

Implementing Constructivist Web-Based Learning and Determining its Effectiveness on a Teacher Preparation Course

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Abstract

This paper describes the design of an online course to reflect a constructivist approach to teaching and learning, and how students are able to identify the constructivist elements of the course. Key to this study is to determine how effectively the student participants believe the course prepares them to become K-8 teachers, and which elements of the course are most beneficial and which are not. Ninety-four percent of the students who took the course over two semesters were able to identify at least four of the constructivist elements of the course. Furthermore, 100% of the student participants found the course to be effective. The data stem from pre- and post-questionnaires and instructor course evaluations.

Introduction

Teacher education programs play an important role in our society because they serve the public interest. One of the primary responsibilities of teacher education programs is to produce effective classroom teachers. Pedagogical research has demonstrated that constructivism can help teachers become successful in the classroom (Emmer & Gerwels, 2002; Vaughan, 2002; Deeds & Allen, 2000; Carlin & Ciaccio, 1997). Therefore, it is in the best interest of preservice teachers that they become familiar with a constructivist philosophy of teaching and learning. *Constructivism* is an approach to teaching and learning that acknowledges that information can be conveyed but understanding is dependent upon the learner.

The need for adopting a constructivist approach to Web-based learning is not new. Researchers have been advocating the need for applying constructivism to online learning for over a decade (Bostock, S. J., 1998; Richardson, 1997; Yang, 1996; Spiro, Jacobson, & Coulson, 1995; Jonassen, 1994). In general, a constructivist approach to learning focuses on the development of problem solving and thinking skills (Eisner, 2004; Fosnot, 1996). Additionally, constructivism emphasizes the learner's ability to solve real-life problems and practical problems (Richardson, 2003; Caine et al., 2002). Implementing a constructivist approach to learning requires that students be exposed to complex activities, such as engaging and reflecting, annotating, questioning, answering, pacing, elaborating, discussing, inquiring, problem solving, linking, constructing, analyzing, evaluating, and synthesizing (Oberlander & Talbert-Johnson, 2004; Gueldenzoph, 2003; Berge, 1999).

This paper describes how a constructivist Web-based course was designed and how students at the completion of the semester were able to identify the constructivist elements of the course. Three research questions were used to design the online course:

1. How can constructivism be built into the design and delivery of an online course?
2. Will the students be able to identify the constructivist elements of the course at the completion of the semester?
3. How effective do students believe the course prepares them to become K-8 teachers?

Background

In the year 2003, the author was asked by the director of the Alternative Certification Program and the Chair of the Teacher Education Department to transform a face-to-face teacher preparation course into an online course. The initial reaction was reluctance, for three reasons.

1. The course requires a large amount of group work which online students might face significant hurdles to complete successfully.
2. The thought of students working online from different cities throughout the state made her feel uncomfortable as a teacher educator because it seemed such an impersonal way for students to learn.
3. A concern that an online course could not be taught constructively.

In essence, there was concern that teaching on line would come with a price, namely, the sacrifice of philosophical beliefs regarding how students learn, and the need to model a constructivist approach to teaching and learning to preservice teachers. However, despite these reservations, the author began reading about online instruction, and within two months began designing an online format of the face-to-face teacher preparation course.

Developing the Online Course

The design of the course took one full year to complete. After reading an extensive amount of the literature, adoption preference was for Egbert and Thomas's (2001) condensation of Dick and Carey's nine components listed in their model for instructional design (1985). In short, Egbert and Thomas have distilled the Dick and Carey model into three stages: Design, Development, and Evaluation/Revision.

Sample

The student participants taking this online course are enrolled in the Alternative Certification Program, are post-baccalaureate, and have earned undergraduate degrees in disciplines outside the field of education. The course is Curriculum Development and Design (K-8) and serves as an introduction to contemporary conceptions of curriculum and instruction as related to teaching in elementary and middle schools. Also, the course content includes instruction on constructivism,

national standards, classroom management, authentic learning and assessment, cooperative learning, and state testing initiatives. In short, this course aims to prepare preservice teachers for entering the classroom, and to help them pass the Texas Examinations of Educator Standards (TExES) (Texas State Board of Education, 2002).

The data collected in this qualitative study stem over two course semesters. The course was first taught in the fall of 2004 and later in the summer of 2005. This online course is rotated with the face-to-face format of the course. The fall class consisted of 15 students, while the summer class was composed of 25 students. The total number of students from both semesters was 40.

Design

At first, the instructional goals were identified, an instructional analysis completed, and characteristics of the learners was determined as suggested by Egbert and Thomas. Colleagues were asked to help with the instructional analysis and to gather data from the Alternative Certification Program to determine the needs and characteristics of the students who would be enrolled in the course.

Embedded into the design of the course is the requirement that all students during the first week of instruction must complete a Course Introduction Questionnaire in which they are asked to provide:

1. A definition of constructivist learning,
2. Information regarding any previous work experience with children,
3. What they would like to learn in this course,
4. If they have taken online courses before, and
5. Describe any concerns they might have regarding working online (see Figure 1).

Figure 1: Course (Introduction) Pre-Questionnaire

1. Please provide a definition of constructivist learning.
 2. Have you worked with children at any age level in the past? If so, please provide some background information regarding your involvement with children? (This may include the providing of religious instruction).
 3. What would you like to learn in this course? Please be as specific as possible.
 4. Have you taken online courses in the past? If so, please list these courses and provide a brief description of each.
 5. Do you have any concerns about working online? If so, please describe.
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At the end of the course, students are given a post-questionnaire to determine if there has been a change regarding the criteria specified in numbers (1) (3) and (5). Numbers (2) and (4) are omitted from the post-questionnaire (see Figure 2). Also, students are asked to list and describe on the post-questionnaire the factors that were instrumental in bringing about a change, if any.

Figure 2: Post-Questionnaire

1. Please provide a definition of constructivist learning. If your definition has changed from the first definition you provided on the Course Introduction Questionnaire please list and describe the reasons for this change?
 2. Do you believe that you learned the content that you wanted from this course? Please explain.
 3. Do you still have the same concerns about working online as you did at the beginning of the course? If yes, please describe. If no, please tell me what helped to diminish your anxieties regarding these concerns?
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Development

Constructivism is an approach to teaching and learning that acknowledges that information can be conveyed but understanding is dependent upon the learner. In short, learners develop their own understanding of the topics they study instead of having it delivered by others. Since constructivism places the learner in the center of the learning process, the course curriculum was developed to give students a hands-on approach to learning. Simply stated, students would be

learning by doing. The major project students do in the course is to design an interdisciplinary thematic unit. This assignment requires group work consisting of three or four students. Each student selects a grade level (K-8) to design a thematic unit and then emails his/her choice to the instructor. Students are encouraged to select grade levels in which they are currently teaching via emergency permits or grade levels that they hope to teach in the future so that the unit will have a practical use. Once the students have sent their preferred grade levels to the instructor, they are grouped with other students who have selected the same grade level. If a student selects a grade level in which no other students have expressed an interest, the student is asked to select a grade level higher or lower in order to be able to work with fellow classmates. Then the instructor assigns the groups and gives out the email addresses to the students in the group so that they can contact their group members. Students have online access to the email addresses of all class members.

To facilitate the students' learning, a steady stream of online discussions via the Discussion Board helped develop a positive instructor/student relationship designed to enable students to feel comfortable about asking questions regardless of the simplicity or complexity of the question.

There are eight lessons in the course: Intellectual Development of Children, Constructivism, Integrating Curriculum, Cooperative Learning, Classroom Management, Assessment, Concept Mapping and Curriculum Mapping, and the Texas Assessment of Knowledge and Skills (TAKS). Lessons and activities have been designed to help the students gain knowledge in each of these topics. Each lesson is divided into four sections: Instructions and Assignments, Thematic Unit Preparation, Lecture Notes, and TExES practice questions.

The goals and objectives of each lesson are learner-centered. Content delivery is sequential and linked in that each lesson builds upon the previous one. University colleagues were asked to read the lessons to provide important feedback. All instructions for completing assignments are succinctly stated. Also, lecture notes are provided to supplement textbook and online readings. Some of the lessons require students to observe children in classrooms, take notes and share their observations via the Discussion Board. Students must teach two of the lessons that they have

designed for their thematic units to actual children in school classrooms or daycare centers. The preservice teachers are asked to describe how they believe the lesson went (i.e., what worked well and what did not). In addition, students are emailed a teaching assessment form that is given to the teacher/director in charge of the classroom or daycare center to complete and send back to the instructor (see Figure 3).

Figure 3: Teaching/Director Assessment Form

Delivery of the Lesson:

1. Describe how the lesson went as a whole.
2. Did the teacher follow the lesson plan?
3. Was the preservice teacher well-prepared for teaching the lesson by having all the necessary resources and materials needed to teach the lesson?
4. Did the teacher state the objectives of the lesson to the children?
5. What instructional strategies did the preservice teacher implement with the children (i.e. cooperative learning, choral reading, concept mapping, etc.)?
6. Describe the classroom management strategies implemented by the preservice teacher.

Student Engagement:

1. Were the students engaged in the lesson? If so, please describe the students' behavior.
2. Were all students given opportunities to respond to questions and participate in the activities?
3. Were the students given opportunities to select the type of topics they wanted to study? (If applicable)

Assessment:

1. What type of assessment(s) of student work did the preservice teacher implement?
 2. At the end of the lesson, did the teacher ask the children what they learned from the lesson? Did he/she validate the students' comments?
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In every lesson there is some activity or assignment that helps the students work toward completing the thematic unit. For example, once students have been assigned to a group, each group has 14 days to determine the topic of their thematic unit and then design a concept map to submit to the instructor for evaluation via email or the Digital Drop Box. Students are encouraged to post their concept maps on the Discussion Board for their colleagues to view and to provide feedback. Early in the semester, an announcement is sent advising students to issue their comments in a positive and constructive manner.

Establishing dialogue between the groups is essential for helping students feel that they belong to a close-knit class even though they may be working hundreds of miles away. The Discussion

Board plays an integral part in the course. In the beginning, the instructor presents a question or comment for students to respond to; however, as students become more comfortable with the online course, they present the questions and topics for discussion. Students are encouraged to add new threads to the discussion if they choose.

Handouts describing and listing all the requirements of the thematic unit are provided at a link site entitled "Important Handouts." To help students with understanding what a thematic unit is, a link was developed so that students could view a sample unit. One of the major requirements is that all lessons in the unit must be original and not photocopied or downloaded from the Internet. Students must design their lessons according to the criteria specified on a checklist handout (see Figure 4, page 15 and 16). All students can view this checklist at any time by simply clicking on the designated link. The instructor uses this same checklist to evaluate the thematic units. Also, students have been given technical access to conduct their group work activities via discussion board, email, and file exchange. The students have the entire semester to work on their units.

In order to ensure that all students are contributing to the thematic unit, each student must evaluate his/her performance and that of each group member via a rubric in which 1 is the lowest and 5 is the highest (see Figure 5, page 17). This tool has been helpful in reducing the number of complaints from students who claim that particular members of the group are not completing their share of the work. Moreover, the use of rubrics reflects authentic assessment which is an integral part of constructivist teaching.

[Evaluation/Revision](#)

The goals for this course are for students to recognize the constructivist elements of the content and its design; and to evaluate the effectiveness of the course. The assessment tools used to determine student success at identifying the constructivist elements consist of the author's pre- and post-questionnaires and the instructor's end of course evaluation. The end of course evaluation requires students to explain how effective they believe the course was in preparing them to become K-8 teachers; and which elements of the course were most beneficial and which were not (Figure 6).

Figure 6: Instructor's End of Course Evaluation

1. Do you believe that TED 5319 follows a constructivist approach to teaching and learning? If yes, please list the constructivist elements of the course and describe how each is embedded into the instructional design of the course? If no, please state why.
 2. Please explain how effective you believe this course is in preparing K-8 classroom teachers. What elements of the course were beneficial to you?
 3. What elements of the course were not beneficial to you?
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Course revisions are based on student comments. In order for students to feel comfortable in evaluating the course without any fear that their grades may be adversely affected by comments they make on their evaluations, students are asked to email or send via regular mail their evaluations to the instructor after they have received their course grades. Unlike students in a face-to-face format of the course who are asked to submit anonymous evaluations placed lying on the back table as they exit the classroom, online students do not have that same luxury of anonymity. They are encouraged to send their course evaluations to the instructor after the course is officially over.

Results

Although this online course has been taught for only two semesters, the results are promising. Of the 40 students taking this course, 35 sent in their final course evaluations reflecting an 87% response rate. The data reveal that all 35 students believed that the course is grounded in constructivism. Also, 94% of the 35 students were able to identify at least four of the constructivist elements of the course. The four elements identified *most* often were:

1. Designing an interdisciplinary thematic unit,
2. Applying knowledge learned from the course to teaching children in actual classrooms,
3. Increasing their understanding of the course content by participating in discussions via the Discussion Board, and
4. The use of rubrics to assess each group member's participation and performance.

Comments on the pre-questionnaire from both semesters establish that some students had no knowledge of constructivism, while others had some familiarity with the concept. At the beginning of the semester, one student wrote,

“I have to admit that I have no idea what constructivist learning is.” However, at the end of the semester this same student wrote “Constructivist learning is when children are actively involved in learning experiences. They build their own knowledge. They interact with their environment or community in which new experiences are connected with past experiences.”

Regarding how effective the course was to preparing them to become K-8 teachers, 100% of the students found the course to be effective. As one student wrote on the course evaluation form;

“I have definitely been introduced to the interesting field of teaching. Coming from a business background, this course gave me a step towards my career in teaching. To begin with, the mere knowledge of how children are different, and how they each learn differently was an interesting aspect. . .

The thematic unit was the most interesting activity. By following and identifying the required Texas Essential Knowledge and Skills, I learned that lesson plans are not the nightmare that I once thought they could be. It was a GREAT and FUN experience taking this course. I felt this course introduced me to areas which will assist me in my future career. I’m ready for the TExES exam.”

Moreover, 35 of the students stated that the content they learned most effectively in the course was designing good lesson plans, learning about classroom management, and studying different instructional strategies. As one student wrote on the post- questionnaire:

“The course has opened my eyes and given me ideas for my classroom. The importance of classroom management, the importance of well-designed and well thought out lesson plans, different learning techniques, etc. is all useful information

to help in the teaching profession. The thematic unit is a great practice tool along with the other assignments that make you think. This assignment (thematic unit), for example, makes you dig deeper for answers. Once you think about it and reflect on your answers, you feel good knowing that you understand. Constructivist learning is great. . .”

The summer course, however, was problematic for one student. She stated that time was a negative factor to her online experience because her group had only eight weeks to complete the thematic unit while students who took the course in the fall had more time to complete their projects. As she wrote:

“I enjoyed talking on the Discussion Board, and I thoroughly enjoyed working in groups. I have to be honest with you though, this class was extremely fast-paced because I took it in the summer. I might have had more time to enjoy it even more and learn more had I taken it in the fall or spring.”

Implementing a constructivist approach to designing an online teacher preparation course is doable. Giving students a Course Introduction Questionnaire to determine their knowledge of constructivism and their levels of experience working on line helped the author gain important background knowledge about her students. She was able to assess their strengths and weaknesses. Moreover, adopting and weaving constructivism into the course design afforded students the opportunities to construct their own knowledge by using their different cognitive abilities to learn and interact with peers, teachers, and children. In addition, the interdisciplinary thematic unit allowed students to capitalize on their interests, working styles, and learning styles. Each group selected the topic for the thematic unit and negotiated the roles and assignments that each member would perform. Also, giving students opportunities to evaluate each other and themselves via a rubric is a key example of authentic assessment which falls under the constructivist approach to teaching and learning.

Conclusion

Initially, the author had strong misgivings about teaching online, but soon realized that teaching a Web-based course via the Internet is an effective medium for preparing preservice teachers to enter the classroom. A direct result of this experience is the belief that online instruction is not an impersonal way to learn. The experience of teaching on line has illuminated that instructors can come to know their online students as well as they do their face-to-face students. More importantly, however, being able to maintain a constructivist approach to teaching and learning has made the author's online teaching experience a positive one.

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Figure 4: Thematic Unit Checklist

Requirements	Yes	No
1. Planning approach or concept map; web	_____	_____
2. Narrative reflects on the planning process	_____	_____
3. Grade level or age level is clearly identified	_____	_____
4. Rationale	_____	_____
5. Project duration of the unit is indicated	_____	_____
6. Central theme of the unit is clearly identified	_____	_____
7. Unit outline or overview accurately describes the unit	_____	_____
8. List of goals	_____	_____
9. Instructional objectives are congruent with the goals	_____	_____
10. Instructional activities will help meet the objectives	_____	_____
11. Instructional activities are appropriate to the grade level	_____	_____
12. Procedures are clearly spelled out for all lessons	_____	_____
13. Lesson introductions provide bridging and focus	_____	_____
14. Lesson closures provide reinforcement and synthesis	_____	_____
15. Lesson activities provide for different learning styles	_____	_____
16. Assessment strategies are appropriate and sufficient	_____	_____
17. Lesson plans are written in a consistent, proper format (photocopied lessons from guides or teacher manuals are not accepted) font size must be the same size and style of print must be the same	_____	_____
18. At least 2 content areas are included in each lesson	_____	_____
19. The introductory lesson/activity introduces the topic, assesses prior knowledge, and arouses student interest	_____	_____
20. The culminating lesson/activity will synthesize what has been learned and bring together "loose ends."	_____	_____
21. Supplemental materials are sufficient and appropriate	_____	_____
---letter to parents		---possible field trip(s)
---list of resource speakers		---plans for 1 bulletin board
---plans for 1 learning center		---annotated list of 5 internet sites
---annotated list of 10 trade books		---technology project (may be one of the lessons)

A brief description of each requirement follows:

1. The title page includes topic/theme title, names of the preservice teachers, grade level, and projected duration of unit.
 2. A rationale offers a justification for why children need to learn the content contained in the unit.
 3. A table of contents demonstrates a chronological arrangement of the unit, headings, and page numbers.
 4. A web or concept map is used to help generate, organize, and make connections between ideas in the unit.
 5. A clearly written list of goals and objectives for the unit that are age or grade appropriate provide the framework of the lesson plans.
 6. A narrative of the planning process allows students to reflect on how they worked on the project. They state what worked well for the group and what did not.
 7. Five lesson plans are written to cover a five day period. Each lesson integrates at least two content areas. Each of the content areas must be represented at least once in the unit.
 8. The resource packet includes: a letter to parents about a field trip; list of resource speakers; a letter to parents explaining the thematic unit; plans for one bulletin board; plans for one learning center; a technology project, an annotated list of at least four Internet sites appropriate to the unit; and an annotated list of at least eight trade books appropriate to the unit.
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Figure 5: Student Rubric for Group Evaluation

Please evaluate yourself and the members of your group according to the following criteria. Rate yourselves 1 to 5 with 1 being the lowest and 5 being highest. Email this evaluation form to the instructor.

Name _____

- _____ responded to email messages promptly
- _____ responded via the Discussion Board
- _____ completed work according to set deadlines issued by the group
- _____ worked cooperatively with group members
- _____ was easy to contact

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