Audience Response Systems: A Comparison of Rewarded Responses versus Nonincentivized Responses Using Clickers as a More Defined Method of Feedback

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ABSTRACT

Audience response systems (ARS), clickers, when used in classrooms are said to improve a myriad of learning outcomes, including engagement, retaining information, student involvement and class attendance. The purpose of this research was to determine if audience response systems improve classroom learning outcomes, as measured by how it measures attendance, pre and post-knowledge, and performance assessments. This study took place in four sections of Introduction to Human Communication, all taught by the same instructor at a comprehensive university in the southeastern United States.

A 2 x 2 quasi-experimental design was employed, with three of the classes randomly assigned a condition, and a fourth class randomly assigned as the control group. Students in the three sections with conditions were given questions during the daily class lectures. Of the three sections with a condition, one answered the questions on paper and received points, the second used clickers to answer the questions and received points, and the third used clickers to answer questions and did not receive points. The fourth group, the control group, was not given any questions during the same lecture. For the two classes that received points for correctly answering questions during the lecture, the points available from the questions accounted for .06% of the final grade. The study also looked at student attendance to determine if points given during the lecture for the three conditions resulted in fewer absences. In addition, scores from a pre and post-test, and pre and post-speech, were used to determine if learning was improved equally across the four sections.

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PREFACE

I was encouraged to look at the topic of Audience Response Systems (ARS) by a professor in the doctoral program. That nudge is what showed me the importance of questioning. The use of ARS is fairly new to the higher education classroom, and I, personally, wanted to know the value of using an ARS system. Through this research study, I found what I felt was the answer to that question. I trust you, too, will investigate the value of implementing ARS if you have not done so already.

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I am extremely thankful for the direction of my dissertation committee. Without their help and guidance, none of what follows would have been possible. Each has spent time with me along the way, guiding me, editing my writing and most important of all, providing much needed encouragement. The most important aspect of the process is that I have made new friends that will last a lifetime.

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Dr. Larry Hilgert
Dr. Kathleen Lowney
Dr. Blaine Browne
Dr. Gerald Siegrist

DEDICATION

To my wife and daughter, Danita and Grace. Thank you for your support during this sometimes difficult and lonely process…I love you both!

Chapter I

INTRODUCTION

Audience response system (ARS) technologies allow participants to respond to questions and receive immediate feedback. Through advancements over the years ARS technology has evolved from something cumbersome, expensive, inefficient, and difficult to use, (Abrahamson, 2006; Judson & Sawada, 2002, Judson & Sawada, 2006) to a system that is wireless and seamlessly integrates with presentation software and a response device in the hand of a student. According to Kendrick (2010) the effectiveness of ARS "seemed to depend upon how well the systems worked and how efficient the instructor was at interpreting the results from the instructor panels" (p. 5). Some instructors find reasons for not using ARS in the classroom, including perceived technical limitations, cost to students, and extra preparation time required. Usage concerns seems to be less of an issue for students as early military research in the 1950s showed student attitudes toward the use of response systems uniformly positive despite many obstacles related to initial technical challenges (Abrahamson, 2006). Recent studies generally confirm a positive experience based on student attitudes.

Audience Response System Use

Audience response systems (ARS) are often referred to as classroom response systems, student response systems, personal response systems, or classroom communication systems. For the purpose of this study, I will refer to all of the hardware and software necessary to employ the technology as an audience response system. ARS

employ remote response devices, otherwise known as "clickers." Whereas the instructor in the classroom utilizes the audience response system, the actual device used by students to respond to questions will be referred to as a clicker. Due to the evolution of technology, ARS development has come a long way since the 1950s, continuing with the advent of Classtalk, the first user-friendly audience response system, in the late 1980s. "Clickers are a tool in active learning engagement," one that can "provide a platform for asking questions of students and allowing for immediate feedback, they also provide for anonymity in answers so students have no need to feel called out or embarrassed by giving an incorrect answer" (Autrey, 2010, pp. 6-7). With the clicker, students report they enjoy the ability to respond anonymously, while being able to participate equally with other students in the classroom (Graham et al., 2007). One study shows an increase from a 7.8% oral response of students to a question posed by the teacher, to a possibility of 100% response by using personal response systems (Draper & Brown, 2004). Since students do not have to be embarrassed to answer questions in the classroom, they can submit their response by simply pressing a button on their clicker indicating their answer choice. No one knows if the student is right or wrong except the instructor, and that depends on how the instructor programmed the presentation software.

Clickers may be used as a means to respond during a class presentation by the instructor or they may be employed as an alternative response mechanism during exams. When used during a class presentation, questions are incorporated in several ways a) the end of the lecture or b) the beginning and the end where comparative data can be made available in the class, and c) throughout the presentation.

There are two main ways to use clickers in the classroom; (1) asking questions during a lecture that utilizes presentation slides; often referred to as polling, and (2) self-paced testing for the administration of quizzes or exams. Clickers may be used as a means to respond during a class presentation by the instructor or they may be employed as an alternate response mechanism during exams.

In a lecture an instructor can include questions throughout or at the end of a presentation for students to answer with their clicker. These questions can either be written by the instructor or found within instructor materials provided by publishers for many new textbooks. Instructors would also indicate the correct answer so the company software for that specific audience response system can assign points and show the breakdown of all of the possible answers on the next slide. Instructors can ask as many clicker questions as they like, however since clicker questions tend to slow down the pace of a lecture it might be good to only include three to five clicker questions in any one 50-minute lecture session ("Columbia University clicker primer," "UC clicker guide," 2009). As stated earlier questions are usually multiple-choice or true or false questions. As referred to earlier, the process for revealing an answer dictates what happens after students see the question. For example, students see a question on the slide, then select, and submit their answer using their clicker. The software then generates a graph that show the percentage of students who chose each answer option, along with the correct answer. At this point the instructor may choose to acknowledge which option is the correct answer and move forward in the lecture. But if an instructor wants to elicit student participation and student conversation, this is where the instructor can ask questions to make students think. For example, the instructor may ask a student who

chose answer option A to defend or present the rationale behind a selection, while still not indicating if that answer option is the correct one or not. Another option would be for the instructor to have students get into groups and try to convince other students to change their answer, then ask the question again and see if there is a difference in how the students answer the question the second time.

The clicker itself works remotely with a radio receiver and software installed on the classroom computer. Answers are submitted through wireless transmission and points for correct answers are assigned so results can be uploaded to an electronic gradebook. In addition to the radio receivers, clickers may also be used with Wi-Fi. Students see the questions embedded in presentations, which are usually in the form of multiple choice or true - false. After all students have answered the question and submitted the answer the software aggregates that information and displays a graph showing the different answer possibilities and indicating by percentage how many students selected each answer option. With the presentation of the graph, students receive instant and useful tangible feedback. Students can also see if their answer is right or wrong and see how many students selected the correct answer. All this information is presented with no names attached; therefore, the student does not know who got the answer right or who got the answer wrong.

The effectiveness of clickers in polling often depends on how an instructor uses the clickers in the classroom, and there is a learning curve. The more technologically up-to-date an instructor is, the easier it is to implement classroom clicker technology. One current go-to guide of this technology is a book entitled *Teaching with Classroom Response Systems: Creating Active Learning Environments*, by Derek Bruff (2009), and

he indicates that the question type determines the outcome. In a lecture there are many possibilities that come from using the audience response system in the classroom, and how questions are written creates specific types of outcomes. Lecture questions can be written to elicit student response, student conversation, testing to see if a student read the assigned information, and all of these appear to enhance learning (Bruff, 2009).

Testing mode for clicker use is a bit different than lecture mode. Once the clicker is placed in testing mode the student can enter a test version. Prior to an exam, the instructor enters the test answers in the software, and provides the number of versions to be used. An appropriate answer key for each test version is automatically derived using the software. Once the version number of the test is provided by students, the students then starts entering answers. The clicker automatically shows the question number on the screen. After all answers have been entered into the clicker the student can review responses by scrolling through the answers. When the student is finished answering the questions, he or she can submit the answers to the software by pressing the submit key. If true-false and/or multiple-choice question were used for the test, the software can correctly grade the test. If the test is created with a type of question that requires the instructor to grade, such as fill-in-the-blank, the software will grade the test, but the grade must be edited after the instructor reviews those answers. After the test is completely graded, the instructor can perform a simple operation to push the grades from the software to the gradebook, if the gradebook is an online learning system like Brightspace, Moodle, BlackBoard, or other online learning system.

Testing students with clickers is a process that, as previously stated, has a learning curve for the instructor and students, but once mastered, becomes a relatively simple

process. Students can take a test via presentation, where all test questions are presented in the form of a slide presentation. This method might create student animosity toward the use of clickers as all students must have submitted an answer before the slide presentation advances to the next question. Instructors who utilize slides as a testing method can put a timer on the slides and show the timer on the screen to the students, but that might limit some students in answering the question. If a student does not answer the question before the next test question is presented on the screen the student could receive no points for that question.

Another method of testing students with audience response systems is to give students a paper test and have students enter their answers into the clicker. After the students enter all the test questions in their individual clicker, they can easily review the answers on the small display before submitting them. Since the students have the paper test as well, students can indicate their answers on the paper, and put their name on the test, thus eliminating the complete loss of information if there were a technological glitch. The instructor keeps the tests just in case there was a problem with the software placing the correct test score in the student grade book.

Purpose of Study

The purpose of this study was to examine the use of an audience response system in the classroom in an attempt to determine if there is any effect on learning. This was done by looking at four sets of data from four sections of the same course; attendance in connection to participation points or the lack of participation points, a pre/post test score, and a pre/post speech score, and finally, attendance, since attendance would be taken in all four sections.

This study examined test scores from a test presented at the beginning of the semester and the same test presented as the final exam in an attempt to see if there is any difference of averages across the four sections. In the same way the study looked at a pre/post informative speech to see if there was any improvement from the first speech to the second speech, and if so did any one section have more of an improvement over the other three sections. In addition, the study looked at the combination of attendance and participation points with regard to the embedded questions across the four sections to determine whether students were more inclined to be in class where participation points were awarded than in classes where participation points were not awarded. Considering that learning, and attendance, may have been effected by points rather than the use of clickers, the control group and one of the three conditioned sections did not use clickers during the semester.

Because of the time constraint in lecture classes, instructor-led processes are often used. In instructor-led discussions, students can receive feedback immediately after the question, or discussion, as the histogram reveals what percentage of students answered each of the answer options. Students could then be asked to support their answers in an effort to generate discussion. After exploring the logic for the various answers provided, the instructor has a chance to examine the answer options to show why it does or does not provide the best solution, or is or is not the correct answer. The presenter then can reveal the answer. As an alternate procedure, the presenter may reset the slide and ask the question again to see if understanding of the material has improved.

Lecture time and group discussion may ensue before the histogram is presented to the class, in a learning style developed by Harvard professor Eric Mazur, called Peer

Instruction (PI). In using PI the instructor asks as question and presents the histogram of responses. The instructor will then engage students in a short lecture time based on the question without revealing the correct answer to the question. Some instructors take this one step further by having the students engage each other in small groups of three or four students to discuss their answers. After a few moments the instructor may ask the question again, then present the histogram again, to see if students have change their responses. Several variants of PI exist, but whatever variant is used, the focus is on getting students involved in the learning process.

In addition to the variety of instructional styles, two things make utilizing ARS in the classroom tempting; private answering of questions by students and instant feedback. When students are answering questions during the class lecture there can be an element of anonymity, or private responses. No student knows how any other student answered a question; even the instructor does not know how any student answered a question during the lecture. The instructor can go into the software after the class is finished to see how students answered any question during the lecture. Students may be shy, and those who would not normally respond to questions posed by the instructor during the lecture can answer questions without his or her answer being known with the use of ARS. Feedback during a presentation is instant, or at least as soon as the instructor reveals the histogram. Through the use of instant feedback the instructor, as well as the entire class, can see how the class responded to the question.

A Brief Look Back

Audience response systems were first available in the late 1950s; first used by the United States Air Force (Froehlich, 1963). The Classroom Communicator, an

experimental device designed for research and mass teaching, was authorized in October 1950 by the Special Devices Center, Office of Naval Research, and produced by Pennsylvania State College (Carpenter, 1950). The Classroom Communicator was designed for 40 students. "It was believed that the equipment could be planned and built to do two things: (a) provide a means for recording and measuring the reactions of individuals in audiences and (b) provide a means for improving, facilitating, or increasing the effectiveness of learning" (Froehlich, 1963, p. 19). What was eventually built was the Modified Classroom Communicator. The Modified Classroom Communicator incorporated response stations for students, a console for the instructor, and was designed and installed in a classroom that seated 30 students. It was thought that this Modified Classroom Communicator might serve as a prototype for future developments, specifically for instructors involved with mass training programs.

In the early 1960s only a very few institutions used audience response systems, as microprocessors were not yet available to manage the data calculations, and only hardwired audience response systems were used at that time. The University of Illinois had a functional instructional system, named PLATO, Programmed Logic for Automatic Teaching Operations, (Buck & Hunka, 1995), developed by electrical engineers at the university's Computer-based Education Research Laboratory (CERL) (Fahey, n.d.). PLATO consisted of a mainframe but many quirks of the system resulted in lots of downtime. PLATO is still in existence today, a product of Edmentum, which produces a variety of device technologies for the 21st century classroom (www.edmentum.com). Buck and Hunka write that "Although mechanical teaching machines gained short-lived popularity in North America, in some parts of Western Europe, and even in the former

Soviet Union in the latter half of the 1950s and early 1960s, their instructional capabilities were limited primarily because of constraints imposed by their mechanical operation" (Buck & Hunka, 1995, p. 19).

IBM produced an instructional system, initially based on a Digital Equipment Corporation Model PDP-1 computer that controlled up to six terminals. Collaboration between IBM and researchers at Stanford University began in 1964. The system consisted of disk drives, an IBM computer that contained peripheral storage, and each terminal had a display unit with a light pen. This was tested using elementary-school students in math and language arts classes (Buck & Hunka, 1995).

Bill Simmons, who retired from IBM as Director of Planning, reflected on how most meetings were unproductive in the corporate world. He built a system in response, named Consensor, and received a patent in 1974. Simmons referred to his system as a thinking machine, and believed "what was lacking…was a mechanism to help people think and react to ideas" (Day Jr, 1985, 62-63).

Early systems contributed to a student's ability to "inform the instructor of the appropriateness of the pace of instruction" (Judson & Sawada, 2002, p. 4). Classes consisted of lectures that contained a series of multiple-choice questions after the lecture on a particular topic. If enough students demonstrated their understanding of the material by answering most of the multiple-choice questions correctly, then the lecture could move forward. At the end of a question, if a majority of student's answers were incorrect, indicating they did not understand the questions, the instructor repeated the material (Judson & Sawada, 2006). Grant monies usually facilitated the development and installation of the early audience response systems, but a "lack of pedagogical

development associated with these new teaching tools led to a decline of their mention in literature until the 1990s" (Kendrick, 2010, p. 6).

Some 30 years later, a group of scientists developed the next advancement of ARS, Classtalk, in 1985. A company called Better Education Incorporated developed Classtalk, and labeled their product as a classroom communication system. Classtalk promised to help teachers impact students, providing individual feedback via the classroom communicator in a class of 30 students the same way teachers could impact a class of 3 to 5 students in previous years (www.bedu.com). In addition to providing an effective method to create and manage an interactive classroom, setup costs were greatly reduced, as compared to earlier classroom communication systems. While Classtalk represented an opportunity for common use among classrooms, major development did not occur until wireless systems became available at the turn of the century. Following the development of wireless devices, a number of companies entered the wireless marketplace, which further reduced costs to the consumer.

Table 1

Historical overview of clicker development

Date	System	Researcher/Developer
Early 1950's	Classroom Communicator	Herbert P. Froehlich
Early 1960's	PLATO	University of Illinois
1964	Model PDP-1	IBM-Stanford University Collaboration
1974	"Thinking Machine"	Bill Simmons
1985	Classtalk	Better Education, Inc.
1997	i<clicker	University of Illinois Physics Department
2001	H-ITT	2 individual professors-later sold company
2002	ResponseCard	Turning Technologies
2009	Top Hat	Mike Silagadze Mohren Shahini

Audience Response System Products

The audience response system marketplace encompasses a myriad of companies that are currently trying to capture the market. The race by companies to be acknowledged as the premier provider of ARS technology looks like the beta versus VHS competition between video players in the early 1980s, except that in the audience response system marketplace it is more like 10 or 15 providers are trying to establish dominance. Each ARS company has its own philosophy, its own type of clicker, and just

when it appears one company sets the standard, technology improves, which is sending everyone back to the drawing board. At the time of this writing, audience response systems are beginning to use technology currently available where participants log into a website to place their votes from their smart phone, tablet or laptop computer. That possibility in itself creates another problem due to the bandwidth it takes for thousands of students all in one location to login at the same time and answer questions without the entire system crashing. The bandwidth issue, though, is not directly related to this topic at hand, although it should be a consideration when an audience response system is utilized in a situation where many people will answer questions via an ARS at the same time.

Several companies currently provide ARS software and various models of hand-held devices that are used to provide answers. Each company has different origins, but all provide instant, anonymous, feedback to users. The following companies provide products for higher education, corporate solutions, healthcare, k-12 and even the entertainment and television industry; i<clicker, Turning Technologies, and Top Hat.

i<clicker, founded in 1997 by physics professors at the University of Illinois, was created for use with lectures modeled after ConceptTests. ConceptTests were first introduced at Harvard University, and featured conceptual questions that gave students the option to discuss possible answers with a neighbor. i<clicker was acquired by Macmillan in 2005, but several of the original inventors are involved in continued development.

In 2002, Turning Technologies entered the ARS marketplace. Turning Technologies' ResponseCard keypads and ResponseWare software assist instructors and

students with instant feedback by integrating questions within presentation software and recording answers from the students (www.turning technologies.com). Turning Technologies utilizes software on a computer that captures responder's answers entered into hand-held devices. The software captures the answers and can then provide a picture of how responders answered questions throughout the lecture. TurningPoint Anywhere Polling allows interactions with responders in any environment and computer application, not only traditional presentation software.

Founded in 2009, Top Hat utilizes the student's personal mobile devices to allow easy engagement with the instructor. Engagement takes the form of answering questions presented in the lecture or even starting a conversation with the instructor (www.tophat.com). The ease of use with i<clicker is created by an automated system. Since students use their own device, whether it is a laptop, tablet or phone, there is no hardware to install. The cloud base system can track attendance, automate grading and poll students. Audience members can participate in lectures that utilize Top Hat by texting answers, which allows responders without smartphones to contribute to the lecture.

The use of audience response systems is not limited to the education field. In TV, entertainment, and the convention industry, Quick Tally is a leading provider of audience response systems, and utilizes Turning Technologies products as its provider of audience response systems. Such television programs as America's Funniest Home Videos (J. Mulder, personal communication, January 7, 2014), which has "two and a half decades of audience voting using Quick Tally to select the winning video with over 500 shows and $13 million in prizes awarded" (www.quicktally.com/clients). Dancing with the Stars,

America's Got Talent and The Last Comic Standing are but just a few of the television shows who are clients of Quick Tally in the entertainment field (http://www.quicktally.com/clients-tv). Other clients of Quick Tally include Price Waterhouse Cooper, BMW and even the U.S. Department of Homeland Security (www.quicktally.com). While many clients utilize ARS technology in convention situations, ARS is also used to administer testing of various types in corporate meetings of such companies as Anheuser Busch, Disney, General Motors, and The Roper Organization (http://www.quicktally.com/clients).

Audience response systems are now part of the Smithsonian's National Museum of American History as part of the entertainment collection. The original ARS system from "American's Funniest Home Videos" joined the permanent Smithsonian collection in 2009, in a donation by Vin Di Bona, creator of the hit television show.

Challenges in Selecting an ARS Provider

Challenges associated with a provider of an audience response system include current infrastructure, cost of the clicker unit, personal preference, and training and implementation. Since cost reduction is relatively uniform and has led to affordable solutions in many cases, infrastructure, and training and implementation are among the first things to consider when selecting a company. The infrastructure question is fairly straightforward and uncomplicated; however, its importance cannot be underestimated. While not an exhaustive list, some points to consider when choosing an audience response system provider cost, technology and personal preference.

The costs associated with the implementation of an ARS system will directly affect the students. As the user of the clicker, the students must provide their own hand-

held device. This means a student must purchase the device, or borrow a clicker from another student. Clicker costs vary, and is determined by company and specific model of clicker chosen by an institution. Clickers for the Turning Technology system, ResponseCard, range in price from $25.00 to $64.00 at Amazon.com. i<clicker ranges in price from $16.00 to $46.00 at Amazon.com, and $45.00 to $55.00 on the i<clicker web site. Top Hat, which utilizes student's personal devices, offers apps for devices, with access ranging from $24.00 for four months of access to $72.00 for lifetime access.

An institution's current technology infrastructure could hamper the implementation of an audience response system. Efficiency will decline if the wireless network is not able to handle large numbers of clickers transferring data via Wi-Fi simultaneously. Physical environments, an excessive number of students wirelessly connecting to a single computer in the classroom, and out-of-date computer network that inhibits data transfer speeds across a network, can hamper performance of an audience response system. A thorough check of a computer network needs to be performed when selecting an audience response system.

Personal preference may be one of many determining factors when selecting an audience response system. There are certainly several companies from which to choose, and while each company has their own positives and negatives, most any provider of ARS will work well and provide instant, anonymous feedback in the classroom.

The biggest problem it seems in selecting a provider of an audience response system is that more than one company might fit the needs of an institution. An institution's choice of provider could put students at a disadvantage, causing them to pay more money for their audience response device if the university chooses a company with

an expensive clicker. With the speed of technological advancements, providers may update their model of clickers, forcing students to buy more than one clicker during their college, and thereby putting more expense on the student. A university may also change ARS providers before a student's college career is complete, again forcing students to purchase new hand-held devices. If a university does not officially select an ARS provider, students might have to purchase multiple clicker units, from different companies, as different instructors could chose to use different personal response systems in their classroom (Tweeten, Smith, Julius, & Murphy-Boyer, 2007).

Institutions have many reasons to integrate clicker usage into their curriculum, but the decision to select one provider of ARS over another provider should not be clouded by glamour as presented by fancy marketing material. There are at least three negative reasons that students have toward the use of ARS in the classroom: under-usage, learning curve for the instructor and students, and computer problems during usage.

First, "when the use of ARS was used primarily for grading there was a perception among some students that the benefits to the instructors, in terms of efficiency, were greater than the benefits of learning for the students" (Graham, Tripp, Seawright, & Joeekel, 2007, p. 241). The cost of the clicker, about $60 for a new unit as of this writing, directly affects the student. If the clicker is not used effectively the student's thought of the cost of the clicker will overshadow the student's opinion of its effectiveness (Graham, Tripp, Seawright, & Joeekel, 2007). Students also report having negative feelings for mandatory attendance if an instructor makes the use of clickers a part of the grading scheme (Graham et al., 2007). If the instructor does effectively use ARS in the classroom, it would seem that the student would not mind spending that

amount of money. In addition, if the university officially selects an audience response system, the student's clicker would potentially last the 4 or 5 years he or she is enrolled.

Second, infrastructure (e.g., bandwidth, network availability, etc.) and computer-based issues related to hardware and software that occur while using clickers can cause problems. A thorough examination of the institution's system-level bandwidth and network availability should be considered before any purchase. In most instances systems-level limitations are not problematic. Computer hardware and software availability within the individual classroom should be addressed. In addition, it is recommended that computers used to facilitate the use of clickers be plugged into a battery backup unit. Possible loss of electricity while using clickers will create a disaster as all data would be lost. The battery backup unit for an individual computer would give the instructor a few minutes to save student's responses before the computer completely shuts down. While rare, the clicker software can glitch and cause problems with data received by students.

Third, while integrating the use of ARS into the classroom is not overly difficult, there can be a learning curve for instructors and students. Before clickers can be used in the classroom, the instructor must, at the bare minimum, create questions with the clicker software that can be shown to the class via presentation software. Once the instructor is familiar with the process of creating questions within the clicker software, the amount of time it takes to create the questions will diminish. The process of transferring grades from the clicker software to the online grade book is the same in that it is a series of steps, and familiarization with the steps will diminish the time necessary to perform the

function. When integrating clickers into the classroom, the instructor must make sure the students understand how to use the clickers to submit their responses.

Introduction to the Problem

How is learning measured? Is learning achieved when a student can recognize required information, and correctly answer questions on a test? Is learning achieved when a student can think abstractly about a subject and describe related concepts? Students attend college to learn a body of information, and instructors want to make sure their students are learning the correct body of information. So how can learning at the conceptual level be measured?

Paper and pencil tests are the traditional academic process in which a student demonstrates their knowledge. It is known, however, that not all students do well on tests. The use of clickers in the classroom, by creating an active learning environment, provides instant anonymous, feedback when students answer questions presented during a lecture. If programed to do so by the instructor, the feedback will let the student know if he or she answered the previous question correctly. Is this exercise a demonstration of learning in action? Does this exercise assist the student in learning on future tests?

Research Questions

The research questions guiding this study are divided into four areas; attendance, pre-post test, pre-post speech, and final course grades.

Attendance

RH1: I predict that clickers with points (Group 4) will have the least absences due to student's usage of clickers, and the awarding of points for correct answers. Group 2 will have the next least number of absences since students will use clickers but will not receive points. Group 3 will have the next least absences, since students will not use clickers, but can receive points for correctly answered questions. Group 1 will have the most absences since they will not use clickers and will not receive points.

Pre-Post Test

RH2: I predict that clickers with points (Group 4) will have the highest post-test scores due to student's usage of clickers, and the awarding of points for correct answers. Group 2 will have the next lowest post-test scores since students will use clickers but will not receive points. Group 3 will have the next lowest post-test scores since students will not use clickers, but can receive points for correctly answered questions. Group 1 will have the lowest post-test scores since they will not use clickers and will not receive points.

Pre-Post Speech

RH3: I predict that clickers with points (Group 4) will have the highest post-speech scores due to student's usage of clickers, and the awarding of points for correct answers. Group 2 will have the next lowest post-speech scores since students will use clickers but will not receive points. Group 3 will have the next lowest post-speech scores since students will not use clickers, but can receive points for correctly answered questions. Group 1 will have the lowest post-speech scores since they will not use clickers and will not receive points.

Final Course Grades

RH4: I predict that clickers with points (Group 4) will have the highest final course grades due to student's usage of clickers, and the awarding of points for correct answers. Group 2 will have the next lowest final course grades scores since students will use clickers but will not receive points. Group 3 will have the next lowest final course grades since students will not use clickers, but can receive points for correctly answered questions. Group 1 will have the lowest final course grades since they will not use clickers and will not receive points.

Chapter II

LITERATURE REVIEW

While the introduction provided a brief history of audience response systems, a more thorough chronology is needed to fully appreciate the contribution of emerging technologies to the development of ARS. Additionally, the detailed history that follows will provide a better understand of how ARS and learning theory are related. Pedagogical advantages of ARS will also be explored.

Audience Response Systems through the Years

As college instructors introduce audience response systems into their classroom more and more research is being generated from those experiences. In a meta-analysis by Fies and Marshall (2006), many aspects of audience response systems are being researched, to include attendance, participation, motivation, engagement, pedagogical uses, interactive classrooms, agile teaching, feedback, immediacy, efficacy, procedural concerns, more formative assessments, peer instruction, emotions, talkative versus non-talkative students, instructors presenting more responsive instruction, students self-monitoring their own understanding, small group discussion, students answering questions in groups versus students answering questions individually, student interest, student enjoyment, anonymity, pedagogy and even private accountability (Fies & Marshall, 2006).

Table 2

Major Areas of Audience Response Systems Research

Measure	Researcher	Measure	Researcher
Attendance	2001 Burnstein & Lederman	Engagement	2004 Draper & Brown
	2004 Greer & Heaney		2005 Latessa & Mouw
	2007 Caldwell		2006 Bergtrom
			2006 Siau, Sheng, & Nah
			2007 Preszler et al
			2007 Caldwell
			2007 Simpson & Oliver
Attention	2001 Bernstein & Lederman	Feedback	2002 Draper et al
	2003 D'Inverno, et al		2006 Abrahamson
	2003 Elliott		2006 Cline
	2004 Beatty		2006 McCabe
	2004 Draper & Brown		2006 Pelton and Pelton
	2004 Slain et al		
	2005 Jackson et al	Participation	2001 Jones et al
	2005 Latessa & Mouw		2001 Van Dijk et al
	2006 Bergtrom		2002 Bullock et al
	2007 Caldwell		2003 Uhari et al
			2006 Siau et al
			2007 Caldwell
Anonymity	2001 Jones et al		
	2004 Draper & Brown		
	2006 Siau et al		
	2007 Caldwell		
	2007 Simpson & Brown		

Adapted from Kay & LaSage, 2009 and Kay & LaSage, 2009.

Based on research presented on the literature review of this paper, the development of audience response systems went through three phases. Phase 1 began with the need to provide standardization of pilot training within the United States military in the early 1950s. In the 1960s development moved to the university setting where grant-based development continued. Then in the late 1960s into the 1970s development moved to the broader public setting.

In 1963 Herbert P. Froehlich served as a research officer on staff for the Chief of Naval Air Technical Training in Memphis, Tennessee. Froehlich discusses the first audience response system, referred to as the Classroom Communicator, which the United States Navy authorized for production in October 1950 (Carpenter, 1950)(Froehlich, 1963). The Classroom Communicator was designed for use in the training of airplane pilots. Pennsylvania State College developed the Classroom Communicator under the direction of the United States Training Center in Port Washington, New York. The belief was the Classroom Communicator could do two things: "(a) provide a means for recording and measuring the reactions of individuals in audiences and (b) provide a means for improving, facilitating, or increasing the rate and effectiveness of learning" (Froehlich, 1963, p. 21).

The original naval service bulletin called for 40 response stations, which would be located in the armrest of each seat. Each response unit consisted of five response keys. The system also had a console with relay panels and power supplies. The Classroom Communicator was designed for use as students watched training films, thus a film analyzer was part of the original design, which was "a continuous recording polygraph, which printed a record indicating which key was selected at each response station, along

with time marks and film footage for use in analyzing films" (Carpenter, 1950, p. 21). As a student answered a question correctly, answer lights would activate indicating a correct answer (Carpenter, 1950; Froehlich, 1963).

What was eventually built was the Modified Classroom Communicator. This system did not have the console panes, score indicators, the correct answer lights, or a film analyzer, and only had 30 questions that allowed four answer options. This modified system retained the ability to measure results to true-false and multiple-choice questions delivered within the lecture, enabling the instructor to see how each individual responded to questions (Carpenter, 1950).

Research in the late 1950s on the Classroom Communicator, presented by Froehlich, indicated positive experiences for subjects involved in the training sessions (Froehlich, 1963). In one of the first studies with the Classroom Communicator, a study of 276 subjects, randomly assigned to three groups by Twyford (1951), and another with 833 subjects randomly assigned to four groups by Kurpiewski (1958), show a positive effect for subjects who used the Classroom Communicator during training sessions over subjects who did not use the Classroom Communicator during training sessions. The research in this dissertation almost perfectly duplicates the study by Kurpiewski (1958). Kurpiewski's 1958 study had a sample of 833 trainees, randomly assigned to four groups, a control group and three groups with conditions. The control group asked questions after the lecture. The three conditioned groups had questions projected during the lecture, and they answered questions by writing answers on paper or by responding with the Classroom Communicator. Results show that trainees who submitted answers to a

posttest via the Classroom Communicator had superior scores over trainees who submitted answers via paper (Froehlich, 1963).

B. F. Skinner, the behavior learning theorist, experimented with teaching machines in the late 1950s. Skinner broke classroom material into frames of information that allowed for self-pacing. The teaching machines Skinner employed provided immediate feedback to the student. In each frame, the student observed part of the information but had to complete the frame with the correct information before the next frame appeared (Casas, 2002). True to Skinner's belief that behavior modification was possible with arranged reinforcements, Skinner believed that students who were continually engaged with the material, are learning. "Students will tell you this. They are learning, and they know it. Many of them say that it is a weird experience; they know something at the end of the hour which they cannot remember having learned" (Skinner, 1960, p. 189).

San Jacinto Community College is the site of development for the Instant Student Response System. Research at San Jacinto stems from development of four devices, according to Dr. Milo Johnson, college president; answer by card, answer light, S.I.R.S., Student Instant Response Systems, and EDEX, the Environmental Data Exchange (Phillips, 1968, p. 5). Answer by card was a system where students were given four cards with numbers or colors on each one. Students would indicate their answer to given questions by showing the correct number or color. The answer light system was similar to answer by card, this time students had switches that activate different colored lights on the desk. Students would flip a switch to light the correct colored bulb to indicate their answer to a question.

The S.I.R.S., Student Instant Response System, was a hard-wired, cable-bound system, permanently installed in a room for 63 students. The teacher's station featured a control panel that lit up as students activated switches at their desk. The instructor could instantly get a sense of how many students were grasping concepts by simply looking at the control panel. Students then could reset the switch panel on the desk by deactivating their switch. The S.I.R.S. was similar in design to the EDEX system, which was produced by the Raytheon Company. Dr. Johnson indicated the S.I.R.S. cost less to produce locally than purchasing the EDEX system from Raytheon. The commercially produced EDEX system did have one advantage in that meters would register total group response and a percentage of students who selected each answer choice. The EDEX system could record the number of correct responses and then be used by the teacher to note individual weaknesses (Phillips, 1968).

Two other audience response systems appear in early literature, one built and installed in lecture halls of Stanford University (1966), the other was at Cornell University (1968) (Abrahamson, 2006). The early audience response systems were not very effective, limited by the "technological difficulty of implementing such systems in the pre-processor, pre-network age" (Abrahamson, 2006). Users of the early systems reported they "never worked" or were "a total pain to use" (Abrahamson, 2006).

The first apparent use in ARS in the private sector stems from the work of Bill Simmons, who retired from his position with IBM as a Director of Planning in the late 1960s. He began to reflect on the lack of effectiveness of many corporate meetings, and in result created what he called Consensor. He applied for a patent for Consensor in 1972 and received the patent in 1974. Consensor consisted of a group of series of dials, wires,

and lights that allowed the instructor to see the degree to which the audience indicated their understanding of the material. The audience member would indicate their answer to questions by turning their individual dial from 0 to 10. If the majority of students agreed, the green lamp would turn on at the instructor's station. If not the red or yellow lamp would light at the instructor's station. Simmons eventually joined with others to form Applied Futures, which was one of the first audience response companies. IBM had a strict autocratic form of command and control management, which doomed Applied Futures even though response to the ARS technology was strong. Applied Futures was sold to Brooks International in 1986. Remnants of the original company formed by Simmons, ComTec, still existed as late as 2005 (Day Jr, 1985; Kendrick, 2010).

In an attempt to measure the effect of electronic feedback with the use of audience response systems, Rubin (1970) tried to determine how often students admit confusion, in a study of different classes taught by the same instructor (Stephen, 1970). The studies in Stephen's report to the American Educational Research Association showed students rarely admitted confusion or asked for clarification, and student's performance was improved by the use of an electronic feedback system. Further findings of Stephen (1970) showed the support for an anonymous feedback system in a college class. "The AFS failed to improve the learning environment in a college classroom as measured by students' performances on quizzes, exams and final scores" (Stephen, 1970, p. 12). Yet, Stephen summarized, "the Anonymous Feedback System offered students a means of becoming more involved in the college classroom" (Stephen, 1970, p. 13). In the early 1970s research on audience response systems generally showed no impact on learning.

Brown studied a freshman math class in 1972 and recommended further research be completed due to the "favorable subjective evaluation of the SPITZ Student Response System" by the students (Brown, 1972, p. 19). Brown's study showed students had a better attitude toward math when taught with audience response systems, but it appeared that the audience response systems did not significantly improve the level of achievement over classes taught without the use of a audience response system.

The Spitz Student Response System (SSRS) "is an electronic classroom communication system that individualizes group instruction by providing constant interaction between the student and his instructor, as well as allowing the instructor to know exactly how well the entire class – and each student – understands a particular presentation" (Brown, 1972, p. 12). The SSRS was installed in 1969 at Southern Methodist University. The SSRS was employed in a multi-purposed study designed to look at student's anxiety, attitude, and achievement. Test subjects consisted of 73 freshman in a mathematics course, but it was determined that SSRS "did not alter a student's achievement, anxiety, or attitude toward mathematics" (Brown, 1972, p. 12).

Horowitz (1998) observed students in IBM managerial training courses over a 6-month period, with and without the use of an audience response system. The training course consisted of 100 students, divided into five sections of 20 students each. A different instructor taught each section. Results show that students who were in a classroom with response systems in use had higher test scores and were more attentive than students who were in courses taught without the use of a response system.

It was not until the late 1980s that the first relatively easy to install and use audience response system was created. Classtalk was the product of Better Education

Incorporated. Better Education Incorporated was a small group of scientists and educators, a virtual Who's Who in their field, who were determined to find new ways to use computer technology to improve learning and teaching. Classtalk, received a patent in 1991: Dr. Louis Abrahamson led this effort. The goal of Dr. Abrahamson and his team was to create a more interactive classroom that would create a better learning environment for students. Classtalk itself was not around very long and eventually sold. There were several negatives involved with this technology: the system had to be hardwired in the classroom, the system had to be pre-ordered with a specific number of units installed, and it was expensive. The price to install the hardwired system was roughly $10,000. The Classtalk system was comprised of three major components: the input device, a central computer and a network that connected them together. The input device was a Hewlett-Packard 95LX palm-top computer, with a full Qwerty keyboard and a 40 x 16 character LCD screen, and later modifications allowed the use of Texas Instruments TI 85 calculators as the input device along with an expanded network design (Dufresne, Gerace, Leonard, Mestre, & Wenk, 1996). In 1996 the configuration of Classtalk required an Apple Macintosh computer with 8M RAM and a second video card. Two video cards provided the instructor with one monitor to view the different control options via one video card, while the second video card could support a second monitor or projector, and the two video cards could support separate images simultaneously.

The heart of Classtalk was the system software. This system allowed the instructor the opportunity to

> create tasks or questions in a variety of styles, present them to the audience by projection or by downloading questions and/or text to the palm-top computers, permit response for a selected interval of time, govern the type of responses allowed, analyze responses in assorted fashions, and project the results of the analysis to the audience (Dufresne et al., 1996, p. 8).

Classroom Communication Systems (CCCs) were viewed as having the potential of transforming the way science was taught in large lecture settings. In using the Classtalk system, Dufresne, Wenk, Mestre, Gerace, and Leonard (Dufresne et al., 1996) developed a style of teaching that created a more active, student-centered classroom setting. Classtalk made it easy to engage students, from the instructor's perspective, and created an environment that enhanced student interaction.

According to Dufresne, the initial courses where Classtalk was utilized produced students who "expressed a high degree of satisfaction with our use of questions, cooperative group work, class-wide discussions, and interactive lectures" (Dufresne et al., 1996, p. 21). Classtalk helped to shift the passive, teacher-centered classroom toward an active classroom, one that was student-centered and accommodated a wider variety or learning styles. The goal of active learning was approached through seven stages: "question generation and selection, sending the questions (to the palm-computers), cooperative group work, collection of answers, histogram display, class-wide discussion and closure" (Dufresne et al., 1996, p. 13).

After short lectures students would answer a question, or series of questions, on the previous lecture. After students answered questions, a histogram, representing the students' answers, could be projected by the instructor for all to see. After displaying the

histogram, the instructor would discuss answers, clarify information, and if it appeared most students did not get the correct answer, the instructor had the option of resetting the questions so students could answer the question again, without indicating the correct answer. Then after students responded to the question the second, or even a third time, the instructor would reveal the answer or answers. The teaching style, called Peer Instruction (PI) and developed by Eric Mazur, followed the constructivist theory of communication, whereby knowledge is gained by the student attempting to use current knowledge to make sense of new knowledge or experiences. The social development theory, a development of Lev Vygotsky and similar to the constructivist theory of communication, focuses on cognitive development. Vygotsky's theory says that social interaction is important to learning. As an example, Vygotsky points out that children are taught to point their finger, but doesn't understand that it has meaning until people react at finger pointing. As the child continues to point a finger, an interpersonal connection between individual is developed.

The constructivist learning theory developed by Jerome Bruner differs from the behaviorist style of learning, which is a passive style that consists of strictly lectures in the classroom with no student involvement. Like Vygotsky's social development theory, constructivist theory says that "learning is an active process where learners construct new ideas or concepts based on their current/past knowledge" ("J. Bruner," 2013).

Classtalk had several positives that are seen in other developments of audience response systems: the ability to create questions before class or during class in response to students' answers, give the student and instructor immediate feedback as students answer questions, and the ability to record and save student responses during the class.

Lasry (2008) reported that peer interaction (PI), the teaching style developed by Eric Mazur (Lasry, Mazur, & Watkins, 2008), often used with the successful implementation of an audience response system, is an effective instructional approach. Another study, comparing flash cards and audience response systems, showed no significant differences in conceptual learning gains, nor in traditional examinations. While the study showed no learning gains in using ARS, Lasry points out that "the contribution of clickers is more on the teaching side than on the learning side of the educational equation" (Lasry, 2008, p. 243). Flash cards took class-time to tally student responses in Lasry's study, but ARS allowed students to receive response in real-time.

One could argue that attendance, participation, and attention are elements that must be satisfied in some way for learning to occur. So the question surrounding audience response systems might be; does the use of the audience response system in the class affect learning? That is actually a question that has been answered in a myriad of ways, and unfortunately those answers would create a nice scatterplot if put in graph form. How does someone measure learning? In today's learning environment many people consider learning dependent upon test scores. Is that learning or is that an example of a student who successfully learns to give the instructor specific information that was presented during the semester? In addition, if a student understands what specific information the instructor is looking for, and provides that information on a test, it could be argued that that represents learning as well.

Gauci, Dantas, Williams, and Kemm (2009) report students improved examination results over previous years with the use of a personal response system in undergraduate physiology. Shapiro (2009) reported a 20.9% increase in answering

questions correctly in a course with audience response systems over the same course without personal response systems. Attendance, greater retention, and comprehension were also reported in the classes with audience response systems (Shapiro, 2009; Cue, 1998).

The use of technology in the classroom makes an impact on students, instructors, and the process of lecturing and learning (Winograd & Cheesman, 2007, p. 180). That technological impact can be negative or positive. Audience response systems are no different. Along with different outcomes created by using ARS in the classroom, the use of an ARS will have direct effects on students and instructors. Some instructors require students to attend class and take attendance daily. According to Winograd & Cheesman, "If attendance is not monitored, retention and enrollment can decline" (2007, p. 178). Conversely, some instructors have different attendance policies, only requiring students to be present for tests. The use of an audience response system, when used with questions that generate points for students toward their final grade, gives students an incentive to attend class. The use of an audience response system in the classroom is not only about some abstract idea of learning but it is also about interactive learning, where the student is active in the learning process by answering questions presented through the presentation via the clicker, and if the student is not in class questions cannot be answered and points will not be obtained.

Along with attendance, participation and student-instructor interaction is another element that might have an indirect impact on students by some (Hall, Thomas, Collier, & Hilgers, 2005). If a student is in class where an audience response system is not used, what must the student do to be considered participating? If a student is in class where an

audience response system is used a student might not participate in responding to questions embedded within the lecture. By not participating, no points would be obtained for that lecture period. In this specific situation if a student were in a class where the instructor didn't actually call roll, but instead used the company software and just looked at who answered questions with their clicker for that lecture period, that student might be counted absent. If a student were in a class where an audience response system was used, it could be said there is some level of participation if the student actively answered questions via the clicker to obtain points for that class time.

Student attention is another indirect element that might be impacted by the use of an audience response system in the classroom. Students in a classroom where an audience response system is used should also demonstrate some level of attention if questions are to be answered via the clicker: "Focused attention to the learning task and the material is obviously important to learning" (Chen, Whittinghill, & Kadlowec, 2010, p. 165). The student must have paid some attention to obtain information from a lecture to answer a question that pertains directly to what has been covered during that class period. The student who falls asleep during the class, or is doing something else like checking Facebook, cannot pay attention to the lecture in order to answer questions correctly. The use of an audience response system might create an environment where students are enticed to pay attention in a greater capacity than if there were no audience response system used in the class.

The use of an audience response system in the classroom will increase the amount of feedback students receive. In a class setting, where students raise their hand and wait for the instructor's recognition, only the student who answers the question aloud will

receive feedback on their specific response. By using an audience response system, students receive instant feedback when they are shown the answer possibilities on a slide. Students immediately know if the answer they selected was correct. Epstein et al. (2002) cite the immediate feedback function of ARS as one of the technology's major advantages. Shapiro (Shapiro, 2009) points out that, while there are several advantages of ARS over in-class paper-based assessment, one advantage is the instant feedback provided students. Since the correct answers and class performance are projected instantly to the class, the instructor is able to reinforce comprehension or correct misconceptions immediately (Shapiro, 2009, p. 21).

The specific classroom environment that the audience response system is used in might affect those in the classroom setting. For example, the impact of an audience response system on attendance of a class with no more than 30 students might be negligible, however in a large classroom setting, where the enrollment number was just over 200, the use of a personal response system improved attendance by as much as 30% where points were given for questions presented during a PowerPoint lecture (Shapiro, 2009, p. 20).

Research shows an increase in student participation, and student-instructor interactions, along with high levels of engagement, motivation, and learning (Hall, Thomas, Collier, & Hilgers, 2005). Research also shows (Hall et al., 2005, p. 105) that students perceive instructors who teach in a responsive manner as "caring." However, details about how audience response systems influence affective learning are important, but are still not well researched.

Amy Shapiro (2009), found attendance rates of about 80% by using ARS and paper-based pop quizzes to encourage attendance. Shapiro's findings showed an improvement of 30% over courses when paper-based extra credit opportunities were offered. Shapiro questions the use of ARS when compared with attendance rates in courses with paper-based pop quizzes. However, Shapiro supports ARS as a simple and time-saving technology, both in and out of class. Using paper-based pop quizzes requires the distribution, collection and grading of possibly hundreds of papers a week. By utilizing ARS, entering grades in an online grade book can be as simple as clicking a few buttons to upload grade information for each student.

Ribbens, (2007) reported a jump in attendance by 20% after technology was introduced in the class. Attendance was affected positively in classes (Woods & Chiu, 2003) and always above 80%, significantly higher than the previous years' sessions that did not include a response system (Boyle & Nicol, n.d.). "Clickers were shown to have a positive effect on students' concentration, enjoyment and attendance" (Kennedy & Cutts, 2005, p. 4). Clicker points were indicated as a motivator to attend class (Trees & Jackson, 2007). Student response systems have also shown to increase participation in classes as measured by institution-wide evaluations across disciplines (Draper & Brown, 2004).

Current audience response systems can be used in just about any classroom on a college campus. Since this technology is relatively new there has not yet accumulated a mass of research data like someone will find on many other topics in education. Research on all areas of audience response systems is still relatively limited, and, while they could be used in any classroom, most of the research on audience response systems

has come from science classes. A cursory search of audience response systems in a higher education setting will evidence articles where clickers are used in physics courses, medical programs, engineering classes, physical and life sciences.

In the college classroom, clickers serve as an extension of students raising their hands in response to statements or questions by an instructor, but not all students respond to questions by raising their hand. Some students are shy; some students do not know the answer to a question and therefore have no reason to raise their hand. Other students know the answer but still do raise their hand to statements and questions presented by the instructor in the classroom.

Audience response systems have gained acceptance in educational use, and use is increasing, especially among college and graduate students (Graham, Tripp, Seawright, & Joekel, 2007). "Multiple studies have found that the system increases participation rates and helps build students' self-confidence, knowledge, and master of the material" (DeSorbo, Noble, Shafer, Geren, & Williams, 2012, p. 531; Cain, Black, & Rohr, 2009; Graham et al., 2007). The ARS has been rated more engaging and enjoyable than lecture formats (Boyle & Nicol, n.d.) by audience participants. "Students report that the ARS provides them with incentive to pay closer attention to the lecture material and respond to in-class questions over and above that of traditional formats" (DeSorbo et al., 2012, p. 531; Mestre, Gerace, Dufresne, & Leonard, 1997).

Derek Bruff, formerly a professor of mathematics at Harvard University and now professor of mathematics and director of the Vanderbilt Center for Teaching at Vanderbilt University, presents the idea of how audience response systems can create active learning environments (Bruff, 2009). The Center for Teaching website at

Vanderbilt University has at least 280 references that point to research on audience response systems that include books, literature reviews, research articles, and even vendor comparisons and adoption issues (http://cft.vanderbilt.edu/docs/classroom-response-system-clickers-bibliography/). Many other researchers are adding to the body of literature with research in understanding how audience response systems influences students, instructors, and the many aspects of their surroundings.

Audience Response Systems and Learning Theories

How do people learn? Of the traditional learning theories, which include behaviorist, humanist, cognitivist, social cognitive, and constructivist, it does not appear that one theory takes the lead in research when audience response systems (ARS) are used (Merriam, Caffarella, & Baumgartner, 2007). However, a few theories have been incorporated into research in a meaningful way on the use of clickers in the classroom.

Trial and error learning, labeled such by theorist Edward L. Thorndike, is another aspect of using audience response systems that seem to fit the behaviorist orientation. It depends on how the instructor utilizes ARS, but questions slides can be reset after students have answered the question. The slide can be reset without revealing the answer to the students, students can then answer the question a second time after a short lecture. Students could enter a discussion, hear more explanation about the question, and answer the question again without any negative effects on the points they would receive for answering question correctly (Merriam et al., 2007).

Behaviorist learning theory, developed by John B. Watson, seems a good fit for use of audience response systems in the classroom. In the behaviorist theory three basic assumptions are held to be true with the context of the behaviorist theory.

First, observable behavior, rather than internal thought processes, is the focus of the study; particularly that learning is manifested by a change in behavior. Second, the environment shapes behavior and what one learns is determined by the elements in the environment not by the individual learner. The third axiom is concerned with the principles of contiguity and reinforcement. Contiguity looks at how close in time two events must be for a bond to be formed, while reinforcement is the means of increasing the likelihood that an event will be repeated. Both of these are central to explaining the learning process (Merriam, Caffarella, & Baumgartner, 2007). Concerning contiguity, the greater the bond. Concerning reinforcement, positive consequences, which immediately follows a response increases the likelihood of that response.

B. F. Skinner's contribution to learning, referred to as operant conditioning, also seems fit for the use of clickers in the classroom. Skinner's research shows that reinforcement of behavior will create a desired effect or action, while a lack of reinforcement will decrease undesired behavior. Skinner sees the ultimate goal of education as assuring the survival of the human species, societies and individuals, and that the teacher can assure this survival by creating an environment that brings about the desired behavior, while extinguishing the undesired behavior (Merriam et al., 2007). In clicker usage, the question presented to students is a stimulus, students providing the correct response receiving points for correctly answering the question increases response for desired behavior. Undesirable behavior, such as inattention…improper…is decreased and may be diminished. (handwritten notes on page 35).

From a different perspective, Judson and Sawada (Judson & Sawada, 2002, p. 192) point out that electronic response systems show a promising future when used in a

manner that fits constructivist-oriented lectures. Use of clickers in the 1960s and 1970s was based on the behaviorist learning theory, which may be partly to blame for their lack of improvement during those years (Judson & Sawada, 2002).

Alexander Astin developed a lesser-known theory, the Student Involvement Theory, in 1984; it describes the importance of student involvement in college. Astin presents the argument that "involvement requires an investment of psychosocial and physical energy" (http://studentdevelopmenttheory.weebly.com/astin.html). The theory examines how student involvement in campus clubs, residence hall activities, and other co-curricular activities can be related to student success in the classroom. But the theory is also broad enough that it "allows researchers to use it to explain students' involvement in the classroom, independent academic work, and extracurricular activities" (Vaterlaus, Beckert, Fauth, & Teemant, 2012, p. 293)

How Clickers Impact Learning

In a rising area of use of audience response systems, synchronous multi-campus location, audiences believed having ARS in the classroom made them feel better about the class, encouraged participation, and conferred a desirable level on anonymity (Clauson, Alkhateeb, & Singh-Franco, 2011). For example, in a 2011 study, which took place in three pharmacy school classrooms, located in Fort Lauderdale, FL, West Palm Beach, FL, and Ponce, Puerto Rico, 85% of students reported ARS made it easier to participate as compared to communicating with the instructor via microphones from their individual seats. A majority of students, 93%, report that they valued the ability to respond anonymously via the ARS. While the ARS was used in pretesting and posttesting in the study, results of the test scores were not reported (Clauson et al., 2011).

Motivation

Motivation is a personal investment by an individual into a specific task (Maehr & Meyer, 1997). In the workplace, two studies presented by Imberman showed that workers from the manufacturing sector were motivated by dollars more so than gift cards for attendance, service awards, educational assistance, and even public recognition or parties (Imberman, 2002, 2012). While business is focused mostly on economic incentives, those in education recognize a variety of ways to motivate students to learn.

"Educational psychologists have long recognized the importance of motivation for supporting student learning" (Lai, 2011, p. 4). In looking at why people perform tasks, continue learning that is formal, or engage in self-directed learning as an adult, one must look at motivation and incentive. While the two terms are separate, and different, they are linked together to reveal why people do things, such as more work or more efficient work in the workplace, learn a new skill or knowledge set because they want to, or, learn information that can be given back to the instructor for a grade as in an educational setting.

According to the Merriam-Webster Dictionary, incentive is defined as something that encourages a person to do something or to work harder ("Definition of Incentive," October 11, 2014). The incentive becomes the motivator, the reward for performing a task, especially in the workplace. In the education setting, when using ARS, the incentive is points toward the final grade in a course when correctly answering questions. However, there are some perceived negatives for attaching clicker-use with questions for points in the classroom.

Motivating students by placing them in homogeneous groups shows some academic success in the literature (Tobolowsky & Associates, 2008). The comprehensive university where this study took place utilizes FLCs, Freshman Learning Cohorts, in an effort to increase retention and graduation rates. Outcomes of grouping students in groups, though, could be dependent on the personal goals of the students themselves. "Students could enter the same group learning situation with very different goal profiles" (Wosnitza & Volet, 2012, p. 599).

Chapter III

METHODOLOGY

Apparatus

Turning Technologies student response devices, or clickers, themselves are generally about the size of an Apple iPhone; 4.87 inches tall, 2.31 inches wide, .30 inches thick, weighing 3.95 ounces (http://www.apple.com), which means they are easily held in the palm of the hand. More recent models are slightly larger and may employ the use of a Qwerty keyboard similar to that found on a Blackberry device (http://www.turningtechnologies.com/response-solutions). Clickers are battery-operated units, with a keypad that allows a student to enter a selection by pressing a button. Clickers typically have a small display at the top of them that allows the student to see the answer choices selected and other information relative to responses. Since clickers are lightweight, mobility is a plus, and they can easily fit in a pocket or small bag for carrying.

Figure 1. Turning Technologies ResponseCard NXT

When using in the presentation mode submitting responses is as simple as pressing a button on the clicker that corresponds to the answer the student wants to provide. Sometimes students look for the enter key on the clicker to submit their answer choice, but do not realize that the clicker software immediately receives the response once the corresponding button is pressed. To change a response, the students simply presses another button on the clicker. The last button pressed on the clicker before time runs out may be the accepted answer that the clicker software grades. This is also true when students use clickers to submit responses to a test. Once the clicker is in testing mode, the student simply presses a button on the clicker unit. The clicker is then ready for the response to the next question. There is no enter key on the clicker unit, and from personal experience, I see where this seems to confuse some students. An answer can be changed as long as the presentation software is accepting answers. The last answer submitted before the presentation software stops accepting responses is the answer that

counts for a student. The instructor may also limit a student's submission to the first response made.

Operational Definitions and Research Design

Audience Response System (ARS): Often referred to as "clickers," an audience response system comprises of individual hand-held units used by students to answer questions embedded within presentation software. Third-party software that works with the presentation software aggregates the data from student answers and presents a histogram to students.

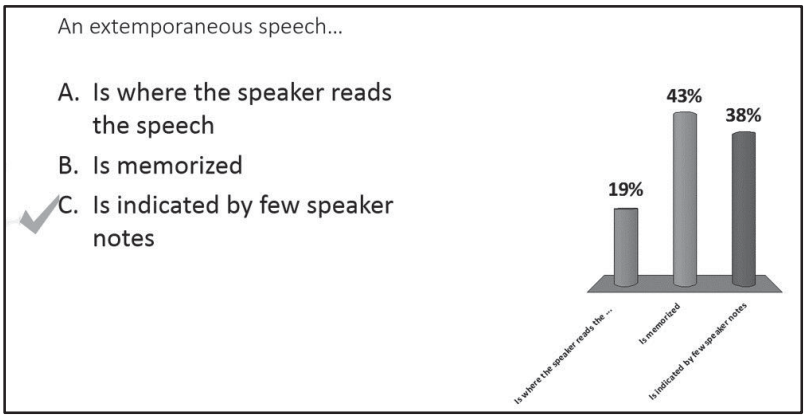

Figure 2. Sample PowerPoint slide with question, correct answer and histogram

Attendance: For the purpose of this study, students were marked present for the class period if they were in the classroom when roll was verbally called. While it is possible to use clicker data to determine if a student was present for any given day, that method was not utilized for this study.

Feedback: the dictionary defines feedback as "helpful information or criticism that is given to someone to say what can be done to improve a performance, product, etc." ("Merriam-Webster.com," n.d.). Simply stated, in this class feedback was the

composite of the answer options to the question. Immediate feedback informed the student that the answer they chose was correct or incorrect.

Participation Points: participation points on the points received for correctly answering the questions embedded within the lecture.

A quantitative research approach was used to examine students in four sections of a communication course at a comprehensive university in the state of Georgia, in an effort to determine if, or how, using an audience response system (ARS) in the classroom affects learning. Multiple instruments were used; an anonymous demographic survey and a pre and post test. To determine if clickers affect learning, a quasi-experimental design was used that had two sections of the class using clickers to answer questions embedded within the daily lecture, while one section wrote the answers to the same questions on paper, and the fourth section, the control group, was not exposed to the questions used in the other three sections. Students in all four sections presented the same informative speech twice, with two weeks of informative speaking lectures embedded between the two speeches. This created a pre and post speech scenario similar to the pre and post test scenario.

Instruments

The study employed a quantitative approach to answer the research questions. A consent form was given (see Appendix B) to each student after a verbal explanation of the study, during the second week of school. The survey contained demographic information, descriptive data, and Likert-scale questions dealing with the student's use of technology.

For the public speaking assignment of the study, a rubric was used that graded on the following areas (see Appendix E):

1. introduction: attention gained
2. introduction: topic/thesis stated clearly
3. introduction: previewed main points
4. body: structure clear/logical
5. body: transitions used well
6. body: usefulness of information clear
7. body: source cited
8. delivery: extemporaneous
9. conclusion: close with strength
10. overall impression

Participants

This study consisted of students who were enrolled in a public comprehensive university in the state of Georgia. These students registered for the Introduction to Human Communication course, COMM 1100, with the following course description: "A broad approach to oral communication skills including intrapersonal, interpersonal, small group, and public speaking" (*VSU Catalog*, 2013, p. 301). The course was taught by me during the fall 2013 semester, and students registered for the class as part of their regular class schedule.

The study was explained to each group during the second week of the semester. During the same class period the study was introduced, students completed demographic forms, which covered such information as class rank, major, and asked questions about their technology usage.

Students were informed that the study was voluntary and no extra credit would be given for a student's participation. Students were informed to not put their name on the

consent form, and to decrease confusion, no "name" line was anywhere on the form. If students wished to not participate in the study, they were told to write their name on the top right of the form along with the following statement: "I do not wish to participate in this study." Students were informed that they must be 18 on the day the consent form was completed, and if they were not 18 they could not participate in the study. Students were told to write their name on the top right of the form if they were under 18, along with this statement: "I am under 18." No student indicated their desire to not participate in the study, however four students identified their age as under 18. Further, students were informed about, and received an email in their university account with an explanation of the study, and the option to change their mind about participating in the study. To indicate their change of mind, students could reply to the email, indicating their wish to not participate in the study. The email sent to the students also contained the contact information for the Institutional Review Board administrator if they had any further questions. No student sent an email indicating they wished to be dropped from the study. This study was determined to be exempt from the Institutional Review Board oversight (see Appendix A).

Procedure

Students were introduced to the study and completed demographic forms for the study at the beginning of the semester. Students were not required to participate in the study, and could withdraw from the study anytime during the semester. Students received neither extra credit nor compensation for being a part of the study. Students who were seventeen on the day the demographic forms were completed were informed they could not be a part of the study due to their age. Students who did not want to be a

part of the study, or who were seventeen on the day the demographic forms were completed, wrote their name on the top right of the demographic form. Students who were 17 wrote their age under their name to indicate they were 17.

The pre-test was given during the next class that followed, where students completed and signed the consent form. This test was a 50 question, true-false test, and it was introduced as an instrument that was designed to establish what the students knew about communication. The students were informed that this test would be graded. The test was graded, however grades did not go into the class grade-book.

This research study took place during the fall semester of 2013 at a comprehensive university in the southeastern United States. Four sections of communication 1100, the introduction to human communication, taught by the same instructor, were used for the study. The four sections are identified as Group 1, the control group, Group 2, Group 3, and Group 4. Group 1, the control group, met Tuesday and Thursday from 3:30 pm until 4:45 pm. Group 2 met Tuesday and Thursday from 9:30 am until 10:45 am. Group 3 met Tuesday and Thursday from 12:30 pm until 1:45 pm. Group 4 met Monday, Wednesday, and Friday from 1:00 pm until 1:50 pm. The study was based on a 2 x 2 quasi-experimental design, with two main effects; points and clickers. There was no random assignment of students as students in the four sections enrolled for the course as part of their normal load of classes for the semester, but the sections were chosen randomly for the condition that they were exposed to either the control group or one of the three experimental groups.

This study presented the same questions to students in the three conditioned sections during lectures, but each of the three sections answered the questions differently;

two of the sections received participation points for correctly answering questions while the other two did not receive participation points for correctly answering questions. Group 2 used clickers but did not receive points for correct answers. Group 3 put their answers on paper, meaning they did not use clickers, but received points for correct answers. Group 4 did use clickers and received points for correct answers. Group 1 was the control group; they did not answer the questions, and received no points for each lecture. By having the three sections answer the questions differently, the students should respond differently to interaction and feedback, as compared to the control group. Students who could receive participation points for answering questions should have a better attendance record since they had an incentive to be in class. The students who could not receive participation points for answering questions, Group 1 and Group 2, had no additional incentive to be in class, and therefore their attendance rate should be less than the two sections that have an incentive to be in class, Group 3 and Group 4.

Students could receive a total of five participation points per chapter covered in the text. For the purpose of this study, students could receive the five points if they answered one of the five questions correctly that was presented in the daily lecture.

Table 3

Anticipated Attendance for the Current Study's Empirical Design

		Clickers Used	
		No	Yes
Points Given	Yes	Group 1: Control group, highest number of absences	Group 2: Lower number of absences than control group
	No	Group 3[1]: Fewer absences than group A; More absences than group2	Group 4: Least number of absences

Note. [1] Wrote answers to questions on paper

Each group received the same lectures over the same material at the same time during the semester. Each of the three conditioned sections were presented the same embedded questions during the lecture, and all four sections moved through course material at the same pace. Three conditions were applied to the three sections to determine if the interaction with the use of clickers and attendance had any effect on learning, as compared to the control group.

Data gathered for the study included attendance, scores from a pre-test/post-test, scores from a pre-speech/post-speech/, and daily points during the lectures. The semester began with a pre-test, given to all four sections. This test was actually the final exam but was labeled "dissertation test" at the beginning of the semester and labeled "final exam" at the end of the semester. No other changes existed between the two tests.

Since the course used for the study was a communication course, all students were required to give an informative and persuasive speech during the semester. Scores from the informative speech were also used for the study. Students were assigned the informative speech during the semester and were given one week to prepare their speech. No lecture material was presented on public speaking prior to the speech. Students were encouraged to not educate themselves on public speaking, but rather prepare and give their speech based on the knowledge they had at the time. A simple show of hands in all four sections indicated only a small percentage of students had actually given a speech before this course. After all students presented their informative speech, each section was presented with two weeks of lectures on public speaking. Students were also shown public speeches during this time, and the positives and challenges (negatives) of the viewed speeches were used as part of the lecture. The same conditions of clicker questions and points continued during this two-week period. The control group received no treatment. After the two-week period of lecture on public speaking, the students presented the same speech, in the same order so each student had the same time to prepare.

Three people graded the speeches, the instructor and two students pursuing a master's degree in communication. The scores from the graduate students were used to show reliability and lack of bias in the instructor's scores; however, they were not used as actual grades for the students. The students were told grades from both speeches would be used as part the study, however only the second grade was actually entered into the grade book.

Table 4

Groups and Treatments

Groups	Treatment
Group 1 (Control Group)	Clicker – No
	Points - No
Group 2	Clicker – Yes
	Points – No
Group 3	Clicker – No
	Points – Yes
Group 4	Clicker – Yes
	Points - Yes

In Group 1, the control group, students will see the questions but there will be no discussion of the questions pertaining to their answers, therefore no feedback. With no incentive to be in class to receive participation points one might expect to see more absences overall in this class. One might also expect to see less improvement of grades in the pre-and post-test and the pre-and post-speeches.

In Group 2, the class that will use clickers to answer questions but will not receive participation points, one might expect a little improvement on grades over the first test to the second test, as well as the speech and possibly over the entire course. Attendance might be a little better than Group 1 since students will answer questions with their clickers.

In Group 3, the class that will use paper to answer embedded questions within the lecture and have the ability to receive participation points, one might expect to see a little better attendance that Group 1 and Group 2, and since they have an incentive to attend class there may be a greater improvement of grades in the test and the speech than in Group 1 and Group 2.

In Group 4, the class that will use clickers to answer questions embedded within the lecture and can receive participation points, there could be the least number of absences of all four sections and the greatest improvement of grades in the test and the speech since the students have an incentive to attend class on a daily basis.

In addition to the pre and post-test and pre and post-speech, students will use clickers to take other tests during semester, as well as complete the demographic form at the beginning of the semester.

Table 5

Grade Book Scheme

Grade Book Item	Ch 2	Ch 3	Ch 4	Ch 5	Ch 6	Ch 7	Ch 14	Info Quiz	Info Quiz 2	Persuasion Quiz	Info Speech
Points	5	5	5	5	5	5	5	5	5	5	100
Group 1											Y
Group 2											Y
Group 3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Group 4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Grade Book Item	Info Speech Outline	Info Speech Time	Info Speech Source Cards	Pers Sp	Pers Sp Outline	Pers Sp Time	Pers Sp Source Cards	Test Ch 1-7	Informative Speaking Test	Persuasive Speaking Test	Final Test
Points	10	10	10	100	10	10	10	100	100	100	100
Group 1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Group 2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Group 3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Group 4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Chapter IV

RESULTS

Demographics

Students enrolled in one of the four sections of the course Introduction to Human Communication, as part of their regular semester class schedule, at a comprehensive University within the state of Georgia, taught by the author during the fall 2013 semester. The four sections, referred to as Groups 1, 2, 3 and 4, consisted of a control group and three conditioned groups. Group 1 was designated the control group.

A quasi-experimental design was employed as a result of the lack of control over how subjects were assigned to each group. No student indicated his or her desire to not be a part of the study. Each group consisted of male ($N = 40$) and female ($N = 62$) students of different races (White; $N = 49$, Black; $N = 35$, Other; $N = 14$), majors, and ages. Ages ranged from 18.11, SD = 1.04, in Group 4, to 19.75, SD = .46, in Group 3, so while the average age differed only slightly, the age for Group 3 was slightly younger. The majority of students in each class were female, and range from 52% in Group 1, to 79% in Group 3. Group 1 and Group 2 had students of all four class rankings, Group 4 only had freshman, sophomore and juniors. Group 3 only consisted of freshman, since it was a freshman year learning experience cohort.

Enrollment in the four classes was $N = 113$. No student objected to being included in the study. Four students listed their age as 17 on the demographic form and

could not be included in the study. Seven students dropped the course the second week of school. The final number of students who participated in the study $N = 102$ represents 96.23% of 106, the enrollment in the four classes. Gender representation for students in the study shows more females in the study than males; males $n = 40$, females $n = 62$. Classification of students is as follows: freshman $n = 53$, sophomore $n = 30$, junior $n = 13$, senior $n = 5$.

The largest single group of students identified their major as Mass Media $n = 18$. The second largest group identified their major as Undecided $n = 16$. Since this is a core class for the university, students represented many different majors; Mass Media $n = 18$, Undecided $n = 16$, Psychology $n = 4$, Dance $n = 3$, Speech Communication $n = 3$. The balance of majors identified by students was a broad representation of majors offered by the university, including sociology, chemistry, marketing, theatre, business administration, and accounting (see Table 6).

This comprehensive university has implemented the use of Freshman-year Learning- experience Cohort (FLC) groups in an attempt to increase student retention. The emerging leaders FLC is an application-based program, and requires students to have a minimum GPA of 2.5 for acceptance. Students accepted into the emerging leaders FLC must also show a history of extra-curricular activities during high school. This FLC is only open to incoming freshmen, and is limited to 75 students each fall semester. Students in Group 3 of the study were in the emerging leaders FLC as part of their freshman year.

Table 6

Demographics of Classes in Study

Demographic	Group 1 Control Group		Group 2 Clickers-No Points		Group 3 Points-No Clickers		Group 4 Clickers With Points	
Age								
Average	19.41		19.75		18.11		18.96	
SD	1.25		2.40		.46		1.04	
Gender								
Male	13	(48%)	11	(38%)	4	(21%)	12	(44%)
Female	14	(52%)	18	(62%)	15	(79%)	15	(56%)
Class Ranking								
Freshman	9	(33%)	9	(33%)	19	(100%)	16	(59%)
Sophomore	12	(44%)	13	(48%)			4	(15%)
Junior	3	(11%)	3	(11%)			7	(26%)
Senior	2	(7%)	2	(7%)				
Ethnicity								
White	11		17		8		13	
Black	11		7		8		9	
Other	4		3		3		4	

Section 1 – 1 did not indicate race, Section 4 – 1 did not indicate race

The freshman learning community Group 3, along with Group 4, had experience with clickers earlier in their school years, both in the 6th grade. Group 1 reported the earliest usage as 7th grade, while Group 2 reported the earliest usage as 8th grade. Group 3 had 13 students who used clickers during their school years. Group 2 and Group 4 each

had 10 students who used clickers in school, while Group 1 only had 6 students who used clickers in school.

Table 7

First Clicker Usage for Students by Grade

Grade	6	7	8	9	10	11	12	Enrolled	
Group 1		2	1	2		1		6/27	22%
Group 2			2		3	4	1	10/27	37%
Group 3	2	2	1	4	3		3	13/19	38%
Group 4	1	2	1	3			3	10/27	37%
Total	3	6	5	9	6	5	7	39/100	39%

Four areas of interest were examined among the four groups studied; attendance, a pre-post informative speech, final exam scores, and final grades among the four groups. Research questions were analyzed using quantitative methodology.

Concerning attendance, it was predicted that Group 4 would have the least number of absences during the course of the semester. This prediction was made because Group 4 used clickers and received points for correct answers. It was thought that students would be motivated to attend class, knowing that if they were not in class they could not answer questions with their clicker and therefore would not get clicker-based points during the class lecture. Further, it was predicted that Group 1, the control group, which did not use a clicker during class and did not receive points, would have the highest number of absences during the course of the semester. It was thought that

students in Group 1 might not have the motivation to attend class as much since attendance was not reinforced.

Concerning final exam scores, it was predicted that Group 4 would have the highest average on the final exam because of the opportunity to receive feedback through the use of the clickers during class lectures. Group 1 was predicted to have the lowest average on the final exam because they were exposed to no treatment during the course of the semester.

Concerning the informative speech, it was predicted again that Group 4 would have the highest average on the post speech, again because of their opportunity to receive feedback through the use of clickers during the course lecture. Group 1 was predicted to have the lowest average on the post speech because of their lack of exposure to treatment during the semester.

Concerning final grades for the course, it was predicted Group 4 would have the highest average grade because of the students' opportunity to receive feedback through the use of clickers through the entire semester. It was predicted that Group 1 wouls have the lowest average final grade for the course because of its lack of exposure to treatment during the semester.

An alpha level of .05 was used to evaluate statistical significance and *r* was calculated as the effect size.

Attendance

RH1: I predict that clickers with points (Group 4) will have the least absences, clickers without points (Group 2) will have the next least absences, no clickers with points (Group

3) will have the next least absences, and no clickers and no points will have the most absences (Group 1- control group).

Results indicate Group 3 had the least absences, not Group 4 as predicted. Group 4 actually had a mean of 8.32 absences, which was the highest mean number of absences for the study.

A one-way between subjects ANOVA was conducted to determine if groups (clicker/point combinations) differed on attendance. Using a .05 criterion, it was found that the groups differed significantly on attendance, $F(3, 98) = 65.40$, $p < .001$, partial $\eta 2 = .67$. The significant F test was followed up with a Tukey post hoc test for multiple comparisons. Group 1 ($M = 1.63$ $SD = 1.64$) differed significantly from both Group 2 ($M = 5.93$ $SD = 1.67$), Group 3 ($M = 1.74$ $SD = .93$), and Group 4 ($M = 8.26$ $SD = 3.03$), $p < .05$. Group 2 ($M = 5.93$ $SD = 1.67$), differed significantly from both Group 3 ($M = 1.74$ $SD = .93$), and Group 4 ($M = 8.26$ $SD = 3.03$), $p < 05$. Finally, Group 3 ($M = 1.74$ $SD = .93$), differed significantly from Group 4 ($M = 8.26$ $SD = 3.03$), $p < .05$.

Table 8

Absences for Each Group

Group	Treatment	Mean	SD	N	Rank
Group 1	Clicker-No Points-No	6.87	2.85	31	3
Group 2	Clicker-Yes Points-No	1.76	.94	21	2
Group 3	Clicker-No Points-Yes	1.62	1.64	29	1
Group 4	Clicker-Yes Points-Yes	8.32	2.79	28	4

Pre-Post Test

RH2: I predict that the group that used clickers and received points will have the highest average mean score on the post-test (Group 4), clickers without points (Group 2) will have the next highest average mean score on the post-test, no clickers with points (Group 3) will have the next highest average mean score on the post-test, and the group with no clickers and no points (Group 1- control group) will have the lowest highest average mean score on the post-test.

Results show that Group 3 had the highest mean score on the post-test, with a mean of 80.53. The predicted group, Group 4, had a mean score of 75.00 on the post-test, which was the lowest post-test mean score in the study.

A one-way analysis of covariance (ANCOVA) was conducted on the test scores in order to determine differences between the four types of clicker and class combinations. Pre-test scores were used as the covariate. A preliminary test for the homogeneity of regression lines assumption between the covariate and dependent variables among the groups did not differ significantly, $F(7, 6.38) = 85$, $p = .144$. The ANCOVA was not significant, $F(3, 83) = 1.49$, $p = .222$. There was a small effect size.

Table 9

Means of Post Test

Groups	Treatment	Means	SD	Rank
Group 1	Clicker-No Points-No	75.00	10.89	4
Group 2	Clicker-Yes Points-No	79.17	9.14	1
Group 3	Clicker-No Points-Yes	80.53	5.99	2
Group 4	Clicker-Yes Points-Yes	78.42	7.65	3

Pre-Post Speech

RH3: The group that received clickers with points will have the highest average mean score on the post-speech (Group 4), clickers without points (Group 2) will have the next highest average mean score on the post-speech, no clickers with points (Group 3) will have the next highest average mean score on the post-speech, and no clickers and no

points (Group 1- control group) will have the lowest highest average mean score on the post-speech.

Two Additional Raters

This study featured two additional raters for the pre and post student speeches, who graded alongside the instructor in all four groups. These two additional raters were both graduate students studying communication at the comprehensive university where the study took place. As of this writing both have graduated with their Master's Degree in communication; one is currently a PhD student in communication, the other is a lecturer teaching public speaking at a university. The additional raters provided correlational information to asses rubric efficacy. In running correlations against the two additional rater's grades for each speech were combined based on availability. Not all ratings by each of the non-instructor pair due to scheduling conflicts and student absences, therefore comparison ratings were based on those classes where non-instructor raters provided the most data.

The speeches in the four groups took place over the course of a week. The instructor was in all of the classes, as he is the instructor on record, but the two additional raters were active graduate students and attending these classes was in addition to their regular schedule. There were a couple of times when one of the raters was not able to attend a class; however, one of the raters was available for each class.

Table 10

Correlation between Instructor and Interraters

Speech		Interraters	Instructor
Speech 1	Pearson Correlation		.487
	Sig (2-tailed)		.000
	N	97	96
Speech 2	Pearson Correlation		.709
	Sig (2-tailed)		.000
	N	99	99

Table 11

Comparison of Means of Speeches

Speech		Mean	N	SD
Speech 1	Interraters	46.25	96	11.41
	Instructor	39.92	96	13.67
Speech 2	Interraters	74.89	99	16.81
	Instructor	67.71	99	12.06

A one-way analysis of covariance (ANCOVA) was conducted on the speech scores in order to determine differences between the four types of clicker and class combinations. Pre speech scores were used as the covariate. The test for homogeneity of regression lines assumption revealed no significant differences in the regression slopes, $F(7,84) = 84$, $p = .332$, and so pre speech scores were partialed out. There was not a significant overall effect for class, $F(7,1.61) = 87$, $p = .199$. There was a small effect size for the model (*partial eta squared* = .18)

The test for homogeneity of regression lines assumption revealed no significant differences in the regression slopes, $F(3,84) = 84$, $p = .332$, and so pre speech scores were partialed out. There was not a significant overall effect for class, $F(7,1.61) = 87$, $p = .199$. There was a small effect size for the model (*partial eta squared* = .18).

Results show that Group 4, the predicted group for the highest post-speech scores finished with the second-highest post-speech score with a mean of 75.67. Group 3 had the highest post-speech scores with a mean of 82.00.

Table 12

Instructor's Grades for Pre and Post-Speech

Group	Treatment	Mean		Std. Deviation		N		Rank
		Speech 1 – Speech 2		Speech 1 – Speech 2		Speech 1 – Speech 2		
Group 1	Clicker-No Points-No	33.22	75.67	8.10	13.22	27	24	4
Group 2	Clicker-Yes Points-No	41.83	74.04	10.63	17.17	29	28	1
Group 3	Clicker-No Points-Yes	35.14	82.00	9.96	8.50	21	19	2
Group 4	Clicker-Yes Points-Yes	36.96	75.00	15.7	18.96	23	21	3

Final Course Grade

RH4: I expect that the group that received clickers with points (Group 4) will have the highest average mean final course grade (Group 4). Clickers without points (Group 2) will have the next highest mean final course grade. No clickers with points (Group 3)

will have the next highest mean final course grade. No clickers and no points (Group 1-control group) will have the lowest mean final course grade.

A one-way between subjects ANOVA was conducted to determine if groups (clicker/point combinations) differed on final grades. Using a .05 criterion, it was found that the groups differed significantly on final grade, $F(3, 102) = 3.85$, $p = .012$, partial $\eta 2 = .XX$. The significant F test was followed up with a Tukey post hoc test for multiple comparisons. Group 2 ($M = 80.34$, $SD = 4.63$) differed significantly from Group 4 ($M = 74.52$, $SD = 13.64$), $p = .007$. However, there were no other differences among any of the other groups, $p > .05$. See table 10 for the class descriptive statistics.

Group 4, and group with the predicted highest final course grades had the next to lowest final course grades with a mean of 77.89. Group 3 had the highest mean of the final course grades with a mean of 84.17.

Table 13

Means and Adjusted Means of Final Grades

Group	Treatment	Actual Mean	SD	Adjusted Mean	Rank
Group 1	Clicker-No Points-No	77.89	10.95	80.23	3
Group 2	Clicker-Yes Points-No	80.34	4.63	81.72	2
Group 3	Clicker-No Points-Yes	84.17	3.70	76.61	1
Group 4	Clicker-Yes Points-Yes	74.52	13.64	79.20	4

Chapter V

DISCUSSION

This intent of this study is to see if the use of an audience response system (ARS) in the higher education classroom has any effect on learning. Pre-and post-outcome measures were compared across four treatment conditions using four sections of the same class taught by the author of this study. During Fall 2013 the quasi experimental nature of the present study created limitations that stem from how students were assigned to groups (classes), and the limited number of students who participated in the study. In using pre-post-measures for both knowledge and performance data there are unique comparisons available that pertain to what specifically effects student learning, in using clickers in the classroom. Finally, this chapter contains recommendations for future research with regard to clickers in the classroom. The measures employed included attendance, pre-post-speech, pre-post-test, and final grades. Alternative explanations for each, in turn, will be provided.

This study is a 2 X 2 quasi-experimental study, which is necessary due to the lack of opportunity to assign individual students to groups. Students, who registered for one of the four sections, did so as part of their normal process in registering for their next semester of classes. Once in the class students were introduced to the study and asked to sign an acknowledgement form that would indicate their understanding that the study would take place, and that they would be a participant in the study. To keep from giving

away the purpose of the study, which is the use of ARS, the study was initially introduced to the four groups as a look at different teaching methodologies. Only after the semester was over, immediately prior to the final exam, were students informed that the use of ARS was the subject of the study.

Table 13

Groups and Treatments

Groups	Treatment
Group 1 (Control Group)	Clicker – No
	Points - No
Group 2	Clicker – Yes
	Points – No
Group 3	Clicker – No
	Points – Yes
Group 4	Clicker – Yes
	Points - Yes

Predictions were made concerning four areas that evolved into the four hypotheses. These four predictions looked at absences, pre and post test scores, pre and post speech scores and final grades. It was predicted that students who did not use clickers and did not receive any participation points (Group 1), would miss the most classes.

Attendance

Contrary to the prediction on attendance that Group 1 would have the most absences, Group 4 actually had the most amount of absences ($M = 8.32$). Group 4 did use clickers, and did receive points, and conversely Group 4 was predicted to have the least amount of absences among the four groups. That certainly was not what was expected. The specific classroom environment that the audience response system is used in might affect those in the classroom setting. For example, the impact of an audience response system on attendance of a class with no more than 30 students might be negligible, however in a large classroom setting, where the enrollment number was just over 200, the use of a personal response system improved attendance by as much as 30% where points were given for questions presented during a PowerPoint lecture (Shapiro, 2009, p. 20).

It would seem that using clickers with points, would support attendance of the students due to an atmosphere where students would not want to miss class because they would miss points associated with the use of clickers, therefore negatively affecting their final grades in the class. Casual conversations with students indicate the opposite, that because of the larger number of points for the semester, they could afford to miss classes without severely affecting their final grade for the course. Several things might influence the predicted outcomes; the time of the class, the student's majors and that the class was a traditional lecture course.

Table 15

Grade Book Items for All Four Groups

Component	Group 1		Group 2		Group 3		Group 4	
	Points	% of Total	Points	% of Total	Points	% of Total	Points	% of Total
Test: Ch 1-3	100	(15.8%)	100	(15.8%)	100	(15%)	100	(15%)
Test: Info Speaking	100	(15.8%)	100	(15.8%)	100	(15%)	100	(15%)
Test: Pers Speaking	100	(15.8%)	100	(15.8%)	100	(15%)	100	(15%)
Final Exam	100	(15.8%)	100	(15.8%)	100	(15%)	100	(15%)
Informative Speech	100	(15.8%)	100	(15.8%)	100	(15%)	100	(15%)
Info Speech Outline	10	(.015%)	10	(.015%)	10	(.015)	10	(15%)
Info Spch Source Cards	10	(.015%)	10	(.015%)	10	(.015)	10	(15%)
Info Speech Time	10	(.015%)	10	(.015%)	10	(.015)	10	(.015)
Persuasion speech	100	(15.8%)	100	(15.8%)	100	(15%)	100	(15%)
Pers speech Outline	10	(.015%)	10	(.015%)	10	(.015)	10	(.015)
Pers Spch Source Cards	10	(.015%)	10	(.015%)	10	(.015)	10	(.015)
Persuasion speech Time	10	(.015%)	10	(.015%)	10	(.015)	10	(.015)
Ch 1 Clicker Questions	0		0		5	(.007%)	5	(.007%)
Ch 2 Clicker Questions	0		0		5	(.007%)	5	(.007%)
Ch 3 Clicker Questions	0		0		5	(.007%)	5	(.007%)
Ch 4 Clicker Questions	0		0		5	(.007%)	5	(.007%)
Ch 5 Clicker Questions	0		0		5	(.007%)	5	(.007%)
Ch 6 Clicker Questions	0		0		5	(.007%)	5	(.007%)
Ch 7 Clicker Questions	0		0		5	(.007%)	5	(.007%)
Totals	630		630		665		665	

In examining why students miss class many factors can be considered, including discouragement, previous semester GPA, and student's determination that class attendance may have little effect on course grade (Van Blerkom, 1990). Van Blerkom (1990) also points out that there may be a direct correlation to absences and final grades for the course. In this case there does not seem to be a correlation between the two as Group 3 has the best attendance, but does not have the highest final grade average among the four groups.

Pre-Post Test

With the pre-and post-test, it was predicted that Group 4 would have the highest mean score on the post-test/final exam due to their use of clicker and clicker-based points. Next best mean score would be Group 3, then Group 2, and finally Group 1 was predicted to have the lowest mean scores.

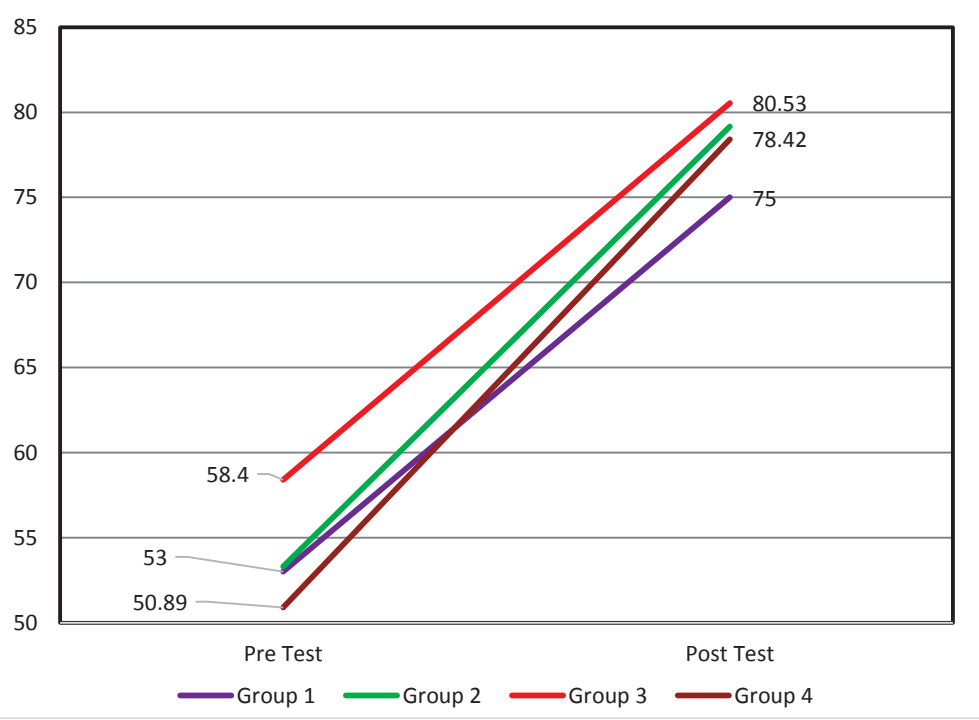

Figure 3. Pre-and post-test scores for each group.

Final results of the post test show that Group 3 had the highest mean score (N = 80.53, SD = 5.99). Group 3 was the class that participated in the freshman learning cohort. It may be that their intelligence level was higher than the other three groups, thus causing the higher mean post-test score. This group of students had to meet several areas of minimum-level standards, and pass an interview before final acceptance into the Freshman-year Learning-Cohort. The intelligence quotient level may overpower any affect that the use of ARS had on the test scores. It is not known if IQ level is a factor since all four groups were not in the FLC program. I could simply be that, for the pre and post test, this group of students were better test-takers than the other three groups.

Pre-Post-Speech

The pre-post-speech with the use of ARS is new research. A search of the literature revealed no research in this area. Because of the paucity of research in pre-post speech performance the usefulness of a performance rating system must first be established.

Interrater reliability for the first speech was "unsatisfactory" (Wrench, Thomas-Maddox, Richmond, & McCroskey, 2013, p. 284), although an intterrater reliability of 0.49 $p < .001$. (see table 10) borders on being "strong" according to Morling (Morling, 2012, p. 124). The correlation between the rater's grades for the second speech was satisfactory according to both Morling and Wrench et. al. The correlations for the interrater's grades and the instructor's grades for the second speech was also low, .71, $p < .001$ (see table 10) according to both Morling (2012) and Wrench et.al. Two reasons may explain the low correlation, some missing data and the inexperience of the two additional raters in grading beginning speaker's speeches.

In spite of the differences of the grades, a paired-sample *t* test showed the actual means of the grades assigned by the two additional raters and the means of grades assigned by the instructor are comparable according to Cohen (Cohen, 1960).

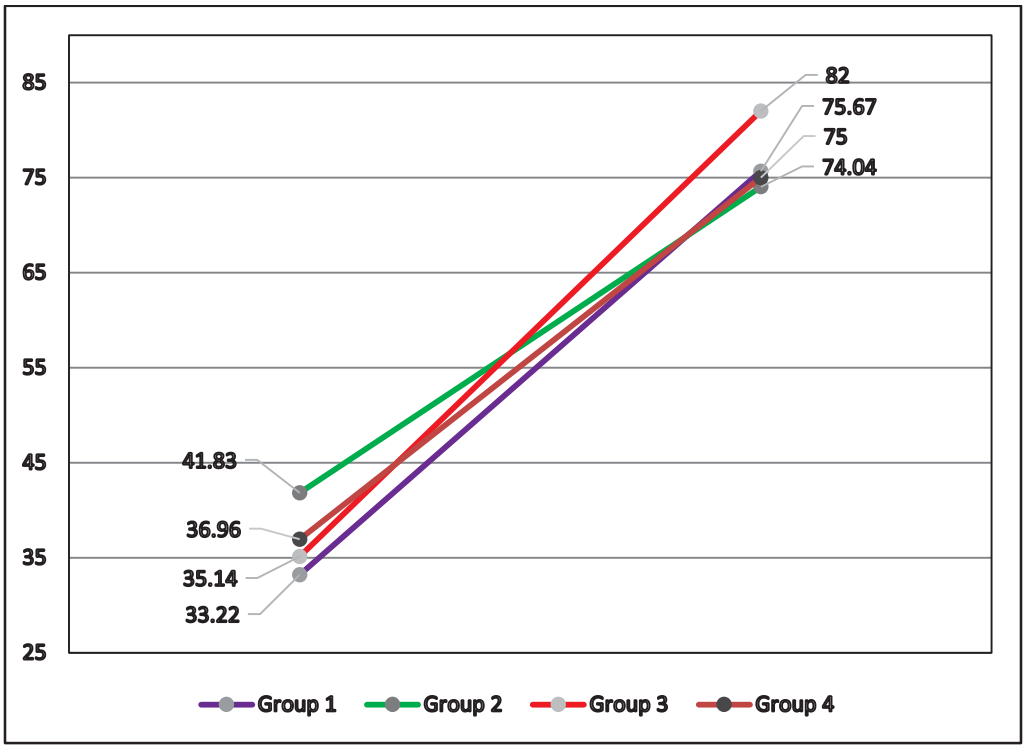

Figure 4. Pre-and post-speech scores for each group.

As with the pre-post speech/final exam, it was predicted that Group 4 would have the highest means on the post speech, due to their use of clickers with points. Results show that Group 3 had the highest mean on the post speech ($N = 81.43$, $SD = 8.5$). As the researcher, I can find no reason why Group 2 scored higher than the other three groups in both speeches. Group 2 did used clickers, but did not receive points for correct answers. While research on student achievement with the use of clickers is limited, this result does back the anecdotal evidence that using clickers will increase student achievement. Bruff (2011) indicated that the use of clickers in his math classes at Vanderbilt University has led to higher levels of learning. Herreid (2006) reports that

student learning appears to be improved when clickers are introduced into science classes. The grading experience of the two additional raters was limited, and may have effected their grading ability of the speeches. The instructor was familiar with grading speeches, and had done so for several years at the time of this study. Grading speeches of beginning public speakers is not always an easy task, and along with the lack of understanding the many nuances of grading speeches, could have easily contributed to the difference of the grades assigned by the two raters and the instructor, however it should be noted that reliability scores improved (from .49 to .70) as novice raters became more familiar with the rubric in this study.

Final Course Grades

I predicted that Group 4 (clickers with points) would have the highest final course grades. Group 3 actually had the highest final course grades. Group 1, the control group, had the lowest.

Considering that Group 3 was the emerging leaders FLC, I am not surprised, now, that Group 3 excelled, once again. In looking at absences, Group 3 also had the lowest absences (M = 1.62). Is this a coincidence? Is there statistical significance? Is this study I did not look to compare attendance with grade, but I would suggest that future research do so.

Future Research

Since this technology platform is still new, there is not enough research to determine how clickers affect learning. I believe future research will help to make those determinations. This study is a small but valuable piece of research in the larger body of inquiry on the use of ARS in higher education classrooms. A couple of recommendations

are made here, concerning number of participants and the location of the study, grading procedures**,** and the course in which the study took place.

The number of participants in this study was limited by several factors. Only one professor was involved in the research. With regard to students, the class size was limited by the physical size of the rooms involved in the study, thereby limiting the number of students who could be involved, since only one professor was involved. It is recommended that future research involve more than one professor, and if possible, larger rooms be allotted for the study, which will allow more students to sign up for the courses. The technology has the ability to adapt to larger rooms, and the software can handle more simultaneous input from students, both of which are necessary to support the amount of data that would be obtained from a larger population.

This study involved participants on one campus. Even though the campus is labeled a comprehensive university, it still serves a relatively small geographical area. Most of the students who attend the university are from one state, located within southern United States. This may affect the outcomes of the study as many of the students were raised in rural settings, where access to technology may be limited. The limited access to technology may be more prevalent within the school systems the students attended during their primary years than in their homes, but educational technology is different from technology used for personal use. This lack of familiarity with, and exposure to the use of audience response system technology, may have an effect on the comfortability and trust level that students had with using the clickers while participating in the study. Replicating this study on multiple university campuses, simultaneously, each in a different region of the United States may show different outcomes. Multiple campuses

would allow for a larger population, with a broader range of familiarity with technology. A multi-campus study would also involve multiple instructors, which may also produce a difference in the outcomes of the study.

The grading procedures I utilized during this research used a system where all items were added to obtain the number of points accumulated by a student. The final grade was obtained by dividing the total number of points accumulated by the total number of points possible. The outcome is a percentage, that is then the final grade for the course.

Further, there may have been unequal incentives for all students to answer questions with the best answer for every question. Two of the groups, Groups 3 and 4, could receive five points for answering one of the five questions correctly that was presented during the class lecture. The other two groups, Groups 1 and 2, could not receive the 5 points. Only Group 2 was presented with the questions during the lecture. Group 1, the control group, was not presented the questions.

The use of clickers in the classroom may be an incentive for students to participate, especially to students who enjoy using technology. The use of technology may also be an incentive to students who are shy and would not generally raise a hand to answer questions since ARS allows students to answer questions privately. If the use of technology is an incentive, the incentive may not have overpowered the desire to not attend class. That same incentive may caused students to not put their best effort forward as they got the possible five points for only answer one of the five questions correctly.

Future research should either place more emphasis on answering the questions correctly by giving points for only, and all of, the correct questions. An additional

consideration is to give points for every question presented, but less points for questions that are answered incorrectly than questions that are answered correctly.

From my personal experience, I suggest a grading system that creates weighted groups of assignments, with each group being a certain percentage of the final grade. Within each group would be multiple assignments that would be a percentage of the group percentage. For example, the main groups might be labeled as; tests 50% of final grade, speeches 40% of final grade, chapter clicker questions 10% of final grade. Within the chapter clicker questions group, the chapters of clicker questions could be divided into equal parts of the 10% that the group is worth.

By creating the weighted grading system the chapter clicker questions can be given a total percentage of the final course grade. This weight allows the instructor to add as many clicker questions across the semester, yet keeping the overall weight of the grades to a certain percentage. This weighted system would punish students less for missing classes as each question would be a very small percentage of the final course grade.

Further, if the study were to involve multiple universities in multiple countries, simultaneously, the outcomes of the study may be drastically different from the outcomes of this study. An international study would involve more students, thereby creating a more diverse population with regard to the previous use of technology. An international study would also involve more professors, which may have an effect on the outcomes of the study.

Finally, this study involved students in one course. If the study were to involve multiple courses, whether on one campus, or in some variation of a multi-campus study,

there may be a difference in outcomes that could be compared between the different courses involved.

Implications

With research ongoing in the area of audience response systems, one might expect to see specific trends develop in the future in the area of usage, testing with clickers, engagement, feedback and attendance. With any new development it takes time to determine its long-term impact, and ARS is no different. This technology is so new there currently remains a lack of specific identifiable trends due to many variables that take place in the classroom, each impacting clicker usage, such as technology and instructor's confidence in ARS. The many variables can have a positive or negative impact on the outcomes of using ARS. As research continues, so will usage of ARS. As usage continues, best practices may develop in a way that creates better understood learning outcomes.

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APPENDIX A

Institutional Review Board Protocol Exemption Report

Institutional Review Board (IRB)
for the Protection of Human Research Participants

PROTOCOL EXEMPTION REPORT

PROTOCOL NUMBER: **IRB-02952-2013** **INVESTIGATOR:** **Norman Earls, Jr.**

PROJECT TITLE: **Clickers in the Classroom: Do they effect learning in a Communications Course?**

INSTITUTIONAL REVIEW BOARD DETERMINATION:

This research protocol is **exempt** from Institutional Review Board oversight under Exemption Category(ies) 1&2. You may begin y study immediately. If the nature of the research project changes such that exemption criteria may no longer apply, please consu the IRB Administrator (irb@valdosta.edu) before continuing your research.

ADDITIONAL COMMENTS/SUGGESTIONS:

Although not a requirement for exemption, the following suggestions are offered by the IRB Administrator to enhance the pro of participants and/or strengthen the research proposal:

☐ If this box is checked, please submit any documents you revise to the IRB Administrator at irb@valdosta.edu to ensure an updated record of your exemption.

Elizabeth W. Olphie *8/14/13*

Elizabeth W. Olphie, IRB Administrator Date

Thank you for submitting an IRB application.
Please direct questions to irb@valdosta.edu or 229-259-5045.

Revised: 12.13.12

APPENDIX B

Consent to Participate in Research

VALDOSTA STATE UNIVERSITY

Consent to Participate in Research

You are being asked to participate in a survey research project entitled *"Clickers in the Classroom: Do they affect learning in a Communication Course?"* which is being conducted by Norman Earls, Jr., a faculty member at Valdosta State University. This survey is anonymous. No one, including the researcher, will be able to associate your responses with your identity. Your participation is voluntary. You may choose not to take the survey, to stop responding at any time, or to skip any questions that you do not want to answer. You must be at least 18 years of age to participate in this study. Your completion of the survey serves as your voluntary agreement to participate in this research project and your certification that you are 18 or older.

Questions regarding the purpose or procedures of the research should be directed to Norman Earls, Jr., at 229-333-5824 or nfearls@valdosta.edu. This study has been exempted from Institutional Review Board (IRB) review in accordance with Federal regulations. The IRB, a university committee established by Federal law, is responsible for protecting the rights and welfare of research participants. If you have concerns or questions about your rights as a research participant, you may contact the IRB Administrator at 229-259-5045 or irb@valdosta.edu.

1. Major _____

2. Education or Highest Education Level completed. Please indicate with an "X".

_____ Undergraduate Freshman

_____ Undergraduate Sophomore

_____ Undergraduate Junior

_____ Undergraduate Senior

3. Please indicate your age as of today: _____

4. Your Gender: Please indicate with an "X". _____Male
_____Female

5. Race: _____

6. Please indicate with an "X" if you own any of the following. Check all that apply.

_____smart phone

_____tablet computer

_____laptop computer

_____desktop computer

7. On a scale of 1 to 10, with 1 being the most uncomfortable and 10 being the most comfortable, please indicate your level of comfortability in using a smart phone.

1 2 3 4 5 6 7 8 9 10 Don't have a smart phone

8. On a scale of 1 to 10, with 1 being the most uncomfortable and 10 being the most comfortable, please indicate your level of comfortability in using a tablet computer.

1 2 3 4 5 6 7 8 9 10 Don't have a tablet computer

9. On a scale of 1 to 10, with 1 being the most uncomfortable and 10 being the most comfortable, please indicate your level of comfortability in using a laptop computer.

1 2 3 4 5 6 7 8 9 10 Don't have a laptop computer

10. On a scale of 1 to 10, with 1 being the most uncomfortable and 10 being the most comfortable, please indicate your level of comfortability in using a desktop computer.

1 2 3 4 5 6 7 8 9 10 Don't have a desktop computer

11. If you have a FaceBook account, how many times per week do you log on? If you do not have a FaceBook account, please select NA.

_____1-3 _____4-6 _____7-9 _____10 or more _____Don't have a FaceBook account

12. Did you use a personal response system in high school or middle school?

_____Yes _____No

13. If you did use a personal response system in high school or middle school, please indicate the grade level in which you first used a personal response system.

_____

APPENDIX C

Opt-Out Email Sent to Students

Copy of email to be sent to students after verbally explaining the research project in class.

You are being asked to participate in a survey research project designed to look at different teaching methodologies in a communication course, which is being conducted by *Norman Earls, Jr.,* a faculty member / student at Valdosta State University. The results of this research will be anonymous. No one will be able to associate your responses with your identity. Your participation is voluntary. You may choose not to participate in the study or to stop participating at any time during the semester. You must be at least 18 years of age to participate in this study. Your completion of the survey serves as your voluntary agreement to participate in this research project and your certification that you are 18 or older.

Questions regarding the purpose or procedures of the research should be directed to Norman Earls, Jr., at 229-*333-5824* or *NFEarls@Valdosta.edu*. This study has been exempted from Institutional Review Board (IRB) review in accordance with Federal regulations. The IRB, a university committee established by Federal law, is responsible for protecting the rights and welfare of research participants. If you have concerns or questions about your rights as a research participant, you may contact the IRB Administrator at 229-259-5045 or irb@valdosta.edu.

To withdraw from the study, please reply to them email indicating so.

Thank you,

Norman Earls

APPENDIX D

Pre-Post Test

1. Given any typical day, how often does a person communicate?
    a. Roughly 15-20 times a day
    b. Continually throughout the day
    c. Less than 5 times a day
    d. Roughly 100-200 times a day
    e. Roughly 200-300 times a day
2. According to surveys of companies, the most important quality they look for in a job applicant is _____.
    a. Technical skill
    b. A degree from an accredited university
    c. The ability to communicate effectively
    d. Practical experience
    e. A willingness to relocate
3. The process nature of communication means_____.
    a. A given interaction has a definite beginning and ending
    b. What happens in one encounter has little impact on other encounters we have
    c. Communication rarely, if ever, changes
    d. Our interactions with others are ongoing and dynamic
    e. We can stop communication
4. The openness of a system is _____.
    a. The extent to which a system strives to sustain equilibrium
    b. The extent of interaction within a system
    c. The extent to which a system affects and is affected by outside factors and processes
    d. The extent of absolute balance in a system
    e. The extent to which someone is willing to communicate
5. Symbols can be described as_____
    a. appropriate verbal and nonverbal behaviors
    b. abstract, arbitrary, and in the US representations of things
    c. a group of interrelated parts that affect one another
    d. figures which caused absolute balance system
    e. anything that interferes with the intended meaning of communication
6. Why was Plato suspicious of rhetoric?
    a. The possibility of its misuse to manipulate and deceive
    b. all citizens might learn how to speak persuasively
    c. it would be the demise of the Academy
    d. it was too difficult for the average person to learn
    e. he was suspicious for all of the above reasons

7. The first known theorists and teachers of rhetoric and persuasive speaking were _____?
    a. Corax and Isocrates
    b. Isocrates and Plato
    c. Corax and Tisias
    d. Isocrates and Tisias
    e. Plato and Tisias
8. Scholars use quantitative research methods to gather information in which of the following?
    a. Ethnography
    b. Textual
    c. Numerical
    d. Symbolic
    e. Syntactical
9. All of the following influence perceptions except_____.
    a. social roles
    b. cognitive abilities
    c. cultural factors
    d. expectations
    e. all of the above influence perception
10. Cultural influences in the United States tend to place high value on which of the following?
    a. Individualism
    b. relaxation and a leisurely pace of living
    c. collectivist orientation
    d. cooperation and deference
    e. membership community
11. Catching yourself in the process of self-serving bias is most likely the result of_____.
    a. Inference
    b. lower cognitive complexity
    c. monitoring
    d. scripts
    e. prototypes
12. Nathan laughs when his grandfather describes him as a "cool cat." "That's how we used is from someone who is neat, pleasing, good," his grandfather says. "Not anymore," Nathan replies. This exchange reminds us that language is_____.
    a. Arbitrary
    b. Rule bound
    c. Totalizing
    d. Stereotypical
    e. Derivative

13. Words are not things they represent. In other words, words are_____.
    a. Ambiguous
    b. Arbitrary
    c. Verbal
    d. Unconscious
    e. Abstract
14. Communication rules are_____.
    a. Shared understandings about what communication means
    b. made up by older generations of people
    c. shared understandings about what behaviors are appropriate various situations
    d. all of the above
    e. a and C
15. Words that slant perceptions are called_____.
    a. Loaded language
    b. Slang
    c. Stereotypes
    d. perceptual shorthands
    e. relational communication
16. Nonverbal communication is estimated to account for what percentage of the total meaning of communication
    a. less than 12%
    b. 16-39%
    c. 41-53%
    d. 65-93%
    e. 100%
17. Smiles, friendly touches, shaking hands are all signs of_____ in Western societies.
    a. Liking
    b. Power
    c. Interaction
    d. Negotiations
    e. Awareness
18. The term referring to body position and motion is_____.
    a. Kinesics
    b. Olfactics
    c. Haptics
    d. Proxemics
    e. Artifacts

19. The study of our perception of odor and scents is known as_____.
    a. Artifacts
    b. Proxemics
    c. Haptics
    d. Olfacctics
    e. Kinesics
20. The study of space and how people use it is known as_____.
    a. Kinesics
    b. Olfactics
    c. Haptics
    d. Proxemics
    e. Artifacts
21. Nonverbal communication involving touch is called
    a. haptics
    b. gestures
    c. phatics
    d. kinesics
    e. dianetics
22. How we perceive and use time to define identities and interaction is referred to as _____.
    a. Chronemics
    b. Artifacts
    c. Proxemics
    d. Paralanguage
    e. Kinesics
23. Vocal communication that is not actual words is known as _____.
    a. Chronemics
    b. Artifacts
    c. Proxemics
    d. Paralanguage
    e. Kinesics
24. What percentage of waking time does the average person spend listening, according to studies?
    a. 10-18%
    b. 21-29%
    c. 45-55%
    d. 83-90%
    e. 93-100

25. Many experts consider the final aspect of listening to be_____.
    a. Organizing
    b. Remembering
    c. Hearing
    d. Interpreting
    e. Responding
26. The process of attending to some aspects of communication and disregarding others as we listen refer to_____
    a. hearing
    b. selecting and organizing
    c. interpreting
    d. responding
    e. remembering
27. Critical listening involves_____.
    a. A loose understanding of the content of the communication
    b. judging the speaker's trustworthiness
    c. acceptance of unfounded generalizations
    d. sensing the emotionally packed the mess
    e. a neutral, unbiased response to the ideas presented
28. The system of ideas, values, beliefs, customs, language that is passed one generation to the next and sustains a secure way of life is known as_____.
    a. Communication
    b. Low-context communication style
    c. High-context communication style
    d. culture
    e. social communities
29. The type of cultures in which people act relatively independent of others in the culture.
    a. Individualistic
    b. Collectivist
    c. low-context
    d. high-context
    e. cultural relevatism
30. Members of a collectivist culture_____.
    a. Think of themselves more as part of group
    b. regard each person is distinct from other people
    c. value personal freedom
    d. tends to have more assertive communication
    e. tends to have more competitive

31. Which of the following communication cultures or co-cultures below tends to favor competitiveness in interaction, limited emotional responsiveness, and a focus on accomplishing instrumental goals?
    a. Feminine communication culture
    b. masculine communication culture
    c. Asian communication culture
    d. African American communication culture
    e. Lesbian communication culture
32. In general, which of the following characteristics best describes a management style favored by many women?
    a. Impersonal
    b. highly directive
    c. issue oriented
    d. collaborative
    e. all of the above
33. The tendency to regard our culture and our way of life as normal and superior to other people and other ways of life is known as_____.
    a. Moral relativism
    b. cultural relativism
    c. ethnocentrism
    d. stereotyping
    e. standpoint theory
34. "I don't approve of the gay lifestyle, but I can accept." This response reflects which of the following orientations to cultural diversity?
    a. Resistance
    b. Tolerance
    c. Understanding
    d. Respect
    e. Participation
35. If you identify with a culture emphasizes collective well-being, you are most likely to_____.
    a. Rank personal freedom as more in order than an orderly society
    b. think an honor reflects primarily on the individual earned
    c. avoid self-promotion
    d. state your position directly and strongly
    e. all of the above
36. We learn our own culture's perspectives and rules by_____.
    a. Studying about it in books
    b. learning our language through observing and interacting with others
    c. being born with it
    d. instinctively responding to nonverbal behaviors
    e. staying isolated from others

37. Groups of people who live within a dominant culture yet also belong to another group that is distinct from the mainstream culture are called
    a. social communities
    b. low-context groups
    c. outliers
    d. new wave communities
    e. none of the above
38. Things that others see in us but we do not see in ourselves are known in the Johari Windows as _____ information.
    a. Hidden
    b. Blind
    c. Unknown
    d. Uncritical
    e. Open
39. The theory that asserts that people find uncertainty uncomfortable and so are motivated to use communication to reduce uncertainty is known as _____.
    a. Johari Window
    b. Social comparison
    c. Uncertainty reduction
    d. Reflected appraisals
    e. Self-disclosure
40. Jon says, "I'm so stupid I'll never graduate college. I just can't learn this chemistry because I'm certain there are dumb!" Jon's self-communication is an example of ____.
    a. Being a downer
    b. Being an upper
    c. Being a vulture
    d. Engaging in self-sabotage
    e. Making a social comparison
41. Where we shop, what we wear and what kind of car we drive, who our friends are, and where we live and work are all influenced by our _____.
    a. Race
    b. Gender
    c. Sexual orientation
    d. Socioeconomic class
    e. All of the above

42. Jamie had problems in her math class and finally begins to tell herself she would never understand math. Jamie had failed to follow which suggestion for personal growth and awareness?
    a. Self-disclosed appropriately
    b. assess yourself fairly
    c. set realistic goals
    d. avoid self-sabotage
    e. create a supportive context
43. Relationships which are governed more by what we do than who we are, are _____.
    a. Personal relationships
    b. Casual relationships
    c. Friendships
    d. Social relationships
    e. Unique relationships
44. Making a decision to remain with a relationship is known as _____.
    a. Commitment
    b. Investments
    c. Passion
    d. Personal relationship
    e. Social relationship
45. The opposing and continuous tensions found in personal relationships are known as _____.
    a. Regulative rules
    b. Constitutive rules
    c. Relationship dialectics
    d. Dyadic processes
    e. Equity theory
46. Lisa wants some time along because she feels a need to get in touch with herself as an individual. However, she also feels the need to share experiences with her partner Bob and cherishes the time they spend together. The tension these different needs are generating within Lisa illustrates which relational dialectic?
    a. Autonomy/connection
    b. Novelty/predictability
    c. Commitment/love
    d. Spontaneity/routine
    e. Closedness/openness

47. The stage in an interracial relationship in which the couple struggles with external pressure is _____.
    a. Racial awareness
    b. Identity emergence
    c. Navigating
    d. Coping
    e. Scalating
48. Single-mother Michelle worked two jobs while her daughters were growing up so they could have everything they need. This style of loving is known as _____.
    a. Mania
    b. Ludus
    c. Agape
    d. Eros
    e. Storge
49. One big problem experienced by couples who are separated geographically is _____.
    a. Dyadic breakdown
    b. Lack of time to communicate
    c. Not being able to communicate about big issues
    d. Lack of social support
    e. Not being able to share small talk
50. Passionate, intense, and fast moving love that is not confined to sexual passion and may be expressed in spiritual, intellectual, emotional ways is known as _____.
    a. Eros
    b. Storge
    c. Ludus
    d. Mania
    e. Agape

APPENDIX E

Pre-Post Speech Grading Rubric

1. Introduction: Attention Gained
   - 5 Great buildup of anticipation within your audience.
   - 3 Utilize more creativity in drawing your audience into the speech.
   - 1 Remember to start by grabbing your audience's attention

2. Introduction: Topic/Thesis Stated Clearly
   - 5 Great clarity in stating thesis/topic
   - 3 Tell us exactly what you will be presenting about this issue
   - 1 It is not clear what your speech is about

3. Introduction: Previewed Main Points
   - 5 Structure set up clearly and effectively
   - 3 Tell us exactly what your main points will be
   - 1 Structure is unclear/lacking organization

4. Body: Structure Clear/Logical
   - 5 Well thought-out and executed organization
   - 3 Provide more clarity to your exact structure
   - 1 Structure is unclear/lacking organization

5. Body: Transitions Used Well
   - 5 Transitions clear and easy to follow
   - 3 Transitions lack clarity at times
   - 1 Transitions not used effectively

6. Body: Usefulness of Information Clear
   - 5 It is clear how your audience could use this information
   - 3 Give more consideration to how your audience could use this information
   - 1 This information is not presented in a way that makes its usefulness clear

7. Body: Source Cited
   - 5 Good clarity to source citation
   - 3 Be sure to cite all sources in your speech
   - 1 No sources offered

8. Delivery: Extemporaneous
   - 5 Great preparation and naturalness to delivery
   - 3 At times you lose your conversational tone while presenting to us
   - 1 Don't memorize, nor read to us…talk to us.

9. Conclusion: Closed With Strength
   - 5 Close is well thought-out and thought provoking
   - 3 Give more thought to how you will leave your audience thinking about this issue

1 Closing line lacked purpose.

10. Overall

5

3

1