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Perceptions of the Online Learning Experience

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PERCEPTIONS OF THE ONLINE LEARNING EXPERIENCE

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Purpose

Online education is a relatively new phenomenon that has been developing over the past decade. While the implementation and popularity of online classes have expanded immensely, there is still some debate on whether it is a superior or inferior teaching method when compared to the traditional classroom. Due to society's mixed views on this topic, I had the desire to explore students' perceptions of the online learning experience and find ways to measure its ability to be effective.

The purpose of my thesis was to conduct research that examined the effectiveness of online courses offered at the college level. Furthermore, my study analyzed significant differences between taking courses entirely online versus attending traditional classes. My hypothesis claimed that online education is more effective than the traditional classroom, and my research focused on a small group of UNI students as I attempted to capture their perspectives with regards to these educational techniques.

Literature Review

Online teaching is a relatively new and developing concept whose influence has exploded over the past decade. In an article titled "Five Trends in Online Learning," KeriLee Horan quotes Allison Powell, the vice president of the International Association for Online Learning (iNACOL), who stated that online education has been growing nationally at an average rate of 30 percent each year since 2002 (Horan, 2010, para. 1).

Disadvantages and Advantages

Both the traditional and online methods of education include benefits and drawbacks, and research within this area commonly reveals mixed results. With regards to online classes, some studies show that it is the superior technique while others do not (Chute, 2007, para. 17).

A long list of pros and cons exists for online education, and researchers are stressing the importance of continuous improvement in its quality. However, some of the disadvantages of online learning cannot be avoided. For example, students who choose to take a course with 100% of the content online are likely to feel disconnected from other students and their professor (Jeimzu and Kosur, 2010, para. 7). These students completely miss out on the value of classroom discussion and interaction with peers. The lack of class participation can also lead to feelings of insecurity about their knowledge and their work, especially without the presence of peers and a professor to constructively criticize them. Washington & Jefferson College in Washington, Pennsylvania is an example of an institution that offers no online courses, and Jan Czechowski, vice president of academic affairs, offers the following reason:

> We feel the students learn more from the direct contact with each other and the faculty. I think the personal contact, the interaction, the communication takes place best when it can be done live and in person (Chute, 2007, para. 49).

Another problem that can arise is a lack of motivation among students taking online courses. The convenience of having the class material available at any time within the comfort of one's home can foster laziness and procrastination. There are typically more distractions that online students must overcome, and it can be tempting for them to adopt thoughts similar to "I have plenty of time, I can do this later." Another point to address is the fact that some classes simply cannot be effective in an online setting; this can be said mostly of courses that require direct hands-on experience with proper equipment and supervision.

How can online education be beneficial? The main reason can be summed up with one word: flexibility. Students have access to their online courses at any time, and proper time management allows them to maintain a schedule that is convenient for them. This can be a

luxury for some students and a necessity for others, especially those who have to simultaneously manage a job, a marriage, children, etc (Jeimzu and Kosur, 2010, para. 3). Ruth Newberry, director of educational technology at Duquesne University, noticed a significant difference between the students of her traditional night class and those taking the online version (Chute, 2007, para. 36-37). Newberry claims that the traditional students consistently seemed tired and disinterested, and she saw richer discussion, expressions, articulation, and thinking in her online literature courses than she ever saw in the classroom discussions. Online teaching also presents an opportunity for the people of rural, remote, and undeserved places to acquire quality education (Chute, 2007, para. 31). This results in an overall ability to offer courses to a larger number of people and a wider variety of demographics. Costs can be saved in various ways as well. Online students worry less about traveling expenses, and institutions that are heavily online-based may be able to hire less staff and save costs on the maintenance of buildings and classrooms. The increasing demand for online courses also seems to be inspiring a generation of improved teaching methods as technology has been able to offer entirely new concepts for learning. The value of the growing use of this technology may be, "its ability to encourage faculty to question their unquestioned beliefs, reevaluate their standard approaches, learn new skills, and rethink their classes" (Meyer, 2002, p. 64).

Previous Studies and Findings

Overall, past research tends to favor online education as a more effective method of teaching when compared to the traditional classroom. In 2009, SRI International for the U.S. Department of Education released a 93-page report with the following conclusion: "On average, students in online learning conditions performed better than those receiving face-to-face instruction" (U.S. Department of Education, 2010, p. 11). The report provided comparisons of

research results for online versus traditional classroom teaching from 1996 to 2008. The research included settings among all levels of education, as well as a variety of adult-continuing education programs, such as medical and military training. The main objective of the report was to address four research questions:

- How does the effectiveness of online learning compare with that of face-to-face instruction?;
- Does supplementing face-to-face instruction with online instruction enhance learning?;
- What practices are associated with more effective online learning?;
- What conditions influence the effectiveness of online learning (U.S. Department of Education, 2010, p. xi)?

Over the 12-year span, 99 studies which had quantitative comparisons of online and traditional performance for the same courses were found and examined. The analysis revealed that on average, students doing some or the entire course online ranked in the 59th percentile in tested performance, and the average classroom student ranked in the 50th percentile (Lohr, 2009, para. 1-3).

Student feedback has been a central focus in past research related to online education. What do students prefer? What factors contribute to student satisfaction and dissatisfaction? These questions are among several that can help explain what is considered a high-quality online education course. The Temple University Online Learning Program has administered a student satisfaction survey at the end of each semester since 1995, when it first offered distance education courses (Schifter and Monolescu, 2004, p. 173-178). The majority of the respondents in 1999 stated that they were spending an average of 15 hours a week on their online course, but in 2000, the response dropped to an average of six hours a week. Furthermore, the number of

students that agreed with the statement "the same courses offered face-to-face would offer more content" has been decreasing with time; almost 50% of students agreed in 1999, while only 24.7% agreed in 2001. The survey also offered open-ended questions for students, which provided useful qualitative forms of feedback. In summary, students felt that more mature, organized, and self-motivated people should undertake online courses, and the main advantage was to allow for flexibility within one's schedule. Some disadvantages mentioned were the inability to receive immediate feedback from the professor, failure to connect on a more personal level with other students taking the course, and some technological problems.

Kyong-Jee Kim and Curtis J. Bonk, researchers from Indiana University, conducted a study in 2006 with objectives that focused less on students and more on feedback from faculty involved in online education. Kim and Bonk surveyed instructors and administrators of postsecondary institutions, mainly in the United States, with the intention of discovering the future trends of online education. In particular, the study makes predictions regarding the changing roles of online instructors, student expectations and needs related to online learning, pedagogical innovation, and projected technology use in online teaching and learning (Kim and Bonk, 2006, para. 4).

Kim and Bonk first identified the most important components of quality for online education that teachers should address, the first being student achievement and satisfaction (Kim and Bonk, 2006, para. 6). The demand for online classes has been increasing, and students are more likely to be dissatisfied as they continuously seek richer, more engaging experiences. Despite mixed reviews from students, previous studies have shown that online education is capable of being at least as effective as the traditional classroom. The next components for quality assessment include faculty training and support. Researchers agree that an online

instructor's role differs significantly from that of a face-to-face instructor, and the quality of an online course depends greatly on the instructor's ability to maximize his or her performance within this role (Kim and Bonk, 2006, para. 7).

The main instrument for this study was an online survey offered to 562 college instructors and administrators who were members of either the Multimedia Educational Resource for Learning and Online Teaching (MERLOT) or the Western Cooperative for Educational Telecommunications (WCET), both premier associations for online education (Kim and Bonk, 2006, para. 13). The survey had 42 questions, including multiple choice and open-ended, and they were grouped into three sections related to the current and future status of online education. The first section gathered basic demographic information, the second section focused on the current status of online education within the respondents' organizations, and the third section regarded predictions and expectations for online teaching and learning (Kim and Bonk, 2006, para. 15).

Kim and Bonk found that most respondents predicted that advances in internet technology, such as extended bandwidth and wireless internet connections, are likely to increase the use of multimedia and interactive simulations in online learning during the next five to 10 years. However, only about one in 10 predicted that these advances would enhance videoconferencing or international collaboration, and just one in 16 thought it might offer greater chances to interact with field experts or practitioners (Kim and Bonk, 2006, para. 23). These results indicate that the quality of the online learning experience seems to be based more on the delivery of course content and less on the notion of social interaction and distributed intelligence. Respondents were asked to select one of seven factors that will most significantly affect the success of online programs. "Monetary support" and "pedagogical competency of online

instructors" were clearly the top two choices, with 131 and 121 respondents respectively. Interestingly enough, pedagogical skill was deemed more important than technological skill for effective online teaching (Kim and Bonk, 2006, para. 26). Respondents for this survey also indicated that they believe blended learning, or instruction that combines face-to-face and online, will experience more growth and expansion than fully online courses (Kim and Bonk, 2006, para. 27). Furthermore, 39 percent of respondents predicted that in the year 2013, the quality of online education courses would be the same as that of traditional instruction, and 47 percent of respondents predicted that it would be superior. Only 8 percent expected the quality of online education in 2013 to be inferior (Kim and Bonk, 2006, para. 29).

Hypothesis

Throughout my literature review, the most common of the conclusions from various studies I discovered is that online education is the more favorable teaching method compared to the traditional classroom. Furthermore, society currently tends to believe that online education has a very promising future and will continue to improve, eventually surpassing the effectiveness of traditional, face-to-face instruction. I decided to base my hypothesis for my research on this overall discovery, but I also had to narrow my focus to a group of students attending the University of Northern Iowa. Therefore, my hypothesis is as follows: Online education is more effective than the traditional classroom at UNI.

Methodology

My research was conducted in an attempt to capture the perspectives of online education among a small group of students enrolled at the University of Northern Iowa. The class I chose was 810:025 Computational Modeling and Simulation, offered during the fall 2011 semester and

taught by my thesis advisor, Mark Jacobson. The class had a face-to-face section with 18 students and an online section with 9 students. I used two different methods for gathering data: performance testing and a survey. The performance testing was achieved through pre- and post-tests that measured the students' academic performance throughout the course. The survey was designed to capture students' opinions and perceptions of traditional and online courses.

Pre- and Post-tests

The pre- and post-tests provided a useful comparative analysis between a traditional class and an online class and measured students' skill development throughout the 2011 fall semester. The goal was to detect any differences between levels of improvement throughout the course between the two sections.

The pretests were administered at the beginning of the semester for both the traditional and online sections. The posttest offered at the end of the semester was in the same format and the same length as the pretest, and only some of the questions were changed slightly. (See Appendix A.)

Because of the mathematical nature of this particular course, Jacobson and I ensured that the tests addressed general math abilities that students had likely obtained during high school and that were emphasized throughout the course. More specifically, the assessment exams tested students' understanding of the common objectives for the course, listed below:

- Student's ability to analyze various forms of quantitative data;
- Student's ability to articulate mathematical and statistical descriptions of diverse problems and situations;
- Student's ability to apply critical thinking and logical reasoning to recognize both usefulness and limitations of various scientific models;

- Student's ability to reason about models relating to real-world phenomena.

My intention was to use the data from the results of the pre- and post-tests to examine the effectiveness of the two teaching styles, traditional and online. I predicted that the test results would indicate specific areas where students did or did not improve during the course, and I would look for significant differences between the results for the traditional class and the online class. After taking each of the pretests, students were not allowed to see their results. This helped alleviate unbiased results for the posttest because the posttest was very similar to the combined pretests. I understood that the pretests and posttest needed to use similar scales of measurement so that identical scores on the two scales would have the same meaning and I would be able to successfully identify areas of improvement (Newton and Rudestam, 1999, p. 218). The analysis of this data would attempt to determine which, if any, areas of the course were more effective for the online students than the traditional and vice versa. The results would hopefully lead me towards conclusions regarding what is necessary to create a worthwhile, high-quality learning experience for students in both the online and traditional setting.

Survey

The second part of my research required the development and administration of a survey. I believed this method would best capture students' opinions, perceptions, and experiences with both traditional and online classes. With regards to sample surveys, it is not uncommon for the response rate and results to be of low quality. Therefore, a good design format would be the key to maximizing the response rate and improving the quality of the data collected (McDougall, 2010, p. 63). With this in mind, I created one survey for the online version of Jacobson's Computational Modeling and Simulation class, and I designed another survey for the traditional class. (See Appendix B.)

First, both surveys asked for the student's year in school (freshman, sophomore, junior, or senior) and the student's major. Because of my small sample size and issues regarding confidentiality, the purpose of gathering this information on individuals was to later group them into broader categories. As a result, specific data results could not be traced back to a single student. For example, among both the traditional and online classes, the resulting groups for year in school were 15 freshmen and 12 non-freshmen. The resulting groups for majors were English/education, computer science, social science, business, and art/music/media. These groupings allowed me to consider possible relationships between student performance and year in school or major. I recognized possibilities such as a non-math major being less familiar with the material of this particular course, or freshmen having little to no experience with college level courses, etc.

The next section of both surveys allowed students to rate categories on a scale of 1 to 5 (strongly disliked to strongly liked). The categories for the survey offered to the online class included: amount of homework, my performance in this course, deadlines/due dates, the quiz/test format, schedule flexibility, and methods of communicating with professor. The survey for the traditional class had the same categories, except 'schedule flexibility' was replaced with 'class meeting time (9:00 MWF).' Assigning ratings to students' opinions on aspects of the course converted some qualitative feedback to quantitative, allowing for more meaningful data analysis.

The final part of both surveys provided students with the opportunity to answer open-ended questions. The survey for the online class asked students why they chose to take the course online; this would provide insight as to why online was preferred over traditional. Then the students were asked if they wish they would have taken the traditional, face-to-face version

of the course and why. This question served to summarize a student's experience with the course, whether it was generally negative or positive. This part of the survey for the traditional class differed slightly. After answering why they took this particular course, they were informed that the same course was offered as an online course and then asked if they had ever taken an online course before. Finally, they were asked if they wish they would have taken the online version of the course. I felt it was important to know whether the student had experience with, and perhaps bias towards, a previous online learning experience.

Research Findings

Pre- and Post-test Results

The pre- and post-test results offered some interesting conclusions. After converting the test scores into a data spreadsheet appropriate for SPSS software, I was able to run various statistical tests.

The first comparison I was interested in was the level of improvement throughout the course between the two sections. I accomplished this by simply comparing the average scores of both sections. Both the pre- and post-tests offered 16 questions, each worth one point for a total of 16 points possible. For the traditional students, the mean score of the pretest was 7.72 points and improved to 9.75 points for the posttest. For the online students, the mean score of the pretest was 7.67 points and improved to 9.11 points for the posttest. According to these numbers, the traditional students improved, on average, by 2.25 points with a significance of 0.001, and the online students improved, on average, by 1.44 points with a significance of 0.056. (See Appendix C.) The low significance levels imply that I can be confident there was a statistically significant difference between the pre- and post-test scores. Furthermore, I can say that on

average, the traditional students improved their scores more than the online students, perhaps indicating that the traditional section learned the material better.

The next part of my analysis involved grouping the students by year in school and major. I wanted to account for significant differences in these areas. For the group analysis by year, I noticed that the majority of the students taking the course were freshmen, so I decided to put sophomores, juniors, and seniors into one group labeled "non-freshmen." I considered the possibility that the non-freshmen would perform better on the pre- and post-tests because unlike freshmen, they had been exposed to college level courses before. I decided this grouping was more useful as an overall perspective rather than dividing it into the traditional and online sections. As a result, 15 students, or 55.6% of my sample, were freshmen and 12 students, or 44.4% of my sample, were non-freshmen. The group analysis by year did reveal the trend that I had expected. For the pretest, the freshmen averaged a score of 7.13 points while the non-freshmen scored higher with an average of 8.42. Results were similar for the posttest with average scores of 9.00 for the freshmen and 10.30 for the non-freshmen. However, the significance of this test was 0.728 for the pretest and 0.737 for the posttest, indicating that my particular sample does not provide statistically significant evidence to support these differences. (See Appendix D.)

My second group analysis was by major. After looking over all of the students' majors, I created five broad categories that each student could fit into, ensuring that no student stood alone. I predicted that students majoring in an area closely related to this particular course, Computational Modeling and Simulation, would perform better on the tests than students majoring in an unrelated field. Again, my predictions showed up in the results, according to my sample. The mean scores of each major for both the pre- and post-tests showed computer science

majors scoring the highest. Furthermore, the significance of this test was 0.130 for the pretest and 0.431 for the posttest. (See Appendix E.) The value for the pretest is considerably lower and close to satisfying the 90% confidence level. I believe this suggests that grouping by major is capable of revealing significant differences. If this study were to be replicated on a larger scale with a larger sample, groupings by major would most likely be a factor to consider.

Overall, the results of my tests, although limited by a small sample size, showed that the students in the traditional section may have done better throughout the course than those in the online section. From the pretest to the posttest, the traditional section improved by an average of 2.25 points while the online section only improved by an average of 1.44 points. The group analysis by year did not show a significant difference in scores, and the group analysis by major did indicate a more significant difference in scores.

Survey Results

For the second part of my research, I compiled the results of the surveys offered to the traditional and online sections. Unfortunately, I only received two surveys from the online section, and this response rate was obviously not enough to provide meaningful conclusions. I decided to discard the surveys for the online section, so my results only include the 12 traditional students who chose to complete the survey. (See Appendix F.)

First I looked at the results for the category ratings. There were six categories that the students rated on a scale of 1 to 5, with 1 meaning they strongly disliked that particular aspect and 5 meaning they strongly liked that aspect. The categories were labeled as follows: amount of homework, deadlines and due dates, the quiz and test format, the class meeting time, methods of communicating with the professor, and my performance in the course. It is important to note that this section of the survey would have been most meaningful if it could have been compared

to the responses from the online section. The comparison may have revealed aspects that traditional students liked more than the online students, and vice versa. However, the survey results from the traditional students did provide some useful information. I looked at the averages of the ratings for each category. According to the responses, the students liked the deadlines and due dates the most with an average rating of 4.42. The students liked the quiz and test format the least with an average rating of 3.42. I can also conclude that the average ratings clearly lean towards the "liked" and "strongly liked" side of the scale, indicating that few students thought negatively of the selected aspects.

Perhaps the most interesting findings were within the open-ended portion of the survey. The students were asked if they had taken an online course before. Five students, which is 42% of the students who completed the survey, said that they had previous experience with online classes. However, 100% of the students who took the survey answered "no" to the following question: Based on your experience with this course, do you wish you would have taken the online version? Fortunately, I provided the opportunity for students to explain their answer to this question, and this provided some interesting and helpful insight as to why none of the students were interested in taking the online version. Almost all of the responses showed an appreciation for interactions with professors, hands-on learning and examples, and the ability to learn more by being in the classroom. (See Appendix G.) Thus, there was a clear preference for the traditional version of the course.

Overall, my survey results led me to believe that the students of my sample do not prefer online education. However, the limitation of sample size is a factor to consider. My results were more useful in reaching a conclusion about the particular course I studied as opposed to the entire university.

Conclusions

Based on the results of my research, I came to the conclusion that there is evidence against my hypothesis which states that online education is more effective than the traditional classroom at UNI. My pre- and post-test results implied that the traditional students improved more than the online students during the semester. My survey results clearly revealed a preference for the traditional classroom, and there was absolutely no indication that online education was favored. Therefore, my study led me to believe that online education is the less effective teaching method at UNI, and the students at UNI do not prefer online classes.

I considered possible explanations for why the students of my sample valued the traditional classroom. The one factor that seemed to offer the best justification is the fact that UNI is a small town campus. This is a characteristic that differentiates UNI from other universities, and I strongly believe it is one of the main reasons students choose to attend UNI. The campus offers small class sizes, allowing students to easily interact with and be recognized by professors. Class discussion and participation is highly valued. There is a sense of closeness and familiarity. These are features that online courses typically cannot offer. Therefore, I believe the advantages that come with the traditional classroom are cherished by the students of UNI, suggesting that the majority does not prefer online courses.

A final conclusion that I reached after completing my study is simply that more research needs to be done. There were a significant amount of limitations within my research, the most obvious being the small sample size. It is difficult to make broad conclusions after researching only one course on campus. However, I am confident that my research can serve as a foundation for future studies on this topic. If my procedure could be applied to multiple classes campus-wide, the results would be more meaningful and more representative of the entire university.

Summary / Significance

Online education is a relatively new phenomenon that is becoming increasingly prevalent in our society. As its growth continues, its impact on our ways of learning and our education techniques also expands. As of right now, studies reveal mixed results regarding whether online courses are more effective than the traditional classroom or not. Therefore, it is important to further improve on society's research within this area.

The research I conducted for my thesis revealed trends that suggest the students of UNI learn better in a traditional setting and do not prefer online classes. While my study was limited by a small sample size, I believe it is a step towards comparing the value of these two teaching methods and provides a foundation for future research. If my study were to be expanded upon, perhaps on a campus-wide scale at a sizable university, the results would certainly be more conclusive and more significant.

The results of my study do not change the fact that online education is widely regarded as a useful tool and is a significant part of our nation's educational system. Society would do well to understand the effects of both online education and the traditional classroom in order to create the most appropriate learning environment. University officials should be familiar with the benefits and drawbacks of online education, especially when considering which classes to offer online, if any at all. Different teaching methods and their effects on student learning should not be the only factors to consider; another implication is the financial effects and whether it is in the university's best interests to offer online learning. Students considering the type of educational experience they want should also have a good understanding. The online setting usually requires a student who is self-motivated, organized, and able to time manage. A student should realize

whether the online experience would be suitable and beneficial for them given their personality and situation.

In conclusion, research within the realm of online learning will continue to improve, and with each new discovery, we will have a better understanding of online education's role in society. Further research developments will continue to maximize the benefits and effectiveness of new educational techniques that society has the capacity to offer for generations to come.

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Appendix A

Pretest

Name _____ This will NOT affect your grade.

All of the following questions will have no effect on your grade. Later in the class we will ask similar questions on a post-test to see how much QUANTITATIVE THINKING ability you have gained compared to what you know on this earlier pre-test. During the next few weeks, you'll get lots of experience with Trigonometry and with Monte Carlo area estimateion.

1. How many RADIANS are there in a CIRCLE? Please guess.

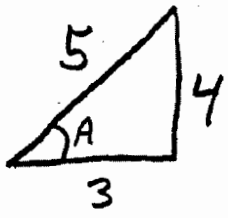
2. In the following fraction, what is the mathematical term for the top part (the 13)? What it the math term for the bottom part (the 21)?

$\frac{13}{21}$ Top part: _____ Bottom part: _____

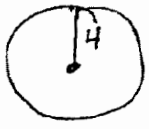
3. What is the SINE of angle A in the triangle?

4. What is the COSINE of the angle A in the same triangle?

5. What is the TANGENT of angle A for the given triangle?

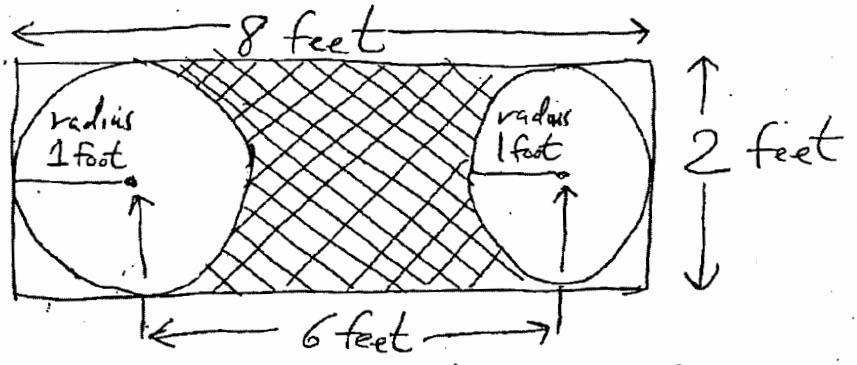


6. What is the area of the following circle? ⟶



radius = 4

7. What is the area of the following figure's shaded portion?



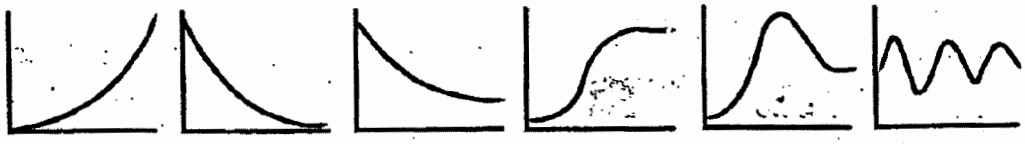
Area of the shaded portion = ?

Area = _____

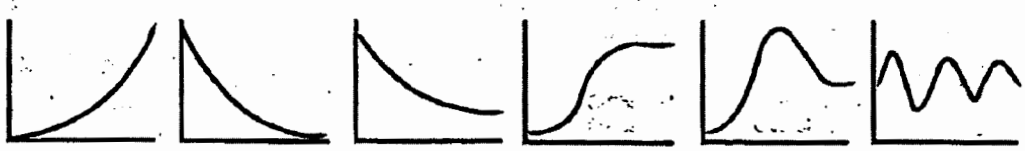
8. What is the slope for the equation y = 3x + 17?

9. What is the intercept for the equation y = 3x + 17?

10. Which of the following represents EXPONENTIAL GROWTH? CIRCLE the correct answer(s).



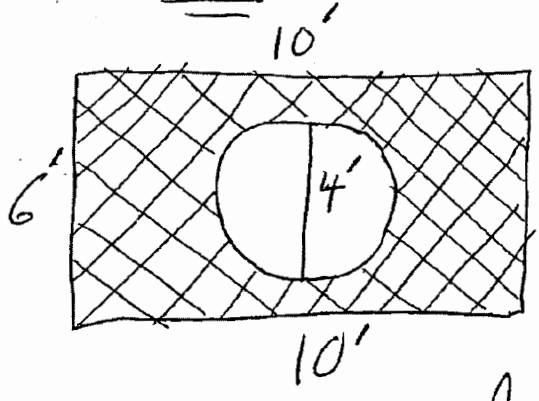
11. Which of the following represents EXPONENTIAL DECAY? CIRCLE the one or all the correct answers.



(12) What is the area of the shaded portion?

(12a)

Note: 10' means 10 feet

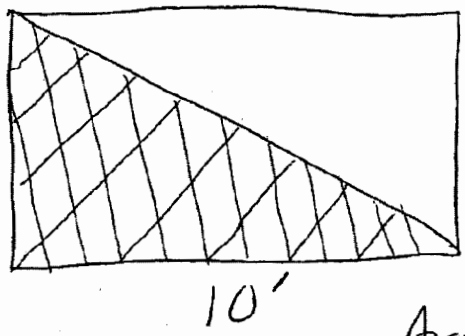


Circle has diameter 4'

Area of the shaded = ?

Area = _____

(12b)



What is the area of the shaded portion?

Area = _____

Posttest

Email answers to jacobson@cs.uwi.edu

This will NOT affect your grade.

Name _____

This is the POST-TEST. All of the following questions will have no effect on your grade. Earlier in the class you were asked similar questions on a pre–test. This is to see how much QUANTITATIVE THINKING ability you have gained compared to what you knew on the earlier pre–test.

Major _____ mm/dd Birthday _____

1. How many RADIANS are there in a CIRCLE? Please guess.

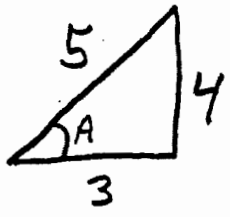
2. In the following fraction, what is the mathematical term for the top part (the 13)? What it the math term for the bottom part (the 21)?

$\frac{13}{21}$ Top part: _____ Bottom part: _____

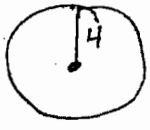
3. What is the SINE of angle A in the triangle?

4. What is the COSINE of the angle A in the same triangle?

5. What is the TANGENT of angle A for the given triangle?

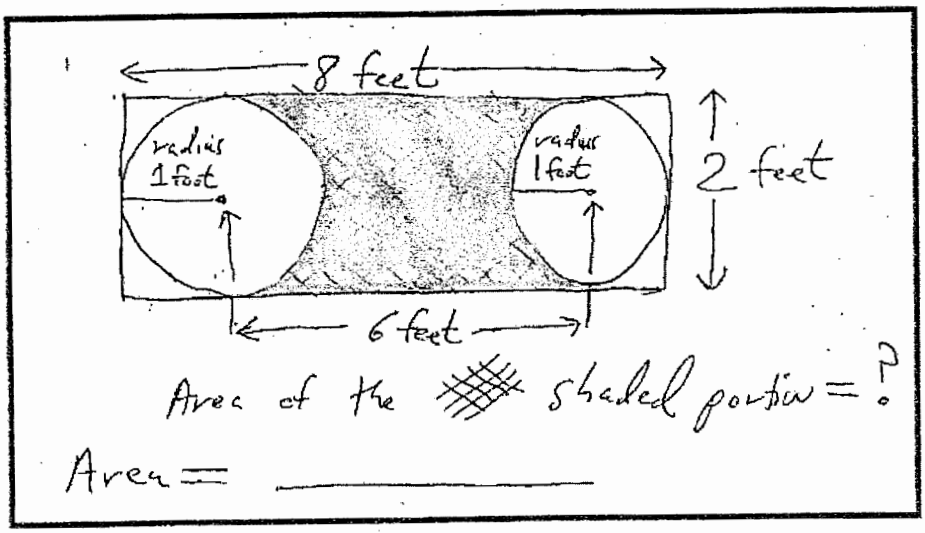


6. What is the area of the following circle? →



radius = 4

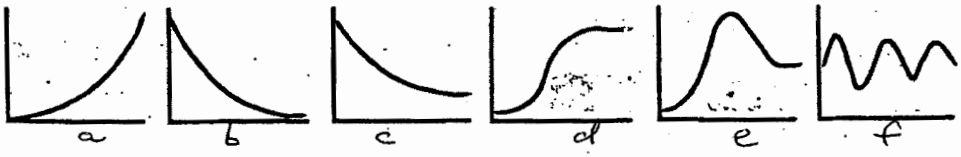
7. What is the area of the following figure's shaded portion?



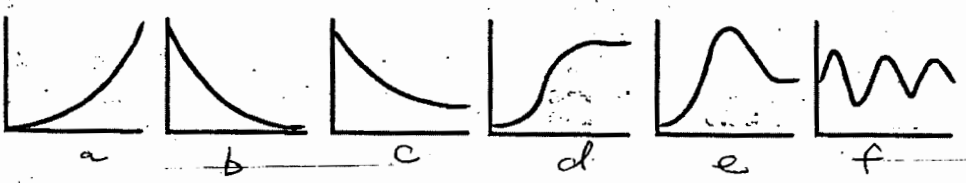
8. What is the slope for the equation $y = 3x + 17$?

9. What is the intercept for the equation $y = 3x + 17$?

10. Which of the following represents EXPONENTIAL GROWTH? CIRCLE the correct answer(s).

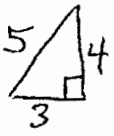


11. Which of the following represents EXPONENTIAL DECAY? CIRCLE the one or all the correct answers.



12. What is the hypotenuse of the right triangle? Just give the LENGTH of the side that is the hypotenuse please.

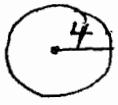
13. What is the area of the given right triangle?



14. Suppose the mean is 67 inches and the standard deviation is 2 inches for the heights of adult males in Iowa. About what percentage of adult Iowa males would be between 65 and 69 inches tall if the heights follow a normal distribution? (Note: N(67, 2) is how this normal distribution is summarized in statistics and math).

15. What is the probability of rolling double 6's (rolling dice sum 12) on a pair of regular 6-faced dice?

16. What is the area of the following circle? It has a radius of 4 inches.

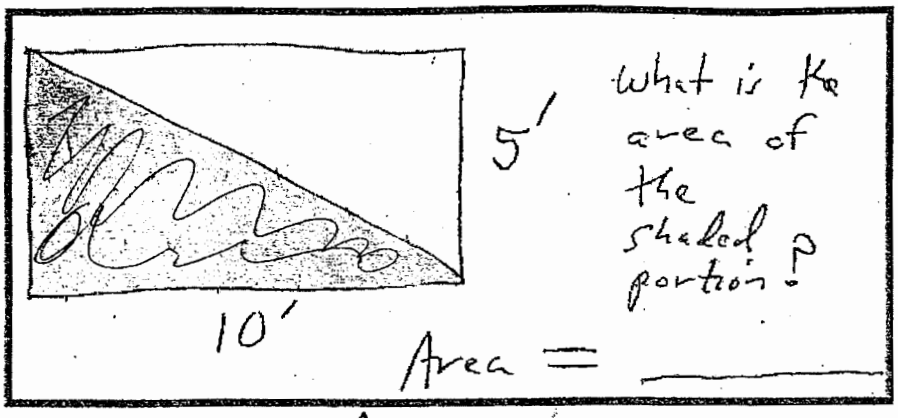


(Q's 17 and 18 on back)

Name _____

Area03.jpg (JPEG Image, 583x261 pixels) https://bb9.uni.edu/courses/1/2112-37002/assessment/043bfe9db7504...

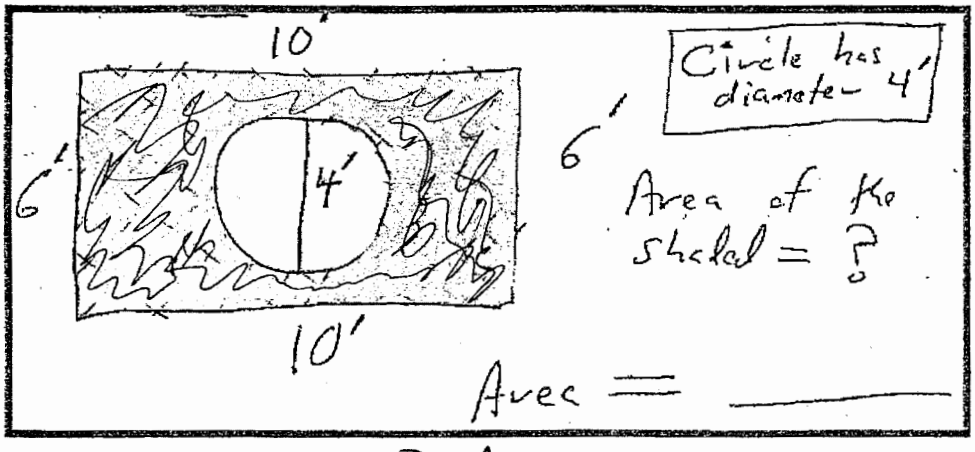
(17)



(17) Area = _____

Area02.jpg (JPEG Image, 635x281 pixels) https://bb9.uni.edu/courses/1/2112-37002/assessment/7fb74b520f024...

(18)



(18) Area = _____

Name _____

Appendix B

Surveys

Online Survey: CS 1025 Computational Modeling and Simulation

Year in School: Freshman Sophomore Junior Senior

Major: _____

Have you taken an online course before? Yes No

Please rate the following categories according to the given scale:

	Strongly Disliked	Disliked	Neutral	Liked	Strongly Liked
Amount of homework.	1	2	3	4	5
My performance in this course.	1	2	3	4	5
Deadlines/due dates.	1	2	3	4	5
The quiz/test format.	1	2	3	4	5
Schedule flexibility.	1	2	3	4	5
Methods of communicating with professor.	1	2	3	4	5

Why did you choose to take this course online?

_____

_____

Based on your experience with the course, do you wish you would have taken the traditional, face-to-face version?

Yes No

Explain why: _____

_____

_____

Traditional Class Survey: CS 1025 Computational Modeling and Simulation

Year in School: Freshman Sophomore Junior Senior

Major: _____

Please rate the following categories according to the given scale:

	Strongly Disliked	**Disliked**	**Neutral**	**Liked**	**Strongly Liked**
Amount of homework.	1	2	3	4	5
My performance in this course.	1	2	3	4	5
Deadlines/due dates.	1	2	3	4	5
The quiz/test format.	1	2	3	4	5
Class meeting time (9:00 MWF).	1	2	3	4	5
Methods of communicating with professor.	1	2	3	4	5

Why did you take this course?

_____

_____

This class is also offered as an online course. Have you taken an online course before? Yes No

Based on your experience with the course, do you wish you would have taken the online version?

Yes No

Explain why: _____

_____

_____

Appendix C

Pre- and Post-test Scores by Section
(1 = Traditional Section, 2 = Online Section)

	Section	N	Mean	Std. Deviation	Std. Error Mean
PreTotal	1	18	7.72	3.268	.770
	2	9	7.67	3.122	1.041
PostTotal	1	16	9.75	3.838	.960
	2	9	9.11	2.147	.716

	Mean Pretest Score	Mean Posttest Score
Traditional	7.72	9.75
Online	7.67	9.11

Mean Difference from Pretest to Posttest

Section		N	Mean	Std. Deviation	Std. Error Mean
1	DiffPostPre	16	2.25	2.082	.520
2	DiffPostPre	9	1.44	1.944	.648

		Test Value = 0			
Section		t	df	Sig. (2-tailed)	Mean Difference
1	DiffPostPre	4.323	15	.001	2.250
2	DiffPostPre	2.229	8	.056	1.444

	Mean Difference	Significance
Traditional	+ 2.25	0.001
Online	+ 1.44	0.056

Appendix D

Group Analysis by Year
(1 = Freshman, 2 = Sophomore, 3 = Junior, 4 = Senior)

Section			Frequency	Percent	Valid Percent	Cumulative Percent
1	Valid	1	7	38.9	38.9	38.9
		2	2	11.1	11.1	50.0
		3	5	27.8	27.8	77.8
		4	4	22.2	22.2	100.0
		Total	18	100.0	100.0	
2	Valid	1	8	88.9	88.9	88.9
		2	1	11.1	11.1	100.0
		Total	9	100.0	100.0	

By Year	Freshmen	Non-freshmen
Traditional	38.9% (7)	61.1% (11)
Online	88.9% (8)	11.1% (1)
Overall	**55.6% (15)**	**44.4% (12)**

	Year	N	Mean	Std. Deviation	Std. Error Mean
PreTotal	>= 2	12	8.42	3.502	1.011
	< 2	15	7.13	2.850	.736
PostTotal	>= 2	10	10.30	4.347	1.375
	< 2	15	9.00	2.390	.617

		Sum of Squares	df	Mean Square	F	Sig.
PreTotal	Between Groups	14.030	3	4.677	.438	.728
	Within Groups	245.600	23	10.678		
	Total	259.630	26			
PostTotal	Between Groups	14.907	3	4.969	.425	.737
	Within Groups	245.333	21	11.683		
	Total	260.240	24			

Pretest	Mean Score
Freshmen	7.13
Non-freshmen	8.42

Significance = 0.728

Posttest	Mean Score
Freshmen	9.00
Non-freshmen	10.30

Significance = 0.737

Appendix E

Group Analysis by Major

(1 = English/Education, 2 = Computer Science, 3 = Social Science, 4 = Business, 5 = Art/Music/Media)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	4	14.8	15.4	15.4
	2	5	18.5	19.2	34.6
	3	7	25.9	26.9	61.5
	4	3	11.1	11.5	73.1
	5	7	25.9	26.9	100.0
	Total	26	96.3	100.0	
Missing	9	1	3.7		
Total		27	100.0		

By Major	Overall
English, Education	14.8% (4)
Computer Science, MIS	18.5% (5)
Social Science	25.9% (7)
Business	11.1% (3)
Art, Music, Media	25.9% (5)

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
PreTotal	1	4	5.75	1.893	.946	2.74	8.76
	2	5	10.80	2.864	1.281	7.24	14.36
	3	7	8.00	3.559	1.345	4.71	11.29
	4	3	6.67	2.309	1.333	.93	12.40
	5	7	7.29	2.812	1.063	4.69	9.89
	Total	26	7.85	3.133	.614	6.58	9.11
PostTotal	1	4	8.50	3.109	1.555	3.55	13.45
	2	4	12.50	1.915	.957	9.45	15.55
	3	7	9.71	4.348	1.643	5.69	13.74
	4	3	7.33	2.887	1.667	.16	14.50
	5	6	9.17	2.639	1.078	6.40	11.94
	Total	24	9.54	3.362	.686	8.12	10.96

		Sum of Squares	df	Mean Square	F	Sig.
PreTotal	Between Groups	81.984	5	16.397	1.938	.130
	Within Groups	177.645	21	8.459		
	Total	259.630	26			
PostTotal	Between Groups	55.311	5	11.062	1.026	.431
	Within Groups	204.929	19	10.786		
	Total	260.240	24			

Pretest	Mean Score
English, Education	5.75
Computer Science	**10.80**
Social Science	8.00
Business	6.67
Art, Music, Media	7.85

Significance = 0.130

Posttest	Mean Score
English, Education	8.50
Computer Science	**12.50**
Social Science	9.71
Business	7.33
Art, Music, Media	9.17

Significance = 0.431

Appendix F

Survey Results

Scale: 1 = Strongly Disliked
2 = Disliked
3 = Neutral
4 = Liked
5 = Strongly Liked

	Average Rating
Amount of homework	4.17
Deadlines/due dates	4.42
The quiz/test format	3.42
Class meeting time (9:00 MWF)	4.25
Methods of communicating w/professor	4.08
My performance in this course	4.08

Appendix G

Survey Question: Based on your experience with the course, do you wish you would have taken the online version?

Student explanations for answering "no":

- "I would need to be in a classroom, because there were many times I couldn't get things."
- "It was nice having him in person to help with problems, and he has some pretty ridiculous jokes."
- "I like the face to face time with the teacher and learning from them in class from their experience which is harder to get online."
- "The professor is somewhat scattered and can be hard to follow, if I took it online it would be harder to get face to face help."
- "Because I don't want to take an online class."
- "Professor to student interaction allows the student to remember the professor saying it. The more senses you can associate with the lesson the better."
- "Because I feel like I get more out of the class when I am there in person."
- "I like the face to face interaction."
- "Not enough focus."
- "I do not like online courses because it's harder to learn the material, and I like the interactions with the professors."
- "I like the hands on work in class."
- "I like hands on learning and examples."