Abstract
This article describes an online computer in education course that is designed to make learning an enjoyable virtual experience while developing critical thinking and working collaboratively with other students in the course. Both quantitative and qualitative data of students’ evaluation of the course were collected and analyzed. Based on the findings, implications for the design of online courses, as well as for the teaching and learning of computers in education are provided.

Key Words
Constructivism, Sociocultural Theory, Collaborative Learning, Computer Education

1. Introduction

The Internet has impacted the way we learn. More and more courses offered by institutions of higher education are delivered via the Internet. A survey by the U.S. Department of Education’s National Center for Education Statistics (NCES) found Web-based distance education to be the most widespread mode of distance delivery [1]. At least 58 percent of institutions which offered distance education used Web-based courses, compared to 54 percent that used two-way interactive video and 47 percent which used one-way pre-recorded video.

According to Eduventures, Inc., a leading independent research and consultancy firm that specializes in corporate, postsecondary and Pre K-12 learning markets, currently there are more than 350,000 students enrolled in completely online degree granting programs generating $1.75 billion in tuition revenues for institutions in 2001/2002 [2]. Eduventures, Inc. estimates that the distance learning market for fully online degree programs is increasing at an annual rate of 45 percent. Because online distance education is a fast-growing area, it is imperative that we gain a better understanding of this mode of distance education delivery.
3. Theoretical Framework

Bednar, Cunningham, Duffy, and Perry [4] argue that the use of instructional strategies and tools should be supported by some learning theory and cognition. The design and development of the ETEC 442 online course is based primarily on constructivism and sociocultural theory.

Jonassen, Davidson, Collins, Campbell and Haag [5] contend that learning can be best facilitated by designing and implementing constructivist tools and learning environments that promote social negotiation of meaning and dialogue among learners. Consequently, they suggest four constructivist attributes for building learning systems: (a) context, (b) construction, (c) collaboration, and (d) conversation. Context refers to the “real world” setting in which learners perform tasks that are as closely related to the real world as possible. Different “real world” features that might be replicated in a learning environment include the physical, organizational, cultural, social, and political issues that are relevant to the application of the knowledge being learned. According to Jonassen et al. (1995), construction of knowledge is the “result of an active process of articulation and reflection within a context.” Learning can be best facilitated when learners can create linkages between their own experience and learning materials and make sense of them. Constructivist learning environments allow learners or groups of learners to create meaning from what they experience rather than “learning” the teacher’s understanding of that experience or content. Collaboration among learners help them to develop, test and evaluate their ideas with each other. Learners are able to develop new and modify their own understanding of an experience or content by the sharing of the multiple perspectives of their peers. Seaton [6] argues that collaboration should be the focus of constructivist distance learning activities. Conversation is vital to collaboration. Learners need to converse with each other to plan, collaborate and create meaning together. This is critical for distance learning since communication is facilitated predominantly through online exchanges.

According to Cobb [7], the process of knowledge construction is strongly influenced by sociocultural factors. Learners do not construct knowledge in a vacuum. Sociocultural theory emphasizes the social context of learning where knowledge is “negotiated by members of a community of practice, the classroom should be organized to guide student learning toward membership in a learning community” [8]. Additionally, sociocultural theory highlights situated learning in which students solve problems that have real-world applications [9].

This paper contends that both constructivism and sociocultural theory overlaps in 3 general areas: (a) construction of knowledge (b) social interaction, and (c) collaboration. All emphasize that knowledge construction through interaction and collaboration in a social context can contribute to successful learning experience.

4. Course Design & Strategies

Learning is context-dependent and acquired through experience and involvement in real-world situations [10]. Students in ETEC 442 learn in the context in which they will ultimately use the knowledge and skill rather than in the abstract, context-less environment typical of the traditional classroom.

The ETEC 442 course provides a broad overview of the application of computers in education covering a range of topics including: troubleshooting, creating a technology plan, Windows and Mac operating systems, desktop publishing, managing information and numbers, technology integration, standards and assessment, hypermedia and Internet in education, electronic portfolios, ethics, equity and copyright. Four major course projects were designed to provide product based outcomes for the knowledge and skills being covered. The projects provided an authentic context which teachers would likely encounter in school. The initial project required learners to work in collaborative teams to produce a technology plan for their classroom. Teams needed to socially negotiate knowledge and skills in desktop publishing and Internet research to accomplish this project. The remaining projects, electronic gradebook, technology integrated lesson plan, and electronic portfolio, were independent work that relied on active manipulation of software tools such as spreadsheets and Powerpoint to accomplish their tasks. The use of other technologies such as digital cameras, scanners, and printers were also embedded in the project design.

Resources for knowledge- and skill-building were available through textbook and online readings and multimedia instruction on a CD-ROM. Course assignments were designed to scaffold the higher levels of skill leading to the construction of the final product. Reflections online allowed for the articulation of personal learning and at the same time distributed meaningful discoveries throughout the learning community.

The first step in building a community of learners in ETEC 442 was achieved through a face-to-face orientation session where students were required to attend a 3-hour workshop on online learning which included hands-on training on navigating and using the different collaborative tools in WebCT such as e-mail, asynchronous discussion board and synchronous chat. In addition, the first online session (Cybersession #1) was designed to acquaint students with WebCT as well with each other. Students were required to work through online WebCT tutorials and complete a DropBox assignment using a self-instructional module. In Cybersession #1,
students got to know each other and build rapport through an online icebreaker activity which require them to visit each other’s student homepages and to post in the discussion board.

In ETEC 442, collaborative learning is engaged learning in which collaborative team members work on activities to help them develop shared meaning-making. Emphasis is placed on team members communicating with each other. Students learn to plan, manage and develop social skills in their teams, which ultimately the workplace will demand. Collaboration helps students learn to clarify and verbalize experiences and content they encounter in the course. The diverse backgrounds of the students force them to become aware of multiple perspectives. The work students do in their teams focuses and reinforce course content.

When students work in groups, learning becomes a social process mediated through discussion, clarification, argument, and persuasion. Together the members of the group build a shared understanding or solution through active negotiation. Collaborative learning processes help students achieve deeper levels of knowledge generation through the creation of shared goals, shared exploration, and a shared process of meaning-making.

In ETEC 442, students collaborate on one group project. To facilitate this group project, private discussion group areas were created for groups to communicate. Students could also use the chat function to collaborate. To establish a culture of peer participation, students were required to post draft versions of sections of other individual assignments for critique by classmates, thus students help each other refine their assignments. In addition, opportunities for social interaction were provided through a social discussion forum (“ETEC 442 Coffee Shop”) and, a “Course-related Q & A” discussion forum.

5. Results & Implications

ETEC 442 online was piloted in Fall 2002. A total of 16 students registered for the online course. At the beginning of the course, students completed an online pre-course evaluation to establish the students’ prerequisite computer skill as well as knowledge of computers in education. Of the 16 students who registered, 12 completed the online course. At the end of the course, students were asked to complete an online course evaluation survey consisting of 39 Likert-scale type and 5 open-ended questions. Survey items and means that are relevant to this discussion are summarized in Table 1.

<table>
<thead>
<tr>
<th>Survey Item</th>
<th>Mean*</th>
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<tbody>
<tr>
<td>The WebCT Discussion section was effective in furthering my understanding of the ETEC 442 course content.</td>
<td>4.40</td>
</tr>
<tr>
<td>Working with my group enhanced my knowledge of designing a technology plan for my classroom</td>
<td>4.20</td>
</tr>
<tr>
<td>The use of WebCT’s synchronous “live” chat facilitated group collaboration.</td>
<td>3.00</td>
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<tr>
<td>The instructor was easily accessible throughout the duration of this course</td>
<td>4.50</td>
</tr>
<tr>
<td>The instructor has been helpful whenever I have encountered difficulties</td>
<td>4.40</td>
</tr>
<tr>
<td>The instructor provided timely feedback</td>
<td>3.30</td>
</tr>
<tr>
<td>I am more knowledgeable now about using PowerPoint than at the beginning of this course</td>
<td>4.90</td>
</tr>
<tr>
<td>I am more knowledgeable now about using electronic spreadsheets than at the beginning of this course</td>
<td>4.30</td>
</tr>
<tr>
<td>I am able to apply my knowledge of desktop publishing to my work with students</td>
<td>4.50</td>
</tr>
<tr>
<td>I am able to apply my knowledge of electronic portfolio to my work or school</td>
<td>4.50</td>
</tr>
<tr>
<td>I am more knowledgeable now about designing lesson plans for technology integration than at the beginning of this course</td>
<td>4.00</td>
</tr>
<tr>
<td>The knowledge and skills that I learned were appropriate for my needs</td>
<td>4.40</td>
</tr>
<tr>
<td>I am satisfied with what I learned from this course</td>
<td>4.30</td>
</tr>
<tr>
<td>I would recommend this course to others</td>
<td>4.40</td>
</tr>
</tbody>
</table>

Table 1: Mean of course survey items.

*5 = strongly agree; 4 = agree; 3 = neither agree nor disagree; 2 = somewhat disagree; 1 = strongly disagree

Analyses of the survey results revealed several trends that have implications for the design of online courses, as well as for the teaching and learning of computer systems and their application to instruction and administration.

Generally, the ETEC 442 online course was effective in stimulating small-group discussion and supporting peer learning. The students found the asynchronous WebCT discussion forum effective in furthering their understanding of course content. The instructor observed students using the private discussion forum most frequently during the course to communicate and collaborate on their assignments with their classmates. The other tool that the students used frequently to communicate and collaborate was another asynchronous tool, email. Students did not use the chat function as much as email and the discussion forum as the synchronous nature of the chat function required them to “meet” in real-time.

While the students found the instructor easily accessible and helpful throughout the course, they found the lack of timely feedback on their discussion postings and assignment submissions to be a weakness of the course.
Timely feedback from instructors is very important in online courses. In their study on students’ frustration with online courses, Hara and Kling found a lack of immediate feedback from the instructor and ambiguous instructions to be main causes of students’ frustration [11].

Students found the major course projects, which were designed to provide product based outcomes for the knowledge and skills being covered as well as to provide authentic contexts that teachers would likely encounter in school, to be appropriate to their learning needs. Some students’ comments included:

“The course presents various ways teachers can use technology to help with tasks for the classroom.”

“This course provided many opportunities to practice using different software programs to produce products that could be useful in a classroom or as a professional educator.”

“Because the assignments were really hands-on type learning, it really allowed us to grasp the concepts being covered.”

Overall, the students responded positively to the course. Many students found the ETEC 442 online course to be a positive learning experience because the asynchronous nature of the course allowed students to work on the course from anywhere and at any time. Some students’ responses to the open-ended question about the major strength of this online course included:

“Being able to work at your pace and time.”

“Working on your own time!”

“I was able to go at my own pace and skim through things that I already know.”

6. Conclusion

The findings of this study have several implications for the design of online courses as well as for the teaching and learning of computers in education. When developing online courses, instructors should: 1) incorporate collaborative and cooperative learning activities to promote critical thinking and peer learning; 2) provide online students with timely feedback; 3) design course projects that provide authentic context and product based outcomes for the knowledge and skills being covered; and 4) design for asynchronous interactions instead of synchronous interactions for the convenience of the students.

References:


