

Investigating Student Learning in a Constructivist Multimedia-Rich Learning Environment

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Abstract

It has been suggested in the existing literature that the use of constructivist approaches in the educational setting contributes to active learning and knowledge transfer for students. This paper provides an overview of constructivist approaches used in a graduate-level instructional media production course at a mid-western comprehensive university. Qualitative data collection techniques were used to investigate the perceptions and learning of students in an environment in which both students and content were the center of the learning experience. The findings suggest the use of active learning approaches, in which students have the opportunity to interact with peers and the instructor, discussion and reflection on learning experiences, and encouragement of knowledge sharing, contribute to student learning.

Introduction

Constructivism has gained acceptance and, today, is highly valued by many educators. Constructivism is an educational theory about how knowledge is acquired and how individuals learn (Brooks & Brooks, 1993). Constructivism is about thinking and understanding. Grounded in this theory is that individuals obtain knowledge by creating constructs and by interpreting and reflecting on their experiences (Jonassen, Peck, & Wilson, 1998). Only constructs, which can be a schema or a concept, can be stored when we process information.

Central to this idea are self-regulation, active learning, individual differences, social learning, and reflection (Gagnon & Collay, 2001; Jonassen, Peck, & Wilson, 1998). Individuals learn by investigating, discovering, and creating structures; actively attaching meaning to a concept; and integrating new or modified constructs into existing knowledge. According to Novak (1998), meaningful learning involves “thinking, feeling, and acting” (p. 9). Because knowledge construction is different for individuals, learning has many varieties. For a constructivist the absolute truth cannot be verified.

Constructivists do not argue that constructivist approaches lead to learning and others do not. However, Stahl (2003) points out that everyone is a constructivist because we are constructing knowledge at every conscious moment. Constructivists share the opinion that students have been passive receivers of knowledge for too long. Teachers have given too many lectures and transmitted their knowledge to students by acting as *Sage on the Stage*. Teachers have traditionally been viewed as experts, God-like individuals who are not to be questioned. Because of their status, they are located on the top of a power structure which places students on the bottom level. Students are thought of as empty vessels not capable of thinking for themselves. They study instructional material by memorizing facts but, shortly thereafter, forget what they have learned. The transfer that should take place from theory to practice does not occur. Instead of using the transmission approach (Berge, 2001), in which students receive knowledge in a top-down delivery system from teachers, constructivists argue students should be actively involved in their learning so that they are able to apply what they have learned.

Learning should be fun and not dreaded as mindless activity where students end up reciting facts they stored in short-term memory. Teachers should ask how they can provide students with environments in which teachers can facilitate student learning so that students (a) can “discover, create, and apply knowledge for themselves”, (b) “push themselves”, and (c) “truly understand what they learn” (Marlowe & Page, 1998, p. 5). According to Marlowe and Page, components that need revision include terminology, communication between involved parties, learning activities, learning environments, student motivation, and student assessment.

Perceived Barriers

Instructors who desire to use constructivist approaches or have used them in their classrooms face barriers from administration, peers, and students. Administrators are concerned that the integration of constructivist approaches takes too much time. Learner-centered activities such as discussions or group work take more time than lectures. Because of accreditation requirements instructors must cover content instead of

using up time with student-centered approaches.

The roles of instructors and learners shift in the constructivist environment. Instructors become mentors, coaches, and facilitators. It requires teachers to modify existing materials and activities. Some may oppose constructivist approaches because they feel this process is too difficult and time consuming. In addition, they might not be thrilled to share control because constructivists typically surrender some control to their students. Instructors who see themselves as the experts in the field may feel threatened if students start questioning them about content or facts.

Student roles also change. The learner now becomes responsible for his or her own learning. Many students have been trained to comply with course requirements and have not been taught to think for themselves. Teachers who would like to implement constructivist approaches may find that students resist this change.

The Study

The purpose of this study was to determine how students would perceive constructivist approaches in the classroom and their own learning. The researcher was particularly interested in (a) how easily students would adapt to the approaches, (b) approaches perceived as useful by students, and (c) approaches that were not effective.

Methodology

Setting

The study was undertaken at a public comprehensive university with approximately 16,000 students in the mid-west. The course offered during spring 2003 was a graduate level, computer-based authoring course for individuals who majored in information media. Students in the human resources development and training track were required to complete the course successfully; others could choose the course as an elective. The instruction took place in a classroom-based environment, but was enhanced with a Web-based course management system and other Web tools such as html files, e-mail, and so forth.

The classroom in which the course was held was located in a state-of-the art facility and was equipped with 31 personal computers, projector, and a VCR. Instructors and students in this classroom had a variety of software programs available to them including, but not limited to, Adobe Photoshop; Inspiration; Macromedia Dreamweaver, Fireworks, and Flash MX; Microsoft Office, Visio, and FrontPage; and Click2Learn ToolBook Instructor. The facility also housed several open computer laboratories allowing students access to printers, scanners, digital cameras, and laptop computers.

Participants

Nine students were enrolled in the instructional media production course. Some of the students attended the university on a full-time basis; others were part-time students. Fifty percent of students were employed full-time in the education or training industry, others were employed on a part-time basis. Students in this group varied greatly on distribution of age, progress made in their program and, subsequently, varied greatly on existing computer and authoring skills. However, all students in the course had successfully completed an instructional design course, a prerequisite for the course.

Course Introduction

At the beginning of the course, learners were introduced to course materials and course requirements. The instructor made it clear that the course was not simply owned by her. Students were asked to consider the course to be “their” course because they had a vested interest and were given voting rights. For example, the course syllabus included a sentence informing participants that late assignments would not be accepted. The instructor explained why this stipulation was in the syllabus but gave students an option to vote on the issue, and students voted for flexible due dates. During the first class session, students introduced themselves and took pictures of one another with a digital camera. These pictures were later placed on the course Web site.

Course Material Description

Course information. The instructor designed a course Web site that included a syllabus, schedule, assignments, and resources. Contact information for all participants was also listed on the site. The instructor supplemented the classroom-based course with WebCT, a Web-based course management system. A link to the course Web site was provided there, as well as some course content materials such as PowerPoint presentations

for the first few chapters discussed in class, help notes for special topics, and a syllabus. Other WebCT tools utilized were communication and evaluation tools. The instructor composed six threaded discussion messages to which students replied. Everyone in the course utilized the e-mail function. Students were also able to submit their assignments through WebCT and view their grades and feedback provided by the instructor.

Materials and tools. Students used a variety of software programs which included Macromedia Dreamweaver, Fireworks, and Flash; the CourseBuilder extension for Dreamweaver; Microsoft PowerPoint, Word, and Visio. The two textbooks required for the course were a multimedia development text and a Dreamweaver MX self-study text. In addition, the instructor provided several software-based books in class. Other chapters from instructional design, instructional technology, and test theory were assigned, as well as several current articles pertaining to Web-based and computer-based education and training.

Assignments and requirements. Students completed two types of assignments: mandatory or optional assignments. Mandatory assignments included (a) a Web site on which other assignments were posted, (b) a computer-authored instructional product for a client, (c) a flowchart and storyboards, (d) a formative peer evaluation, (e) a group presentation, (f) and class participation. Students were also able to use some of the class time for working on their projects.

The completion of mandatory assignments made up 80% of the student's grade. Students were able to choose from the following optional assignments: (a) two annotated bibliographies, (b) an image editing project, (c) a Flash MX project, (d) a research paper, and (e) a final examination.

Jonassen (2000) emphasizes the importance of "grounded educational practices" in the learner-centered environment (p. 11). Instructions for assignments, however, were kept to a minimum. For writing assignments, the instructor purposely did not include any parameters such as paper length, research topics, and so forth. The instructor requested students to submit a proposal outlining the purpose, questions students sought to explore, and a table of contents in order to provide guidance and feedback to the students who selected these assignments. Specifications for the production of authoring projects were also limited because the instructor did not want to limit the creativity of students. During the course of the semester, group members were required to share their work in progress with the class. The instructor provided feedback to the groups at various stages, particularly once they completed the flowchart and storyboards. In order to provide students with additional guidance grading rubrics were posted on the Web for all assignments.

Activities. Out-of-class activities included generation of final exam questions, posting to threaded discussions in WebCT, reading assigned chapters and articles, locating resources for writing assignments, group work related to the client project, and taking the final examination. In-class activities included small group and whole class discussions pertaining to assigned readings, threaded discussions, and writing assignments. Students discussed work in progress and shared experiences. They presented completed assignments to the entire class, asked questions of one another, and provided viewpoints and feedback to their peers. Some class time was set aside to work on all elements of the client project.

Instruction. Lectures were kept at a minimum. During the first four weeks, the Dreamweaver sessions were structured like hands-on training session. Students worked through chapters covering basic skills with the instructor. The instructor demonstrated tasks while learners repeated the exercises on their computers. One-on-one assistance was available from the instructor and a graduate assistant. Fireworks and Flash sessions were less structured demonstrations because these assignments were optional. Assigned readings were discussed in either two groups or with the entire class. Students were encouraged to ask questions, share their experiences, express their viewpoints, differentiate concepts, and critique any writings. Only when students could not answer questions raised during the discussions did the instructor provide guidance by clarifying points and concepts.

Method

The instructor and a graduate assistant observed students during the class sessions. The instructor initiated discussions regarding the assignments and tools used. The students were asked to complete a 3-minute evaluation form after each class session to provide feedback to the instructor. The instructor encouraged students to contact her with any questions relating to the course and provided professional and personal contact information on the syllabus. In addition, students had the opportunity to contact a graduate assistant who was available during class and by appointment. The graduate assistant kept the instructor abreast of students who sought his assistance.

In addition, students were asked to provide feedback about the course during a short interview session. Participants were informed that the short session was not a course or instructor evaluation and that the purpose of the interview was not to gather positive feedback. Rather, the interviewer was interested in ascertaining strategies and activities that helped the student learn. The question was: What activities have helped you learn

the materials in this course? After students responded to this question, they were asked to complete a questionnaire with a listing of specific course elements and strategies. Individuals indicated which elements were or were not helpful and identified the five most helpful activities.

Results

In-Class Observation

Students voiced confusion during several class sessions. They were not accustomed to having decision-making abilities pertaining to course structure such as deadlines, time management, and assignment parameters. The limited information about assignments particularly confused students even though online grading rubrics were provided on the course Web site. The graduate assistant who observed the same behavior on several occasions confirmed this perception.

Students at first did not actively take responsibility or ownership for their work. For example, they did not ask questions about the first annotation and did not follow instructions on the Web site. When feedback about this optional assignment was provided by the instructor, several students were surprised by the instructor's expectations. Before that class session began, the instructor posted an example on the Web to provide additional guidance.

In one instance, students inquired about the required length of the research paper. The instructor in turn asked them how long they thought the paper should be. Students turned to each other in disbelief. It appeared they were out of their comfort zone regarding this experience. A discussion followed, and participants decided approximately ten pages were appropriate. The instructor indicated any length was acceptable for as long as they met all requirements listed in the grading rubric.

Another element students were not used to was that they could select some optional assignments and decide which topics they would like to explore. Several times during class sessions students said that they were used to being told what to do. As the semester progressed students became less confused and took responsibility for their own learning; it appeared that they enjoyed working on their assignments. Not surprisingly, students selected different combinations of assignments, chose a wide variety of topics, and used several different tools. For example, tools used by students in designing their Flowcharts were Word, Visio, or PowerPoint; each group used a different tool.

The instructor was perplexed that students were confused. She expected students would access the assignment information on the Web. Surprisingly, not all students accessed this information. The instructor needed to refer them to the Web site on several occasions when questions pertaining to assignments, grading, and scheduling were raised.

Another concern was if students were actually learning or not. Without the use of quizzes and tests, the instructor was not certain if students were learning in the beginning of the course. However, a few weeks into the semester students conveyed content knowledge and understanding during discussions. They demonstrated that they mastered new skills when they submitted completed assignments. Students actively participated in class. They were asking many questions, shared their experiences and viewpoints, and assisted one another during class sessions.

Occasionally, flexible deadlines caused scheduling problems. Discussions about threaded discussions and show & tells needed to be postponed several times due to not everyone having completed the assignment on the proposed deadline. The instructor needed to be flexible and adjusted the schedule accordingly. Flexibility was also required in regard to the use of class time. At times, students were so engaged in discussions that other activities needed to be either eliminated or rescheduled. This structured chaos in the classroom was responsible for some excellent sessions in which information was truly shared and knowledge individually constructed.

One other concern was the rating of course evaluations. The instructor was untenured and held a probationary position. Because the introduction of change can produce a level of dissatisfaction, the instructor was concerned about the possibility of receiving unfavorable ratings. Administration takes course evaluations seriously at this university and results are used in the renewal, promotion, and tenure decisions. This concern was one of the reasons why students were asked to complete a 3-minute evaluation at the end of each session. When students expressed concern about a particular class session, the instructor was able to address the issue in the beginning of the next class session. In addition, the short evaluation form provided the instructor with valuable feedback, which was used to make changes throughout the semester.

Interview Responses

When asked what helped students learn, seven of them reported the hands-on activities were helpful to them because they "learned by doing." The same number of students pointed out the in-class discussions helped

them learn. Interview participants clarified the interaction was good and they appreciated discussions about chapters in the Multimedia textbooks. One student indicated the class discussions “pulled it all together”. These students also enjoyed listening to others’ viewpoints and found it helpful to hear what other groups working on the client project were going through.

Six participants mentioned that the group work on the project helped them in their learning process. Students mentioned the perspectives of other group members were particularly helpful, and they were able to balance the workload between group members. Five students considered the workshop-style Dreamweaver sessions held during the first few weeks in the semester helpful. Two students each mentioned that the following elements were advantageous to them learning in the course: (a) the Web project, (b) Multimedia textbook, (c) assistance of the graduate assistant, (d) threaded discussions, (e) annotations, (f) assigned articles, (g) class schedule, and (h) feedback. Even though students were not asked which elements were not helpful in their learning in the interview, four of them shared some of these elements with the interviewer. They were the course management system, the Flash demonstration, the Dreamweaver textbook, and threaded discussions.

Survey Responses

Activities considered helpful. All participants indicated the following course activities had been helpful in their learning: (a) in-class discussions in small groups and as a whole, (b) showing and viewing completed assignments, (c) completing a research paper draft, (d) designing a personal Web page, and (e) working on all parts of the client project (proposal, outline, flowchart, storyboards, and the product itself), (f) providing and receiving feedback during a formative evaluation, and (g) presenting the final group project to the class. In addition, all students agreed (a) flexible due dates, (b) online grading rubrics, (c) the freedom to select topics for assignments, (d) resources such as example forms posted online, and (e) instructor feedback helped them learn.

Activities with the highest ratings. Students assigned the highest ratings to the following course elements: (1) Web project, (2) hands-on activities, (3) group work, (4) instructor feedback, (5) group discussion, (6) multimedia textbook, (7) selecting assignments, (8) client proposal, and (9) client project.

Activities not considered helpful. One activity not considered helpful by the majority of the students (more than 50%) was reading assigned chapters in the Dreamweaver textbook. A large percentage of students (44.4%) did not consider the threaded discussions helpful, and 33.3% did not consider the image manipulation project with Fireworks, the final examination, and “our” course attitude as valuable in their learning process.

Discussion and Implications

The introduction of constructivist approaches in a classroom with learners who are not accustomed to taking responsibility for critical thinking and learning is difficult. The instructor must truly believe in this theory in order to continue this effort because of the barriers encountered by various constituencies. Instructors must be flexible to accommodate progress, or lack thereof, with course content and requirements.

Many students have been taught to comply with what their instructors tell them without questioning the experts. Critical thinking and reflection can be learned, however. If they have not learned these skills by the time they arrive in our classrooms, we should strive to teach them these skills, because they will need them once they graduate with their college degrees.

It is not surprising to find students reported hands-on activities and discussions, may they be group discussions or exchanges during which they share their viewpoints, were helpful in their learning. Placing content and learners in the center of the learning experience by engaging students in the learning process, giving them the opportunity to take ownership of ideas and products, and providing them with a learning environment in which expression and reflection, enables them to form constructs.

Feedback is critical in student learning. Feedback from not only the instructors but also from peers is imperative in the learning process. Learning does not occur in a vacuum; it is truly a social process. Our students are not empty vessels when they arrive on campus. They have acquired knowledge elsewhere and had prior life and professional experiences they can share with others. Instructors should provide students with the opportunity to revise projects and learn from mistakes in order to facilitate improvement. Good writers do not write by themselves - professionals use a peer-review process. It is also advantageous for students to build good team working and communication skills. Many projects in the business industry are designed and produced by a team of individuals utilizing the expertise of its members.

Conclusion

The researcher hypothesized some of the course activities would be more helpful to learners than

others. In fact, the researcher expected that certain activities would be clearly identified by all students. Indeed, some of the activities that were expected to be rated highly by students in being helpful in their learning process were identified as such. However, there were a wide variety of activities that received high ratings. These results indicate instructors should design a wide variety of activities and assignments in order to support student learning. Because not all students learn the same way, we need to take individual differences and learning styles into account. This approach, however, is more labor intensive for the instructor.

Another hypothesis was that the “our” course attitude would be a successful approach in the course. The instructor expected this approach would set the stage for a relaxed and supportive learning environment. Students did not report that this approach was considered helpful in their learning. One student wrote on the survey, “Graduate students have learned to do what they are told to do so this part is difficult to get used to.” Perhaps students in this course were not quite prepared to encounter this type of learning environment.

Prepared or not, we should provide students with a safe, supportive environment because some already experience a high level of stress while they attend universities. Fear of failure and lack of control and power is the reality of many students in higher education settings. We should create teachable moments by creating supportive environments in which we can assist learners in creating constructs and internalizing them with the goal to increase retention and transferability so that students can maximize application.

Readers must be careful in generalizing findings in this study to other populations. The study involved a small sample of graduate students at one comprehensive university in the mid west. There is a need for replication of the study with other populations and a larger sample size.

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