST LEARNING MODEL

The view that students construct their knowledge from individual experiences and from thinking through these experiences is called “constructivism” (Windschitl and Andre, 1998; Loyens, Rikers, and Schmidt, 2009). The constructivist model of learning opposes the objectivist idea that the best way to transmit knowledge is dissemination from expert to learner. Instead, proponents of the constructivist model of learning argue that the learner should have more control over the learning process and that individuals learn better when they discover things on their own (Leidner and Jarvenpaa, 1995). It can be argued that there are circumstances in which it would be more efficient for an instructor to simply tell an answer to the student, instead of guiding the student to find the answer on his/her own. However, constructivist proponents believe that the process of determining the correct answer for oneself, or at least formulating an idea and thinking about the question, is a very important aspect of the learning process.

Likewise Brandt (1997) observes that learners construct knowledge by making sense of experiences in terms of what is already known. Learners transfer knowledge through experiences via mental models, which are used to assimilate new information into knowledge, and thus become expanded mental models. This knowledge transfer emphasizes knowledge construction and problem solving in domains of increasing conceptual complexity.

It can be argued that the constructivist model of learning is more appropriate where students have an existing level of education. With a course that is developed to follow the constructivist model, it is necessary for the student to have a level of learning comprehension that exceeds what is necessary for an objectivist-style course. In order for the constructivist model to be effective the learner must have experience with hypothesizing and predicting, mentally manipulating objects, posing questions, researching answers, imagining, investigating, and inventing (O’Loughlin, 1992).

An objectivist-based course requires less learning ability from the student. In a lecture-style, objectivist course the role of the student is to absorb as much of the knowledge that is being transferred from the instructor as possible. The instructor is in control of the content and pace in this type of course. As a result, it appears that an objectivist-style course is the more appropriate choice in lower levels of education, when the student may not have developed the learning comprehension and tools that are necessary in a constructivist-style course. In a higher level course, such as a college course, the student has developed the ability to learn more constructively.

Building on the constructivist model is the resource view of learning. Here the model depicts a changing role for the instructor; from that of an expert dispensing knowledge to one of a resource and a guide. Rakes (1996) envisions a change from traditional learning to one based on a multitude of resources being made available to a student. Rakes supports the move to ‘resource based learning.’ He recommends increasing a student’s success through the addition of practice to shift from the traditional view of learning (cognitive and behavioral) to a resource-based view of learning. Table 1 provides a comparison of the traditional view and resource view of learning.

Traditional Learning	Resource-Based Learning
Teacher as an expert model	Teacher as a facilitator/guide
Textbook as primary source	Variety of sources/media
Facts as primary	Questions as primary
Information is packaged	Information is discovered
Emphasis on product	Emphasis on process
Assessment is quantitative	Assessment is qualitative/quantitative
Table 1: Traditional versus Resource Based Learning (Rakes, 1996)	

In essence, the years of formal education that a student has endured previous to college have taught him/her much about the learning process. It could be argued that the college student has “learned how to learn” - which is a prerequisite for constructivist learning. At the college level, students are able to take more responsibility of the learning process and are a better fit for this style of learning. Table 2 contrasts key elements of objectivism and constructivism.

	Objectivism	Constructivism
Main benefit	Cost efficient dissemination of course materials	Deeper understanding and longer retention of materials
Locus of control	Professor controls content and pace	Student centered control of content and pace although professor provides guidance
Education emphasis	Student acquisition of knowledge and facts	Student acquisition of strategies and processes to attain knowledge
Communication	Predominantly from professor to student	Emphasizes professor-student interaction
Relationship to technology	Little need for new technologies	Assimilates new technologies for communication and knowledge discovery into the education process
Table 2: Comparing Objectivism and Constructivism		

THE ADVANTAGES OF THE CONSTRUCTIVIST MODEL AT THE COLLEGE LEVEL

Individuals are thought to learn more effectively when they are forced to discover knowledge for themselves rather than when they are instructed (Leidner and Jarvenpaa, 1995; Benbunan-Fich, 2002; Hiltz and Turoff, 2002). When the constructivist model is implemented at the college level it can be advantageous to the learning process. The role of the instructor in this setting is to act as a guide in the

learning process. The instructor poses questions for the students to think about and then the instructor helps students navigate toward answers.

In this type of environment students are learning the course material and also discovering their own abilities to contemplate and to research a topic. I.e., instructing students on learning how to create knowledge. This type of education is applicable to the environment that the student will face after the university experience. In the corporate world there may not always be someone who is willing and/or able to provide the immediate answer - a teacher will not always be available to provide or acknowledge the correct answer to a problem. There may even be more than one correct answer. The student who has learned to discover knowledge for himself/herself is better prepared to come to a conclusion and the supporting process that led to the conclusion. This will provide the student an advantage any many situations. Bonwell and Eison (1991) state that students must engage in higher thinking tasks such as analysis, synthesis and evaluation, in order to better incorporate the learning into their experiences.

Another aspect of constructivist learning is that it lays the foundation for the concept of lifelong learning. Since the constructivist model of learning requires the student to be more active in and take more control over the learning process, it helps to develop the student's ability to learn on his or her own and supports the concept of lifelong learning. The student will likely be more receptive to formal learning opportunities after college courses are complete.

The cooperative (a.k.a. collaborative) model is an offspring of and closely related to the constructivist model. It seems to be particularly relevant to online courses in higher-level education. The "construction" of knowledge is expanded from the student and instructor to include construction that is achieved via student-to-student exchanges. According to the cooperative model of education, learning occurs as individuals exercise, verify, solidify, and improve their mental models through discussion and information sharing (Leidner and Jarvenpaa, 1995). The cooperative model encourages students to communicate with one another to aid in the learning process. Cooperative proponents believe that the learning process is enhanced by student-to-student communication. Business schools stress the ability to incorporate technology into management as well as ability to work in teams - the cooperative model implemented via an online course would seem to support both objectives.

Cooperativists assume that knowledge is constructed as it is shared, and the more that students interact among each other the more knowledge is constructed (Leidner and Jarvenpaa, 1995; Bruckman, 2002). This model is like the constructivist model except that it includes the cooperation of peers or classmates into the learning process. The instructor is still expected to be a guide in the learning process, but not control of the learning process as in the objectivist model. Proponents of the cooperative model believe that students are more creative and think more critically when they work with a group of peers. This may occur because students are being (formally and/or informally) evaluated by their peers as well as their instructor as they are working together on a problem.

Although the advantages to the constructivist and collaborative models are many, there are also disadvantages when implementing these types of educational environments. When the course material being covered is fact-based or procedure oriented, it is often more efficient for the instructor to simply tell the student the answer than for the student to spend a lot of time doing research only to come to the same conclusion. However, it has been shown that when a student reaches an answer for himself/herself, he/she is more likely to retain that knowledge for a longer period of time (Leidner and Jarvenpaa, 1995).

There are also issues to resolve when implementing these types of courses within the constraints of the traditional classroom setting. Many universities have too many students and too few faculty members to practically implement these types of constructivist models. There could be too many conversations going on within a classroom for one instructor to adequately guide each group through the process of discovering the answer to a problem. Constructivist courses are practical when the professor has no more students in a course than he/she can effectively guide during the class period. Due to time and budget constraints at many universities, it may not be practical to hire more professors or to ask professors to

teach a greater number of courses, but the fact remains that it would be beneficial to the educational process for many courses to follow the constructivist model.

The technology of the Internet today may help to provide at least a partial solution to this problem. Online courses can be modeled after constructivism. Internet technology may allow constructivist and cooperativist models to make their way into the educational process at institutions of higher learning.

ONLINE COURSES PROMOTE CONSTRUCTIVIST LEARNING

Online courses have a number of characteristics that are different from those of traditional, face-to-face classroom courses. The obvious difference is the ability to access course material from outside the classroom via the Internet. Students are able to access course material at a time of their convenience. This type of any-time/any-place access allows students in an online course more control over the pace of learning, a necessity for constructivist education (Palocsay and Stevens, 2008).

One issue that affects online courses to a greater extent than traditional courses is the rapid pace of technological change. A potential problem with online courses could be students spending too much time trying to learn how to use the technology required to access the course instead of concentrating on the actual course material. This issue reflects the need for online courses to be designed considering the ease-of-use of the required technology (Leidner and Jarvenpaa, 1995).

Another negative issue associated with online courses is the increased effort required by professors to create an online course. It has been shown online courses have a higher level of student initiated communication, which often requires the professor to take a great deal more time to respond to student questions (Arbaugh and Rau, 2007). This increase in faculty to student communication may make professors reluctant to implement online courses.

Huang (2002) recognizes the need for instructional materials to support the constructivist theories and states that builders of online courses need to use some special techniques and perceptions to lead to success. Huang continues that adults have special needs and requirements as learners compared with children and adolescents in which 'self-exploration' is important.

Feedback is a component of learning that is supported by the constructivist model. Gagne, Briggs and Wager (1992) propose nine elements that should be present in any lesson in order for learning to occur. These nine elements form a framework where each element leads to the next, higher level element. They are:

- Gaining attention (“reception”)
- Informing learners of the objective (“expectancy”)
- Stimulating recall of prior learning (“retrieval”)
- Presenting the stimulus (“selective perception”)
- Providing learning guidance (“semantic encoding”)
- Eliciting performance (“responding”)
- Providing feedback (“reinforcement”)
- Assessing performance (“retrieval”)
- Enhancing retention and transfer (“generalization”)

Of the nine “conditions for learning” that Gagne et al. (1992) provide, other research shows that eliciting performance (“responding”) and practice from the student as well as providing adequate feedback (“reinforcement”) are the events most directly connected to student success (Martin, Klein & Sullivan,

2007). Finally, Yadin and Or-Bach (2010) discuss the continuing need for self-assessment and individual learning.

Promoters of the constructivist model of education agree that the increased amount of student control in an online course is a great advantage. However, it could be argued that this increase in student control has a negative effect on education. When students are given more control of the educational process, could student motivation become more of a factor?

LESSONS LEARNED

It is helpful to view online courses from three perspectives when considering whether or not to change a course you are teaching from the traditional face-to-face approach to online. Those perspectives are course organization, the use of information technology, and the true cost of course delivery. It is important to note that the influence of each of these perspectives changes over time. Information technology yields to Moore's Law and the price of computer processing drops quickly. Budgets, especially for public universities, can quickly decrease or increase and impact the purchase of technology and the necessary support personnel for online courses. Professors should reexamine the importance of each perspective as circumstances change.

Organization

Organizing an online course is a larger task than simply the organization of your course - your university already has standards. Three common university aspects of organization are security, unauthorized access to copyrighted materials, and a common "shell" for online courses hosted by the university. Universities frequently provide guidance and help in the form of mentors and/or graduate student and staff assistance in moving materials to a format amenable for online courses. Best practices at the university may be shared in workshops and handouts. More importantly, students will be more comfortable accessing your online course materials if they are organized in the same format as other online courses at your university.

The Quality Matters organization (www.qmprogram.org) "is a faculty-centered, peer review process that is designed to certify the quality of online and blended courses." Even if you do not choose to have your course peer evaluated you will find rubrics for course development for higher education courses. The rubric for course standards 2011-2013 provide eight categories of course organization broken down into subareas with weightings assigned to each. The web site also provides information on research, conferences, materials, and other support for a novice or veteran developer of online courses.

Security of students' academic records and personal information is a legal requirement that universities take seriously. We are long past the era of leaving graded assignments in a box by the professor's door for students to pick up at their convenience. The ability of hackers to quickly access digital records of many students increases the danger. Beyond the legal ramifications, it is an embarrassment to the professor and to the university when student records are not kept secure.

The online course should be developed before the course begins. Preparation is more than a syllabus or the outline of projects. A full set of lectures, detailed projects and solutions, readings, and other materials should be ready before the course begins. The instructor should anticipate how students will solve the assignments. Is collaboration allowed? If so, is there a university approved process for the interaction such as a blog or a site for blogs limited to team members?

An early start allows time for assembling copyrighted materials that would fall under the "fair use" doctrine. University libraries can assist with the collections of copyrighted materials and assuring that they fall under "fair use" terms. Holders of copyrights, especially publishers of popular management cases, have become more active in searching for and prosecuting universities where copyrighted materials are improperly made available to students. The definition of "fair use" is interpreted differently on a

regular basis so it benefits the instructor to visit the U.S. Copyright Office web site (www.copyright.gov) and the university library before making copyrighted materials available to students.

As the popularity of platforms for education has increased, such as Blackboard (www.blackboard.com), universities have begun to enter into blanket contracts for the inclusion of all courses taught at the university. You may have such a contract at your school and not realize the partnership exists. There are two benefits for using the university's chosen platform; students are likely to already be familiar with its use and also such platforms typically handle both traditional face-to-face courses as well as online courses.

Use of Information Technology

Consider using the students' preferred information technology when communicating administrative information to your class. 77% of people 18 to 24 have a fear of being without a cell phone (Netburn, 2012). A newscast quoting a Pearson Foundation survey (Quinn, 2012) said that 25% of college students already have an iPad or Android tablet and 50% of surveyed students say they expect to purchase one in the next six months. Applications exist so that you can push text messages to cell phones and iPads/tablets from your computer or iPad/tablet and not from your cell phone.

Email will never die, but it needs help. Universities may require email as the official method of digital correspondence with students because it conforms to university security policies already in place. However, consider sending short text messages to your online course students that indicate they should check their email for a message from you with a specific subject title.

Embrace the advantages of "cloud" resources. This frees you from dependence on a specific technology for delivering course materials. It also means the course resources can be accessed by you and by students over a variety of technologies. You may not always be at a computer or have a tablet with you, but very frequently you will have a smart phone with access to the technology required for accessing course materials.

Do not overlook the importance of lectures for a completely online course. In every course some materials are most effectively provided in a faculty-to-student lecture. Inexpensive software exists for the capture of audio and the images appearing on your computer screen to be replayed later as a podcast or as streaming video. In the simplest form, you can use this to augment PowerPoint slides in a lecture. It can be very valuable when the instructor needs to provide an example of a complex idea to students. Complex spreadsheet formulas or programming examples can be demonstrated, explained, shown again with common mistakes, and reworked showing how the mistakes should be corrected. Since students can view and review these podcasts/video streams multiple times the students are in control of their learning pace. More importantly, students can construct their knowledge and learn ways to solve future problems.

True Cost of Course Delivery

The complexity of providing a high quality educational experience online can be underestimated by those who have not personally participated in developing such a course. In a sense, the arrival of online courses has been as traumatic to the process of college education as the arrival of textbooks for courses. We can imagine that when textbooks began to be used in college there must have been people saying they could now cut the cost of education since professors were no longer needed in the classroom because the textbook contained the necessary materials. It was written by persons of stature in the field – arguably more qualified than the average professor at the front of the classroom.

Such naïve conclusions do not account for the industry that lies in the background to support the textbook. The process moves from identifying authors that have both academic stature as well as a talent for written communication to the production of the book in quantities matching anticipated sales. Marketing, acquisition of copyright agreements, creating of artwork in the text, and a host of other tasks are required. There is a large industry of information technology that is the infrastructure on which online courses rely.

Most importantly, a high quality educational experience requires an instructor to guide students through the complexities of materials in the text. Helping students learn to apply text materials to new problems and examples beyond the textbook allows students to create their own knowledge. Many instructors of online courses report their faculty-to-student communication is much greater in online courses than traditional face-to-face courses. The technology of faculty-to-student communication is a key component to effective online courses.

Supporting online courses requires technology in the form of computer servers, networks, audio and video resources, and other areas. But even more important are the professionals working behind the scenes to support the technology and constantly maintain the technology so that course materials can be accessed by new versions of software and new types of information technology. The cost of support personnel may not be apparent to those who believe online courses will be a cheap way to deliver college courses. One thing we know from Moore's Law is that whatever technology we use today will be outmoded much quicker than we wish. The cost of technology support and adaptation to new technology is often ignored when the cost of online courses is discussed.

CONCLUSION

The constructivist model of learning provides students more control over the educational process and a hands-on style of learning. The increasing focus on experiential learning, internships, faculty who include students in research, and other participative learning opportunities just highlights the shift towards constructivism in universities. Giving students more control of the learning process allows students to discover information themselves. Self-discovery has been shown to increase the student's perceived retention of course material. This style of education better prepares the student for situations that will be encountered outside of the university, where there will not be a professor to guide him/her through a problem.

Providing online course materials via technology that students already incorporate into their daily lives allows students more access to course materials. Students miss class for a variety of reasons. Even in class they can become distracted and miss material that is presented. An online course with asynchronous materials that engage the student allows student access to materials as many times as they need in order to comprehend the materials. Materials can be accessed when the student is better prepared for study as opposed to an arbitrary time when the professor and other students can meet in a specific classroom.

Online courses provide several advantages over traditional courses at the college level when designed and implemented effectively. Online courses promote the constructivist model of education and encourage more individualized student communication which is advantageous in the learning process. With proper design, online courses can be more cost effective than traditional courses with comparable or accelerated levels of learning.

Students interact with their world via smart phones and tablets. They operate on the assumption that resources they need, whether communicating with friends or purchasing car insurance, can be found on demand via the Internet. They will learn more and be more engaged in their education when course materials are available the same way they consume other resources.

Information technology facilitates the constructivist model of learning. Students have more control of the learning process as a result of being able to access course material on their own and a greater propensity to directly contact the instructor. This is important in the constructivist model of learning. Communication has been shown to increase and be more effective in an online course. The elevated level of communication is important for successful constructivist-style education.

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