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FRESHMAN LEVEL MATHEMATICS COURSES ONLINE: THE PERCEPTIONS OF COLLEGE STUDENTS

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Advances in technology have led to an increase in educational opportunities in the online environment. Mayur, Hart, and Richards (2008) suggest “The Web will definitely play a major role as education and training grows and develops. The growth and access to the Internet has taken non-traditional education to a new level with the vast availability of Web-based courses in higher education” (p. 333). Online curriculum and distance education course offerings are not confined to a particular space or time as is the case with traditional classroom courses (Daugherty & Funke, 1998). The virtual learning environment allows learning to occur at any time and in any place as long as the Internet is available. The most obvious advantage to online learning is the convenience of being able to access course materials and complete coursework at any time, day or night. According to a study by Daugherty & Funke (1998) several students reported that the convenience of online instruction accommodates nontraditional students who may work and/or have family responsibilities. While the convenience of online learning is attractive it is also imperative for students to realize the differences in course taught online and courses taught in a traditional classroom environment as well as understand what those differences entail. The synchronous communication and interaction with faculty and other students that typically occurs in a traditional classroom setting is compromised in the online environment. Swartz (1997) suggests that students in online courses can have feelings of isolation as a result of the physical separation between the instructor and student (as cited in Daugherty & Funke, 1998). Further, according to Daugherty & Funke (1998), interaction with faculty and other students in the class was a factor in student satisfaction in the online course.

Another distinction between an online course and a traditional classroom course is the necessity for online students to be self-motivated, independent learners. “In many instances, to be successful in these online courses, learners will need to rely on their individual abilities of

directing their learning and navigating through assignments and deadlines” (Hodges, 2005, p. 376). Often students registering for online courses fail to see these requirements and decide on online courses based exclusively on convenience factors (Tesone & Ricci, 2008). Sieber (2005) asserts, “It is widely agreed that many immature learners lack the life experience, self-directedness and persistence, as well as the writing skills and analytical ability, required for successful online learning” (p. 331).

The purpose of this investigation was to examine the perspectives and experiences of college students in online mathematics courses. Students from freshman level mathematics courses taught online during the Fall 2011 and Spring 2012 semesters were asked to complete a survey regarding several aspects of technology, mathematics, and distance learning. This survey was developed in an effort to improve the quality of my online mathematics courses and bridge the gap between the expectations and perceptions of faculty and those of the online student. The survey includes questions such as the advantages and disadvantages of taking an online mathematics course as well as questions concerning students’ mathematics and computer skills, access to a computer and the Internet, use of online and campus resources, and attitude toward technology. This paper presents the findings of the survey as well as implications for improving the quality of online mathematics courses.

Method

Participants

The participants were university students enrolled in one of two online mathematics courses, Intermediate Algebra or Finite Mathematics, during the Fall 2011 and/or Spring 2012 semesters. Since the participants were all students in my online courses this sample would be a sample of convenience. According to Merriam (1998) convenience sampling is simply a sample

that is convenient in regards to factors such as time, money, location, and availability of participants.

Of the 135 students enrolled in these courses there were a total of twenty-seven students who completed the survey. Of the twenty-seven participants, six were male and twenty-one were female. One student identified as Asian or Asian American, three identified as Black or African American, and twenty-three identified as White. One student was under the age of 20, twelve were age 20-25, four were age 26-29, eight were age 30-39, and two were age 40-49.

Setting

Jacksonville State University is a public four-year university located in rural northeast Alabama and has an enrollment of approximately 9,500 students. According to the Fall 2011 enrollment data approximately 59% of students are female and 41% are male, 65% are White 28% are Black/African American and less than 1% of students identified themselves as belonging to any other ethnicity. In addition, approximately 3,700 students are Distance Education students.

The courses selected for participation in this project were freshman level mathematics courses that are taught entirely online. The curriculum for each course was presented online using Blackboard which is an online course management system implemented in the Mathematical, Computing, and Information Sciences Department at Jacksonville State University. Assessments were a combination of paper-pencil exams that were proctored and online quizzes that did not require proctoring.

Procedure

University students enrolled in Intermediate Algebra or Finite Mathematics online during the Fall 2011 and Spring 2012 semesters were asked to complete a structured online survey

about their experiences in and perceptions of their online mathematics course. The survey was posted in Blackboard. The same survey was administered in each course. The survey was anonymous and was completed after students' final grades were submitted. Students were not given credit nor penalized based on their completion of the survey.

The survey questions included multiple choice questions as well as open-ended questions. The multiple choice responses were tabulated and summarized and the open-ended responses were analyzed using an inductive approach to identify themes or categories and their contextual meanings.

Survey

The survey questions included multiple choice questions as well as open-ended questions. The survey included questions such as the advantages and disadvantages of taking an online mathematics course as well as questions concerning students' mathematics and computer skills, access to a computer and the Internet, use of online and campus resources, and attitude toward technology. The survey also included basic demographic questions.

The survey information posted in Blackboard informed students that the purpose of the survey was to learn about students in the class and gain insight into their perspectives of the online math course. They were also informed the survey was developed in an effort to improve the quality of my online math courses and their name as well as any other identifying information would be kept confidential and would not be used in any report regarding the survey results. The following table, Table 1, lists the fifteen survey questions students were asked to complete.

Table 1 Student Survey

Question 1	Are you: a. Female b. Male
Question 2	Ethnicity: a. American Indian or Alaskan Native b. Asian or Asian American c. Black or African American d. Hispanic e. White f. Other
Question 3	What is your age? a. 17-19 b. 20-22 c. 23-25 d. 26-29 e. 30-39 f. 40-49 g. 50+
Question 4	Which of the following best describes you? a. I only take courses offered online. b. I take courses offered online and traditional classroom courses taught on campus.
Question 5	Which of the following best describes you? a. I have my own personal computer with Internet access. b. I share a computer with Internet access with family members or roommates. c. I do not have a computer at home with Internet access.
Question 6	Did you check the Blackboard System Requirements to ensure the computer you were using for this class had the necessary components? a. Yes b. No
Question 7	Which of the following best describes you? a. I keep up with the latest advances in technology and am always eager to learn about new software, tools, etc. b. I keep up with advances in technology such as new software, tools, etc as it relates to or becomes necessary for my job or school. c. I generally know the basics and use new software, tools, etc when it is a must.
Question 8	Which of the following do you own?

	<p>Note: you may select more than one.</p> <ul style="list-style-type: none"> a. Laptop computer b. iPad c. tablet other than iPad d. iPhone e. smartphone other than iPhone
Question 9	<p>Which of the following best describes you?</p> <ul style="list-style-type: none"> a. Math courses are typically easy for me. b. Math courses are typically not very easy or very difficult for me. c. Math courses are typically difficult for me.
Question 10	<p>Which of the following best describes you?</p> <ul style="list-style-type: none"> a. I usually make an A or B in math courses. b. I usually make a C in math courses. c. I usually make a D or F in math courses.
Question 11	<p>When taking this course did you use campus resources such as the Academic Center for Excellence or either of the Math Tutoring Centers for assistance?</p> <ul style="list-style-type: none"> a. Yes b. I had access to campus but I did not use those resources. c. I did not use those resources because I did not have access to campus.
Question 12	<p>When taking this course did you use online resources such as online tutoring, online videos, homework forums, etc?</p> <ul style="list-style-type: none"> a. Yes b. No
Question 13	<p>In terms of difficulty, how would you describe the online math course versus a traditional math course taught in the classroom?</p> <ul style="list-style-type: none"> a. The online course was easier. b. The online course was more difficult. c. They are about the same.
Question 14	<p>What are the advantages of taking an online math course? (open-ended)</p>
Question 15	<p>What are the disadvantages of taking an online math course? (open-ended)</p>

Data Analysis

Survey Results and Analysis

There were a total of twenty-seven students who completed the survey. Of the twenty-seven participants, six were male and twenty-one were female. One student identified as Asian

or Asian American, three identified as Black or African American, and twenty-three identified as White. One student was under the age of 20, twelve were age 20-25, four were age 26-29, eight were age 30-39, and two were age 40-49. The following table, Table 2, summarizes the results of questions four through seven and questions nine through thirteen.

Table 2 Student Survey Summary Results: Questions 4-7 and 9-13

Question 4	Which of the following best describes you? a. I only take courses offered online. b. I take courses offered online and traditional classroom courses taught on campus.	a. 15% b. 85%
Question 5	Which of the following best describes you? a. I have my own personal computer with Internet access. b. I share a computer with Internet access with family members or roommates. c. I do not have a computer at home with Internet access.	a. 81% b. 15% c. 4%
Question 6	Did you check the Blackboard System Requirements to ensure the computer you were using for this class had the necessary components? a. Yes b. No	a. 85% b. 15%
Question 7	Which of the following best describes you? a. I keep up with the latest advances in technology and am always eager to learn about new software, tools, etc. b. I keep up with advances in technology such as new software, tools, etc as it relates to or becomes necessary for my job or school. c. I generally know the basics and use new software, tools, etc when it is a must.	a. 33% b. 48% c. 19%
Question 9	Which of the following best describes you? a. Math courses are typically easy for me. b. Math courses are typically not very easy or very difficult for me. c. Math courses are typically difficult for me. * Did not answer	a. 11% b. 41% c. 44% * 4%
Question 10	Which of the following best describes you? a. I usually make an A or B in math courses. b. I usually make a C in math courses. c. I usually make a D or F in math courses.	a. 59% b. 26% c. 15%

Question 11	When taking this course did you use campus resources such as the Academic Center for Excellence or either of the Math Tutoring Centers for assistance? a. Yes b. I had access to campus but I did not use those resources. c. I did not use those resources because I did not have access to campus.	a. 26% b. 63% c. 11%
Question 12	When taking this course did you use online resources such as online tutoring, online videos, homework forums, etc? a. Yes b. No	a. 67% b. 33%
Question 13	In terms of difficulty, how would you describe the online math course versus a traditional math course taught in the classroom? a. The online course was easier. b. The online course was more difficult. c. They are about the same.	a. 11% b. 52% c. 37%

In trying to gain insight into the students' experience and usage of technology I included questions in the survey concerning their enrollment in online courses and traditional classroom courses (Question 4), their access to a computer and the Internet (Question 5), and their computer skills and attitude toward technology (Questions 6, 7, 8 and 12). Eighty-five percent of the students said they take courses offered online and traditional classroom courses taught on campus and 15% only take courses offered online. Ninety-six percent of students have either their own computer or share a computer with Internet access. Thirty-three percent said they keep up with the latest advances in technology and are always eager to learn about new software, tools, etc., 48% said they keep up with advances in technology such as new software, tools, etc as it relates to or becomes necessary for their job or school and 19% said they generally know the basics and use new software, tools, etc when it is a must.

Question 8 was a multiple answer question in which students were asked, "Which of the following do you own? Note: you may select more than one." The answer choices were: a.

Laptop computer, b. iPad, c. tablet other than iPad, d. iPhone, and e. smartphone other than iPhone. Overall 25 students own a laptop, 15 own an iPhone or other smartphone, and 9 own an iPad or other tablet. Only one student selected all five devices and one student selected four of the devices including: laptop, iPad, iPhone, and smartphone other than iPhone. Eleven students own only a laptop, 7 own a laptop and an iPhone or other smartphone, 3 students own a laptop, iPad or other tablet, and an iPhone or other smartphone. There were two students who own a laptop and iPad or other tablet, one student who owns an iPhone only and one who owns a tablet other than an iPad only.

With 93% of students owning a laptop computer and 81% indicating they keep up with the latest advances in technology and are eager to learn about new software, tools, etc or keep up with advances in technology as it becomes necessary for school or work only 67% of students said they use online resources such as online tutoring, online videos, homework forums, etc when taking their online math course. Further, of those students who said they keep up with the latest advances in technology and are eager to learn about new software, tools, etc only 44% said they used online resources such as online tutoring, online videos, homework forums, etc when taking their online math course.

Questions 9 and 10 asked students to describe their math skills. And, 11% of students said math courses are typically easy for me, 41% said math courses are typically not very easy or very difficult for me, and 44% said math courses are typically difficult for me. There was one student who did not answer this question. Also, 59% of students said they usually make an A or B in math courses, 26% said they usually make a C in math courses, and 15% said they usually make a D or F in math courses. The final grades for those who completed the survey were: 37% made an A or B, 33% made a C, and 30% made a D or F.

Question 14 was an open-ended question that asked students, “What are the advantages of taking an online math course?” The majority, 67%, of student responses pertained to the convenience of online courses. Many of these students replied, being able to “work at my own pace” and several students added being able to work on the course material at times that fit into their schedules. Participant 27 stated, “I have three boys under the age of six and therefore my schedule can be pretty hectic. Online courses are great for me because I can do homework or complete test after I have put them in bed for the night or early in the morning, during my "free time." The convenience. Being able to work on my time schedule.” Similarly, Participant 21 replied, “Easier to schedule around other activities such as work and school and being able to do the work at any hour.”

Three student replies referenced being able to move through the curriculum at their pace as an advantage because if they understood a particular concept they did not have to sit in a classroom and listen to faculty assist students who had trouble mastering that same concept. For example, the response from Participant 7, “I was able to work at my own pace following a reasonable schedule, which is always an advantage. It can be painful to spend a lot of time in a classroom covering a concept you have already mastered...” Similarly, Participant 3 stated, “You don't have to go to class and listen to people who don't know 2+2 ask questions.”

Some of the other responses referred to the convenience of accessing course materials at any time and one student stated, “I don't feel as much pressure when completing the homework assignments.” Another student stated, “Nothing!” and two referenced not having to drive to campus. There was also one student who did not answer this question.

Question 15 was an open-ended question that asked students, “What are the disadvantages of taking an online math course?” A majority, 74%, of responses referred to an

aspect they considered typical in a traditional classroom environment yet they felt is compromised or missing in the online class environment. The three major themes that emerged were: lack of support by the way of asking questions, self teaching, and the absence of in-class lectures or presentations. Participant 11, stated “No teacher to help with problems you encounter. No hand on help” and Participant 14 wrote, “Can't ask questions!! I also did not know until this survey there was even a math tutoring area at the campus, is it free?” Participant 26 felt it was a disadvantage “Having to look up or find the answers to problems I didn't understand, instead of being able to ask the professor right then and getting an explanation.” Two other responses that pertained to not being able to ask questions were “Not having someone to ask questions” and “If I did have a question, it was harder to comprehend online.”

Those participants who mentioned self teaching and/or classroom lectures wrote statements such as, “Not hearing the lecture in class” and “The disadvantages are that you are not getting that in-class instruction from the professor and you are trying to teach yourself.” Similarly, Participants 4 and 10 wrote, “Not being in class means that I essentially teach myself. I failed to do this the first time around, but I passed this semester” and “Disadvantages are not actually seeing the teacher lecture. You are basically teaching yourself how to work the problems...” Finally, Participant 8 mentioned all three of these themes writing, “I don't like not being in contact with the teacher on a regular basis and I also didn't like not having each lesson explained in class and questions immediately answered when you need them.”

Of those participants who cited lack of support by the way of asking questions, self teaching, and/or the absence of in-class lectures or presentations as a disadvantage of taking an online class 70% had access to campus but did not use the campus resources such as the Academic Center for Excellence or either of the Math Tutoring Centers for assistance. Only

25% of those participants used those campus resources while one student did not have access to campus in order to use those resources. Also, 67% of those participants who cited factors of convenience such as being able to work at your own pace and work on the course as it fit into their schedules, etc. as being an advantage of taking an online math course also cited not having traditional classroom components such as in-class instruction and having questions answered immediately as disadvantages of an online math course.

Conclusion

The results of this investigation support much of the literature presented in the introduction of this paper. Specifically, 67% of students identified a factor pertaining to convenience when asked about the advantages of an online math course. Also, when asked about the disadvantages of an online math course, 74% of students referred to aspects of the traditional classroom environment such as immediate feedback to questions and observing faculty lectures that are compromised in the online class environment. Interestingly, while 93% of students own a laptop computer with Internet access only 68% used online resources such as online videos and homework forums when taking their online math course. The implication is that although students have a computer with Internet access many did not use the Internet as a resource for their online math course. This may indicate students' inability to direct their learning (Hodges, 2005) or perhaps they are as Sieber (2005) suggests, immature learners who do not yet have the self-directedness and persistence required for successful online learning. This may be further evidenced by the students' final grades for the online math course versus the grades they reported typically earning in a math course. Recall, in math courses 59% of students said they usually make an A or B, 26% said they usually make a C, and 15% said they usually

make a D or F. While the final grades for the participants in these online math courses were: 37% made an A or B, 33% made a C, and 30% made a D or F.

This survey was developed in an effort to improve the quality of my online mathematics courses and bridge the gap between the expectations and perceptions of faculty and those of the online student. The results of this survey suggest that while convenience is the main advantage for students in taking an online course many would like opportunities to communicate with faculty and perhaps other students. The opportunity for communication may also help foster a sense of classroom community that is otherwise missing in the online environment. Lastly, the majority of online students surveyed did have a computer with Internet access but many need to be directed and encouraged to use the Internet as a resource for learning. One of the primary challenges facing faculty will be to not only teach online students the curriculum at hand but to also encourage students to be persistent in their learning and develop the ability to direct their own learning in order to be successful.

While some of the findings from this project support previous research cited in the introduction of this paper the small sample size for this project is a limitation. Twenty-seven participants results in a 20% response rate for the survey. In addition, since all participants were selected from one institution the results may not be generalizable to online learners in other institutions. Further investigation that includes online learners from other institutions and perhaps a higher response rate would be necessary to confirm if these results could be generalized to larger populations.

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