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How online learning can benefit deaf and heard of hearing people

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How Online Learning Can Benefit Deaf and Hard of Hearing People

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Abstract:

Online learning can be used for those who are not able to physically attend classes. Rapid expansion of online tools and technologies make online learning more available.

Testing was done in applications of Online Learning classes for Deaf and Hard of Hearing students at the collegiate level. Experiments show that interactivity and responsiveness of the instructor plays an important role in Online Learning as applied to Deaf and Hard of Hearing students.

Chapter I: Introduction

1.1: Problem Statement and Research Questions

The focus of this study is to look for indicators whether online education is more efficient and boosts Deaf and Hard of Hearing (DHH) students' learning in online classes compared to traditional classroom lecture based learning. The problem statement that is being addressed by this study is that DHH students are perceived to perform poorly in classrooms utilizing standard lectures. There is a known issue that some DHH students have problems with reading skills due to their English competencies (Wang, 2006, p. 17). About 90% of DHH children are born into non-deaf families and are not exposed to sign language until later in life. This can result in lack of communication, which results in learning problems in school (Covell, 2006, p. 2). On average, DHH people who are 18 years old and leaving high school have reached only fourth to sixth grade level in reading skills and more than 30% are considered functionally illiterate (Covell, 2006, p. 86). As a result of this, DHH people usually have a harder time following and/or comprehending text based lectures along with readings that are assigned from a book.

Research shows that digital formats for a classroom did indeed boost a person's motivation to learn (Wang, 2006, p. 36). In today's world, one form of Distance Education is provided by means of a computer interface on the Internet. This study tests the theory as to whether Distance Education improves a DHH person's motivation, mastery of knowledge, grades, and the quality of his/her experience.

The author's premise as to the reason Distance Learning is more beneficial to DHH students is because it offers more chances for hands-on experiences. DHH people who have an

English deficiency can use online search engines to look up small segments of the presentation or words they do not understand. One teacher in the Philippines noticed that students enjoyed working on the Internet, because they discover new things on their own (Kagoan, 2010, p. 12) Students also can work online at their own pace, instead of falling behind in a rapidly progressing traditional classroom environment.

By definition, DHH students have a loss of hearing to some degree that will impede their ability to hear normal spoken lectures. In modern schools across the nation, DHH students are aided by a Sign Language Interpreter who signs in American Sign Language (ASL). If Interpreting is not appropriate for the individual's communication needs, then C-Print captioning can be secured for supporting the DHH person (PEPNet, 2002, para. 3). C-Print is a proven technology, but it can be a challenge for DHH students who have limited English skills. The reason for this is that C-Print is a textual transcript of every word being spoken in the classroom. Reading through it all can be quite daunting for some. In online classes, the means for providing additional support to DHH people is somewhat limited. Despite these limits, the use of technology itself seems to be a motivating factor to DHH success in online classes. The author thinks that this could be related to the asynchronous nature of online classrooms. Asynchronous instruction allows students to access course materials, readings, etc. at a pace and time that is most convenient for them (Mozzani-Miller, 2006, p. 8). This is not always the case, since some online lectures can be at the instructor's pace, especially if it is delivered synchronously as a live online video stream. Live video streams would still require interpreting and/or captioning for DHH students, unless the instructor is able to use sign language and the students can understand sign language. Deadlines can still be applied to assignments and projects at the instructor's

discretion. The implementation of online tools provides the ability to go back and look and review classroom material repeatedly if needed.

The hypothesis is; "Distance Education will improve a DHH person's learning in classes demonstrated by improved grades". There are several aspects to test this hypothesis. These tests consist of a post experiment survey that includes feedback from students in regards to the classes they took, and the actual grade results from the classes.

The author's assumption for this study is that the grades of students reflect their understanding of the material in the class. Grade results are also assumed to represent how well the student enjoys the course material. A student that is enjoying the class is likely to interact more with their peers and/or the class instructor. For example, a student that was involved in a class and absorbed data more efficiently will provide responses to a question in greater detail than a student who barely stayed awake during the class. The more motivated students would also assume to be more proactive in the class, regardless of the class environment. Questions asking for expansion on the material being taught might show that the student is interested in learning more about the presented material. This shows that the class that they took was able to "hook" them onto the subject being taught.

The number of clarification questions asked by the students shows their understanding of the material. The more questions students ask for clarification, the more it should indicate that they do not understand the subject, which could mean that the delivery method is not working for them. Questions that are asked to delve deeper into the coursework would show the student is interested in the material and would like to learn more. These curiosity-based questions would show that students have initiative to learn using whatever delivery method currently being

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utilized. The author attended the traditional classroom lectures as an observer to take note of the types of questions DHH students asked. The author also participated in the emails used for the online classes. The author also observed student and instructor interaction while he was attending the traditional classroom lectures.

Grade results are a straightforward way of measuring a student's performance in a class, whether or not it was an online class. Grades give an overall view of how the student fared in an online class as opposed to a traditional classroom. Grades were used as a common form of learning measurement, in order to draw conclusions regarding traditional classroom lectures as opposed to online classes.

1.2: Significance

This study covers the implementation of Distance Learning or online learning into the DHH population taking collegiate level classes. Nowadays, more and more people are taking classes online and using various tools to learn course material. The authors did a study to see if online learning does improve the process of learning in DHH students, or at least provide a positive learning experience.

The author, who is deaf, has taken several classes both in an online environment and in a traditional lecture based environment. This paper studies the possibility that online classes improves a DHH person's learning as opposed to taking a class in person and/or reading directly from a textbook.

1.3: Scope of Study

This study took place with DHH students at the collegiate level. A pre experiment survey showed that there were approximately fifteen males and four females (See Appendix C1). The author also covered various levels of hearing losses that ranged from completely Deaf to hard of hearing. Twelve of the DHH students in this thesis experiment considered themselves "Deaf", while seven considered themselves "hard of hearing" (See Appendix C2). The author collected feedback from the students involved in the thesis study and discovered that eighty-nine point eight percent (89.8%) of the students had a strong bias towards the use of communication utilizing American Sign Language (ASL) as opposed to the use of *only* spoken language (See Appendix C3).

1.4: Definition of Terms

- Distance Education/Online Learning – teaching or presenting material to students who are not physically present in a classroom. This would be done over a computing medium most of the time. This can also apply to students in a traditional classroom in which the instructor is not present.

- Blended Learning - mixing different learning environments to teach a class. Most often, Blended Learning is defined as a combination of online classrooms and traditional lectures. Rochester Institute of Technology's definition of a blended course is "…defined as any course in which approximately 25-50% of classroom lectures and other seat time is replaced by instructor-guided online learning activities or experiences—primarily asynchronous discussion (large

and/or small-group)--but also synchronous chat sessions, as well as online quizzes, games, discovery labs, and simulations" (Starenko et al, 2007, pg 163).

- American Sign Language (ASL) - Is the usage of a persons hands to form shapes and symbols that would convey language without the use of sound. ASL is not related to the English language due to the vocabulary, grammar, and sentence structure being completely different.

- C-Print - Also known as "Caption" print. C-Print is a speech to text program that uses a person that is in the class typing word for word what happens in the class using the voices of the professor and/or students. DHH students are able to either see this captioning in real time or can view the classroom lecture at a later time.

Chapter II: Literature Review

2.1: Classroom Learning in a Modern Society

The term "Generation Y" applies to people born between 1980 and 1995. Generation Y learners have grown up with computers, cell phones, MP3 players, video games, etc which have been used to obtain information electronically (Volek, 2007, p. 13). The introduction of electronics into an academic environment can be daunting for a teacher in educational institutions. Students expect teachers to be tech savvy in order to keep up with them. Teachers can keep classes interesting for students by implementing "active learning". Active learning means teaching using games, having students work in small groups, teaching using unfolding case studies, or utilizing narrative pedagogy (Qualey, 2008, p. 113). Classroom lectures prove to be beneficial in clarifying difficult concepts, organizing thinking, promoting problem solving, and challenging attitudes (Qualey, 2008, p. 114).

2.2: Brief Background on Distance Education

Distance Education has been around since the 1700's. In 1728, Caleb Phillips offered shorthand correspondence learning via the postal service (Harting et al, 2005, p. 35). This took a lot of time and lost mail would have posed a problem. People looked for ways to improve this delivery of education to those who were separated geographically from their institutions. In the 1900's, various new methods were tried such as: instructional films, slides and motion pictures, radio, and television (Distance Learning History, 2012). Between 1972 and 1994, the percentage of college students over the age of 25 rose from 28% to 41% (Banas et al, 1998, p. 366). This

required more time and distance flexibility, since most people over 25 were working and required education from a distance. When schools started to adapt the use of the Internet to deliver education to people at home, Distance Education boomed. Another factor in the increase of Distance Education over the Internet was the increased computing bandwidth made available to the public.

2.3: What Drives Students to Take Classes Online?

More and more students are taking classes online due to location or time constraints. Some people are going back to school while working a full time job, and the only means of taking classes are online. Online education is available to both hearing and DHH people alike. Anyone that has a computer that supports the education medium being delivered can participate in online classes. Not everyone benefits from it however. Studies show that in a hearing environment, online class grades did not differ that much from traditional offline classrooms (Mozzani-Miller, 2006, p. 4). However, DHH students did learn more using online tools due to increased motivation (Wang, 2006, p. 144-145).

The primary problem faced by universities is the delivery of Distance Education (Mozzani-Miller, 2006, p. 4-5). Universities have to ensure that the education received by the students is the same level as a traditional classroom setting. This is particularly important in universities that teach both in a classroom and online settings simultaneously. In order for the online students to be on par with the students in the classroom, the education being delivered over the Internet should be of the same quality.

2.4: What Can Distance Learning Provide?

The quality of the education being provided online can be greatly improved when Virtual Classroom software is used. An example of this would be Moodle, which is open source online education software. It is shown that virtual classroom software increased student test scores by an average of 17% to 30% (Griffin, 2007, p. 10). One of the reasons the test grades improved significantly could be due to online classes offering the ability for students to work on their own schedule. This is called asynchronous learning. Most standard classroom settings are synchronous learning, which means that the student and the faculty must be present at the same time. Virtual classrooms provide, but are not limited to; 1. Participant listings, 2. Recording Capabilities for later viewing, 3. Ease of use without training, 4. Ability to display visuals (EG: power point), 5. Preview of visuals, 6. Whiteboard with annotation tools, 7. Shared web browsers, 8. Application sharing capability, 9. Audio, 10. Text chat, 11. Interaction tools, and 12. Polling tools (Griffin, 2007, p. 4-6).

2.5: Best Practices in Distance Education

In order for students to take a class online or over a distance, they should have high motivation levels, since contact with teachers and peers can be hampered by response times and/or online presence. Teachers should provide consistent and timely feedback, encourage discussion between students, and reinforce effective study skills (www.uiweb.uidaho.edu/eo/dist8.html). Instructors need to be cognizant of incorporating a significant amount of interactivity into their courses (Mahle, 2007, p. 48). Students need to interact with each other, not just the instructor. It has been suggested that interactivity is directly

related to a learner's motivation, which leads to positive outcomes. Students who participated in courses that employed higher levels on interactivity outperformed those who were in a less interactive course (Mahle, 2007, p. 49).

2.6: What's The Relationship Between Distance Education and DHH students?

The most important tool for DHH people in an online classroom setting is anything that is visual. DHH people require visual input in order to process information (Wang, 2006, p. 19). DHH people have some degree of hearing loss, so they require visual input to perform any learning based activity. Virtual classrooms are normally supposed to provide any form of visuals, such as power point presentations (Griffin, 2007, p. 4). Interpreters or other visual input using American Sign Language is one of the better methods for DHH people to learn classroom material. The reason for this is because DHH people have a harder time with the English language depending on their language used in the home while growing up (Wang, 2006, p. 7). There are currently ways to show a live video stream of a lecture, and some people have thought of putting the live webcam on an interpreter in order for DHH people to be able to follow the class.

It was shown that DHH people were more eager to work in a technology supported instructional environment (Wang, 2006, p. 9). This would be partly due to the fact that most online classrooms are asynchronous, which means that DHH people can work at their own convenience while following a given schedule and curriculum. Working at their own convenience is a great asset for DHH people, because they can take as much time needed to process the information being taught in the classroom. It was shown that motivation, knowledge

acquisition, and skill were greater in DHH students who learn via digital formats, as opposed to

traditional formats (Wang, 2006, p. 27). The increased motivation could be a factor in the

improved learning ability of DHH students taking online classes. The reason for this is because,

if a person is not enjoying the classroom material, they will most likely not learn.

Chapter III: Methodology

3.1: Approach and Overview

This experiment consisted of an online class group and a traditional class group. In order to test the results between a traditional class and an online class, the author divided a classroom lecture into two different sections. The traditional class was taught in a regular classroom environment. The teacher in the traditional classroom used American Sign Language (ASL) and/or verbal language to teach. The online group was responsible for following the same course curriculum via the online course management software called Desire2Learn. Materials including power point presentations were provided online. These materials enabled the online group to participate in the class regardless of location.

The online class and traditional class were taught at the same difficulty level. The class materials between the two experiment groups are the same, but the method of delivery is different. Both groups have: a power point presentation, a textbook/lab book, and a quiz on the material that was covered. The syllabus is the same for the standard class and online class. The students from the traditional class were able to question the instructor in person. The online class has access to the instructor's email for questioning. The online class was encouraged to email the author in addition to the instructor, so that the author could keep track of the questions. The traditional class covered the material completely in one classroom, while the online accessed all information and questioned the teacher through the Internet and email. The material covered was familiar to the author, since he had past experience in networking related classes.

For the traditional class, the instructor presented material through talking and/or the use of American Sign Language (ASL). One instructor was able to speak verbally and sign at the same time, while the other instructor used only sign language. The whiteboard was utilized at the instructor's convenience to illustrate key points in the lecture itself. The classroom lecture was loosely structured enough in order to allow time for discussions and questioning. The classroom lecture allowed for extensive interaction between the students and their peers and/or the instructor. Immediately before the lecture, there was approximately a fifteen-minute time slot for the traditional class to discuss the previous week's homework assignment. In some cases, the last fifteen minutes of the class consisted of quick review of the material that was just presented. The traditional class session was typically limited to a maximum of two hours.

The online class followed the same course content as the traditional class. The difference was that there was no instructor presenting the material in person. Instead, the online class was assigned the same homework assignment along with the same power point presentation that was used for the traditional class. There was no actual lecture in real time for the online class. The material was available to access online at anytime. The online students were allowed to email the instructor at any time with questions. Asking questions through email limited the online class students to a purely online experience with no in-person interactions amongst themselves, the instructor, and/or the author.

The quizzes for both groups were done in person on a lab computer as normally scheduled. Keeping the quiz inside the lab with the author and the instructor present ensured that no cheating or plagiarism was done. Once the quiz was performed in the allotted twenty-minute time frame, the students who are in the online class were free to go home. Keeping the standard

date, time, and location of the quiz did not affect the learning style that the students are used to. The traditional class lectures were taught by the standard instructor in order to avoid grading and/or data result corruption. The reason for keeping the standard instructor in the loop is that the students are used to learning with the instructor's specific teaching style. Having the author teach the class would have affected the data results, due to a different teaching style.

Once both classes were done, the traditional class and the online class members switched. By using the same students and just swapping groups, the author was effectively creating a "new" traditional class and online class. After the group members swapped, new material from the same subject was taught. The difficulty of the new subject material was the same as that of the first subject. The author feels that switching the groups provided better feedback from the post class survey, since the two class groups were exposed to both learning styles. It is possible that some people who preferred traditional lecture based classes might prefer the online class instead. Switching the class members would also test various student knowledge levels in both sections of the class to make the experiment more "balanced".

3.2: Data Gathering Method

Before the classes were taught, the author handed out a short six-question questionnaire that allowed him to see certain characteristics of the students involved in the experiment (See Appendix A). The questions were regarding their gender, their level of hearing loss, communication preferences, along with their preference for learning. The preferences for learning are absolute answers, such as "reading text", "online", or "classroom based lecture".

This allows the author to see what kind of preferences the class members have prior to subjecting them to the experiment. The author collected quantitative data from this pre-experiment survey.

Once the experiment was done, there was another survey handed out to the class members. The post-experiment survey allowed the author to collect feedback from the class members and to see if their preferred method of learning changed or not. The twelve question post-experiment survey implemented likert scale questions along with short answer questions. This allows for the collection of qualitative and quantitative data. The addition of qualitative data allowed the author to collect anonymous quotes from the students for use in this thesis.

Feedback was critical for gathering qualitative and quantitative data for this study. For example, this feedback can be measured using a likert scale weighting such as, one or two for negative feedback and four or five for positive feedback. The likert value of three was considered neutral. This quantitative data is accompanied by qualitative data. The qualitative data was taken from DHH student responses to short answer questions. These short answer responses gave the author more insight as to how DHH students view Distance Education learning as opposed to traditional classroom learning. The author decided to use an online clipboard survey to collect DHH student feedback, due to the ease of distribution.

3.3: Steps Required to Make the Study More Effective

The author recognized several limitations that impacted the collection of accurate data for this thesis.

Motivation: Students were not one hundred percent motivated to participate in this study, so the author had to provide a basis of motivation. Making the online classes mandatory as a part of the curriculum eliminated the student motivation factors.

Participation: This study required a sufficient number of participants for valid data to be collected. The author was attempting to get at least ten students, but ended up with eighteen students at the conclusion of the study.

Class difficulty: The author found material that was easily taught to a group of people without being overwhelmingly difficult for them. The difficulty level was kept the same due to the material remaining in accordance with the syllabus.

Teacher Approval: The author convinced some teachers to allow him to access their course materials and to partake in their classes. The reason for teacher approval is so the author was able to attend the lecture, along with the acceptance of implementing online classes into their curriculum.

3.4: Events or Behaviors That Could Impact the Study

According to Wang (2006, pg 67), there are also other areas or behaviors to be considered, and they are;

1. Physical Settings, such as the location the student is taking the online class. A noisy dorm room can be more distracting than a quiet corner in a library.

2. Tasks engaged by the students/instructor can affect how the instructor teaches the material or how the student learns the material. In an ideal situation, an instructor should be teaching material that falls within their comfortable field of expertise to students who are actively listening and have the prerequisites to understand the material.

3. Time on or off the task can be attributed to the time that students take to work on a specific task.

4. Interaction between the students/instructor will be different in an online class, but the material being taught still needs to get delivered to the students. The closer the interaction level is between the instructor and students in both the online course and the traditional course; the better. An instructor that promotes positive interaction with students will be able to convey information to the students more efficiently than one that doesn't. Online classes may have a risk of low student interaction due to the lack of physical presence and the lack of an instructor being present.

5. Technical issues, such as computer downtime or Internet delivery issues can impact the material being taught. An asynchronous based online classroom would have less impact from technical issues.

6. Unusual activities, such as external interference from other people, natural disasters, etc can cause disruptions in a student's learning.

7. Students behavior in the class (such as sleeping or chatting) can cause them to not learn the material as effectively. This can be an issue with online classes, since there is no real way to monitor the students' activities at their respective locations.

Chapter IV: Presentation of Findings

4.1 Survey Results

The results from the post experiment survey showed some interesting trends in the reaction of the students regarding the online classes as opposed to traditional in class lectures. Most students responded that they liked learning about their class in the online section. Fourteen students liked taking the class online, while three did not.

Appendix D1:
Did Students Like Learning Online?
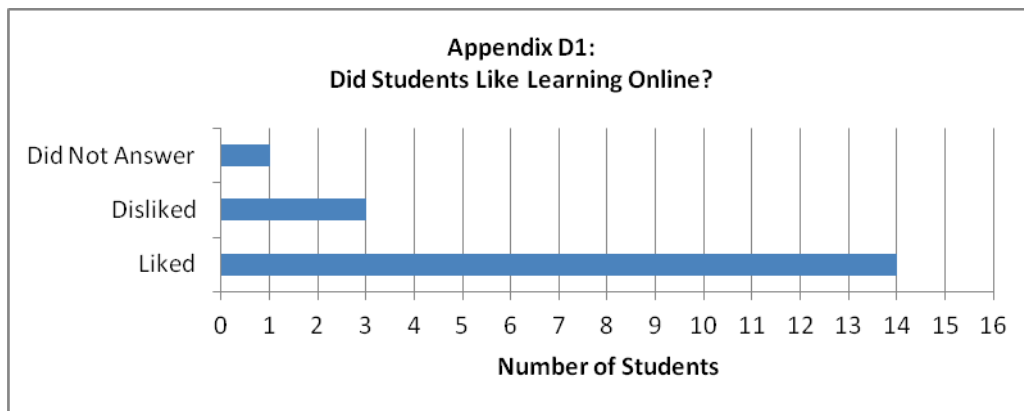
The students favored the fact that the online class eliminated the distance travelled to go to class. One student stated "From what I experience, this method allows me save my time because I do not have to walk to class back and forth daily" (See Appendix D2). This is a big issue on large campuses, such as Rochester Institute of Technology (RIT). Eliminating the need to walk to classes enabled students to have more time to study along with avoiding inclement weather. Students also felt that there was less stress working online, since they were able to multitask between the power point presentation and homework assignments. In regards to traditional lectures, one student stated, "lecture, It bores me. I get distracted too easily…" (See Appendix D7). Working online allowed students to use web based search engines to look up

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material that they did not understand. One major component of the online class was that it allowed asynchronous learning, which meant that the students were able to work on their homework assignments at their own pace. Each week, this enabled some of the students to turn in their homework assignments earlier than expected.

Students did convey some concerns and dislikes about learning material online. The biggest drawback was the lack of real-time interaction from the instructor. The lack of an instructor's live presence online hindered students' ability to get responses to their questions in a rapid manner. One student said that they missed the ability to "ask my professor in face to face communication" (See Appendix D3). Another student said, "I was not able to hear my instructor comments, word of wisdoms and experiences in the field of networking" (See Appendix D3). This shows that the students were longing for face-to-face communication with the instructor. This lack of personal interaction took out the ability to have the instructor share personal experiences with students, along with use of real world examples in real time. The instructor could have done this online if they bothered to do so. The online class experiment included the use of emails for contacting the instructor and author in cases of questions. Although there were very few emails, the students still complained about the response time to a question they asked. One student stated, "I didn't like was not able to get sudden respond answer when I need it most" (See Appendix D3). This could be a contributing factor as to why students didn't bother to email the instructor with questions in the first place. Email correspondence is also not as lucid as having a real person explain material to someone face to face. Some students brought up that a live webcam of the instructor would be a perfect addition to the online classroom (See Appendix D4).

The interesting result that came from this experiment was that the students were also positive about learning in a traditional classroom environment, which means that the results of the experiment were not as one sided as the author thought it would be. Fourteen students liked learning in a traditional classroom environment, whereas one student did not.

Appendix D5:
Did The Students Like Learning in a Classroom?

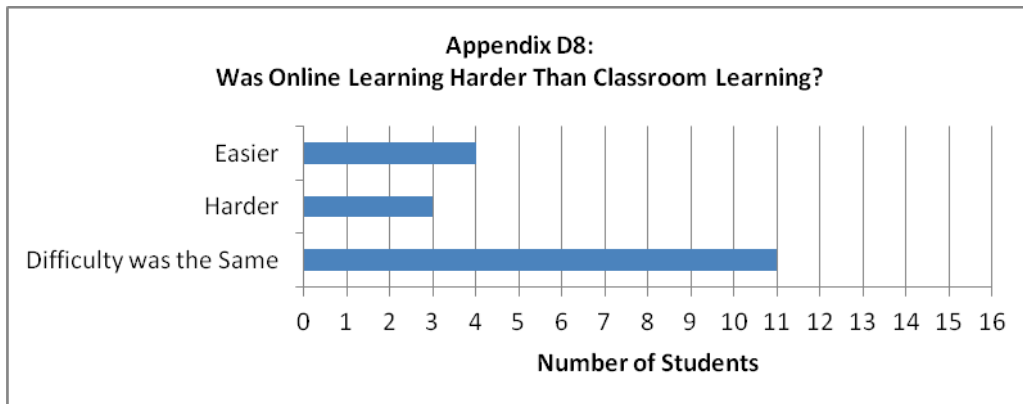| Category	Number of Students
Did Not Answer	3
Disliked	1
Liked	14

Number of Students (0–16 scale)
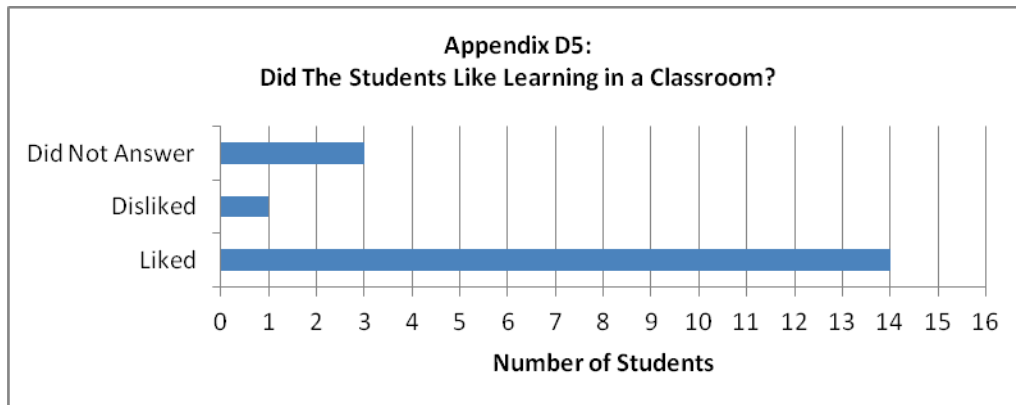
This shows that students liked both the online and in class lectures for their own reasons. The primary driving factor for students in the traditional classroom was the level of interaction that was available with the instructor, along with peers. Responses to questions were more prompt in the traditional classroom, since the instructor was right there. Students were also able to participate in classroom discussions. Students noted that the instructor was able to keep the class interesting by utilizing various methods, which were; sharing personal experiences, providing tips and tricks, using real world examples, open discussion, along with keeping the class mentally stimulated. Students also noted that receiving the lecture from the instructor themselves made the material easier to understand.

Taking the class in a traditional classroom was not without negative remarks. Students stated that the in class lecture was sometimes just too long and boring (See Appendix D7). Based on student responses and author observations, the students in the traditional classes were more

easily distracted and more likely to get sidetracked from the task(s) at hand. Once again, the traveling distance was brought up. The students have to walk more than a quarter mile to classes in winter weather at RIT, which was naturally frowned upon. One student said a disadvantage of the traditional classes was "just walking through the cold" (See Appendix D7).

According to the difficulty level questions segment of the survey, most students responded that learning online was neither easier nor harder than learning in a classroom. There was a slight bias to the online experience being easier than the classroom experience. Four students thought the online experience was easier than the traditional classroom, while three students thought it was harder. Eleven students said that the difficulty level was about the same.

Appendix D8:
Was Online Learning Harder Than Classroom Learning?

Category	Number of Students
Easier	4
Harder	3
Difficulty was the Same	11

Even though the students thought the difficulty level of the online class was the same as the in class lecture, most of them stated that they would like to take a class online again at RIT. This shows that the online experience was beneficial to them enough to warrant the desire to take a class online again. Eight students were willing to take an online course again in the future, while four were not.

Appendix D10:
Should Other Students Experience Online Classes?
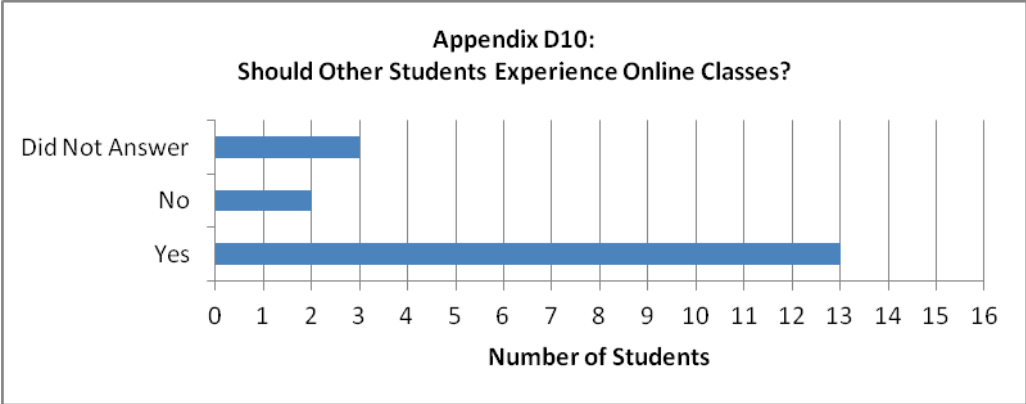
Students provided an opinion that others should be able to experience taking classes online. The experience was positive enough for them to recommend it to new students. Thirteen students recommended that others should experience online classes, while two students did not.

Appendix D9:
Would The Students Take Online Classes Again?
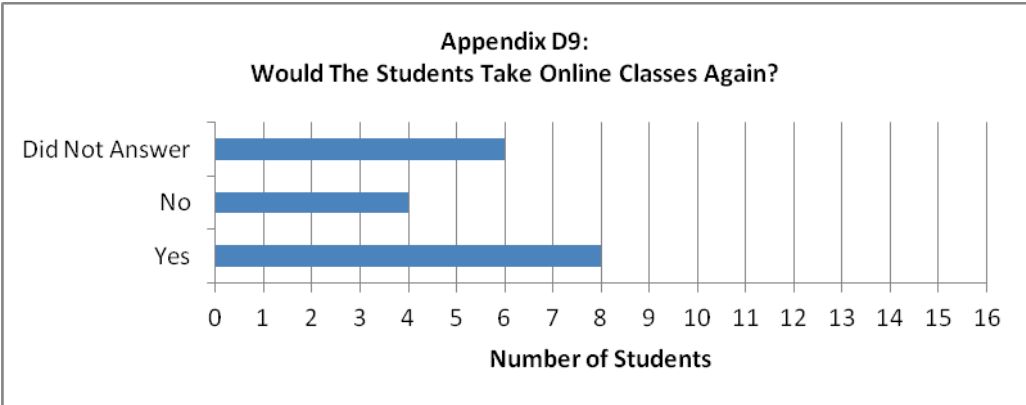
Another interesting result that came up from the post survey experiment was when the students provided their preference of taking classes at RIT. Most students responded that they would prefer taking the class in a traditional classroom environment. A strong number of students stated that their decision would be based on what type of course is being taught. The author felt that the style of the instructor's teaching played an important role in the students' answer as to the preference of taking classes. Four students preferred taking classes online, while

seven students prefer the traditional lecture. However, six students stated that their preference for taking classes would depend on the course being taught.

Appendix D11:
How Would The Students Prefer To Take a Class?

Category	Number of Students
Did Not Answer	1
Depends on the Course	6
Traditional Class	7
Online Class	4

Number of Students
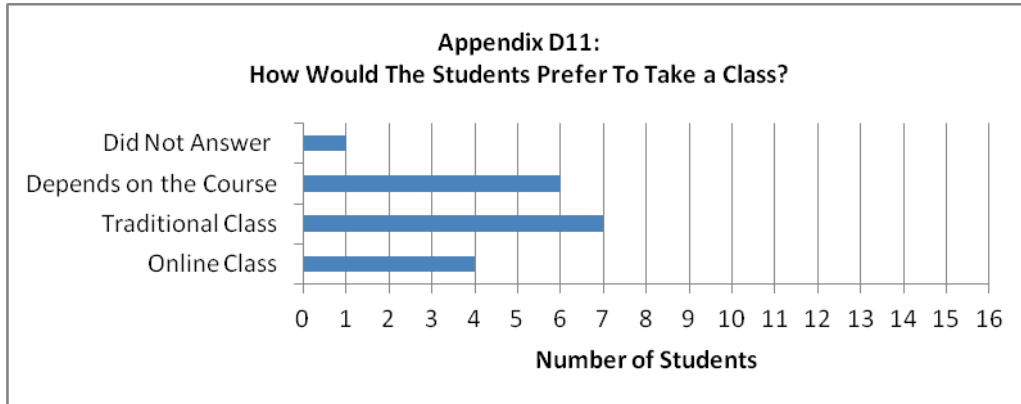
This result might change if the online experience was improved with increased interaction from the instructor in the online classroom. Students were apparently not stimulated by the lack of teacher and peer interaction in the online class. Students also reflected upon the style of teaching that was done by the instructor as an important factor in their decision to take classes online or not. The type of class that is being taught might have more of an effect on the result as well, since a math class might be best taught in a classroom, while other types of classes can be done online.

4.2: Grade Distribution Results

The author analyzed the data gathered from the grade results. According to the data presented in Appendix E1 and E2, it shows that more students fared better in the traditional classes as opposed to the online classes by a small margin. The author thinks that if the class members had a chance to experience a longer period of online classes, it would have shown

improvements in the grade results. To determine that online classes are not beneficial based solely on grade results would not be advisable, since different students react differently to a sudden change in classroom curriculum over a short period of time.

4.3: Summary

DHH students seem to be heavily reliant on American Sign Language (ASL) for their communication needs. It seems that they also need something "visual" in order to have them learn. Reading from a textbook or C-print captioning was not favored by these students.

Another thing to keep in mind is that many students may have been undecided due to lack of experience with interpreters and/or C-print captioning. For this experiment, interpreting and C-print captioning was not needed due to the instructor's ability to use ASL.

The experiment results bring up the benefits of blended learning for DHH students due to their visual needs. Neither the online nor traditional courses seem to have struck a chord with the students in this experiment. The online course experience did have some appeal to the students as per the qualitative data gathered. Students were still on the fence about which course style fits their needs. Further experience with taking classes online might further clarify our understanding of DHH students' preferences and needs.

Chapter V: Conclusions

From the results of this study, it was apparent that students enjoyed the freedom of online classes. However, the main drawback of taking the classes online was the lack of an instructor being present in real time. It was perceived that if the professors were more prompt in their email responses, the students might be more comfortable with taking classes online. In this study, the instructors should have established the communication expectations for the online instruction ahead of time. Students would email the instructors at night and expect responses by the morning, which did not happen if the instructors had morning classes to teach. Mallory et al. (2003, pg 3) found that students rated feedback on homework or comments from the instructor as very important. This brings to mind the idea of blending the online material along with traditional in class material.

Blended learning can be done in a variety of methods. One common method would to have a live streaming webcam video of the instructor teaching the class, while the student watches from his/her own home. So the overall conclusion the author had from this thesis experiment is that online learning does benefit DHH students as long as other accommodations are made such as live webcam chats, live captioning, and/or chat room interaction that includes the instructor in real time. Fourteen students answered that they liked learning online, and the same number of students liked the traditional lectures (See Appendices D1 and D5). According to the short answer section of the survey, more students had positive feedback for the online classes than the traditional classes (See Appendices D2 and D6). According to Long et al. (2007, p. 8), DHH students who took classes online had a greater increase in interaction with their

instructors as opposed to a traditional classroom. The author's experiment did not receive the same results due to a lack of instructor involvement. According to Appendix D2, there was more variety of reasons students liked taking classes online. This shows that the students reaped more benefits from taking the classes online, but it was far from perfect.

Online classrooms provide the benefit of flexibility and the ability to time independently. In class lectures provide the critical relationship between instructor and student. Blending the two methods together would produce an ideal blended learning experience for students. It has been proven that between 60 to 80 percent of the DHH students in a previous experiment have stated that they liked having a part of the class online and they thought that other students should take a blended learning course (Long, et al. 2007, p.9).

Chapter VI: Recommendations

Based on the results from this thesis, the author has several recommendations for instruction of DHH students. DHH students should have the same difficulty level of classes, whether it is online or traditional classroom lecture. Keeping the difficulty level the same would ensure that the instruction goes along smoothly and is well received by the DHH students. If a class is taught traditionally in person, the class should be kept as interesting as possible. Having an instructor promote student-to-student interaction will allow students to be more involved. Students who have the capability to hear an instructor speak have the ability to look whenever they please, while DHH students have to look at one person at all times. DHH students have difficulty following a presentation or power point slides, since they have to look at the instructor or interpreter. This can cause a traditional classroom lecture to be less interesting to DHH students. The author noticed this effect in one of the classes he attended. Having the class time broken up into different sections of lecture, student discussion, instructor Q and A, along with homework review would ensure that the traditional class covers all the material needed in an effective manner. The author attending the experimental classes has previous experience in classes that only consisted of a 90 minute long presentation, and noticed students falling asleep or not paying attention at all.

The online classes should also be given more timely attention by an instructor. If the instructor more closely monitored the online class, then students will be able to receive responses to their emails quicker. Communication expectations for both the instructor and the students need to be established ahead of time for online instruction. Having an instructor interact with students

online using a web cam, live streaming lecture video, or instant messaging would bring more of an uplifting experience to DHH students taking classes online. This would also be a great boon to those students who are unable to physically attend the class. Mallory also proved this in a previous study in 2003, in mainstreamed classes.

Implementing a form of blended learning would provide the best results for DHH students. Having a class that normally consists of lectures, and giving the students the option of attending physically would be giving the students the best of both worlds. Attendance would be required, whether the class was taken online or in person. This would be done by taking attendance of those who are present in the class along with those who are viewing the material online. The online material would have a live stream of the instructor teaching the class. This would enable online students to see the instructor's lecture and not miss out on any points that were not included in the online reading materials. Having an online chat room that is visible by both the online group and the traditional class group would be beneficial for peer interaction.

The popularity of online courses continues to grow in today's modern society, so people should attempt to embrace these courses. One example of online courses that people can take for free is Coursera ® (http://www.coursera.org). Coursera ® advertises the ability to watch lectures from around the world, learning at your own pace, and the ability to interact with peers via the online course. A wide variety of topics are available for students to take, regardless if they are DHH or not.

Online courses would also be a great asset in mainstreamed classes that have a mixture of DHH students and hearing students. DHH students felt that having an online course would help level the playing field between the students and their hearing peers by providing a text-based

communication format (Mallory, et al. 2003, pg 6). Instead of falling behind, the online format of a class would slow down the synchronous pace into an asynchronous pace, that would allow DHH students more time to compose a response or ask a relevant question (Long, et al. 2007, p. 2) .

Rochester Institute of Technology (RIT) values lifelong learning and promotes learning in various types of methods. Students attending RIT have the ability to take courses in a traditional lecture format, online courses, or via "flipped classrooms". Flipped classrooms are also called "inverted" classrooms. These classrooms focus on eliminating the need for students to be caught up in taking notes while the lecturer is presenting. This also can be done online. Instead of doing homework assignments and then coming to class to listen to a professor lecture, the students will watch the lecture online prior to coming to class (Hall, 2013). Once the students go to class, they can work in a more interactive setting to discuss the homework and/or work along with their peers on a project. One excellent tool that RIT has been using is called Adobe Connect ® (http://www.adobe.com/Connect). Adobe Connect ® allows for inverted classrooms, since the tool enables professors to upload pre-recorded lectures for online access. Adobe Connect ® also allows for live streaming of classroom material, the lecture, online chat rooms, and/or live captioning. The live captioning and video streaming would be beneficial to DHH students not able to attend classes. Utilizing Adobe Connect ® would enable educational institutions to reach out to those students who are physically unable to attend classes without sacrificing the quality of instruction.

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Appendix Listing

Appendix A: Pre-Course Survey Questions

A1. Are you:

Male

Female

A2. Are you:

Deaf

Hard of Hearing

A3. I prefer to communicate using:

Sign Language (ASL)

Spoken Language (English)

Mixture of both (Speech and Signing)

A4. When "listening" to another person:

I read lips.

I listen with what hearing I have.

I look at the Sign Language.

I do a combination of any of the above methods.

A5. When studying or learning a topic:

I would rather read it in text articles and/or books.

I would rather watch a professor lecture about it.

I would rather look at power point presentations online.

A6. Please note whether you agree or disagree with the following statements.

These questions apply to all courses you have taken so far, including high school and college. If you have not experienced one of the items on these questions, please check the "Undecided" button.

I understand almost all of the information in classes with an instructor who signs

Likert Scale: Strongly Agree/Agree/Undecided/Disagree/Strongly Disagree

I understand almost all the information in classes where the instructor uses an interpreter

Likert Scale: Strongly Agree/Agree/Undecided/Disagree/Strongly Disagree

I understand almost all the information in classes where the instructor uses live captioning (C

Print)

Likert Scale: Strongly Agree/Agree/Undecided/Disagree/Strongly Disagree

B1. I liked learning about Networking Essentials online using MyCourses.

Instructions: Pick the answer that best fits.

Strongly Disagree/Disagree/No Difference/Agree/Strongly Agree

B2. What did you like about learning about Networking Essentials online?

B3. What didn't you like about learning about Networking Essentials online?

B4. How can the online experience be improved?

B5. I liked learning about Networking Essentials in the classroom.

Instructions: Pick the answer that best fits.

Strongly Disagree/Disagree/No Difference/Agree/Strongly Agree

B6. What did you like about learning about Networking Essentials in the classroom?

B7. What didn't you like about learning about Networking Essentials in the classroom?

B8. I felt that learning about Networking Essentials online was easier than in the classroom:

Instructions: Pick the answer that best fits

Much harder/Harder/About The Same/Easier/Much easier

B9. I would like to take online classes at NTID/RIT again.

Instructions: Pick the answer that best fits.

Strongly Disagree/Disagree/Undecided/Agree/Strongly Agree

B10. I feel that other people should experience online classes at NTID/RIT using MyCourses.

Instructions: Pick the answer that best fits.

Strongly Disagree/Disagree/Undecided/Agree/Strongly Agree

B11. If I could pick one way to take a class at NTID/RIT, which would it be?

Online course using MyCourses.

Traditional course in the classroom.

Depends on the course.

I don't know.

B12. Explain Your answer to question 11 above:

Number of Respondents: 19

C1. Are you:

15 students (78.95%) answered "Male"

4 students (21.05%) answered "Female"

C2. Are you:

12 students (63.16%) answered "Deaf"

7 students (36.84%) answered "Hard of Hearing"

C3. I prefer to communicate using:

8 students (42.11%) answered "Sign Language (ASL)"

2 students (10.53%) answered "Spoken Language (English)"

9 students (47.37%) answered "Mixture of both (Speech and Signing)"

C4. When "listening" to another person:

1 student (5.26%) answered "I read lips."

3 students (15.79%) answered "I listen with what hearing I have."

4 students (21.05%) answered "I look at the Sign Language."

11 students (57.89%) answered "I do a combination of any of the above methods."

C5. When studying or learning a topic:

3 students (15.79%) answered "I would rather read it in text articles and/or books."

9 students (47.37%) answered "I would rather watch a professor lecture about it."

7 students (36.84%) answered "I would rather look at power point presentations online."

C6. Please note whether you agree or disagree with the following statements.

I understand almost all of the information in classes with an instructor who signs

No students (0%) answered "Strongly Disagree"

1 student (5.26%) answered "Disagree"

2 students (10.53%) answered "Undecided"

6 students (31.58%) answered "Agree"

10 students (52.63%) answered "Strongly Agree"

I understand almost all the information in classes where the instructor uses an interpreter

No students (0%) answered "Strongly Disagree"

2 students (10.53%) answered "Disagree"

5 students (26.32%) answered "Undecided"

5 students (26.32%) answered "Agree"

7 students (36.84%) answered "Strongly Agree"

I understand almost all the information in classes where the instructor uses live captioning (C Print)

1 student (5.26%) answered "Strongly Disagree"

No students (0%) answered "Disagree"

8 students (42.11%) answered "Undecided"

4 students (21.05%) answered "Agree"

6 students (31.58%) answered "Strongly Agree"

Number of Respondents: 18

D1. I liked learning about Networking Essentials online using MyCourses.

No Students (0%) answered "Strongly Disagree"

3 Students (16.67%) answered "Disagree"

1 Student (5.56%) answered "No Difference"

10 Students (55.56%) answered "Agree"

4 Students (22.22%) answered "Strongly Agree"

D2. What did you like about learning about Networking Essentials online?

-" easy see online and homework due and i like online quiz, test"

-" I did like about learning online is to read the powerpoint and the book at the same time."

- "From what I experience, this method allows me save my time because I do not have to walk to class back and forth daily."

- "It's sometimes easier for me to read things without getting bored of lecture and sometimes it makes me sleepy. Looking at slideshows on my own was helpful."

- "Well I prefer in class more. However, the best thing about online class is you can relax a little bit."

-" I liked not having to go to class just working on homework right away."

-" My benifets are having the to study the ch. right off the bat and starting my homework afterwards. Save me so much more time and enable me to study more than listening to Jermey Lecture. His lecture are good, but its doesn't do well for me to remember them. I neeed more time."

- "I learning Networking Essentials online is taking my own time."

- "I like how I can just leave early and review on my own. When I'm struggling, I keep find the right answer."

- "Very independent."

-" I can do it on my own time."

- "Because it was easier to do things at my own pace."

-"staying in dorm instead of going out and just to listen to teacher"

-" I liked that I didn't really have to come to class or stay there all day long and that so much information is online when i didn't know it was there."

- "helped give me extra time with all my assignments"

- "You do not lose paper"

-" I liked the PowerPoint slides."

- "Powerpoint"

D3. What didn't you like about learning about Networking Essentials online?

-" i think nothing and i like all"

- "No teacher lecture :("

- "Sometimes, if I do not understand specific term related to Network Essentials. I better ask my professor in face to face communication."

-" If I have question or anything I don't really like to use email much, sometimes it can't really explain or expand to make sure I understand. I rather have in person to explain clearly if I ask questions."

- "I was not able to hear my instructor comments, word of wisdoms and experiences in the field of networking"

- "I could not ask the teacher one on one about the assignments. And I was not fully sure what had to be done for an online class."

-" I actually liked it, but the thing i didn't like was not able to get sudden respond answer when I need it the most."

-" I didn't like about learning about Networking Essentials online is cant go to see the teacher to need the help. I don't know the classmate asking the questions."

- "Not seeing teacher in person."

- "Some powerpoint doesnt explain something Clearly"

- "Nothing"

- "i didnt really have any problems at all"

- "none"

- "I didn't like that if I had a question I couldnt ask the teacher and get a response right away"

-" nothing"

- "Too much details and confusing. I felt it was not the same learning between classroom and online. If I understood better with Networking, I would understand better on line."

-" Taking quizzes"

*** 1 student did not answer

D4. How can the online experience be improved?

-" i just learn from 2010 since 2 year i experience"

-" I think it would be cool if there is video on teacher lecture during online courses."

-" I would suggest you add real-time replay video rather than e-mail client for the students who are confusing about word or phrases."

- "Not sure but what I said above pretty much explains it."

-" The instructor could release a video log lecture"

-" Make it perfectly clear what has to be done for the class online."

- "An online experience can improve a lot if Professor Jermey has a Live Video Stream Chat for our class. Like maybe make a chat group with password login only for students who are in Networking Fundamental. It would be a fun experience if that was incoroprated into the RIT online mycourse system."

-" The online experience be improved is help me to focus on the homework and spent time to doing at home."

- "my reading skills and my learning skills."

- "online need to explain the specific topic"

-" Nothing"

- "it depends on what the topic is and the class"

- "more webcamming experience"

-" Maybe be able to watch your instructor on webcam so you can feel the presence of being there"

- "none"

- "to learn on my course which that improved me alot."

D5. I liked learning about Networking Essentials in the classroom.

1 Student (5.56%) answered "Strongly Disagree"

No students (0%) answered "Disagree"

2 Students (11.11%) answered "No Difference"

8 Students (44.44%) answered "Agree"

6 Students (33.33%) answered "Strongly Agree"

*** 1 Student (5.56%) did not answer

D6. What did you like about learning about Networking Essentials in the classroom?

-" it ok because and i like lab , homework ...."

-" To learn more and ask teacher some questions related on homeworks and books."

- "My professor tend to teach some interesting things."

-" I can understand more of it when teacher explains more about topic. It helps me to learn."

-" I am able to participate in things more. I can get to hear my instructor comment on some important principles that sometime only happen to come up in class"

- "I like learning in a classroom better than online because I see the teacher right there and he can answer any questions right away in class."

-" I like learning hand on labs the best, but sometimes I think its more as a rush. Overall, its very good. Learning the Professor lecture is good, because sometime the professor tells what from his experieces are like back in the older days and now we pass it on to the next generation. I like his tips. Pay very close attention to him and you'll do great in the field of networking. Its a lot of work, but if you keep at it, you'll end up in good career field with good pay."

-" I like about learning about Networking Essentials in the classroom is to understand clear by the communication and see what the learning about it."

- "There is nothing much the same as online class."

- "Teacher did explain something clearly than online"

- "Teacher on hand for any questions

the places that were shown through the computers"

- "none"

-" It just felt more comfortable and I could enjoy learning because I really have an amazing teacher"

- "the help and support i get from staff"

- "Teacher there to help and can show you"

- "Get more feed back from professor."

- "My professor always explaining some details on powerpoint on every tuesday"

D7. What didn't you like about learning about Networking Essentials in the classroom?

-" i dont like power point long presentation"

-" NADA (Nothing)"

- "If lectures are boring, I wish to leave early."

- "Lecture, It bores me, I get distracted easy even though I know that I need to pay attention. Only if it's too long."

-" Sometime i happens to be too tired so when i came to classs I am not really interesting in listening"

- "Just classroom is bit far from my dorm."

- "Seem long and but does help to understand the concept better than not having a instructure at all."

-" None"

- "Talks about from the power point because I can review it on my own."

- "Teacher could be off the point, so i would like to get point of that topic."

-" Not on my own time"

-" the long lectures and having to sit through them"

- "listening to teacher and benefit nothing... basically teacher is helpless"

- "Nothing i cna think of really"

- "just walking through the cold"

-"Taking alot of labs"

*** 2 students did not answer

D8. I felt that learning about Networking Essentials online was easier than in the classroom:

No students (0%) answered "Much harder"

3 students (16.67%) answered "Harder"

11 students (61.11%) answered "About The Same"

2 students (11.11%) answered "Easier"

2 students (11.11%) answered "Much easier"

D9. I would like to take online classes at NTID/RIT again

1 student (5.56%) answered "Strongly Disagree"

3 students (16.67%) answered "Disagree"

6 students (33.33%) answered "Undecided"

5 students (27.78%) answered "Agree"

3 students (16.67%) answered "Strongly Agree"

D10. I feel that other people should experience online classes at NTID/RIT using MyCourses

0 students (0%) answered "Strongly Disagree"

2 students (11.11%) answered "Disagree"

3 students (16.67%) answered "Undecided"

8 students (44.44%) answered "Agree"

5 students (27.78%) answered "Strongly Agree"

D11. If I could pick one way to take a class at NTID/RIT, which would it be?

4 students (22.22%) answered "Online course using MyCourses."

7 students (38.89%) answered "Traditional course in the classroom."

6 students (33.33%) answered "Depends on the course."

1 student (5.56%) answered "I don't know."

D12. Explain Your answer to question 11 above:

- "because i like online and see easy due homework , and lab if i like on classroom might little bit forget due that why i forget see paper"

-" I'd rather to ask teacher questions and learn more what other students ask. If the student ask a teacher with a good question that I haven't thought about it. it is nice to have peer in the classroom and get to know each other. Online, no social life!!! It is nice to talk with someone and discuss about the homework. To help each other out.. That's - teamwork I am looking for :)"

- "Honestly, I strongly despise online courses because I do not want stare to my computer for long time while professor is lecturing. I prefer go to in class and learning from professor directly. In addition, I may ask professor when I do not understand the term of Network courses or anything related to it."

-" Some courses are easy to understand some are difficult, some courses include hands-on, so it depends"

- "Some class can happen to be complex than another. for instance some computer class required in person lecture ie programming, web development and even math courses."

-" I personally prefer working with the teacher right there than staying in my dorm room. I feel more awake in class than if I stay in my dorm all day taking online classes."

- "It depends on how really hard is the course is for me. If it really hard then I'd rather instead going to class for a lecture i could use my time to study the book and pratice quizes online enable me to get better grades."

- "I like the traditional course in the classroom because it is understand clear and the classroom to understand better."

-" If the course requires a lot of hand-on then I would want a classroom. For courses that are more of just reading, writing, or completely computer-related (software side) activity then online will do."

-" Im going to be taking an online class in the spring becuase I want to learn at my own pace"

- "NTID courses are much easier than RIT so i dont mind taking NTID courses online"

-" It depends on if the course is interesting or not and mostly the teacher that I have."

-"Some teachers are extremely boring and I just come to class and fall asleep."

- "cause of the extra help"

- "Some are self explain and other is group talk and learn"

-" In the classroom, I feel more comfortable to communicate with professor. I e-mailed with a few questions but no response but my assignment papers were held for some reason. I could have gotten help more before I took the quiz and I didn't do well on it - considering I passed it."

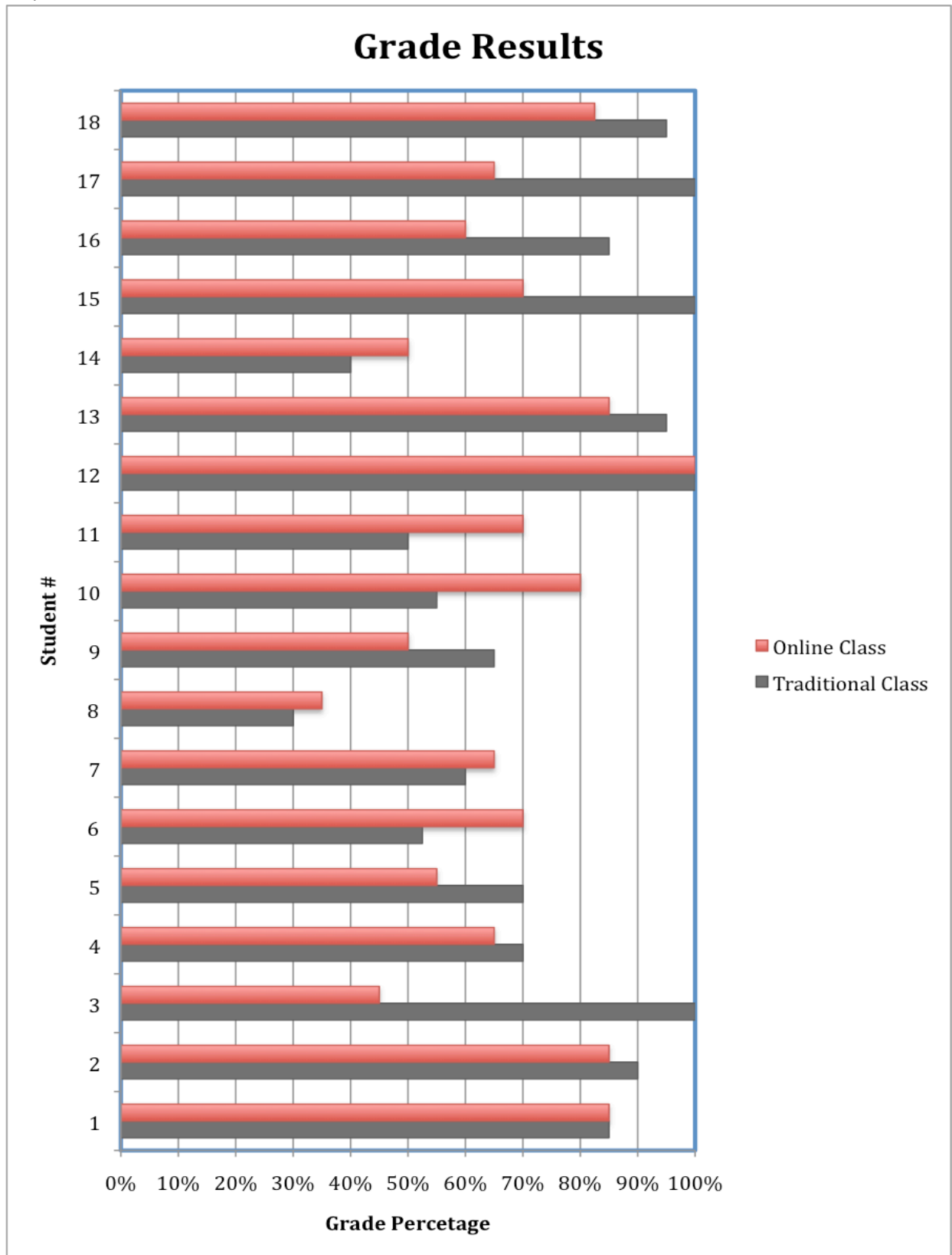- "Lecturing on powerpoint is more easier to understand than online on my courses."

2 students did not answer

Appendix E: Grade Results and Comparison

E1.

Student #	In Class	Online
1	85%	85%
2	90%	85%
3	100%	45%
4	70%	65%
5	70%	55%
6	52.50%	70%
7	60%	65%
8	30%	35%
9	65%	50%
10	55%	80%
11	50%	70%
12	100%	100%
13	95%	85%
14	40%	50%
15	100%	70%
16	85%	60%
17	100%	65%
18	95%	82.50%

E2.

Appendix F: IRB Consent Form

R·I·T

Rochester Institute of Technology

RIT Institutional Review Board for the
Protection of Human Subjects in Research
141 Lomb Memorial Drive
Rochester, New York 14623-5604
Phone: 585-475-7673
Fax: 585-475-7990
Email: hmfsrs@rit.edu

Form C
IRB Decision Form

TO: Matthew Bilowus; Sylvia Perez-Hardy

FROM: RIT Institutional Review Board

DATE: October 5, 2012

RE: Decision of the RIT Institutional Review Board

Project Title - How Distance Education Can Benefit Deaf People

The Institutional Review Board (IRB) has taken the following action on your project named above.

☒   Exempt   46.101 (b) (1)

Now that your project is approved, you may proceed as you described in the Form A.

You are required to submit to the IRB any:
* Proposed modifications and wait for approval before implementing them,
* Unanticipated risks, and
* Actual injury to human subjects.

Heather Foti, MPH
Associate Director
Office of Human Subjects Research

Revised 10-18-06

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Informed Consent Form

Project: Comparing Networking Essentials class online versus in-class lecture.

Researcher: Matthew S. Bilowus

You are invited to participate in Mr. Bilowus's research project. This project is to see if taking classes online do help Deaf and Hard Of Hearing students do better than going to a normal classroom lecture.

This project will help Mr. Bilowus get his Master's Degree at RIT.

What will happen:

For one week during week 7 or week 8, you will not be required to come to class. You will read and learn the material using MyCourses only. The other week will be used for normal class time. Mr. Bilowus will be present in the class documenting questions and other data for his project.

Your grades will be decided normally with no adjustments to the syllabus.

Mr. Bilowus hopes to use the data that he collects to improve the learning experience for future Deaf and Hard of Hearing students.

Your names will *not* be used or revealed to anyone! If there is videotape used, the tape will be destroyed at the end of the research project.

This is completely voluntary. You have a choice to participate or not.

Contact Information:

If you have any concerns or questions about this project, you can email Mr. Bilowus at:

misterbilowus@gmail.com

Do you wish to be a part of this project? (Please put an "X" next to your choice)

_____ YES - I want to participate and take one week's worth of classes online.

_____ NO - I do not want to participate.

_____ Signature

_____ Print name

_____ Date