Students’ Ability to Retain Information:

Face-to-Face Courses versus Online Courses

Tiffany S. LaRue and Erin L. Robinson

Longwood University

Abstract

Due to the growing demand and utilization of online courses it is important to see students are retaining as much information as they would in a face-to-face course. The current study explores if individuals who are in the face-to-face condition have higher quiz scores than the individual in the online condition. The independent variable was type of course and the levels of the independent variable were face-to-face and online condition. Both conditions were in a computer lab setting. The face-to-face condition received a verbal summary, distractor, and quiz. The online condition accessed on the passage and quiz on the computer. The online condition did not receive the verbal summary and completed the word search by hard copy. The results indicated that participants in the face-to-face condition did not retain more information than those in the online condition. However, participants who completed an online course earned a higher score on the quiz than the individual who had never completed an online course. We have learned that if students actively engage themselves and use their available resources then they are predicted to do well in any type of course.

*Keywords:* distance education, academic achievement, in person classroom, online education, retention, faculty student perception

Students’ Ability to Retain Information: Face-to-Face Courses versus Online Courses

In recent years, there has been an increasing amount of online courses being offered in colleges and universities. Online courses allow students a flexible schedule, maintain a work life while pursuing an education, and online courses are cost efficient. (Hachey, Wladis, & Conway, 2014). In online courses individuals learn by CD’s, DVD’s, and by electronic learning management systems (Malik & Khurshed, 2011). Online courses offer more stimulus material, which increases a student’s attention, and improves student success (Euzent, Martin, Moskal & Moskal, 2011). Individuals chose to register for online courses because it is convenient. An individual must have self-disciplined in order to achieve in online courses (Euzent et al., 2011). However, the academic performance of students that complete online courses is often questioned.

Students learning styles can also play an immense role in the type of course they would prefer to take. According to Buerck, Malmstrom, and Peppers (2002) participants viewed the four learning styles, which are *Converger, Diverger, Assimilator, and Accommodator.* Convergers are good at problem solving and making decisions. Divergers are good at observing concrete situations and coming up with new ideas. Assimilators are good with logic and abstract concepts. Accommodators are good at carrying out new plans, setting goals, and fieldwork (Buerck et al., 2002). The individuals were divided up by their learning styles and placed into an online course or a face-to-face course. In this study they found that students who can think logically, and are good with abstract concepts are more likely to prefer face-to-face courses, because individuals desire lectures, readings, and critically thinking (Buerck et al., 2002). On the other hand, those who have more of a Converger learning style are more likely to favor online courses. Convergers are the ones who are good at problem solving, and working on technical tasks (Buerck et al., 2002). A study conducted by Zacharis (2010) concluded that the learning methods could be equivalently effective in face-to-face courses and online courses, no matter what an individual’s learning style happens to be. Although, this does not give a concrete answer about which learning style is better, maybe their type of learning style plays a key role in retention.

Students need to have a sense of interest and be actively engaged in order to achieve in the academic field. Direct communication is limited with online courses. Online courses offer less teacher-student interaction. Students are not able to further their social skills as easy as they could in a face-to-face course. In face-to-face courses teacher-student interactions and peer interactions helps students adapt and create social relationships (Buerck et al., 2002). A professor’s teacher-student interaction, time, and effort all have an influence on an individual’s academic achievement.

An instructor’s time and effort was utilized more in online courses than face-to-face courses (Worley & Tesdell, 2009). Time and effort was defined as minutes it took to accomplish teacher-related responsibilities/task (Worley & Tesdell, 2009). Worley & Tesdell (2009) said they felt obligated to respond back to someone in an online course because they were from a distance. Professors that taught face-to-face courses felt they had certain limitations when they should answer and help a student (Worley & Tesdell, 2009). In online courses professors do not have specific block times set aside to meet with students. The role of a teacher is very important in the learning environment because students seek the interaction and their timely responses (Mahmood, Mahmood, & Malik, 2012). Professors are helpful guides by navigating students on the right path to the ultimate success, graduation. It is often times unseen but professors put a lot of dedication and time into their courses as well. Professors put an extra 20% of time in online courses compared to face-to-face courses (Worley & Tesdell, 2009). The course materials that professors instruct call for more attention, time, and effort all depending on the course and the number of times it has been taught. The extra time needed in online courses can be negative on a professor because it takes them away from their home and social life.

In recent years, professors tend to shy away from online courses if given the choice, because they take longer to teach (Worley & Tesdell, 2009). A professor must feel confident and excited about what they teach for students to be engaged and have academic success (Worley & Tesdell, 2009). The lack of professor willingness could result in lack of motivation from the student (Worley & Tesdell, 2009). There are still ongoing concerns professors have when teaching an online course such as: not having enough information, lack of preparation, and anxiety of using technology while teaching (Worley & Tesdell, 2009). Professors critique their courses from year to year depending on course evaluations. The online course evaluations response rate is extremely low (Topper, 2007).

Euzent et al. (2011) conducted a study and found individuals had increased withdrawal rates in online courses rather than face-to-face courses. Since 2011, dropout rates in online course have increased. Researchers believe these increases in dropout rates means students are not retaining information or persevering to complete the course (Hachey et al., 2014). In 2014, students retained 10-20 percent less in online course compared to face-to-face (Hachey et al., 2014). The question arises are online students being able to achieve their educational goals? An investigation done by Hachey et al. (2014), suggested that colleges and universities could improve retention by having more prerequisites for an individual to complete before they can get accepted into a program. More prerequisites would cause student’s grade point average (GPA) to increase. A GPA is a predictor of academic success and retention (Hachey et al., 2014).

There are gender differences in academic success among selection of course type. The male population tends to complete more online courses (Buerck et al., 2002). Some males want to feel dominant over their counterparts so they are more likely do independent work, which would be done in an online course. Males do not tend to engage in social academic interactions. However, many males have poor time management skills and organizational skills (Buerck et al., 2002). Time management and organizational skills are extremely important in thriving and having success in online courses. Females on the other hand place a huge emphasizes on interactions and relationships (Buerck et al., 2002). The female population completes mostly face-to-face courses (Buerck et al., 2002). Females tend to be more nurturing therefore craving the face-to-face interaction. There is counter-evidence that needs attention Braun, 2008, found the convenience of online courses out rated the need for peer affiliations and teacher-student interactions no matter the gender of the individual.

Student satisfaction of face-to-face courses is higher than those of online courses (Bollinger & Martindale, 2004). Face-to-face courses have shown increased student satisfaction and retention (Bollinger & Martindale, 2004). The goal to academic success is for students to learn and obtain information. If students are not pleased with their courses they are predicted to dropout. In order for individuals to be successful and contribute to society most need a good education. A good education prepares individuals for the future. If students enjoy their college learning experience/ environment there are greater chances for them to become successful and live a healthy lifestyle. By earning a college degree it gives individuals a sense of comfort and increases individuals’ career choices. It is important that an individual learn in an environment that satisfies their and helps them retain information (Bollinger & Martindale, 2004).

A study completed by Otter et al. (2013) discussed the possibility of the students’ performance being affected by their negative perceptions of online classes. Some students think that the teachers are not needed if they are taking an online course. On the other hand, Faculty members feel like their presence is needed and it is very important in an online class because they do not have the one on one interaction with their students. The students believe that the online courses require more work because the students must teach and learn the material on their own. This results in the students thinking that more time is being spent in a traditional classroom and undervalue the role as a professor that teaches online classes. When in reality professors place more emphasis on teaching the online class (Otter et al., 2013).

The purpose of online courses is to help those that have a busy schedule, and need help accommodating their needs. The study done by Mahmood, Mahmood, and Malik (2012) studies the satisfaction level of the students taking a traditional Psychology course, and an online course taught by the same professor. Participants completed the Distance Learning Student Response Questionnaire, which was used to collect data to see the level of student satisfaction (Mahmood et al., 2012). In this study they found that there was a slight difference in how the students viewed the online course and face-to-face course. Results showed that they favored traditional learning slightly more than online courses. Mahmood et al. (2012) stated that the professors’ role is very important in a learning environment, and that the student and teacher interactions are very effective. Students felt that in their traditional courses, teachers were well prepared for class, provided meaningful and timely feedback, and resources to complete assignments were readily available to them (Mahmood et al., 2012). Even though traditional courses are viewed as favorable, class sizes are increasing and colleges are urged to plan accordingly.

Critics in higher-level education stated that administrators force online courses on students and professors because of its cost efficiency. Students at several universities made clear that they are unpleased with online course advantages (Jaffee, 1998). Students are not content with online courses no matter what the positives are such as: flexibility and cost efficiency. Students’ performance in online courses can be affected based on their lack of interest. According to, McGinley, Osgood, and Kenney (2012) it may be difficult for students to overcome the face-to-face course learning style. Once students become comfortable with one learning style it becomes difficult for them to transition to a different method of learning. Taking an online course limits the class interactions and peer relationships.

The point of the current study is to determine if individuals retain more information in face-to-face course or online course. We hypothesize that students in face-to-face courses will retain more information than those in online courses. In this study, “retention” is defined as the number of questions the individual’s got correct on their quiz. Face-to-face courses give students the opportunity to work in groups as well as individually to gain proper social development. This belief is supported because it is beneficial for students to have good interpersonal skills. Face-to-face courses give students the opportunity to gather various teacher methods such as: lecture, PowerPoint presentations, and online discussions. We believe that students in face-to-face courses will earn a higher score on the quiz.

**Method**

**Participants**

Participants (29 males, 126 females, *M*age = 19.38 years of age, age range: 17-38) were recruited from a medium-sized rural university in Southern Virginia. The compensation the participants received was an extra credit point for one of their psychology courses. Participants signed up via Sona Systems under a deceptive title, which was “The Effects of Room Temperature on Students’ Ability to Retain Information.”

**Materials and Procedure**

Participants were randomly assigned to either a face-to-face or online condition. The independent variable was the type of course that participants were randomly assigned. The studies dependent variable was the ability to retain information from the course. The dependent variable was operationally defined as the number of questions participants got correct on the quiz. The quiz was a psychological measure. Each participant was tested in an on-campus computer lab setting. In the face-to-face condition participants did not use a computer even though they were in a computer lab. All of the computers were logged off, and the monitors were shut off so that they did not try to use them. The participants were given an opening statement. Prior to the participants entering the face-to-face condition the researchers had all of the papers clipped and placed face down in front of each computer. The papers were placed in a particular sequence, which included: the passage, then the word search, and lastly the quiz. To ensure participants were completing the correct exercise in the correct order we labeled the papers from one to three on the back top right corner of each paper. Each participant was randomly assigned a computer and given the passage via hard copy (see Appendix A). In the face-to-face condition participants were given a summary because the researchers wanted to create teacher-student interaction and to make it feel like a real classroom setting. The participants were given five minutes to read the passage and asked to turn it face down upon completion. A stopwatch timed the participants. The researchers summarized a few key points such as: the definition of constructivism, defined what Jean Piaget believed the three stages of development were, and the age they encountered them which were sensorimotor (infants), preoperational stage (2-7 years), and stage of concrete operations (around age 11) this took two minutes. The individuals were then given a word search to complete (see Appendix B). The word search served as a distractor between the passage and quiz. Each participant had five minutes to complete the task. After participants were finished, they were asked to place the word search face down. Participants then unclipped the next paper, which was a quiz to test their retention (see Appendix C). The participants had five minutes to complete the quiz. At the conclusion of the study the participants were thanked and debriefed. In the randomly assigned online condition participants were given an opening statement. Participants were asked to access the folder that is located on the desktop computer labeled Temp\_learning which is where the passage and quiz were located. The participants independently read a passage in front of a computer in which they were assigned to (see Appendix A). Each participant was given three minutes to read the passage. A stopwatch timed the participants. At the conclusion of the reading task participants were instructed to cut off the monitor. The distractor exercise was given in the form of hard copy (see Appendix B). The distractor exercise was a word search it served as a diversion between the passage and the quiz (see Appendix C). The participants were given five minutes to compete the word search. Immediately, after the distractor participants were given five minutes to complete a quiz via on the computer to test their knowledge. The participants completed the quiz by writing the correct letter to the question on a separate piece of paper. Participants were debriefed and thanked for participating in the study.

**Results**

An independent *t* test indicated that the participants who were in the face-to-face condition did not retain more information (*M* = 46.22, *SD* = 17.99) than the individuals who were in the online course (*M* = 42.21, *SD* = 20.28). As Figure 1 shows, the two groups were not statistically different from one another, *t*(153) = 1.30, *p* = .195, *d* = .011, 95% CI[2.07, 10.09] (two-tailed).

We also found that participants who had already completed an online course earned a higher score on the quiz (*M* = 49.46, *SD* = 18.23) than the participants who had not completed an online course before (*M* = 40.92, *SD* = 19.16, *t*(153) = 2.75, *p* = .007, *d* = .025, 95% CI[2.41, 14.66] (two tailed). Refer to Figure 1 for a version of these results.

**Discussion**

The data from the present study did not indicate any significant differences in an individual’s academic success whether the participants were randomly assigned to the face-to-face condition or the online condition. In support of this finding, Zacharis (2010) found there were no significant differences between the two learning styles. Zacharis (2010) stated that students could be just as successful in an online course as they are in a face-to-face learning course. The key component of the study is that the students enrolled in the type of courses they desired based off of their known strengths, needs and preferences (Zacharis, 2010). Online courses offer the flexibility for individuals to decide when to complete the assignments, but it also has the ability to inhibit social interactions and knowledge.

According to Malik and Kkurshed (2011) there are fewer possibilities for students to think critically, gain interpersonal skills, and improve moral judgment. This is related to our study because participants in the online condition mean percentage correct on quiz was slightly lower than those in the face-to-face condition. A reason for the slightly lower mean score could be the lack of interaction with the researchers, which could be similar in an online course. Those in the face-to-face condition interacted more with the researchers. Participants in the face-to-face condition were provided a verbal summary of the passage that the participants in the online condition did not receive.

The participants who were randomly assigned to the online condition earned a slightly lower mean percentage correct on the quiz than those in the face-to-face condition. However, an independent *t* test indicted that there was no significant difference in the type of course a student was assigned to and their mean percentage correct on quiz. The mean percentage correct on quiz was extremely low. This may indicate the passage and quiz was too difficult. According to our study the type of course a student completes will not determine how much information they retain. Another independent *t* was conducted comparing those who have previously taken an online class to the score on the quiz. There was a significant difference if participants have already completed an online course.

Our study did not show significant differences in the type of course a student took, our results did reveal that there was a significant difference between participants who have previously taken an online course and their academic achievement on the quiz. Individuals who had completed an online course demonstrated on the quiz that they retained more information by earning a higher overall mean grade than the individuals in the face-to-face condition. Those who have previously taken an online course will earn a higher score in either type of course. The students’ academic success depends on their performance, experience, and motivation. Trigwell, Ashwin, and Millan (2013) found that motivation was a strong indicator of academic success and retention. Participants in our study had a higher mean percentage correct if they had previously completed an online course in both conditions. This suggests that experience is in a factor in overall achievement. The mastery of a subject, involvement, and exposure to a stimulus helps individuals to achieve more easily than those without experience. If individuals had prior contact they were projected to do better. This was supported in our study those who had completed an online course earned a higher quiz score. This concludes a student’s effort and experience in a class is a fundamental determinate in how well they do in the course.

Our hypothesis was not supported because it is hard to generalize the outcome of student’s performance in a class. The reason why it is hard to generalize a student’s outcome is because everyone has a different learning preference. Buerck, Malmstrom, and Peppers (2002) found that students have a different learning style and that it could affect how well they will perform in an online or face-to-face course. In addition to the different learning styles being preferred, the participants were not interested in the material and did not devote their full attention. The current study, the participants read a passage about Jean Piaget and several of the participants did not appear to be engaged. The lack of engagement could have been for a number of reasons such as: participating in our study just to earn extra credit for their course, not taking the task seriously, focusing on the length of the study, or they could have been fatigued and unable to work to their full potential. When students were not engaged it caused them to not comprehend the passage. This could be a reason why the mean percentage correct on quiz was low.

If we were to conduct this study again, we would change the materials that we gave to our face-to-face condition. Although we read a summary of the passage to reiterate what the participants read, we felt that it was an ineffective approach. Making a PowerPoint and interacting with the participants, could have a similar effect to the average face-to-face learning environment and may increase students engagement. We also felt that in certain areas of the study we allotted too much time, which caused the participants to impatiently wait for the next set of directions. Due to the fact that it has to be the same across all conditions we had to make sure the time was consistent in both settings. Furthermore, we discussed simplifying the quiz to ensure the participants have a better understanding of the material.

Our knowledge has drastically increased after completing this research. We have learned that if students actively engage themselves and use their available resources that they are predicted to do well in any type of course. To ensure that students do well in their courses they must be engaged and actively participating in all required assignment. We have also been educated on the extensive role that instructors play in the teaching of face-to-face courses and online courses. Professors can actively communicate with their students in both types of learning environments such as: Skype, Electronic mailing, phone calling and Online Learning Management Systems (LMS).

In addition to gathering data from a larger population, researchers should analyze hybrid courses which incorporate both learning styles. Hybrid courses are a blend of traditional face-to-face courses as well as integrative technology based online components. As the years progress, technology will continue to advance and online courses will become more prevalent. However, the utilization of online courses will not diminish face-to-face courses. While the findings of the current study make important contributions to the present literature, it would be beneficial to explore other contributors that effect retention and academic performance.

In future endeavors we suggest that future researchers focus on a better way to successfully demonstrate a students’ performance in a classroom. It is difficult to measure an individuals’ ability to retain information by having the participants read a passage, complete a distractor, and complete a quiz that serves as a model for that they learned. One solution could be to manipulate the dependent variable. Instead of measuring retention, they could measure recall and it can be operationally defined by the number of facts they remember from the passage. Another suggestion would be to change the passage the participants are given. An extensive four paragraph passage about Jean Piaget was given to the participants. As stated above, we believe that students’ poor performance on the quiz was due to lack of engagement. By changing the passage and making sure it is an appropriate length, it can eliminate the possibility of students losing interest in the material they are reading. If students are interested in the material and use their available resources then they are predicted to do equally well in an online course as they are in a face-to-face course.

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*Figure 1.* Displayed are the results for comparing type of course and the mean percentage correct. The participant’s ability to retain information was measured by the mean percentage correct they earned on the quiz.

*Figure 2.* Displayed are the results completion of online course and percentage correct on quiz. The participant’s ability to retain information was measured by the mean grade they earned on the quiz.

Appendix A

After graduating from his university studies, Piaget moved to Paris and taught at a school directed by Alfred Binet, who developed standardized intelligence tests still used today. As he helped to score Binet’s tests, Piaget noticed patterns of consistent errors made by younger children but not by older children and adults. He formed a hypothesis that young children thought differently than adults. This was the germ of what would eventually become his theory of progressive, distinct stages of cognitive development that people go through universally as they grow.

Piaget proposed in his theory that in learning, just as in biology, humans adapt to their environments through processes of assimilation and accommodation. He proposed that babies form mental constructs to represent their world, which he called schemata. An infant assimilates new information by fitting it into an existing schema. When it will not fit, the child accommodates to it by modifying an existing schema or forming a new one. Because of his emphasis on children’s roles in actively constructing their own knowledge of reality, Piaget has been called a great pioneer of constructivism, the theory that people build knowledge based on interactions between their thoughts and experiences.

Piaget called his second stage the preoperational stage, from around ages 2-7 years. Children are acquiring motor skills at this time. Their thought is characterized by egocentrism, thinking everything revolves around them with an inability to assume others’ viewpoints. Animism—attributing human characteristics and behaviors to inanimate objects—and magical thinking—the belief that their thoughts or actions cause unrelated external events—are typical. Children are not yet capable of thinking logically or of conservation, the ability to retain mentally such properties as amount, number, or volume despite changes in shape, appearance, or arrangement.

In the following stage of concrete operations which lasts until around age 11, children begin to think logically and perform what Piaget termed mental operations; but they can only do these relative to concrete objects they can see, touch, and manipulate. They can thus learn simple arithmetic and science. They no longer think egocentrically. They can solve conservation problems involving concrete materials, first realizing that quantities of solids or liquids are the same even when their shapes or the shapes of their containers are changed; and that the number of objects remains constant even when they are arranged differently. However, they are not yet capable of thinking abstractly or performing entirely mental operations.

Retrieved from: <http://www.studyguidezone.com/reading-comprehension-worksheet.htm>

Appendix B

A Vacation to Remember!!!

E E M R I N E V U O S M N E E

X H W J R E L A X A T I O N B

C F W V Q H C R U I S E W J C

I N F M S I W T X K Z C V S E

T C U S G F V E S A N D E Z N

E Z E G D Z L I F I I V K O G

M Z A L M T L I G E A G D H M

E Q B S E V Q K P W P Y D H N

N O M B K B B W E F M O C I J

T F L M R Q R P P X L A R T J

P H Q F K N D A G I E O Q U A

T M U C N X R P T B Q B P S E

E U C N G U P K X I Y X S S X

I E C N A D F Z K F O N J J H

J B H X Y X J G Y J X N N C X

|  |  |
| --- | --- |
| Beach | Flip Flops |
| Celebration | Excitement |
| Cruise | Relaxation |
| Dance | Sand |
| Europe | Souvenir |
|  |  |

Retrieved from http://www.puzzle-maker.com/cgi-bin/ws

Appendix C

**Age** \_\_\_\_\_\_\_\_\_ (write in blank)

**Sex**: Male Female Other \_\_\_\_\_\_\_\_\_ (circle or write in blank)

**Class Rank**: Freshman Sophomore Junior Senior Other \_\_\_\_\_\_\_\_\_ (circle or write in blank)

**Question:** Have you completed any college level online courses? Yes No (circle one)

Directions: You have already read a brief summary of Piaget’s career. Complete the following questions by circling the correct answer.

**1. Piaget’s proposal of human adaptation to the environment was an application of a principle of:**

1. Freudian psychoanalysis.
2. The biology he studied.
3. Binet’s intelligence test.
4. Direct child observation.
5. None of these.

**2. What is correct about Piaget’s experience with Alfred Binet’s intelligence tests, according to the passage?**

1. Piaget helped Alfred Binet by developing the intelligence tests.
2. Piaget found the tests were inappropriate for younger children.
3. Piaget felt younger children thought differently than adults did.
4. Piaget identified error patterns that invalidated the test results.
5. None of these

**3. Piaget’s theory involved which of these?**

1. A gradual and continuous progression of cognitive development
2. Completely different progression from one individual to the next
3. The premise that younger children make errors but adults do not
4. Universal progressive stages of development all humans undergo
5. None of these

**4. The theory that humans build knowledge from interactions between their thoughts and experiences is called:**

1. Biology.
2. Constructivism.
3. Cognitive development.
4. Developmental psychology.

**5. \_\_\_\_\_\_\_\_\_ are in Piaget’s preoperational stage of cognitive development.**

1. Toddlers
2. Infants
3. Teens
4. Adults
5. Unknown

**6. If a child believes that his disobedience caused a thunderstorm, this specifically an example of what Piaget termed:**

1. Animism.
2. Magical thinking.
3. Egocentrism.
4. Conservation.
5. None of these.

**7. Which of these is correct about the stage of concrete operations?**

1. Children can think abstractly during this stage.
2. Children still think egocentrically in this stage.
3. Children can think logically during this stage.
4. Children cannot perform mental operations.
5. None of these is available from the passage.

**8. In a classic Piagetian experiment, a researcher pours liquid into a tall, narrow beaker, and transfers it to a short, wide beaker in front of a student, asking the student which beaker holds more liquid. The student says the amount of liquid is the same regardless of which beaker holds it. Of Piaget’s stages, which is the earliest one in which this student is likely to be?**

1. Sensorimotor
2. Preoperational
3. Concrete operations
4. Formal operations
5. This is not available

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