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A DISTANCE EDUCATION CLASSROOM DESIGNED TO FACILITATE SYNCHRONOUS LEARNER AND INSTRUCTOR INTERACTIONS

by

Stuart P. Bernstein

A DISSERTATION

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For the Degree of Doctor of Philosophy

Major: Educational Studies

Under the Supervision of Professor James P. O'Hanlon

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A DISTANCE EDUCATION CLASSROOM DESIGNED TO FACILITATE SYNCHRONOUS LEARNER AND INSTRUCTOR INTERACTIONS

Stuart Paul Bernstein, Ph.D.

University of Nebraska, 2013

Advisor: James P. O'Hanlon

The purpose of this study was to determine whether a live, synchronous distance delivery technology would facilitate interaction, immediacy, and presence between an instructor and his contiguous and remote classrooms, and whether it would facilitate interaction between the two groups of students. This study researched the opinions of students on whether they felt the platform facilitated interaction between the two groups of learners, both groups of learners and the instructor, and both groups of learners and the content.

This research followed the development and testing of a synchronous delivery platform that would replicate a traditional, interactive, classroom in a remote location. The research was conducted at a public university in two undergraduate construction management courses, over two successive semesters with different groups of students. The students and the instructor were observed and interviewed by an independent classroom observer. There were two main components of the delivery platform: the first was the synchronous, sidewall projection of the students in each room and the second was the synchronous, frontwall projection of the instructor and content to the students in the distant classroom.

The students in both classrooms reported the platform facilitated interaction, immediacy, and presence between the students in the remote classroom and the instructor. They further reported the sidewall projections did not facilitate learner-learner interaction between classrooms and did not necessarily feel learner-learner interaction was pertinent in either a distant or traditional classroom. The student's perceptions of student-content interaction were mixed, with the results improving considerably in the final phase of this study.

Enough questions have been raised in this study to warrant further research into the effectiveness of synchronous distance instructional platforms using advanced technology. The results also indicate a need for further research into the causal relationships of immediacy and presence on cognitive learning. With minor improvements in equipment and environment, elementary, secondary, and post-secondary institutions could effectively adopt this system for use in replicating interactive, synchronous distance education classes in remote locations.

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Dedication

To my wife and friend of thirty-five years, Rose, whose constant encouragement, calm, patience and support provided me the opportunity to fulfill my journey. Your confidence in me has kept me sane. Thanks for being there and for believing in me.

Acknowledgements

There are many people who should be acknowledged for helping to get me to this point and I hope they all know how much their ongoing support has meant to me. For brevity sake, I would like to individually acknowledge only a small handful of the most important of those.

First, let me thank Dr. James O'Hanlon, who, to my surprise and delight, agreed to serve as my advisor. When I first met Jim, he was teaching one of my graduate classes. I was immediately impressed with his calm demeanor, insight, and credentials, and knew he was the person I wanted as my mentor. I was then fortunate to be able to work with him when he became the Interim Director of my school, and then the Interim Dean of my college. He brought a great deal of stability to both organizations, further proving to me I had made the right decision. He has been a great chair and more importantly an excellent mentor reading my drafts and keeping me focused on what was important. I also want to thank the other members of my committee, Drs. Miles Bryant, Brent Cejda, and James Walter, who were all there when I needed their guidance and advice.

I want to thank my parents, both of whom have passed away. I want to thank my father for instilling in me a work ethic and a desire to learn, second to none. During our lifetime together, my father rarely worked less than two jobs at a time, while continuing to take courses at the local university, never working toward any

degree, instead, learning for the sake of learning. He was a man who never backed down from an opportunity to discuss history and religion, subjects in which he was well versed. I want to thank my mother, who was a saint in the hearts of all who knew her, for her inner beauty, wisdom, sense of humor, understanding and patience. Everyone who ever met her loved and respected her, and there is no one who did not mourn her passing with great sadness. She stood by me and loved me, even when I seemed to take the wrong, and often most difficult, choices that life offered me. And she never tired of telling people that I was studying to become a doctor.

And, of course, I want to thank my immediate family for their continued patience, understanding, and support. My wife Rose, my son Sean, and my twin daughters LaShanna and Ashley, who willingly followed me up and down the east coast, and finally half way across the country to Nebraska, as I pursued my late-in-life desire to become a professor, even though it meant the lion's share of my time was spent between teaching classes and taking classes, instead of with them. Through it all, Rose continued to work full time as a middle and high school teacher, managing the house, raising the children to become outstanding citizens, and dealing with me focusing on my studies. Our love and respect for education has rubbed off on them; Sean has returned to UNMC to earn his medical degree, after graduating with honors from the University of Minnesota; LaShanna has graduated from NU's College of Education, with a BA in Elementary Education; and Ashley,

completed her BS in Food Science from NU, and is currently employed in Omaha inventing new foods. All three of our children are great scholars, which they get, not from me, but from their mother, who is not only brilliant, but a wise woman who kept us all in line by letting us know we were all too blessed to be stressed.

Finally, I want to acknowledge all of the assistance and support I received from Brett Meyers from the very beginning of this project to its very end. Brett was invaluable in providing me feedback, guidance, and suggestions relating to all issues technical and pedagogical and for providing his impeccable calming, moral support whenever I let the pressures get to me.

Chapter 1 – Introduction

Statement and Scope of the Problem

"You won't catch me using that new-fangled equipment." According to legend that is what John Henry said as he laid down his hammer before he died. It is what the man said to his wife as a horseless carriage passed his buggy on the trail. It is what the father said to his son when he saw the first personal computer advertised. It is what my colleagues said to me when I told them about the new distance education technology configuration I was developing. Many of them felt that current distance education technology was satisfactory and there was no need to develop anything new.

Students are like snowflakes; no two of them are identical. Over the years, there have been a number of descriptions of learning styles that have been developed to understand how different students learn. Boyatzis & Kolb (1991) used the Learning Skills Profile to generalize the learning styles of various students. As educators studied these learning styles, teaching styles were developed to best accommodate each type of learner. Rapport and interactivity between teacher and learner has been shown to improve participation, learning, and retention among many students Lowman (1995). Burroughs (2007), Rodriguez, Plax, and Kearney (1996) and Kelly and Gorham (1998) have all shown some causal relationship between instructor immediacy and student learning. Duff (2003) stated that spoken language is the core of human communication and that "there is no teaching without communication." Darabi, Arrastia, Nelson, Cornille, and Liang (2011), Traphagen et.al. (2010), Kim (2011), Garrison, Anderson,

and Archer (2010), Garrison and Cleveland-Innes (2005), Kim, Kwon, and Cho (2011), and Borup, West, and Graham (2012) have all written about the importance of interaction between students and instructor through cognitive, social, and teaching presence in the classroom.

Through my own experiences, and through conversations with colleagues and students, there was a consensus that the current forms of distance delivery methods do not provide real time, synchronous, two-way, audio-video channels of communication for classroom teaching that facilitate the development of a distant classroom community, complete with interaction, immediacy and presence. Many professors and students, though, prefer asynchronous, online distance learning, which is befitting their learning and teaching style.

For those students and instructors who prefer a real time, interactive, classroom community, NUVIEW (Nebraska University Virtual Interactive Education Window) is in the process of being developed and tested. The NUVIEW concept consists of a configuration of cameras and projectors that continuously broadcast audio and video of the students, the instructor, and the content. The students in each room are videoed and projected in the opposite classroom to facilitate continuous visual and audio contact between the two groups of students in different locations. The instructor, his content projections, and anything he writes on the whiteboard, are captured by a single camera and projected at a 1:1 ratio, to the front of the remote classroom. The intention is to capture everything a student sees and hears in the contiguous classroom and project it to

the remote classroom so that students in both locations receive the same educational experience. It was hypothesized that NUVIEW would facilitate interaction between groups of students and between the instructor and students equally in multiple locations. NUVIEW and the subsequent distance platforms were developed to provide the students in each location the opportunity to receive the same classroom community experience regardless of location. This study documents and analyzes the development of that distance delivery system with the intended goal of having students in neither location feel remote or at a disadvantage.

In 2011, John Hennessy, the current president of Stanford University, commented in a New York Times article that he could "imagine a virtual campus for some specialized programs and continuing education" and that "distributed learning can be incorporated in undergraduate education". Hennessy felt that online, undergraduate teaching was appropriate in "supplanting the large lecture" hall and in the developing world. He strongly cautioned, though, against allowing distance education to destroy the sense of community that undergraduate students receive by being on campus and in the classroom.

Following Hennessy's logic regarding the need for distance education, but not at the expense of sacrificing the sense of community that students should have on the campus and in the classroom, a need exists for the development of a new delivery method that will provide the opportunity for the seamless delivery of a classroom community experience to remote locations without the students in any location feeling as if they were

remote from the other group or from the instructor. McKinney, McKinney, Franiuk, and Schweitzer (2006) made it clear that the greatest contributions to student success and satisfaction was the sense of community created in the classroom, which was due to the attitude of the instructor and the environment developed by the other students. They were able to show that:

> This sense of community in turn, has been shown to relate not only to students' perceptions of their performance and their satisfaction with the course, but also with the measures of their actual performance. (p.283)

While technology alone is not the answer to improving distance education, it is hypothesized for this study that live, synchronous, two-way, audio-video will provide an appropriate distance delivery system for those instructors who subscribe to the practice of interactivity to create a classroom community. At the very least, it will offer all instructors the opportunity to deliver their classes to a remote location without changing their current mode of classroom teaching, and without the students, in either location, losing any interaction due to geographic distance.

Purpose of the Study

The purpose of this qualitative study is to understand the perceptions of faculty and students regarding the replication of a traditional classroom experience in a geographically distant classroom for university students studying at a midwestern university, with a focus on interaction among students and instructor. For this research interaction is defined in terms of immediacy and presence between and among instructors

and learners where effective, deliberate, planned learning is to occur.

This study documents the development of a live, interactive, synchronous, two-way, audio-video, distance learning delivery system and the testing of students' perception of the effectiveness of such a system for classroom teaching between remote locations. It explores the process of developing this new system, which should enable delivery of any instructor's classroom presentation to a distant location without changing their delivery method to suit the technology. It uses two live groups of students in three different phases to document and assess the students' and instructor's perception of the effectiveness of this type of system in creating a classroom community. One group of students, referred to as the contiguous group, is located in the same room as the instructor, while the other group, referred to as the remote or distant group, is in an adjoining classroom. This paper also explores the perceptions of the instructor and learners to understand whether the method supports a harmonious, synchronous, interactive classroom community. The results of Phase I led to further developments and research in Phases II and III. In Phase I it was determined through observation and student opinions that the sidewall projections of the students in each classroom were not effective in facilitating interaction between the two separate groups of students. In fact the student responses showed that leaner-learner interaction was not very prevalent in a contiguous non-distance learning classroom, so it would be difficult to expect it to be prevalent between remote classrooms. In Phase II the sidewall projections were not used, and because of the poor quality of the audio in both rooms there was little to no

interaction between the groups of students, and between the remote students and the instructor. Students in the remote location could hear the instructor and see the content being conveyed on the whiteboard, but they could not interact directly with the instructor, creating a one-way communication channel. This resulted in the remote students creating their own separate learning community. Phase III involved the installation of all new audio-video equipment which fully facilitated interaction between the groups of students and between the instructor and both groups of students. In this phase students in each room were able to monitor students in the other classroom via 70" monitors installed at the front of each classroom. All three phases of this study helped to determine whether the technique of using live, synchronous, two-way, audio-video feed in a distance classroom is sound enough to invest further capital in its development for future development and implementation.

Grand Tour Question

Can a live, synchronous, two-way, audio-video distance delivery system positively shape or play a role in students' and instructor's interaction, immediacy, and presence in distance education classrooms?

Research Questions

1. Can a live, synchronous, two-way, audio-video distance delivery system be developed that will facilitate learner-learner interaction between students in remote and contiguous classrooms?
2. Is direct learner-to-learner interaction prevalent in the traditional, non-distance

education, engineering classroom and is it critical in the construction of a classroom learning community?

3. Does a live, synchronous, two-way, audio-video distance delivery system facilitate teacher-learner interaction between remote students and instructor?
4. Does a live, synchronous, two-way, audio-video distance delivery system facilitate teacher-learner immediacy between remote students and instructor?
5. Does a live, synchronous, two-way, audio-video distance delivery system facilitate presence (transactional, social, teaching, and cognitive) between learner and instructor?

Context of the Research

The college used in this research study has two departments, both of which are in the unique position of teaching the same curriculum on two separate campuses within the single state university system. These campuses are approximately sixty miles apart. Many students and instructors in the college find the current distance learning methods to be more difficult and less satisfactory than being in a live classroom. One of the main issues is the loss of interaction and sense of community that can be developed in a contiguous classroom among learners and between learners and their instructor.

John Dewey was one of the early proponents of constructivism in education. In this method of teaching, Dewey called for student engagement and interaction in the classroom. Although he did not use the phrase ‘classroom community’, Dewey (1959) stated, “I believe that the school is primarily a social institution, education being a social

process, the school is simply that form of community life…. (p. 22). Vigotsky (1978) a strong proponent of the social learning theory, posited that interaction with an experienced person, such as an instructor, would provide the learner with the ability to complete more advanced tasks, and to learn more than they would have individually.

Gagne and Rohwer (1969) laid out "events of instruction" they felt were critical for student learning. These include gaining and maintaining the attention of the learner, prompting and guiding the students through the proper use of communication, and providing the learner with feedback. Kolencik and Hillwig (2011) contend that teaching metacognitive skills will improve student achievement and in order to develop these skills in the students the instructor must be able to pose problems, raise questions, and engage students in the process of problem solving.

The Excellence in Civil Engineering Education (ExCEEd) is a program whose focus is on Lowman's (1995) interpersonal interaction between learner and instructor. Experiential learning, as described by Kolb (1984), requires that students be actively involved in the learning experience. Campbell and Mayer (2009) described the effective use of a personal response system in responding to questions from the instructor as a method of increasing student interest and retention of subject matter. Kelly and Gorham (1988) contended there is a causal relationship between immediacy and cognitive learning. They posited, "Immediacy is related to arousal, which is related to attention, which is related to memory, which is related to cognitive learning." (p. 201) Not all instructors and learners thrive best in interactive classrooms, but for those who do the

current distance education models may not accommodate this style of learning. Thus the focus of this study is on attempting to develop a live, synchronous, two-way, audio-video distance delivery system that is intended to support the seamless and effective delivery of any classroom teaching style to a remote location and will accommodate and promote interaction among learners and between learners and instructor.

Another anecdotal issue heard from distance learning students is a feeling of being remote, almost to the point of being left out of the classroom experience, and therefore they do not feel immersed in the learning process. This feeling is caused by more than just geographical distance (Moore, 1993). There is also a psychological distance that is compounded by technology that was not designed for synchronous interaction between instructor and learner. While various distance education methods have been used to alleviate that problem (Oz, 2005), there have been no reports of synchronous video methods that have been entirely successful at replicating the interactive classroom community. There have also been situations where the instructor was so focused on trying to make the technology work well, that he was actually creating a transactional distance between himself and his students in the contiguous as well as the distant locations (Oz, 2005.)

This researcher worked with a multi-media specialist exploring existing methods and technologies for delivering courses to remote locations. Together, they explored a number of existing options including Cisco TelePresence™, Second Life™, SAIC's OLIVE™, Camtasia™, Adobe Connect™, and Wimba™, but they did not feel that any

of those met the requirements for developing an interactive, unified, classroom community. None of them provided a synchronous, interactive, audio-video experience that replicated being in the classroom with the instructor and with students in the other location. This research into other forms of online delivery systems did provide the author an opportunity to explore current technology and helped him to envision what he was trying to accomplish. Further discussions with equipment vendors, students, and peers led the author to the development and further re-development of a live, synchronous, two-way, audio-video distance delivery system that will be termed NUVIEW.

Location of the study. The engineering college at this midwestern university is in the unique position of being split geographically across two campuses an hour apart. The departments of civil engineering, construction engineering, and construction management have each duplicated the same undergraduate and graduate degree programs on both campuses. Currently, only civil engineering is teaching classes remotely between the two campuses, with construction management in the process of getting started. Among the civil engineering faculty, there is much dissatisfaction over having to use the current technology to deliver distance education classes. It is the immediate intention of the dean of the engineering college that a better vehicle for delivering a distance class that would foster a sense of being in the classroom with the instructor needs to be developed. The goal is to eliminate the perception of being remote that is part of the dissatisfaction that civil engineering faculty and students are feeling with the existing models.

Significance of the Research

This live, synchronous, two-way, audio-video distance delivery system was not being developed as a panacea for all distance education delivery issues. It was not meant to replace asynchronous, online methods that are currently preferred by those students who like to work alone and on their own schedules. Murphy, Rodriguez-Manzanares, and Barbour (2011) found that asynchronous learning was better for cognitive learning among the more independent learners because it provided more time for reflection, whereas synchronous learning was more motivational and facilitated personal participation, which suits many younger students. This new delivery system being researched is meant to be a tool that can be used by instructors who prefer to maintain an interactive, communicative, classroom community; instructors who find it difficult to do so using current distance education technology. This new live, synchronous, two-way, audio-video distance delivery system is designed to enable the interactive instructor to continue delivering the same quality classroom content and experience to a remote location replicating the interactive classroom experience in a distant location.

The significance of this study is to determine whether this new live, synchronous, two-way, audio-video distance delivery system facilitates interaction among learners, and interaction, immediacy, and presence between learners and instructor, between contiguous and remote classrooms. The researcher has arduously discussed the original selection and placement of the equipment to be used in transmitting and displaying images of the students and instructor with colleagues, vendors, and equipment

manufacturers. The intent is to create images in each classroom that will convey the feeling that both groups are actually occupying a single joint classroom. Many distance education platforms exist that use equipment to display images of the students and the instructor, but not in a way that creates the feeling of being together in one location. Part of the difficulty in configuring the equipment layout is that this has never been attempted and none of the people consulted could fully visualize the intent or the outcome of the collective images. This study provides the practical testing of the original equipment layout (Phase I), and the reconfiguration and re-testing of new equipment (Phases II and III) necessary to help determine the selection and effectiveness of the equipment and its placement in the classroom looking at size, clarity, usefulness, and its acceptance by the students and the instructor in facilitating an interactive environment between remote classrooms.

The development of this live, synchronous, two-way, audio-video distance delivery system is also designed to fill an immediate need within the college, where some buildings have small classroom sizes (24 – 35 students) that do not facilitate large groups of students. It is also meant to fill a need where the same course is taught on separate campuses, and could taught by a single instructor. Once it is further tested beyond these three phases and perfected, it will be offered first to the entire college, second to the university, and then will be used to develop distant education opportunities between this university and the rest of the world. As more constituents continue to use this method of delivering distance education the plan is to continue improving and developing

enhancements to the original format of the system.

General Data-Gathering Method

The bulk of the data were collected during the spring and fall 2012 semesters, during which time two sections of construction estimating classes were taught. The original testing of the live, synchronous, two-way, audio-video distance delivery system was conducted in the spring of 2012 using a group of students in a contiguous classroom and a second group simultaneously in a remote classroom. Prior to the start of teaching the spring course, data were gathered relating to the best technology and configurations available, with the assistance and collaboration of the multi-media learning specialist currently employed by the university. The researcher and the multi-media learning specialist spent three months meeting with audio-video vendors to learn about current equipment capabilities, working through different configurations, and finally developing a system that is meant to deliver the desired interactive results between the two classrooms. Through the literature search pertinent information was garnered regarding the best interactive teaching practices in general as well as the best interactive teaching practices specifically for distance education that helped in creating the reconfiguration of equipment for Phases II and III. During and after the spring semester further literature reviews were conducted and even more data pertinent to facilitating a classroom community in a distant location were discovered. Together with the help of two separate vendors a new configuration of equipment was developed in order to improve interaction between the two locations. The testing for Phases II and III was conducted in the fall of

2012 utilizing 40 students who were registered for the same Construction Estimating class. This group of students was then randomly split into two groups that occupied the same two classrooms that were utilized during Phase I where they were taught the second estimating class simultaneously.

During each of the semesters, the instructor utilized the classroom observer to monitor the remote classroom, providing feedback and observations, as well as being the person to distribute and collect the surveys from the students and conduct the interviews with the students during and at the end of each semester. In keeping with the good practices for clinical supervision of teaching as outlined by Acheson and Gall (1997) the observer fulfilled the role of a clinical supervisor when sitting with the instructor evaluating the techniques, procedures, and effectiveness of his teaching and of the student learning that was taking place.

Definition of Terms

Asynchronous learning. Asynchronous learning is the delivery of education that is not constrained by time or place. Asynchronous learning includes correspondence study and all pre-recorded audio and video transmissions (whether delivered on the radio, television, or the internet). For the purpose of this paper, asynchronous learning will only include current methods of delivery that utilize the Internet, such as BlackBoard™, enabling students to log in and interact at their convenience.

Classroom community. The development of a social construct within the classroom that contributes to the mutual benefit of the students and the instructor through

the building of networks, interaction, trust, communication, and dialogue.

Classroom observer. The classroom observer monitors the class, the instructor, and the students in both classrooms. The observer collects qualitative data from the students, maintains a journal of his observations, and conducts reflective interviews with the instructor. The observer offers constructive criticisms and suggestions to the instructor for improvements to the process.

Codec. A codec is a piece of electronic hardware that either encodes a stream or signal for transmission or decodes the same signal in another location for playback. Codecs are typically used in videoconferencing and distance learning situations to transmit audio and video between locations. The term codec comes from ***code*** and ***dec****ode.*

Cognitive presence. Cognitive presence has best been defined by Garrison, Anderson, and Archer (2000) "as the extent to which learners are able to *construct and confirm* meaning through sustained discourse in a critical community of inquiry. (p. 9)"

Contiguous classroom. For the purpose of this paper, contiguous classroom is being defined as the actual classroom from which the instructor originates each lesson. The term contiguous classroom was used in this fashion in Moore's writings on distance learning.

Distance education. Distance education is an all-encompassing term, which includes all forms of educational delivery methods that occur outside of the contiguous classroom regardless of physical distance separation or method of delivery. This

includes, but is not limited to, correspondence study, radio broadcasts, television broadcasts, online broadcasts both synchronous and asynchronous, and two-way, audio-video, synchronous broadcasts.

Immediacy. Immediacy is the extent to which selected communicative behaviors by the instructor, such as eye-to-eye contact and body language, enhance interpersonal communication with the students.

Interaction. Interaction (or interactivity) is the process of developing communication among the learners and the instructor in what is described as the community classroom. As opposed to the "sage on the stage" lecture format type of learning environment, interactivity has the instructor acting as the "guide on the side," facilitating the discussions by raising the topics, providing background information, and calling on students directly using their names, to get the discussions started, providing the students abundant opportunities for critical thinking, developing problem solving skills, public speaking skills, and networking opportunities in the classroom.

Learner-learner interaction. Learner-learner interaction indicates that students communicate directly with each other regarding topics being discussed in the class and that not all communication must pass through the instructor. Learner-learner interaction occurs both within and outside of the classroom, face-to-face and online. This is also referred to sometimes as student-student interaction.

Learner-instructor interaction. Learner-instructor (instructor-learner, instructor-student, and student-instructor) interaction includes, but is not limited to,

question and answer techniques initiated by either party and general dialogue that is relevant to the class topic being discussed. For the purpose of this paper learner-instructor communication will include verbal and body language.

Remote classroom. For the purpose of this paper, the remote classroom is being defined as the classroom to which the instructor broadcasts the lesson, regardless of actual distance. In other words, the classroom could be adjacent to the contiguous classroom or half way around the world. It is also referred to interchangeably as the distance classroom.

Remote student. Remote student and distant student will be used interchangeably in this report to designate students who are not within the confines of the contiguous classroom. This will include the specific students studied for this project as well as students in general in distance education classrooms.

Social presence. Social presence is the ability and extent of learners and instructors to convey themselves as being personally involved in the process of communication as opposed to simply being present.

Synchronous Learning. Synchronous learning refers to the delivery of education, which must occur simultaneously, but not necessarily in the same geographic location. Synchronous learning can occur when the learner and the instructor are in the same classroom or when the instructor is broadcasting live to students in a remote location via radio, television, or the Internet. It can include, but is not limited to, two-way audio-video, one-way audio-video coupled with two-way written communication

(email, chat rooms, discussion groups, etc.), and two-way video, one-way audio. For the purpose of this paper, synchronous learning will refer to two-way, audio-video transmissions.

Teaching presence. Teaching presence is defined as the design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educational worthwhile learning outcomes. (Anderson, Rourke, Garrison, & Archer, 2001, p.5)

Transactional Distance. According to Moore (1991) transactional distance is the:

> … distance that is more than simply a geographic separation of learners and teachers. It is a distance of understandings and perceptions, caused in part by the geographic distance that has to be overcome by teachers, learners and educational organizations if effective, deliberate, planned learning is to occur (p. 2).

That physical separation described by Moore can occur within the contiguous classroom as well as between the contiguous and remote classrooms. It is often exacerbated by a physical separation that is compounded by ineffective use of technology.

Transactional Presence. "The perception of presence is defined as the degree to which a distance education student senses the availability of, and connectedness with, each party." (Shin, 2003) Shin further defines this psychological distance in terms of human contact, interaction, and relationship among learners and instructors.

Unified classroom community. The development of a social construct within

multiple, separate classrooms that contribute to the mutual benefit of the students and the instructor through the building of networks, interaction, trust, communication, and dialogue that breaks down the geographical transactional distance between the groups.

Assumptions of the Study

One of the major assumptions of this study is that distance education will continue to flourish and develop as the growing populations demand access to education in locations where it is currently not available and where it may not be feasible to build schools to meet that demand. It is also assumed that as technology continues to develop and improve so too will the distance education delivery methods continue to develop through numerous tests and iterations.

Another important assumption in this study is that the students are willing to participate in this study. A further important assumption is feedback will be received from the participants that will assist in leading to improvements in the system and that time, funding, and technology will be available to make to make the necessary changes to move the research forward.

Target Audiences

The target audience for this study includes any instructor, school, or industry that is looking to deliver a high-quality, synchronous, audio-video, distance classroom experience. Any instructor who is interested in delivering any level of classroom instruction (for schools from kindergarten through graduate school, and in industry) should be interested in this study.

Schools and industries that do not have classrooms large enough to accommodate the number of students who register for a single section of a class may be interested in the outcomes of this study. Schools and industries that want to share their classroom experience with other locations, as opposed to having the students travel to the contiguous classroom, could be interested in a successful outcome of this study.

Scope of the Research

Distance education is a reality that has been with us for more than a century (Casey, 2008) and should continue to develop as technology improves and students and instructors become more adept at and accepting of it. There is little doubt that distance education will be required to meet the growing demands for education in remote locations where new schools may be too costly or adequate faculty are not available. Since there are so many teaching methods and learning styles that facilitate educational opportunities for students it is critical to provide delivery systems that accommodate all of those teaching and learning styles. Fulford and Zhang (1993) pointed out that two-way distance education systems which provide high levels of interactivity are the best way to meet the instructional needs of students. As technology continues to develop, educators should continue to use that technology to develop more interactive, remote classrooms.

Delimitations and Limitations

A major delimitation of this study was that it deliberately focused on synchronous, two-way, audio-video classroom delivery. Numerous studies have been completed relating to distance education, many of which pertain directly to asynchronous

delivery methods. This study was not intended to show a comparison in the effectiveness or preference of synchronous versus asynchronous delivery methods. The effectiveness of the instructor and the preference of the students for both types of delivery are dependent on the type of teaching method used and the learning styles of the students (Battalio, 2009) and goes beyond the scope and purpose of this study.

Another major delimitation of the study is the author's personal involvement in this project and his preference for interactive learning and teaching. The author is inextricably linked with the potential success or failure of this program as he is the primary instructor during the testing phases and has a personal stake in seeing that it is successful. The author also has a personal bias toward the interactive classroom community and finds it difficult to take and deliver courses online asynchronously, because of the perceived lack of interaction.

Another delimitation of the study is that neither group of students being studied are actually geographically distant, but instead are in the same building, in different classrooms and have direct physical access to the instructor. If the technology fails on any given day, the author could have had the students walk down the hall to join the students in the contiguous classroom. In future studies, where the participants are geographically separated this would not be possible. Having access to a classroom observer with the qualifications and dedication of the one used in this study could also be difficult to find. This could be viewed as a delimitation. Consulting with the classroom observer twice a week could have changed the outcome of the study, and depending on

the advice given and how much of it was taken, may not be replicable in other studies. Probably the most serious delimitation was starting phase I with all of the students together in one classroom before separating them into two sections. Having them together could create a certain synergy that might not be replicable if the groups were separated from the very beginning and spent no time together.

The limitations of these studies include the small number of student participants (Spring, N<30; Fall N<40) and the fact that it only looked at one instructor and two courses.

Chapter 2 - Literature Review

Introduction

This research project is focused on the development and testing of a distance learning delivery platform that will facilitate interactive teaching and learning between the two groups of students and between the students and instructor in distant classrooms. It is the intention of this system to have students in both locations feel they are receiving an equal education without feeling remote from the instructor or the other students. The intent of this literature review is to reveal research that has been done on the history and best practices of both distance and traditional classroom education.

The logical place to start a review of literature for this educational research project is with a review of the best practices of education in general. This review starts with discussions of the literature of John Dewey, Lev Vigotsky, and others regarding their philosophies for developing interactive teaching and learning experiences where the classroom becomes a social community. It then moves into a review of some of the best practices recommended for teaching distance education classes. It includes reviews of different delivery methods as well as different teaching styles.

The review then moves into specific discussions on distance education starting with a review of the history of distance education to provide a perspective of what has been attempted in the past leading to the development of modern day delivery systems. It continues with a review of the development of synchronous video delivery methods as a precursor to the development of a new synchronous platform for this research project.

This leads to a review of distance teaching by Michael G. Moore (1972), who is considered by many to be the father of modern distance education. This section concludes with a review of distance education retention rates.

Taking what was learned from the literature on and by Dewey, Vigotsky, and Moore the next section of the literature review proceeds into a review of interaction in the classroom. Moore (1989) developed the seminal theory on interaction in distance education describing it terms of learner-learner, learner-instructor, and learner-content, with many other researchers building upon those themes. Moore (1993) was also the first to write about transactional distance as a distance of understanding and perception that occurs in the traditional classroom and is exacerbated by the geographical distance of remote classrooms. Building on that theme Shin developed his theory on transactional presence which is the antithesis of transactional distance and leads us into the next section of the literature review.

Tinto (1997) described the classroom community as the intersection where social and academic activities integrate to boost student interaction and retention. A great deal of research was done following the concepts of the classroom community and particularly on the interactions which occur in both distant and traditional classrooms. This led to specific reviews of literature regarding immediacy and presence. Immediacy was described by Mehrabian (1967) as the communicative behaviors that develop a closeness and nonverbal interaction between people, specifically between an instructor and his students. Presence is part of the Community of Inquiry concept that was developed by

Garrison, Anderson, and Archer in 2000 defining three distinct types of presence: cognitive, social, and teaching.

This review of the literature is intended to determine the extent and need for further research into the development of an effective synchronous distance education delivery system that will facilitate the use of some of the best classroom teaching practices in both contiguous and remote classrooms focusing on such concepts as immediacy and presence to build classroom communities where students and instructors interact to increase learning.

Best Practices

John Dewey was one of the early proponents of constructivism in education. In this method of teaching, Dewey called for student engagement and interaction in the classroom. Although he did not use the phrase 'classroom community', Dewey (Dworkin, 1959) stated, "I believe that the school is primarily a social institution, education being a social process, the school is simply that form of community life…. (p. 22). Vigotsky (1978) a strong proponent of the social learning theory, posits that interaction with an experienced person, such as an instructor, will provide the learner with the ability to complete more advanced tasks, and to learn more than they would have individually.

Citing the research of others, Gagne and Rohwer (1969) laid and explained the eight "events of instruction" they felt were critical in the process of human learning. Of those events outlined, the following were considered critical by the researchers in

developing a classroom community. They included the use of methods to "gain and maintain the attention of the learner" (p.382), prompt and guide the students through the use of communication, and provide feedback for the learner. Regarding learner attention, Gagne and Rohwer (1969) advocated the use of observational stimuli, which have been shown to engage the students and improve learning. Creating a real-time, synchronous, audio-video classroom system can equip the instructors with the ability to provide a visual and auditory stimulus through which they can offer immediate feedback to the students.

In their book on the use of metacognition in the classroom, Kolencik and Hillwig (2011) discussed how teaching metacognitive skills would improve student achievement. In order to develop these skills in the students the instructor must be able to pose problems, raise questions, and engage students in the process of problem solving. They further pointed out that the art of questioning was at the heart of learning and teaching, stimulates thinking, and invites students to engage in conversation. Students who learn to question, will develop a higher level of curiosity, a stronger desire to learn, and the ability to retain information, all showing the importance of interaction in the classroom.

Mayer (2008) laid out his 10 principles of multimedia learning with an overview of how the science of learning and the science of instruction can affect the design of distance education in what he refers to as a two-way street approach to pedagogical research. He refered to this as "basic research on applied problems" (p. 761). In this article, he focused on the importance of incorporating multimedia into instructional

design because of the separate channels that humans use to facilitate learning - one channel for processing visual inputs and the other for processing audio inputs. This supports the importance of distance learning technology that incorporates high quality audio and video. In discussing the science of instruction, Mayer (2008) posited the importance of stimulating the cognitive functions of the students using appropriate channels. He cited research he performed with his colleagues (Mayer & Anderson, 1991; Mayer & Anderson, 1992; Mayer & Sims, 1994; and Mayer, Moreno, Boire, & Vagge, 1999) on the cognitive theory of multimedia learning that showed how students learn better when they can create connections between the verbal and pictorial presentations, reinforcing the contention that it is advantageous for distance learning to provide both audio and video presentations in class.

In their review of the literature on the best practices of online instructors, Fish and Wickersham (2009) made the point that in 2004, universities in the United States alone were already offering 54,000 online courses. The authors pointed out that as the popularity and need for distance education continues to increase, instructors must do more than just repackage their existing traditional courses and dump them into course management systems. They felt faculty needed to learn how to communicate differently and also needed to learn how to strengthen their relationships with their distance education students.

Lewis and Abdul-Hamid (2006) conducted a qualitative study of thirty exemplary instructors exploring effective online teaching methods. Faculty who were selected for

this study were considered exemplary based on their scores for the Instructional Practices Inventory and on average student evaluation scores of 4.3 out of 5. What they discovered was that developing a high quality online environment did not "emerge naturally or unwittingly" (p.96). The authors found, through interviews with the participating faculty, how critical interactions between faculty and students and among students were considered. Faculty had to "carefully plan, maintain organization, and creatively engage students...(p. 96)." This should be true for any type of teaching, whether online, classroom, or distant. The authors also found that instructors "must be open to assessing their courses continuously for strategies that prevent the emotional and cognitive disconnection experienced by many students taking web-based courses" (p.96), and that students need to be active participants in the learning process. Another finding of the study was how important the exemplary faculty felt social interaction in and out of the classroom was for the students. To facilitate this, many of them instituted collaborative projects to connect students.

Chickering and Gamson (1987) described their seven principles of teaching quality undergraduate education as being developed through common sense approaches and relying on "50 years of research on the way teachers teach and students learn, how students work and play with one another, and how students and faculty talk to each other" (p. 3.) Among those seven principles were student-faculty contact, cooperation among students, encouraging active learning, and providing prompt feedback. These are practiced, quality traits of the best instructors, which take time and determination to

develop in a face-to-face classroom situation with students. This article cited various examples of schools that were successfully practicing these seven principles. It did not discuss whether the principles were developed through quantitative means, but instead seemed to rely on a study of psychological principles and the personal experiences of the authors.

These traits of quality instructors become even more difficult to accomplish as the geographic distance between student and faculty increases, as described by Michael Moore (1993) in his paper on transactional distance. Moore's seminal study of distance education was the foundation for the next two decades of work on the subject. In his didactic article on transactional distance, Moore (1993) discussed the importance of communication in the classroom and how manipulating the media can increase dialogue between learner and instructor. He described the importance of establishing the course structure in relation to the potential for transactional distance and further opined the highly structured class inhibits dialogue and increases transactional distance in both the contiguous and remote classrooms. Moore (1993) further opined on how the courses that encouraged more dialogue tended to be less structured and had a lower transactional distance in both locations.

Moore and Kuol (2007) went further in their quantitative study of one hundred and thirty nine university alumni asking why they selected particular members of the faculty to receive an excellence in teaching award. The most important reason, as cited by the alumni, was the faculty members' willingness and ability to communicate with the

students. These findings were corroborated by an earlier survey that was given on the evaluation of teaching at the same university (Kuol, 2006) and by an excellence in teaching study conducted in the United Kingdom (Skelton, 2004.) In the Moore & Kuol (2007) survey, the alumni were asked to identify one faculty member they would recommend for a teaching excellence award and to provide the reasons why. What the surveys showed was that students considered their instructors to be excellent based on their approachability as opposed to their command of the subject reinforcing the need for interactive classrooms, where communication and approachability can be developed.

In his article based on a personal interview with Frank E.X. Dance, and a review of his signatory work, Duff (2003) wrote about the importance of the speech theory of human communication in regards to the successful classroom. "There is no teaching without communication. The better the communication, the more chance for teaching success" (Frank E. X. Dance, interview with the author 28 March 2001, p. 256). Dance based this opinion on decades of research he conducted on communication in the classroom.

Campbell and Mayer (2009) conducted a quantitative study of students at the University of California to determine whether the interactive method of questioning students in the classroom increased their involvement. The authors used a questionnaire, a test booklet, and an evaluation survey to test two groups of students. The results of the test showed the students in the questioning group not only significantly outperformed the students in the control group, but the students in the questioning group also found the

questioning tactic to be more enjoyable and helpful. The authors then conducted a second experiment with a new group of students at the same school. The only changes they made were to the questionnaire. They changed the questions from multiple-choice to short answer; three of the questions were re-written to avoid ambiguity; and two new questions were added. The results of the second experiment were similar to the first. The authors further discovered that the students felt they understood the material better when using the questioning method. This study supported the theory of improving questioning techniques in synchronous, two-way, audio-video, distance education classrooms.

Distance Education

History of distance education. Distance education, as many people currently understand it, seems to have been around for a relatively short period. In reality, the concept of distance education has been around since 1852 when the Phonographic Institute of Cincinnati, Ohio, delivered the Pitman Shorthand program, via the United States Postal Service, to (primarily) women across the country (Casey, 2008). It is interesting to compare the course content and teaching methodology of those classes with ones currently offered on-line, asynchronously. In 1873, Anna Ticknor created the Society to Encourage Studies at Home. In 1882, William Rainey Harper created a correspondence school at Chautauqua, NY, which eventually led to the development of a Correspondence University in Ithaca, NY, in 1883 (Erazo & Derlin, 1995.) In 1890, the Colliery School of Mines, in Wilkes-Barre, PA, taught mine safety through the mail. Colliery Schools became the International Correspondence Schools, and began training

iron and railroad employees (Moore & Kearsley, 2006.) The University of Chicago lent credence to correspondence type distance education in 1892 when it offered college level courses through the mail (Hansen, 2001.) It is an interesting study to explore the similarities between the original correspondence courses and the current asynchronous course offerings.

A shift in distance education pedagogy occurred when radio broadcasting offered another form of educational delivery system, which allowed students to listen to their instructors live. In 1921, the Universities of Salt Lake City, Wisconsin, and Minnesota were granted radio licenses to deliver educational content, and between 1918 and 1946, the Federal Communications Commission (FCC) granted over 200 licenses to other institutions (Casey, 2008.) For those students who required more than just written information and instructions from which to learn, this provided a leap forward in connecting the students with the instructor. For the sage on the stage lecturing type of instructor, this type of delivery system was ideal.

The University of Iowa delivered the first televised course in 1934 (Casey, 2008.) The FCC created a band of 20 television channels known as the Instructional Television Fixed Service to provide low cost delivery of educational courses in 1963. The California State University system was the first to apply for one of the licenses required by the FCC (Casey, 2008.) While this still only provided one-way communication, it did allow the students to see their instructor, providing another level of interconnection. It also enabled the instructor to use visual demonstrations in class.

In 1964, the Carnegie Corporation provided funding to the University of Wisconsin to develop the Articulated Instructional Media (AIM) Project to systemize and develop distance education techniques (Casey, 2008.) Professor Charles Wedemeyer, the founder of AIM, researched and initiated a number of innovative distance education techniques, moving distance learning toward the 21st century. In 1967, the federal government established the Public Broadcasting Act, which eventually led to the delivery of high quality interconnected national programs of study (Casey.) The first licensed college courses, to be offered via this legislation, were developed and delivered by the Coastline Community College in California (Casey.) In 1969, England created the British Open University, and in 1974, Germany created the German FernUniversität to offer distance education courses (Casey.)

With the development of the World Wide Web, the number of delivery opportunities increased. One of these delivery systems is Blackboard™, which provides faculty and students the vehicle from which to communicate on line through chat rooms, discussion boards, email, and wikis. Most of these forms of communication operate asynchronously, although some will operate synchronously. However Blackboard and other similar systems do not offer two way, synchronous, video and audio interactive technology.

Development of synchronous video delivery methods. Imagine a distant education student sitting at home in 1921, listening to the radio, receiving a broadcast educating him on radio broadcasting, radio building, or radio repair. While that may

seem hard to fathom today, there are a number of different courses that are currently being offered around the world by way of the radio. Move the student forward in time another decade to 1934 when he could have received his education sitting in front of a television. The student could not only hear his instructor, but he could see his instructor and see what his instructor was doing. Unfortunately, as with radio, this was one-way communication, without the opportunity for creating dialogue, or interactivity between students and instructors.

Move our time traveling student forward in time again, this time more than a half century, to the 1990's where correspondence study took on a whole new meaning with the advent of email and the development of the Blackboard Learning System™. With the development of audio-video systems, such as Polycom™, two-way audio-video distance delivery was possible, and as bandwidths increased, so did the amount of data that could be delivered. Due to the limitations of technology and bandwidth at most facilities, though, synchronous audio-video distance delivery still has limitations in the speed, quality, size, number of, and synchronicity of the packages being sent and received between codecs at remote locations.

Chiou and Chung (2003) developed and tested an instrument to evaluate the interactions of instructors in a synchronous classroom, because in previous testing they found that over 54% of the students involved in distance education felt the interaction between the instructor and the remote students was insufficient and expressed the opinion that such interaction influenced their effort to learn the material in a synchronous

classroom. For this research, Chiou and Chung tested 100 female students, 65 of whom were on-site, the rest in a remote location. The study found seven types of interactions. For both locations, teacher nonverbal interaction received the highest mean score, with out-of-class interaction receiving the lowest.

Distance teaching. Michael G. Moore (1972) postulated in his review piece of distance teaching, that the distinguishing difference between the contiguous classroom and the distant classroom is social interaction. This article was a review of the existing literature of all non-contiguous teaching methods, which were referred to collectively, by Moore, as distance teaching. Moore further defined distance teaching as "the family of instructional methods in which the teaching behaviors are executed apart from the learning behaviors, including those that in contiguous teaching would be performed in the learner's presence…" (p. 76).

Distance education retention rates. In an article written for the *Chronicle of Higher Education*, Carr (2000) quoted retention figures for schools across the United States. All of the schools discussed had lower retention rates in their distance courses than in their contiguous classes. Of significance were two community colleges in Texas. The first was in Tyler where they experienced a 58% completion rate for online classes versus a 71% completion rate for on campus courses. Pamela Quinn, the assistant chancellor at the Dallas County Community College reported an 11 to 15% difference between the 10,000 students taking online versus campus classes, with the higher completion rate being for those students who took their classes on campus. While the

article did not conclude any specific reasons for the high drop out rates, these numbers are important to note in developing and testing distance learning courses.

Interaction

Moore (1989) wrote his editorial describing what he felt were the three critical interactions necessary for delivering high quality distance education. Moore defined the three interactions as learner-content, learner-instructor, and learner-learner. Without the first, Moore contended that education does not exist. A student's education is dependent on the receipt of knowledge, or content. Without this exchange of information, education does not exist. He further stated that the second interaction (learner-instructor) can be highly valuable when conducted properly, but is not necessary. Autonomous learners are able to learn on their own or even when interaction with the instructor is low or poor. However, he felt that immediate feedback from the learner to the instructor is important in maintaining student motivation, and increasing instructor interaction, which in turn improves learning.

It is the learner-learner interaction, which creates a somewhat different paradigm. Moore opined that interaction among learners can be a valuable learning resource, but admitted that learner-learner interaction within the classroom is dependent on the circumstances and is not particularly important especially among adult and advanced learners. Learner-learner interaction is more prevalent and critical outside of the classroom where students are not in direct contact with the instructor and therefore become more dependent on each other.

Sharp and Huett (2005) examined the current literature on interaction to determine the importance of learner-learner in comparison to learner-instructor and learner-content, the three interactions described by Moore & Kearsley (1996.) Sharp and Huett (2005) also found a fourth interaction: learner-interface (Hillman, Willis, and Gunawardena, 1994.) Hillman (et.al, 1994) opined that students would have difficulty interacting with the content, the instructor, and other learners if they were not able to interact with the distance media being used to deliver the other three. Northrup and Rasmussen (2000) advocated for the inclusion of another interaction in their discussion piece, which they referred to as learner-feedback where it is important for the learner to receive immediate feedback on their input regarding its accuracy. Sutton (2001) suggested an interaction she called vicarious interaction. Her argument is that "learners can learn vicariously through observing the interaction of other students (Sutton, 2001, p. 226.)

Sharp and Huett (2005) contended that learners need to be active members of communities in which learning takes place. It is this sense of community and interaction in the classroom that leads participants to a greater understanding of the material. Classroom community and interaction are often taken for granted in the contiguous classroom, but is missing in the distant classroom. Sharp and Huett (2005) further pointed out a number of other articles that showed how learning communities had a positive effect on student participation and learning. However, in a number of studies the conclusion was that students and instructors alike ranked learner-learner as the least

important of the three interactions suggested by Moore & Kearsley (1996).

Erdogan and Campbell (2008) conducted a qualitative study of 22 in-service teachers to review the extent and methods used in questioning their students in a constructivist taught science class. The data collected for the article related to the number of questions asked by the instructor, whether they were open or closed ended, and whether the instructor used the student's responses to guide the ensuing dialogue. The first issue raised was the importance of teacher questioning (instructor-learner) in the classroom and how it increased student social interaction and participation in the learning process. The second was how student responses indicated a prior knowledge of the subject matter, and provided the students an opportunity to "check, refine, and expound upon what they already know" (p. 1893). And third, through responding and dialoguing in class, students were actually pooling their cumulative knowledge (learner-learner) and increasing their personal depth of the subject matter.

Bauer and Rezabek (1992) conducted a quantitative study of 172 university students at the University of Northern Colorado. The students were divided into four sections of the same class, with each section divided into three separate treatment groups of approximately 14 students each. Treatment group A received instruction via two-way audio, group B used two-way, audio-video, and group C met face to face. Students in each treatment group were asked a series of questions about the topic being discussed in class and the number of responses were recorded. The results showed little significant difference in the number of responses between the audio and audio-video classes.

However, there was a significant difference between the broadcast classes and the traditional classes, with the traditional classes recording a much higher rate of response.

These results were not surprising considering the technology that was available in 1991 when this study was conducted. The only pieces of equipment described in the paper were the use of one 26" monitor at each site, and a conference table with seating for 20. There was no mention of the type of microphones used, but there is a good chance they were push-to-speak style, which generally inhibit student participation. There was also no mention of whether the instructor called on the students individually or asked the question allowing students at either of the sites to respond. There was also a distinct possibility that a considerable time lag existed between sites, which would further inhibit students at the remote sites from responding, as they would not have an equal opportunity to respond to the questions asked by the instructor.

Fulford and Zhang (1993) conducted a quantitative research study using 233 K-6 teachers participating in an interactive televised class. The teachers were given surveys to complete at the beginning, middle, and end of the course. The surveys used a six point semantic differential scale to measure their responses to questions soliciting their perception of their own involvement in the class. The most critical finding in this study was that overall group participation accounted for an increase in learner satisfaction more than did personal interaction. It was Fulford and Zhang's opinion, therefore, that focusing on keeping the group interactive was more important than keeping each individual interactive in increasing learner satisfaction.

Dupin-Bryant (2004) conducted a descriptive, quantitative study of university instructors who used an interactive audio-video, distance education method of delivery. Dupin-Bryant was looking to find out what teaching styles were used, and to what degree were the instructors committed to learner-centered principles and teaching styles. Three hundred and thirty surveys were distributed, 225 were returned, and 22 were rejected due to missing data. One hundred and thirty six were male, the rest female. The Principles of Adult Learning Style survey was the instrument used in this study. The results showed that 80% of the respondents resorted to a teacher-centered style when teaching distance education with just fewer than 4% of the learner-centered instructors being very strongly committed to that style. The author suggested that learner-centered faculty resort back to a teacher-centered style when teaching distance education courses, and recommended that institutions of higher education adopt training and support to facilitate the use of learner-centered teaching, which has been shown to reduce social and psychological distance between instructors and students.

Oz (2005) wrote a case study of two medical schools in Turkey that were using an interactive distance learning technique he dubbed “classference”. This was described as a two-way, synchronous videoconferencing system that allowed the students and instructor to share electronic chalkboards, document cameras, and PowerPoint presenters. It also included live videostreams of the instructor and the students from both remote locations. Faculty who participated in this method were encouraged to attend training sessions geared to enhance their teaching skills. This article focused on how the system

worked and what equipment was used. Oz did not discuss whether students or faculty were surveyed or interviewed about their opinions of the system nor were there any quantitative data gathered to show its effectiveness in delivering the content to the students. However, it did state that students in both locations felt that interacting with students in the other location was a positive experience and that mean test scores at each site were very similar. In this case study by Oz the students were projected on large screens at the front and back of the classroom.

Meeuwisse, Severiens, & Born (2010) conducted a quantitative study on whether interaction in the classroom led to the retention of minority and majority students. She pointed out previous studies that demonstrated that ethnic minority students tended to drop out from their university programs when they felt they did not belong and that positive interaction with peers and instructors increased their sense of belonging. Meeuwisse (et.al., 2010) states:

> Most studies examining the link between the learning environment on the one hand and sense of belonging or quality interactions on the other hand show that learning environments that can be characterized as activating and or cooperative environments, help students to integrate, experience a sense of belonging and achieve good study results.

The 523 students in the study were given online surveys that measured the "extent to which a learning environment is activating" (p. 535.) The results of the survey showed that the more interactive learning environments produced higher quality relationships

between students and instructors, and an interactive classroom positively influenced the collaborative work among peers.

Campbell and Mayer (2009) conducted an experiment with two groups of students to determine the effectiveness of questioning techniques to improve student learning in the classroom. The authors contended that students who are questioned during class were encouraged to engage in organizing what they had learned while integrating it with other knowledge. They were more likely to pay attention if they had to anticipate being called upon in class. Also, based on their performance in answering the question students would then adjust their cognitive behavior. In this quantitative experiment each group of students was shown a PowerPoint presentation. One presentation had questions imbedded which they had to answer using hand held answering devices. The other group saw the same presentation, but in the form of statements with the instructor providing corresponding explanations. While the results between the two groups were not significantly different, Campbell and Mayer (2009) found that the students from the questioning group found the process to be "helpful in understanding the material." (p. 755)

Transactional distance. Moore (1993) wrote the seminal definition of the Theory of Transactional Distance in his book of the same name. In it, he described the distance in distance education as being more than merely a geographical separation. Referring back to his previous work on distance education Moore stated

> …a distance of understandings and perceptions…that has to be overcome by

> teachers, learners and educational organizations if effective, deliberate, planned learning is to occur. (Moore, 1991, p.1)
>
> It is the physical separation that leads to a psychological and communications gap, a space of potential misunderstanding between the inputs of the instructor and those of the learner, and this is the transactional distance. (Moore, 1991, p.2)

This distance of understanding and perception that Moore described can exist between instructors and learners without being exacerbated by geographical distances. In other words, transactional distance can occur in a contiguous classroom where the instructor and the learners are not connecting and learning is not occurring.

Moore (1993) further defined transactional distance in terms of structure, dialogue, and learner autonomy. He defined dialogue in terms of the educational relationship between students and instructors designed to improve student understanding. Structure is defined as the flexibility or rigidity of the program in terms of objectives, strategies, and evaluation methods. Learner autonomy was defined as extent that learners are able to determine their own goals, experiences, and evaluations. Moore (1993) further described the relationships among these three variables. Dialogue and transactional distance are inversely proportional. Structure decreases the extent of dialogue, which in turn increases the transactional. What Moore was stating is that the instructor who follows a structured (scripted) lesson plan decreases the opportunity for unstructured dialogue (interaction) with the students thereby increasing transactional distance even within the contiguous classroom where the student and instructor are face

to face. This is exacerbated when a geographical distance separates the two.

Moore posited that dialogue and structure are the variables in teaching and the interaction between teaching and learning which determine the distance between instructor and learner. He stated "dialogue describes the interaction between the teacher and learner when one gives instruction and the other responds." (Moore, 1991, Distance Education Theory, para. 6) In essence without dialogue between the students and the teacher and among the students themselves there is an increased distance between the parties, which inhibits learning. As Moore was developing his theory on distance education he was also stating that learning would not occur in a distance classroom if transactional distance existed between the instructor and the learners in person.

The understanding of this theory on transactional distance is critical as academia continues to develop new distance learning techniques. Moore was stating that the equipment and method used to deliver distance education are insignificant if they are being used to just transfer bad teaching habits over the Internet.

Transactional presence. Shin (2003) defined the term transactional presence in his exploratory investigation into the efficacy of the same. Shin defined transactional presence as the psychological availability and connectedness between parties, specifically among students and between students and instructors. Shin hypothesized that "a distance student's perception of transactional presence of teachers, peers, and the educational institution significantly predict: (H1) learning achievement, (H2) learning satisfaction, and (H3) learning persistence." (p.72) He contended that psychological distance in the

classroom is more important to understand than the physical. Shin sampled 506 students, from a variety of programs at a Korean university. Shin developed a survey in which students were asked about their learning achievement, satisfaction, and persistence to learn. The data were analyzed using a series of multiple regression and correlation analyses. The results partially supported H1, fully supported H2, and partially supported H3. What Shin (2003) concluded was the teachers' physical presence increased the level of student participation, which in turn increased the students' perception of their learning achievement. He then conjectured that transactional presence in the distance classroom would be a viable counterpart to the instructor's physical presence in the contiguous classroom.

Classroom Community

Tinto (1997) described the classroom community as "…the crossroads where the social and the academic meet. If academic and social involvement or integration is to occur, it must occur in the classroom" (p. 599). In this mixed methods research conducted at a northwestern United States community college, 517 students were initially surveyed regarding their student attributes, prior education, current life situation, educational intention, learning preferences, perceptions of ability, and attitudes regarding education. Tinto (1997) surveyed two separate groups of students. The first group consisted of 210 students who had enrolled in a program referred to as the Coordinated Studies Program (CSP) in which the students registered for a block of classes together. The second group of 307 students enrolled in the same classes, but did so on an

individual basis. These students were then asked to participate in a qualitative survey. One hundred twenty-one of the CSP students and 166 individual students complied. During the next semester Tinto (1997) completed a follow up study of the students who had completed both surveys. What he found was a persistence rate of 66.7% for the CSP students and a 52% rate for the others. This indicated that students who were involved in the CSP classes were more likely to continue their education successfully because of the feeling of security and trust, and sense of accomplishment from their experiences being part of a classroom community. "Generally speaking, the greater students' involvement in the life of the college, especially its academic life, the greater their acquisition of knowledge and development of skills." (p. 600)

In the chapter he wrote comparing learning and leaving among university students, Tinto (2000) discussed the importance of the classroom community on student experience. He described the classroom as a microcosm of the university itself and the main crossroads for student and faculty interaction. He cited Fischer, Grant, Fassinger, Smith, Karp, Yoels, and Nunn as various authors who had researched classroom participation comparing it to a spectator sport, where students remain disconnected from both the learning and social aspects of the classroom. Tinto described classroom communities as one positive change to the academic climate that has helped to increase student participation and involvement with the learning process and the importance of the classroom becoming a learning community, where interaction among peers and between students and instructors is critical.

Rovai (2001) conducted a case study of 20 adult learners enrolled in an online course at a large western United States university. Data were collected using the Sense of Classroom Community Index (SCCI) developed by Rovai & Lucking (2000). Using the SCCI as a pre and post test the results showed an increase in the maximum scores for both males and females, with females being significantly higher than males. What the survey indicated was a sense of community increases the flow of information. Students benefited by being part of the classroom community through feelings of well-being, spirit, trust, shared emotion, and a commitment to shared goals. Overall, student opinions provided the evidence that a sense of classroom community was developed through interactions among the students and the faculty and that interaction created a feeling of closeness and mutual benefits among the students.

Using a survey to measure the sense of community, McKinney, McKinney, Franiuk, and Schweitzer (2006) conducted a study in a Midwestern university psychology classroom. A sense of classroom community was the independent variable. Based on constructs used in neighborhood community research, which were used to predict student attitudes in the classroom, how the students perceived learning, and what their outcome assessments were, the authors measured six variables: connection, participation, safety, support, belonging, and empowerment (to rate the students' sense of community). McKinney et al. (2006) found a positive correlation between these scores and the student perceptions of learning and actual performance.

What McKinney, McKinney, Franiuk, and Schweitzer (2006) found was that

more than 87% of the participants felt that a caring instructor and a supportive classroom environment were the largest factors in students' satisfaction and success. The authors found that the theoretical construct of social capital, which includes networking and trust, led to the development of cooperation among community members. This study significantly showed the importance of creating a sense of community within the classroom in order to improve student satisfaction and performance.

Summers and Svincki (2007) demonstrated an empirical relationship between university student achievement goals and classroom community through the use of existing survey instruments. The authors focused on cooperative learning, social interdependence theory, and achievement motivation theory and how these related to the sense of classroom community. Cooperative learning is a classroom procedure that puts students together in learning groups where they can work with and off each other to improve their cognitive abilities. Social interdependence theory works hand in hand with cooperative learning in that the members of the groups are dependent on one another to achieve individual and group goals. Achievement motivation theory states that students will be motivated to work in order to achieve subject mastery, performance rewards (as in grades) or both together. Summers and Svincki defined classroom community as the students' feelings of belonging to the group with the understanding that their educational needs will be met.

What Summers and Svincki (2007) discovered was that cooperative learning significantly increased the students' sense of classroom community. They further found

that students involved in cooperative learning situations were more concerned with subject mastery than they were with rewards. Their study was limited, though, in that they did not study any small or moderate sized traditional (non-cooperative) classrooms to determine the effect of classroom community. Their study did show that the development of a sense of community in the classroom does lead to improved student outcomes as well as their personal sense of belonging.

Kay, Summers, and Svincki (2011) developed an inductive analysis of 16 university faculty case studies to look at classroom community from the viewpoint of the instructor. Using the words of the participants in the results of the study Kay et al. (2011) defined the classroom community as an opportunity for students to build a positive bond with other members of the class. Another participant described it as having the needs of the individual met by members of the community. A third description was that of the students having a common interest in a place where they could intellectually stimulate each other. Through the evidence gathered in this study Kay et al. (2011) determined that the classroom communities they created had a tangibly, positive impact on student achievement.

Booker (2008) conducted a quantitative analysis of fourth-year students at a large public research university in the Southeastern United States using a modified version of the College and University Community Inventory to determine the students feeling towards their peers and instructor in classes where building community was focused on. Students reported that in their favorite classes it was due to the faculty making them feel

as if they were part of the classroom community. They similarly attributed their positive experiences and sense of connection to their instructor. On the flip side the students did not give high ratings to the instructors in their least favorite classes.

Immediacy

Mehrabian (1967) first defined immediacy as communicative behaviors, which "enhance closeness to and nonverbal interaction with another." (p. 203)

In order to understand the link between immediacy and cognitive behavior Kelley and Gorham (1988) conducted a study of 100 undergraduate students' short-term memory skills. The independent variables in the test were eye contact and physical immediacy with the dependent variable being recall. The physical conditions and instructions for conducting the experiment were identical for all participants. They were told this was a short-term memory study and immediacy was not mentioned. However, the researchers were actually varying the degree of eye contact and physical immediacy with the participants to determine whether immediacy had an effect on recall. Four conditions were tested. With a possible score of 6.0 as highest recall the following mean scores were recorded: 4.9 for eye contact and high physical immediacy; 4.53 for no eye contact and high physical immediacy; 4.35 for eye contact and low physical immediacy; and 3.44 for no eye contact and low physical immediacy. These results showed a significant relationship between immediacy and cognitive skills (in terms of short term recall.)

Gorham (1988) conducted a study on the effects of immediacy with learning

using surveys sent out to undergraduate students from a variety of classes and colleges. The surveys were sent out during the 12th week of a 16-week semester after students had the opportunity to get to know their instructors and before final grades were posted. Three hundred eighty-seven questionnaires were analyzed with approximately half female and half male respondents. Of those analyzed 122 were from classes of 1-25 students, 144 from classes of 26-50 students, and 121 from classes of 51 or more students. The results showed a significant relationship between learning and immediacy, both verbal and nonverbal. Another significant result of this study showed that as class size increased, the importance of certain behaviors became even more important. These included asking the students questions, encouraging the students to engage in discussions, and addressing the students by name.

> Teaching-learning interactions, like other interpersonal relationships are characterized by both explicit and implicit communication. Interpersonal perceptions and communicative relationships between teachers and students are crucial to the teaching learning process and the degree of immediacy between teacher and students is an important variable in those relationships. (p. 40)

Christophel (1990) hypothesized that H1: student perceptions of teacher verbal and nonverbal immediacy behaviors will be positively associated with student state motivation; H2: student perceptions of teacher immediacy behaviors will be positively associated with cognitive, affective, and behavioral learning; and H3: students perceptions of trait and state motivation will be positively associated with cognitive,

affective, and behavioral learning. Her research question was: to what extent are teacher immediacy and student state motivation collinear predictors of learning. The participants in the study included undergraduate and graduate students, teaching assistants and faculty recruited from many different classes across a single university. Surveys were distributed to the participants about half way through the semester. Data were collected for two different studies. The first study asked the participants to answer the questions based on the course immediately preceding the one they were in. The second study randomly split each class in half. Half of the students completed a survey pertaining to motivation and immediacy while the other half completed a survey pertaining to motivation and learning.

The results of the Christophel (1990) study showed a positive correlation between student perceptions of teacher immediacy and their state motivation levels. The data also verified H2 in that student perceptions of teacher immediacy were positively associated with their degree of learning, and H3 that trait and state motivation were positively associated with their learning. One surprising outcome of the data was that non-verbal immediacy behaviors showed higher positive correlations with learning than did verbal immediacy. This is a further indication of the importance of quality video connections between remote locations.

Rodriguez, Plax, and Kearney (1996) used a series of four existing testing instruments with 224 undergraduate students at a large western United States university. The first instrument was developed by Richmond, Gorham, & McCroskey (1987) to measure nonverbal teacher immediacy. The second instrument that tested student state

motivation was developed by Christophel (1990.) The third instrument was developed by Gorham (1988) to measure affective learning, and the fourth instrument was employed by Frymier (1994) and Christophel and Gorham (1995) to test student cognitive learning. The data from these four instruments comprised one data set, which was then used to compare the results obtained by Frymier in 1994. The purpose of the research conducted by Rodriguez, Plax, and Kearney (1996) was to determine whether student state motivation was the causal relation between teacher nonverbal immediacy and cognitive learning, or if the relationship between immediacy and cognitive learning was mediated by affective learning. While there was no significant difference between the two models the research did show the important role nonverbal teacher immediacy plays in the development of state motivation, affective learning, and cognitive learning.

Titsworth (2004) relied on studies conducted by O'Hair, O'Hair, and Wooden (1988), Titsworth and Kiewra (1998), Bretzing and Kulhavy (1979), and Rickards and Friedman (1978), which demonstrated the importance of notetaking as a positive learning strategy for students in a lecture-type classroom setup. From these prior studies, Titsworth posited that verbal and nonverbal lecture cues given in class by the instructor "stimulate student interest, signal the importance of topics, and signals the organization of ideas" (p. 307.) Titsworth studied a group of 104 undergraduate students in a mid-sized Midwestern university, to determine the effects that teacher nonverbal immediacy has on student notetaking. Students were shown one of four prescripted lectures. Each lecture contained the same content and was presented by the same instructor. One video

contained multiple intentional organizational cues with a second video containing none. In a second set of videos, one contained a high number of intentional immediacy behaviors while the other contained little to none, with the instructor reading from behind a podium. The results of this study showed that students who watched the high immediacy video actually recorded fewer notes, but received similar test scores as those students who watched the low immediacy video. On the other hand the students who watched the video with the high organizational cues took much better notes than the students who watched the video with low organizational cues and received substantially higher test grades.

Burroughs (2007) conducted a study looking at the relationship between teacher nonverbal immediacy and student compliance/resistance with learning. Based on studies by Anderson, Everton, and Brophy, (1979); Brophy and Everton, (1976); Everton, Anderson, Anderson, and Brophy (1980); and Everton and Emmer (1982), Burroughs (2007) determined that classroom management had been proven to encourage student learning while preventing student resistance to learning. Burroughs (2007) posited that teacher nonverbal immediacy served to gain compliance from the students. In her study, Burroughs (2007) posed five research questions. In essence they asked if teacher nonverbal immediacy had an effect on student resistance to learning and willingness to comply; and did teacher immediacy and student willingness to comply have a relationship to the students' perceived cognitive and affective learning. The study was conducted using 564 undergraduate students from a mid-Atlantic university. Participants

completed a questionnaire that measured teacher nonverbal immediacy, affective learning, cognitive learning, and willingness to comply. The results of the surveys showed that college students were more likely to respond positively to instructors who demonstrate immediate behaviors which translated to higher compliance. The results further showed students' willingness to comply and teachers' high nonverbal immediacy both had a positive relationship with students' cognitive and affective learning.

Schutt, Allen, and Laumakis (2009) conducted a research study to investigate student perception of instructor immediacy and social presence in computer generated environments. The authors hypothesized that participants in the high-immediacy sessions would experience a higher perception of instructor immediacy than those in the lower immediacy sessions, and that there is a positive correlation between perceived instructor immediacy and perceived social presence. To test their theories Schutt, Allen, and Laumakis (2009) simulated two distinct synchronous learning environments, one with audio and video feeds from the instructor, and one with just audio feed from the instructor. Both environments included text chat for the students to communicate with the instructor. Two versions of the same lesson were scripted for the study. One version contained higher verbal and nonverbal immediacy cues than the other and each was broadcast to different groups in the two environments creating four different study groups from which to obtain data.

The participants in the Schutt, Allen, and Laumakis (2009) study were from a large public university located in Southern California. Nine hundred eight-nine subjects

were randomly placed in the four groups. Of those original participants, 632 completed the assignment, and 433 agreed to have their data analyzed for the study. The participants were given a short demographic survey to complete prior to viewing the lessons. After viewing the lessons, the students were given a questionnaire based on Gorham's Verbal Immediacy Behavior Scale and the Nonverbal Immediacy Behavior Scale developed by Richmond in 1987 to measure instructor immediacy. To measure social presence, the students were given an instrument developed by Garrison (2004). Finally, the students were given a few open-ended questions asking them to provide additional comments.

The results of the Schutt, Allen, and Laumakis (2009) study showed that students in the high-immediacy sessions (one with video and one without) significantly experienced higher levels of immediacy than in the other two, with the video session scoring significantly higher than all others. They also found a significant positive correlation between immediacy and social presence. Based on their findings Schutt et al. (2009) suggested that synchronous broadcast of video facilitates a higher rate of immediacy and social presence in distance classrooms. In their discussion the authors included the following points and quotes from the students:

> …some participants who reported that the instructor seemed like a real person, indicated that factors influencing their perception of the instructor included the fact that the instructor, among other reasons, encouraged students to talk, used gestures, answered questions, and they could also see him and hear his voice.

> Specifically, participants reported that "he expressed emotions, and asked questions to get the students involved," "he made a lot of gestures and called out individuals by name," "he cared about what the students understood or didn't understand," and "he was actively engaging with the class, he was asking questions and giving a chance for students to voice their opinions and questions." (p. 147)

Schutt et al. (2009) further concluded:

> What seems particularly relevant in an age of new media machines is to better understand the role of ancient forms of human expression that communicate interest, enthusiasm, empathy, concern, and recognition—the forms of expression that help real students and real teachers to project their personal presence through electronic pathways.

Presence in the Classroom

The article by Garrison, Anderson, and Archer (2000) is a seminal article in that it defined what the authors considered the Community of Inquiry (COI) which included Cognitive Presence, Social Presence, and Teacher Presence. They developed this model through an extensive review of communication and distance education literature. Garrison et al. (2000) posited that the intersection of these three presences in the distance classroom was what made up the Educational Experience for the students as indicated in the figure below. Cognitive presence was the basic component of this triad and

considered to be how students "construct meaning through sustained communication" (p. 89.) The development of cognitive presence in the COI is due in part to facilitation of communication through the selected medium. Social presence was defined as "the ability of participants in the community of inquiry to project their personal characteristics into the community, thereby presenting themselves to the other participants as real people" (p. 89.) Teaching presence is comprised of designing and facilitating the educational experience for the students and is therefore the bailiwick of the instructor.

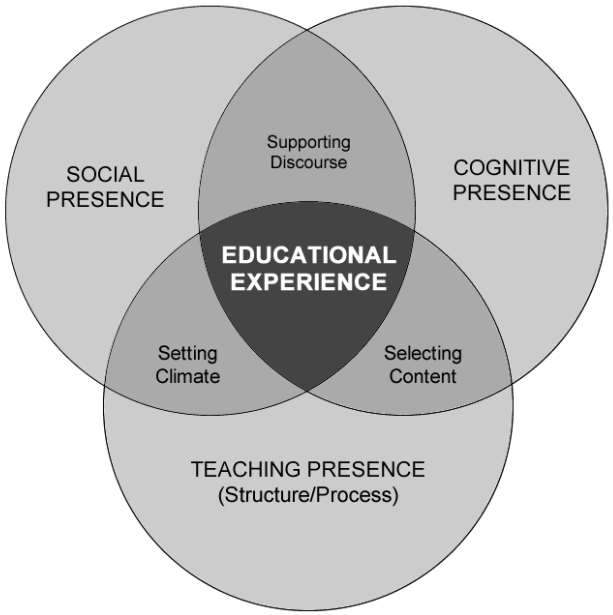

Figure 1 - Community of Inquiry: Elements of an education experience

When using computer conferencing techniques Garrison, Anderson, and Archer (2000) contended that students tended to be less interactive than in a classroom. The authors also claimed that social presence could be more difficult to develop in computer conferencing classrooms since it is very dependent on written versus oral communication

techniques. Garrison et al. (2000) felt that it was more difficult to sustain cognitive presence where social presence is low and that social presence is critical in the establishment of a community of learners. The authors contended that visual contact between the students and the instructor is key in establishing social presence. Finally, Garrison et al. (2000) contended that the strong presence of an instructor was necessary in establishing an academic community of inquiry.

In 2006 Lloyd Kornelsen wrote about the research he conducted in 2001 in which he first coined the term "presence" to describe his experiences in the classroom when everything seemed to flow and come together between students, instructor, and learning. Using a phenomenological methodology, Kornelsen interviewed three adult educators and observed their classroom techniques over a period of three months. In describing presence, stated

> …teachers need to manifest those traits that invite presence: presence of themselves, of their learners, and of the subject-content. Teaching with presence means teaching in a way that encourages openness, imbues vitality, and sometimes abandons order.

Kornelsen (2006) further suggested that teachers should "engender a caring, respecting, and trusting environment. This is an environment where learners are freer to risk, challenge and reciprocate with openness themselves." This description of presence seems to take into consideration immediacy and interaction. The participants in the study used terms such as "being human", "being who you are", "being vulnerable and open",

"being yourself", and "being honest." Another facet developed by the participants was helping the subject-content be present to the students. They described this as "walking the talk," "being enthusiastic," and "living what you teach" as opposed to just teaching what you know or have read. According to the participants students can relate better to the instructor who has experienced and appreciates what they are teaching as opposed to those who have learned and researched a topic and are simply regurgitating facts. Another facet of being present is the ability to let go of the prearranged agenda for the class. The participants felt that good teachers come to class prepared with an agenda to follow; great teachers allow the interaction with the students to dictate when to deviate from that agenda, allowing them to feel they are a vital part of the teaching-learning process. The participants felt it was important for "teachers to feel free to be themselves." In conclusion, Kornelsen summarized presence as "…teaching in a way that facilitates the presence not only of the teacher but of the learner and subject-content as well."

In 2008, author and professor, Jerry Farber, wrote a commentary on teaching and presence, in which he stated,

> When we're absent, when we're there but not there, this, in effect, excludes the students, who are reduced to the role of mere onlookers (in lecture) or objects to be manipulated (in "class-centered" activities). If their motivation is strong enough, they may be able to involve themselves actively in what is happening, but they are less likely to do so—and what occurs is less likely to stay with them —

than when there is a sense of presence in the classroom.

Farber went on to support presence in the classroom as a method that "…carries with it a sense of immediacy, openness, and spontaneity" and "…. draws presence from the other people in the room…" As opposed to treating them as simply spectators at the instructor's performance the students were encouraged to participate in the learning-teaching process. Farber described what kept him present in his classrooms. These included "being unwilling to settle for less," "staying aware of people in the room," and "staying aware of oneself and seeking out one's own energy."

Using the Community of Inquiry Instrument developed by Arbaugh in 2008, Garrison, Cleveland-Innes, and Fung (2010) received 205 completed surveys from a group of students in 14 different courses. The Garrison et al. (2010) research questions asked whether teaching and social presence were perceived to be a positive influence on cognitive behavior; and did teaching presence positively influence social presence. The survey showed statistically significant results that teaching and social presence did have a positive influence on cognitive presence and teaching presence did have a positive influence on social presence.

Brubaker (2012) conducted a qualitative study of students in one of his teacher education classes at a large comprehensive state university in northeastern United States to explore the process of developing collaborative dialogue among students and instructor in cultivating a community of inquiry in the classroom. Data were collected through the

collection of audio recordings taken of class exercises, group meetings, meetings with students outside of class, student-teacher conferences, and informal discussions with colleagues of the author. It also included course documents, personal reflections by the students, and field notes compiled by experienced third party observers.

Brubaker (2012) described the conventional method of teaching as "depositing 'prefixed parcels of knowledge into allegedly empty student minds'" (p. 240.) Creating a democratic community of inquiry requires the rethinking and reconstructing of roles in the classroom reducing the authoritarian position of the instructor and encouraging participation by the students in the process of learning and teaching in order to help students realize and develop their full potential as students and people. The teacher's role becomes that of the organizer and facilitator by providing the text, developing the agenda, forming the classroom community, encouraging student involvement through classroom exercises, and encouraging students to actively engage in relevant classroom dialogue.

What Brubaker (2012) discovered in his findings was the importance of constructing a community of mutual interdependence and trust among the students and the instructor. This was done by involving and encouraging as many students as possible in the classroom discussion process. Three themes emerged from the data. The first was that collaborative communication in the classroom encouraged the students to examine conventional teaching practices and to see how this type of communication helped to enrich student understanding of the course content. The second theme looked at how

authority in the classroom was redistributed from the instructor to be shared by the students which fostered a feeling of collective growth amongst them. The third theme had to do with the students' difficulty in adjusting to this type of democratic classroom when many of their other classes were still being conducted using the conventional authoritarian model. While the students understood and preferred the community of inquiry method they simply had a difficult time adjusting to it because it was not being reinforced in their other classes. Brubaker concluded his study by adding:

> I believe this study illustrates that by helping students come to their own conclusions and think for themselves through philosophical inquiry and collective deliberation, teachers can foster a pedagogical vision that is fundamentally democratic, equitable, and nurturing.

Borup, West, and Graham (2012) conducted a qualitative, cross-case study of three case studies to explore how social presence could be improved through the use of asynchronous videos in online classes. The three cases included three different online educational courses taught by three different instructors. Students were selected from the classes based information they had provided in end-of-course surveys they had taken in previous classes. Those chosen were selected on the authors' opinions of who would be the most informative. Twelve secondary education preservice teachers and six elementary education preservice teachers were selected for the study. Semi-structured interviews were conducted with each participant designed to elicit information on their feelings of being connected with their peers and the instructors, and whether the

technology used facilitated this interaction.

In the first case study the instructor used an interactive online communication tool called VoiceThread, which allowed him to upload images, PowerPoint, video, text, and audio narrations. Students were then able to view these postings and return comments using text, audio, or video. Students in this class were encouraged to post their responses using video, but most posted using text replies. In the second case study the instructor also used VoiceThread to discuss assignments, facilitate small group interactions among the students, and to provide feedback from the instructor on student assignments. The instructor in the third case study chose to use YouTube, a free video hosting site on the Internet. The instructor in this class posted 5 – 15 minute videos of himself each week and required the students to post at least half of their responses as 30-60 second videos.

In reviewing the data, Borup, West, and Graham (2012) found that all of the participants agreed their instructor's videos positively impacted the course. Some of them commented that it seemed the instructor was interacting with them directly, they would have preferred more of it, and it improved their learning. The students also commented that the videos facilitated a feeling of cohesion, familiarity, and closeness with the instructor. Many of the students, however, did not feel the same way about their peers and instead felt fellow students were not watching the videos they had posted. Those who did view their peer's videos felt they learned something important about the personality of those students which in turn helped to create and solidify a sense of community. In conclusion, Borup et al. (2012) felt the study showed the importance of

using video (in this case asynchronous) in distance education classes to increase the instructor's social presence in the course. They did find that creating extended, threaded conversations was difficult using asynchronous video and recommended the development of a better video communication method.

Bernard, Abrami, Lou, Borikhovski, Wade, Wozney, Wallet, Fiset, and Huang (2004) conducted a quantitative synthesis using a meta-analysis of empirical distance education articles that compared distance education and traditional classroom based instruction techniques. Bernard et al. (2004) originally examined 2,262 articles, 862 of them were retrieved and read, and 232 of those were included in this analysis. This resulted in 688 outcomes based on 57,019 student achievement outcomes, 35,365 student attitude outcomes, and 3,744,869 retention outcomes. One overall finding of the study was that "methodology and pedagogy are more important than media in predicting achievement." (p. 399) Another finding did show that achievement outcomes were slightly higher in the distance education classrooms by a very small margin. A third finding showed that comparative studies of students in contiguous classrooms versus those in distance classrooms resulting a more positive attitude toward being in the classroom. Studies of both synchronous and asynchronous distance education classes showed that students favored classroom instruction over distance education. The studies further indicated that retention was higher in classroom instruction. Overall, Bernard et al. (2004) found it difficult to draw any significant conclusions from the data provided in the existing literature.

One important conclusion made in the Bernard, Abrami, Lou, Borikhovski, Wade, Wozney, Wallet, Fiset, and Huang (2004) meta-analysis was the importance of the use of the seven basic teaching principles, that were originally developed by Chickering and Gamson in 1987 for classroom teaching. Bernard et al. (2004) found these principles were just as critical in the distance education classrooms, but were more difficult to transfer to asynchronous online teaching, which may necessitate the need to develop new online best teaching principles. Because synchronous distance education is more similar to the contiguous classroom the basic classroom skills are more easily translated.

Summary

The literature review has taken the reader on a journey through the best practices in education and into a history and overview of distance education in general. This led to a review of the literature on interaction in the distance classroom which included information on transactional distance and presence as well as the three types of interactions in distance education classrooms developed by Moore (1989); learner-learner, learner-instructor, and learner-content. This led to a review of the literature on developing a sense of classroom community in both the contiguous and remote classrooms and how this is greatly facilitated through teacher immediacy behaviors which finally led to a review of the literature concerning the importance of developing a community of inquiry that includes social, cognitive, and teaching presence.

Good teaching and learning necessitates an exchange of information between learners and instructors. The review of literature clearly shows this. Maintaining that

exchange of information can be difficult enough in a contiguous classroom due to transactional distance, but it becomes even more difficult in remote classrooms where the geographical separation and quality of the equipment can further impede communication. The literature shows that both transactional and geographical distance can be overcome by employing interactive techniques in the classroom. These methods include, but are not limited to questioning and discussion and are enhanced through the use of immediacy behaviors. The literature further shows that developing a classroom community increases the opportunity to foster dialogue between students and instructors thereby increasing learning. That sense of community in the classroom has been difficult to achieve historically in distance education. Looking back through the history of distance education, early forms of delivery were not amenable to building community, but the development of new technologies has fostered new possibilities for creating classroom communities linking remote sites and reducing the feeling that students might have of being remote. Looking at all of these data together shows an opportunity for developing and testing a technology that will facilitate enhanced learning in synchronous, two-way, audio-video, distance education classrooms.

Chapter 3 - Methodology

The Research Problem

Can a university instructor create the feeling of a unified, classroom community between two geographically separate locations, employing teaching tactics such as immediacy and presence, and facilitating interaction among the students and between the students and the instructor through the development of a two-way, audio-video, synchronous distance learning technology?

This research project was conducted in three separate phases. Phase I was conducted in the spring of 2012. It was conducted to test a distance delivery system that would facilitate interaction between distant classrooms, both in concept and in the use of the selected equipment. As is the case in an action research study, many things were learned and discovered during phase I, which led to the determination that different equipment and methods would be needed to continue the study of whether this distance delivery system facilitated the opportunity to create a classroom community between distant classrooms. Time was needed after the completion of Phase I to engineer and install the new equipment, so, in the interim, Phase II was developed to further study students' opinions of learner-instructor and learner-learner interactions. Because the equipment in Phase I did not facilitate learner-learner interaction it was decided to abandon the sidewall projection of the students until better technology and equipment could be developed. The front wall projection of the instructor had worked very well, and had been well received by the students. It was therefore decided to focus on how this

front wall projection facilitated interaction between the instructor and the students in the distance classroom through immediacy, social interaction, and teacher presence. In essence, was the instructor able to make the distant students feel as if they were an active part of the classroom community with the contiguous students? Phase II also looked at the existence of student-student interaction among the students within a remote classroom.

Phase III commenced with the installation of the new equipment, which allowed for the further study of interactions among the students and between the students and the instructor. The new equipment brought much better audio and video connections between the contiguous and remote classrooms. This improvement in the communication between locations allowed for the study of learner-learner interactions between the remote locations, as the students from each room could now see and hear each other clearly. It also allowed for even further study of the interactions that occurred between the distant learners and the instructor.

Following the tenets of the Action Research model, changes were made in the methods of studying the subject along with the focus of what was being studied. This ongoing spiral of learning from and making changes because of data garnered from previous phases in the research is the reason why action research was the methodology selected for guiding this study.

Definition of action research. Kurt Lewin coined the term “action research” in 1934 (Mills, 2011). After a few years of practical experience conducting action research,

Lewin stated that it "gives credence to the development of powers of reflective thought, discussion, decision and action by ordinary people participating in collective research on 'private troubles' that they have in common" (Adelman, 1993, p.8). In his book on Action research, Elliot (1991) refers to it as teachers studying their own teaching, which describes the methods used in this study.

Creswell (2008) further breaks down action research into two designs: practical and participatory. He describes Participatory Action Research as

> …recursive and focused on bringing about change in practices. This occurs through spirals of reflection and action. When teachers reflect on their roles in schools, they will try one action and then another, always returning to the central question of what they learned and accomplished because of their actions. (p. 604)

This research was conducted by a university professor who was concerned with developing a distance education system that would enable him to facilitate his interactive style of teaching in a distant classroom. The spirals of reflection and action occurred within each phase, with each phase leading to the development and redevelopment of the next.

Sagor (2005) defined action research as "a disciplined process of inquiry conducted by and for those taking the action. The primary reason for engaging in action research is to assist the actor in improving or refining his or her actions" (p. 1). This study was conducted with the instructor as the actor working to improve distance education techniques for his classroom.

Creswell further stated, “action researchers explore a practical problem with an aim toward developing a solution to a problem” (Creswell, 2008, p. 596). The research done on this project was used to develop a solution to the problem of students feeling remote when they are taking a distance education class. Similar to Creswell, Pine (2009) defined action research as studying a “problematic situation” (p. 30) systematically in order to find a solution to the issue. Pine (2009) further defined it as a concurrent process of looking at issues in a specific classroom and finding solutions for them, all for the sake of improving teaching and learning.

Hendricks (2009) described action research in terms of the teacher who investigates what he does in order to improve his practices, which is what was done in developing the researcher’s ability to create a unified classroom community between remote locations.

Philosophical worldview (paradigm). As action research has become more popular among researchers, the definition and descriptions have changed and developed, as well. Over time, it has been referred to as a research design (Creswell, 2008), a strategy of inquiry (Creswell, 2009), a method (Hendricks, 2009), or a paradigm (Pine, 2009, Johnson, 2008.)

Johnson (2008) takes the position that action research is a paradigm. He defines it as being useful in guiding the researcher in achieving new understandings. He further states that paradigms are “what we believe to be true” (p.16), which can affect the perspectives we take in our research, what data we choose to look at, and how we

interpret those data. Pine (2009) agrees with Johnson. He claims "action research is a paradigm and not a method" (p. 30).

Creswell (2009) describes four basic worldviews and states that the researchers should select one first, in order to then shape their research. In further discussing the process of Action Research, Creswell (2009) states, "instead of focusing on methods, researchers emphasize the research problem and use all approaches available to understand the problem" (p. 10). Following this prescribed methodology, the researcher allowed the gathered data to determine the methods used to best understand the issues at hand.

Steps in the action research process. Mills (2000) developed a dialectic action research spiral, which is a model for teachers to study themselves involving four stages: identifying an area of focus, developing an action plan, collecting data, and analyzing and interpreting the data. The area of focus for this project was in designing the NUVIEW system to support the delivery of an interactive, community classroom in a remote location. Developing the action plan included researching current technologies and delivery methods to determine how to accomplish the goal of creating a distance learning system that could support a classroom community between geographically separated classrooms and would prevent students from feeling disadvantaged because of the separation. This was accomplished by consulting with technical experts, setting up a plan to have the equipment installed, lining up the classes to teach, obtaining approval from the IRB, and coordinating all of these efforts to make it happen. The data collection

began during the first stage in the form of a journal, which was kept from the very beginning, documenting the entire process. The spiral that Mills (2000) describes was repeated three times for this project. The final stage occurred during the months following the completion of phase III as all of the collected data were analyzed and described.

There was no documentation of a classroom setup of this nature being attempted before and the concept had to be developed from scratch. Six different audio-video vendors were brought in as consultants in engineering this new system. After months of discussions of how it could be engineered and how it might end up working it was realized that a system would need to be selected and tested with the determination that the testing would result in the system being redesigned. Action research was the ideal method for developing a system, testing it, making changes based on the data gathered, retesting it, and following that cycle until a viable solution was discovered.

Role of the researcher. The role of the researcher in a typical practical action research study is that of the active participant (Herr and Anderson, 2005; Mills, 2011; Sagor, 2005; Hendricks, 2009; Creswell, 2008, 2009; Johnson, 2008; and Pine, 2009). The instructor in this study was the person who developed the concept of NUVIEW and conducted the research. The classroom observer served to help ensure that the outcomes were not biased or compromised. The observer continuously provided second opinions, read the study as a peer debriefer and also a member checker.

The researcher was the first instructor to test this new technology because he

preferred being an active, as opposed to a passive, observer in this study. He selected a course (CNST 3790, Construction Estimating II) for phase I that would have enough students enrolled to carry out the study. This course was populated with students most of whom had already participated in at least one of the researcher's other classes and were familiar with his teaching methods. The purpose for this was to eliminate having the instructor's interactive teaching style be a variable that would affect the outcome of the study. The instructor's teaching style is very interactive and keeps the students constantly involved in the learning/teaching process by involving them in ongoing discussions instead of lecturing to them. Students in this program are not typically used to this method of teaching.

Joseph Lowman (1995) discussed the importance of good classroom discussion in developing independent thinking in students. He also pointed out that students who are involved in an ongoing discussion feel they and their thoughts are important and relevant, which leads them to further classroom involvement and participation. When instructors are able to engage their students by looking them directly in the eyes, they tend to be more involved in classroom discussions. Burroughs (2007) suggested that teacher's "immediacy is the underlying motivator of students' on-task compliance" (p. 456). Bloom (1956) stated that cognitive learning and recall were directly connected to both comprehension and retention. Based on Bloom's findings, Kelly and Gorham (1988) developed a four-step model, which linked immediacy to cognitive learning. According to Kelly and Gorham "immediacy is related to arousal, which is related to attention, with

is related to memory, which is related to cognitive learning. (p.201)"

It is this type of interactive rapport, which led to the development of an interactive distance delivery system so that instructors who have an interactive teaching style and who felt shackled by the current technology when trying to teach a distant course would feel comfortable and would be able to build their own unified classroom communities. It was also felt that if this distance delivery system would work for an interactive teaching style it would most likely work for any other style of teaching, as well.

Intent of the research. The purpose of this research project was to test how a particular distance delivery system facilitated learner-learner and learner-instructor interaction in a pair of distance education classroom in order to develop a single interactive classroom community. The research focused on student opinions from both the contiguous and remote classrooms in eliciting their opinions of how well the configurations of equipment delivered a quality classroom community experience to students in separate classrooms using live, synchronous, audio-video feeds.

For this project an interactive classroom is considered one where communication and development of content takes place bi-directionally between the instructor and the students as opposed to unidirectional as in a lecture format. In other words the development of the content and the learning experience is collaborative. The building of this collaborative learning community is predicated on continual and immediate verbal and non-verbal feedback. The intent of this research is to replicate this interactive classroom in a remote location combining the two classrooms into one interactive

collaborative learning community as depicted in the graphic below.

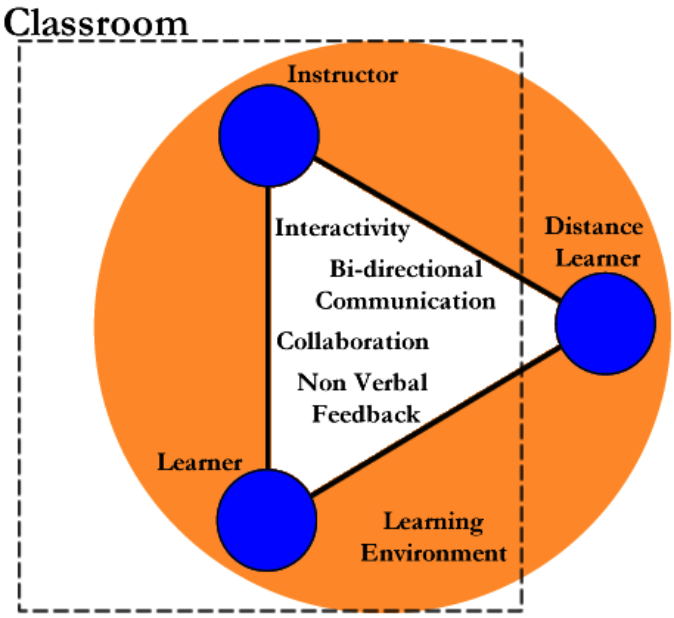

Figure 2. Remote and contiguous interactive classroom community concept

Grand Tour Question

Can a live, synchronous, two-way, audio-video distance delivery system positively shape or play a role in students' and instructor's interaction, immediacy, and presence in distance education classrooms?

Overall plan of action. This study was designed to use the Action Research methodology of iteratively looking at an issue and developing and redeveloping solutions that address the issue. A three-phase plan was developed to look at whether the concept of the front and sidewall projections would facilitate the development of a classroom community between remote classrooms and if the equipment selected would deliver a

quality product.

Phase I was designed to study student and instructor reactions to the concept and delivery capabilities of a distance delivery system that was being referred to as NUVIEW. In this first phase, the system included sidewall projections of the students from the other classroom. At the time it was believed these sidewall projections would enhance and facilitate learner-learner interaction between the classrooms. The student reactions to the sidewall projections in Phase I and to learner-learner interaction during class were predominantly negative, which led to its elimination in Phase II and a redirected focus on learner-instructor interaction between classrooms and learner-learner interaction within the remote classroom. The participants' reaction to the poor quality of the original NUVIEW equipment in Phase I also led to the re-engineering of the system and replacement of the equipment with higher quality, high definition audio-video equipment in Phase III. With the installation of the new equipment in Phase III, the study resumed its focus on the ability of the equipment to facilitate a classroom community between remote classrooms, with a concentration on both learner-learner and learner-instructor interaction comparing the results from Phase III with those from Phases I and II.

Research Protocols - Phase I

Research sub-questions. The following questions were specifically addressed during this phase of the project.

1. Can a live, synchronous, two-way, audio-video distance delivery system be

developed that will facilitate learner-learner interaction between students in remote and contiguous classrooms?

2. Does a live, synchronous, two-way, audio-video distance delivery system facilitate instructor-learner interaction between remote students and instructor?

Plan of action. The plan was to teach two sections of the same course at the same time, during the spring semester, with each section of students in separate, adjoining rooms. The course used in this study was a junior level construction estimating class that is required for Construction Management students and is open as an elective for other students who meet the prerequisites. The students signed up for the class in the fall of 2011 without an option as to which section they would be in. The original equipment was installed at the end of the first eight weeks of the semester and the students were randomly placed in the two separate sections, with the intention that both groups, regardless of which section they were in, would receive the same education and opportunities.

Two separate classrooms had been configured with the original equipment that allowed the students to see their counterparts from the other classroom projected along a sidewall of their own classroom wall. These projections were intended to give the students the perception that the classroom continued beyond the actual wall and that the two classrooms were virtually connected, side-by-side, as one. The sidewall projection also afforded the instructor a view of the students from both classrooms seemingly together in one classroom. The contiguous classroom contained one mounted camera

that focused on the instructor, and one that focused on the students. The images from the student camera were projected on the sidewall of the remote classroom and the images from the instructor camera were projected on the front wall of the remote classroom. This system was intended to facilitate the development of a combined community between classrooms that were geographically separated from each other by significant distances.

Figure 3 - Mockup view of the sidewall projection in the distance classroom

The remote classroom had two cameras focused on the students. One camera captured the images of the remote students from the side and projected them on the wall

of the contiguous classroom. The other student camera captured them from the front of the room and projected them on a monitor at the back of the class for the use of the instructor only. Both rooms contained two microphones and two speakers that were directly connected and intended to capture and deliver all sounds from one room to the other.

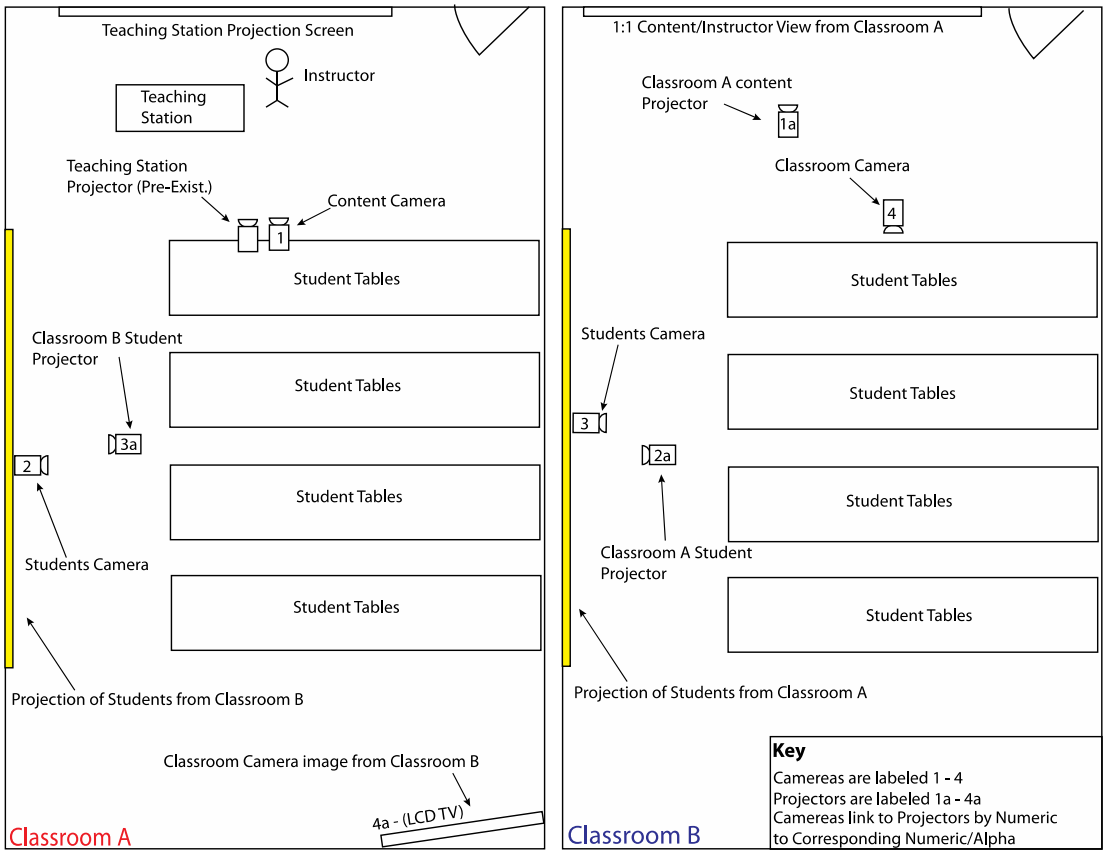

Figure 4: Diagram of Phase I classroom equipment layout

Introduction of project to the students. CNST 3790, which was the focus of Phase I, is a mandatory class for most of the students and this was the only section being taught in 2012. Therefore, the students were required to take the class if they wanted to stay on schedule for graduation. However, so as not to coerce the students into participating in the study, or to prejudice their responses, student involvement in the collection of research data was completely voluntary.

Once the equipment was installed the project was described to the students along with the intent of the study. It was made clear to the students the focus of the study was on the effectiveness of the equipment in facilitating interaction between students in both classrooms, and between students and the instructor. The study was not about the students' abilities, or their ability to learn the information being presented in class. Nor was it about their opinion of the instructor and his method of teaching, except where it directly related to the technology.

It was also made clear that their choice to volunteer or not volunteer would not affect their standing in the class or their grade in any way and that the instructor would not know which students agreed to participate. The selected volunteers' involvement in the project included completing a pre-project survey, answering two or three survey questions after each class, and having one-on-one interviews at the end of the semester all under the auspices of the classroom observer. The students' identities were not revealed to the instructor.

All of the students who volunteered to participate in the study were emailed a link

to the survey questions after each class. One or two questions pertained to something specific that happened or technique that was used on each particular day. Each survey also contained a question asking students which room they were in. This allowed for comparison of data between the remote and contiguous groups. The number of students who responded each time fluctuated from six to eighteen participants. The responses were not compiled and delivered to the author until after the semester had ended and all grades had been posted.

One week prior to the final exams, students were asked to volunteer to be interviewed. Of those students who volunteered, eight were selected at random. Seven of the students kept their appointments. One of the interviews failed to record. That student was asked to conduct the interview a second time, but did not keep their second appointment. All interviews were conducted by the classroom observer, audio taped, and sent to a transcriptionist. The transcripts were cleansed of all information that could identify them or any other students in the class, and then delivered to the author only after the semester grades had been submitted. Once this research project is completed all tapes, and transcripts will be properly destroyed.

Once the students had been divided between the two classes the distance delivery equipment was turned on at the beginning of each class. The students in the distance classroom received a projected image of the instructor and everything he did and wrote at the front of the room at a 1:1 ratio at the front of their remote classroom. Additionally, they received a projected image of the students from the contiguous classroom displayed

on the sidewall of their remote classroom. The students in the contiguous classroom received a projected image of the students from the remote classroom on the sidewall of the contiguous classroom. In the back of the contiguous classroom a 46” monitor received an image of the remote students shot from the front of the remote classroom. This monitor was for the use of the instructor.

Figure 5: Photo of distant classroom with front and sidewall projections - Phase I

Classroom observer. The classroom observer acted as the data collector during the research process. The instructor considered this setup necessary to eliminate the possibility of implication of coercion of the students. In his role as the surrogate

researcher, the classroom observer conducted the surveys, conducted the briefings regarding the distance delivery equipment, and coordinated and conducted all student interviews. Any issues the students had regarding the research project were dealt with directly with the classroom observer. After each class period the classroom observer would select one or two questions from the list of previously developed questions, post them on line, and send the students a link to website where they could answer the questions. In addition to the one or two questions, which were relevant to the distance delivery system, they were also asked which room they were in that day.

Besides collecting the data, the classroom observer attended most of the classes and maintained a journal (reference Appendix A – Classroom Observer's Journal) regarding the use and efficacy of the distance delivery equipment. His observations included how the instructor effectively used the technology and how the instructor interacted with students in both classrooms. His other focus was also on the students in both classrooms and how they interacted with each other and with the instructor through the equipment.

The classroom observer worked with the instructor on this project since its inception, brainstorming ideas regarding the technology and the methods for gathering data and his input was invaluable due to his experience, training, and education. This partnership between the classroom observer and the instructor continued through all three phases of the project. Since the classroom observer assisted in the development of the data collection procedures, including the writing of the questions, further training in

conducting interviews was not deemed necessary. The observer and the instructor met after each class session during the data collection phase for a debriefing to discuss what had occurred or been observed, what recommendations the classroom observer may have had, and which questions should be sent to the students. The observer provided valuable feedback to the instructor, which assisted in better use of the technology.

Classroom observer qualifications. The classroom observer is currently employed by the university as the director of innovative teaching initiatives. He has a bachelor's degree in Telecommunications Management and one in Secondary Education. The classroom observer worked at one institution as an instructional designer where he taught faculty best pedagogical practices for using technology in the classroom. He also assisted the same institution with developing an online university. The classroom observer was then hired by another university to serve as instructional technology coordinator for their law college. His responsibilities there included development of interactive media for brick and mortar classroom use as well as helping to develop initiatives for emerging online curriculum.

He then returned to school where he completed his Masters of Science in Education and came to work for the college where this research was conducted as its multi-media specialist and director of innovative teaching initiatives. His charges include working with faculty to design and develop instructional technologies, conduct research on instructional methods related to online learning, and to help create technologies that will enhance and improve the students' learning experiences using tested pedagogical

practices.

After initially developing the concept for NUVIEW, work with the classroom observer began to test and brainstorm different ideas and technologies. Since the beginning, the classroom observer has been completely supportive of the author's ideas and has proved to be invaluable in providing assistance and opinions to help improve the concepts. Because of his background, education, experience, and most of all, because of his personality and high code of ethics, the author knew he could trust the classroom observer implicitly to work with the students.

Timing of the research. Most of the students in this class had the instructor previously and understood his interactive style of teaching. For students who experience it for the first time, it can take a little while to get used to as it involves a constant dialogue between student and teacher. The fact the equipment was not installed until the eighth week of class gave the students time to acclimate to the instructor's interactive style. For the last eight weeks of the semester, not including prep and final exam weeks, the students were divided into the two sections and started meeting in separate classrooms. After the first four weeks of the system testing, the students switched classrooms to provide equal opportunity for all students to experience both rooms.

Data collection methods. The following methods were used to collect data for this research project.

Pre-project survey. The pre-project survey was designed to elicit preconceived ideas of distance education from the students to serve as a baseline from which to make a

comparison of their specific opinions of the distance delivery equipment after they were subjected to its properties. The students were asked about their previous experiences with distance education, what type of delivery methods were used, what were their opinions of the delivery method, and whether the method previously used facilitated interaction between students and between students and instructor. They were also asked their opinion of NUVIEW as it had been described to them, what their preconceived notions of the technology were, did they expect it would be a distraction, did they feel it would facilitate interaction between students in both classrooms and between students and instructor, and if given a choice, which classroom they preferred sitting in.

***Questionnaires*.** Student participants were asked to answer one or two questions at the end of each daily class period. The classroom observer sent all volunteers an email that included a link to an on-line questionnaire. The students were able to reply without their identity ever being known to the instructor or the classroom observer. The same questions were submitted to the students in both the remote and the contiguous rooms. Along with the study questions, the students were asked which room they were in so that demographic could be used to compare answers between both groups of students.

The questions were used to elicit different types of information during the study. One grouping of questions asked about the effectiveness of the technology in delivering the lesson content in a quality manner. These questions were used to discover whether the electronic media used to deliver specific portions of content worked effectively. These media included PowerPoint presentations, video displays, overhead projections,

and physical models. Some questions were directed specifically at the students in the remote classroom. These included questions regarding whether the visual portion of the presentation received was of high quality, was the audio portion of the presentation received of high quality, did they feel the presentation would have been more effective if they had been in the contiguous room, did the quality of what they saw and heard induce them to interact with the instructor and/or the students in the contiguous classroom.

Another group of questions was used to determine the degree of interaction that occurred during a particular class period. The questions included:

- Did you communicate directly with a student in the other classroom before, during, or after class?
- What was the quality of the interaction in your group today?
- Did you communicate directly with the instructor today?
- Did you initiate communication with your instructor today?
- Were you comfortable asking the instructor questions?
- Were you comfortable responding directly to your peers in the other location?
- Did you feel you were part of the ongoing discussions in class today?
- Do you think the instructor's focus was divided equally between the two classes, and if not, how would you categorize the percentages?

Interviews. Eight students were selected at random from the pool of students who volunteered to be interviewed. An hour was set aside for each interview, providing enough time to garner rich meaningful information from each student. Most of the

interviews averaged around thirty minutes.

The interviews consisted of open-ended questions that were designed to solicit the students' honest opinions of the effectiveness of the equipment in delivering distance education. The interview questions were as follows:

- What was your overall impression of NUVIEW as a system for delivering distance education?
- How do you feel that NUVIEW facilitated or hindered interaction between students in both classes and between students and the instructor?
- What methods or technology would you change or add to NUVIEW to improve its effectiveness and why?
- If you were given an option to take another class using NUVIEW, would you do so; would you prefer to be in one room over the other; would you recommend that your friends do the same; and why, for each question?
- If you were given the option to take a distance education class using NUVIEW or using a different existing method, which would you choose and why?

These questions were developed to keep the students focused and on track.

Journals. The researcher as the active participant observer (Mills, 2011), kept a journal of the process from the very first meeting with his dean where they discussed the idea for a new distance learning method (Reference Appendix B – Author's Journal.) The

journal contained notes from all of the meetings that occurred from that time until this dissertation draft was submitted, including meetings with administrators, the multi-media learning specialist, information technology personnel, and equipment vendors. The journal was added to throughout the semester to document thoughts and reactions to using the distance delivery equipment, including those that occurred both in and out of the classroom. These are referred to as *field notes* by Johnson (2008.)

The classroom observer also maintained a journal (Reference Appendix A – Classroom Observer's Journal) that commenced with the start of the spring semester, and was used to document his thoughts, ideas, and critiques of how the method seemed to be working. These thoughts were shared with the instructor on an ongoing basis. The classroom observer also entered in the journal any informal discussions he had with the students regarding the process. Both journals have been used as artifacts.

Artifacts. There were artifacts (Reference Appendix C – Artifacts) collected for this study that include the following:

- Equipment specifications
- Photos of the room layout
- Drawings of the room layouts
- Photos of the rooms in use

Missing data and corroboration. In analyzing the data, Mills (2011) recommended trying to identify any missing data or remaining questions that needed to be asked. Pine (2009) further recommended examining the data from different

perspectives with a fresh set of eyes in order to find themes that may not have been observed the first time through. He suggested conferring with students who were involved with the study and colleagues who might have an interest in the results. Creswell (2008) concurred with the idea of enlisting others' help in the matter. Conferring with the students was not acceptable for this study since the researcher was not allowed to know the identity of the students, but the classroom observer did review the data for themes that may have been missed. Three fellow doctoral students who were also working on their dissertations at the same time reviewed the documents providing feedback on what they felt was missing.

Data compilation. After grades were turned in the classroom observer compiled the questionnaire responses, and the interviews were submitted to an independent professional transcriptionist. The compiled questionnaires and transcriptions were then given to the researcher who commenced processing the data. All questions in the surveys (except for room demographic) and the interviews were open ended and subjected to quantitative analysis.

Sampling method. Creswell (2008) suggested that qualitative researchers will purposefully select individuals or sites that will best be able to provide information for understanding the central phenomenon. He further suggested the use of theoretical sampling in grounded theory research. In theoretical sampling, the researchers collect data from people who have actually experienced the process being studied, which in this study were the students from both sections of the class. Creswell (2008) further

suggested returning to the participants during the study to garner a saturation of data, which the classroom observer did through the periodic questionnaires.

This study was conducted using a purposeful sampling of students who signed up for the class. It could possibly have been a more conclusive study if there were more diversity in the type of students who were in the classroom. Unfortunately, the class is offered in a very homogeneous department. Typically, less than 5% of the student population in this program consists of female or minority students. There is seldom more than one female, one African American, and two or three Hispanic students in any of the classes in this program. The number of non-traditional students (students who had entered college at an older age) would also be around two or three. For this study there were 28 students total. Of those, two were female, one was non-traditional, and one was bi-racial.

Data recording. The key to careful analysis of the data hinges on the accuracy of the data collected. It was the primary concern of the observer to ensure that data were recorded carefully, objectively, and ethically (Mills, 2011; and Johnson, 2008.) The surveys and questionnaires were placed online by the classroom observer. He notified students when they were required to complete one of the surveys or questionnaires via an email. Two emails were sent out for each phase; the first was a notification and the second was a friendly reminder. The classroom observer then collected and compiled the data and stored it in a locked drawer in his office. The observer transferred the data to the researcher after the semester was over and grades had been submitted. The researcher

stored the documents in a locked drawer in his office during the time they were being analyzed and shredded them after this report was accepted.

The interviews were scheduled and arranged between the classroom observer and the individual students. They met privately in the classroom observer's office for a scheduled period of one hour (the average was around 30 minutes) during which time the interviews were digitally recorded. The recordings were secured, delivered to the transcriptionist, and the original audio was erased. The transcriptions were then stored in a locked drawer of the observer's office until it was time to deliver them to the researcher, who kept them in a locked drawer in his office when not working with them. After they were analyzed and this report was completed, all of those documents were shredded.

Miscellaneous data. Students in the research classroom had access to the classroom observer and were given the opportunity to convey their input to him at any time. All conversations were voluntary and confidential.

Data analysis. Qualitative analysis is a continual reflection of the data that occurs concurrently with the data collection process (Creswell, 2009.) This project involved the analysis of open-ended data. The following are specific steps that are recommended for the process and are the ones that were followed for this phase of the project.

Organizing the data. Once the qualitative data have been compiled, Mills (2011); Sagor (2005); Pine (2009); Hendricks (2009), and Creswell (2008) recommend

organizing the data into themes and patterns, coding it, and creating a concept map to assist in visualizing it. Creswell (2003) suggests the following eight steps in analyzing the data.

1. Read everything carefully getting a good overall impression of the data.

2. Select one transcription and try to determine what it is about and what are its underlying meanings.

3. After going through the entire transcriptions make a list of the topics you came up with. Group these topics together.

4. Rewrite your topics as codes and return to the transcriptions. Use the codes to notate segments of the text.

5. Turn your topics into categories and try to reduce the number of categories by grouping related topics together.

6. Alphabetize the codes.

7. Perform a preliminary analysis of the coded data.

8. Recode data as necessary.

Validating the findings. Qualitative validity deals with the accuracy of the findings through the use of specific procedures, such as triangulation, member checking, rich descriptions, bias clarification, discrepant information, peer debriefing, external audits, transferability, democratic, outcome, process, catalytic, and dialogic, (Creswell, 2009; Hendricks, 2009; Herr & Anderson, 2005; Pine, 2009; and Mills, 2011).

Of those procedures suggested, the following methods were used to validate the

findings. Triangulation is defined as "the process of corroborating evidence from different individuals" (Creswell, 2008, p. 266) in order to ensure the accuracy of the study (Creswell, 2008; Johnson, 2008; Pine, 2009; and Hendricks, 2009.) The triangulation conducted for this study was between the two groups of students, the classroom observer, and the researcher. Another was the use of rich, thick descriptions providing the readers with a sense of shared experience.

Peer debriefing involves finding a person who can look at, and question, the study from a different perspective, adding validity to the results (Creswell, 2009). Three peer doctoral students who were not involved in the study read this document and provided feedback on issues that were not entirely clear. Peer debriefing also occurred with the classroom observer. Although he was directly involved in the study he was not involved in the writing of the dissertation itself and was therefore able to provide constructive criticism regarding its content.

Discrepant information provides validity to the study by showing that all information in the study does not necessarily confirm or agree with the expected or desired results (Creswell, 2009.) Discrepant information was the basis for continuing to develop and study a live, interactive, synchronous, two-way, audio-video, distance learning delivery system into Phases II and III. The external auditor is a person who has not been connected with the research during the process and is called in at the end to review the final draft in order to contribute unbiased feedback (Creswell, 2009.) Teaching colleagues who were not vested in the outcome of this study were asked to

conduct such a review.

Mills (2011) outlined the following strategies for achieving validity; talk little and listen a lot, record observations accurately, begin writing early, let readers see the data, report fully, be candid, seek feedback, and write accurately. The advice of mentors and colleagues was accepted graciously, writing of this document began prior to the start of the spring semester developing Chapters 1 through 3 as a proposal, and feedback from colleagues led to this document being revised and improved several times.

Generalizability. Generalizability, or transferability, is typically linked with the postpositivist worldview, as it reflects a need for establishing absolute truths that can be repeated, and will hold true anywhere (Creswell, 2009.) Herr and Anderson (2005) point out that the original researcher cannot know what sites may choose to replicate the study, but that the original researchers are still responsible for the burden of proof that the method works. In order to duplicate the study conducted in Phase I, another venue would have to duplicate the equipment used, which would not make sense since it was found to be inadequate for the intended purpose.

Ethical consideration. Hendricks (2009) contends that the "ethical guidelines for educational research are based on those established for quantitative research" (p.117) and therefore are not necessarily befitting action research. Hendricks' (2009) contention was that the action research process is subject to change, and the researchers cannot say with any degree of certainty that the types of data being collected, or the methods used to collect it, will not change. Since this action research project was developed to discover

new ways to improve the classroom experience, it became necessary during the study to change the methods for collecting data in Phases II and III. It also became necessary in Phase II to change the type of data being collected.

There is a definite need to protect students from harm and not expose them to risk (Mills, 2011; and Herr & Anderson, 2005). For this study, it was essentially the distance delivery system that was being investigated, not the students. The students were participating in a normal class, taught by the instructor in the same way he taught all of his other classes, with the only difference being the addition of equipment to broadcast information to a remote site. The students were not being studied. Instead, they were being asked to provide feedback about a live, interactive, synchronous, two-way, audio-video, distance learning delivery system. Any information and feedback that they provided was kept anonymous, and was collected by the classroom observer to insure there was no appearance of coercion or prejudice on the part of the instructor. To further protect students from risk or harm, the students spent half the study in one classroom, and half the study in the other providing them all equal time under each circumstance.

The concept of the technology, and the intent of the study, was explained to all of the students at the midpoint of the semester, prior to the start of the testing, and they were asked to participate on a voluntary basis. The names of the students who agreed to participate were not shared with the instructor at any time, and the information they provided was kept anonymous, was not shown to the instructor until the semester was over and grades had been submitted, and were submitted in aggregate form. Any

photographs taken for the purpose of inclusion in the study, were used with the expressed, signed permission of the students involved. All interactions with the students, to obtain their views of the distance learning delivery system were conducted with the classroom observer and not the instructor. Students were not asked any questions about the instructor himself, or his ability, but only about the technology and its affect on interactivity between students in both locations and between students in both locations and the professor.

Research Protocols – Phase II

Research sub-questions. The following questions were specifically addressed during this phase of the project.

1. Is direct learner-to-learner interaction prevalent in the traditional, non-distance education, engineering classroom and is it critical in the construction of a classroom learning community?
2. Does a live, synchronous, two-way, audio-video distance delivery system facilitate teacher-learner interaction between remote students and instructor?
3. Does a live, synchronous, two-way, audio-video distance delivery system facilitate teacher-learner immediacy between remote students and instructor?
4. Does a live, synchronous, two-way, audio-video distance delivery system facilitate presence (transactional, social, teaching, and cognitive) between learner and instructor?

Plan of action. The data collected from the students in Phase I led to the

development of the plan of action for Phase II. In Phase I, the students expressed that they did not think the sidewall projection of the students facilitated learner-learner interaction. They felt the quality of the video was poor, the size of the students projected on the wall was difficult to relate to because they appeared oversized, and the picture did not show all of the students, only some of them. Their primary reason for not utilizing the sidewall projection though was that they rarely engaged in learner-learner interaction in a non-distance classroom so why would they bother in a distance classroom. As one student wrote:

> I don't really look to the side in a classroom. I'm mostly… unless it's really something interesting, then I'll turn and look at them. But, for simple questions back and forth, I'm not going to turn to every student and look at them.

For this reason, it was decided to eliminate the sidewall projection from Phase II.

Through further testing of the audio in both rooms it was determined that student interaction between rooms was difficult and disrupting and could not be further studied with the existing equipment.

It was therefore determined to engineer and install a new live, interactive, synchronous, two-way, audio-video, distance learning delivery system with equipment and configuration that would facilitate a classroom community with better video and audio. It was also decided that since the students were not comfortable using the sidewall projection, a 70" monitor would be placed at the front of the class, above the instructor

projection, where the students could see their counterparts from the other classroom. Through the data collected from the students in Phase I, it was determined that the students would prefer to look up front to see the other students and that it would not be a distraction from the instructor. They felt they would only look at that monitor when a student from the other classroom actually was speaking. It was further decided to test the capabilities of equipment to transmit the audio and video feeds across the Internet instead of using the direct connections that were utilized in Phase I.

The fall 2012 semester started on August 20th, but the new equipment would not be installed and operational until mid-October so it was determined that a Phase II would be used to focus on learner-instructor interactions. Since the quality of the instructor's audio and video were operating fine, the front wall projection of the instructor in the distant classroom continued in the same fashion as it had in Phase I. The monitor in the rear of the contiguous classroom showing the students in the remote classroom was kept active during Phase II as was the existing audio equipment. The sidewall cameras used to capture the student images in each room were removed and their respective projectors were disconnected.

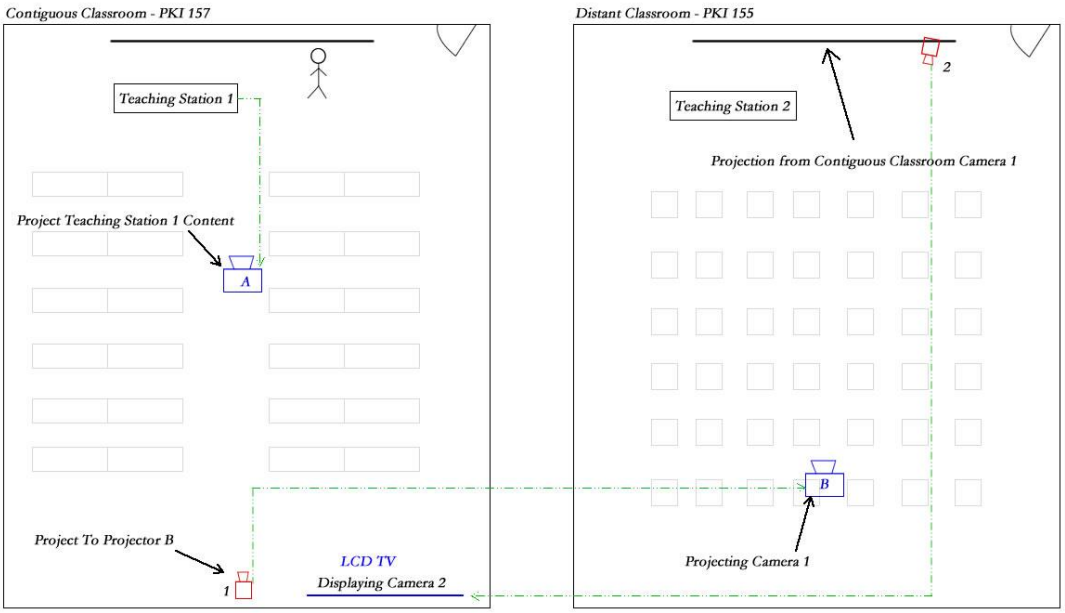

Figure 6: Phase II equipment layout

The plan involved teaching two sections of the same course (CNST 3780, Construction Estimating I, the predecessor to the CNST 3790 class taught in Phase I) during the fall semester, with each section of students in the adjoining rooms used in Phase I. CNST 3780 is a junior level construction estimating class that is required for construction management students and is open as an elective for other students who meet the prerequisites. The students signed up for the class in the spring of 2011 with no knowledge that it would be part of this research study. During the first week of the semester, the students were randomly placed in the two separate sections, and assigned to their respective rooms. The intention of the research was that both groups, regardless of which section they were in, would receive the same education and opportunities. To

further ensure this, the students switched rooms every other class period.

Due to the poor quality of the audio system, students were not able to hear each other between classes and the instructor was not able to hear responses and questions from the students in the distance classroom. In order to facilitate any type of learner-instructor interaction it was decided to focus that interaction between the students and the instructor in the contiguous classroom, only. The students in the distance classroom would experience one-way communication (some people might consider this to be interaction) between themselves and the instructor, as they could hear the instructor fine, but the instructor could not hear them. In order to ensure that all of the students received a similar opportunity to obtain a quality education in this class it was decided they would alternate between classrooms on a daily basis.

To provide the distant students an opportunity for some interaction with the contiguous classroom, it was decided to allow students to use their electronic communication devices to ask relevant questions pertaining to the material being covered in class. To facilitate interaction between the two groups, students in each classroom were asked to find someone in the other classroom with whom they could communicate. Students in the distance classroom were encouraged to transmit their questions to their counterparts in the contiguous classroom, who would relay the question orally to the instructor. The instructor then answered that question for both groups of students to hear. When students in the contiguous classroom asked the instructor a question, the instructor would first repeat the question and then answer it.

Introduction of project to the students. CNST 3780, which was the focus of this study, is a mandatory class for all construction engineering and management students in the program, and this was the only section being taught in 2012. Therefore, the students were required to take the class if they wanted to stay on schedule for graduation. However, the students' participation in the study, and their involvement in the collection of research data were completely voluntary.

During the first week of the semester, the classroom observer described the project to the students along with the intent of the study. The audio connection between the two classrooms was demonstrated so the students would understand why that component was not being utilized during this phase of the research. It was then explained how the semester would be divided into two phases. The first phase would utilize the front wall projection in the remote classroom in order to facilitate one-way communication from the instructor to the remote students. The students were told how they would be switching classrooms after each period to provide each group equal time in each classroom so they could fully appreciate the impact of two-way interaction in the classroom. It was also made clear to the students the focus of the study was on the distance delivery system and was not about the students' abilities, or their ability to learn the information being presented in class. Nor was it about their opinion of the instructor and his method of teaching, except where it directly related to the technology.

It was explained to the students that their choice to volunteer or not volunteer to participate in the gathering of research data would not affect their standing in the class or

their grade in any way and that the instructor would not know which students agreed to participate. The selected volunteers' involvement in the project included having interviews at two-week intervals and participation in three focus groups conducted at five-week intervals during the semester all under the auspices of the classroom observer. The students' identities were not revealed to the instructor.

The group of students who originally volunteered to participate in the study were then given consent forms to sign (reference Appendix D – IRB forms) volunteering to participate in the interview process if chosen. They were informed that four students would be selected at random from the group who signed the consent forms to participate in the interviews. These four students would be paired at random and interviewed alternately every other week, so that each week two students would be interviewed each week of the semester. It was further explained that all four students would be asked the same questions each week.

The same group of students who originally volunteered to participate in the study were then given consent forms to sign (reference Appendix D – IRB forms) volunteering to participate in the focus groups if chosen. They were informed that six students would be selected at random from the group who signed these consent forms to participate in the focus groups. They were further informed that there would be three focus groups conducted at five-week intervals and that random selection would occur for each group. It was therefore possible that the same students could be selected more than once and the students were informed they could refuse to participate at any time.

The classroom observer conducted all interviews and focus groups. The sessions were audio taped and the tapes were sent to a transcriptionist. The transcripts were cleansed of all information that could identify any other students and were then delivered to the researcher only after the semester grades had been submitted. Once the study is completed all tapes, and transcripts will be properly destroyed.

Classroom observer. The classroom observer was the same person used in Phase I. The classroom observer worked with the researcher during the summer of 2012 to help design and engineer the layout of equipment for Phase II and ended up making some important and brilliant contributions. Through his involvement in Phase I the classroom observer brought fresh new ways of looking at the project such as immediacy and instructor presence.

Classroom observer qualifications. The classroom observer's qualifications are the same as they were in Phase I with the added experience of being with the college for an additional six months and having the benefit of performing a similar role during Phase I.

Graduate teaching assistant. The graduate teaching assistant is working on a doctorate in construction engineering with a focus on pre-cast concrete structures. As part of his responsibilities he attended each of the CNST 3780 classes. His role during Phase II was as consultant and observer and would meet with the instructor and the classroom observer after each class to debrief what he had seen and to offer his input on how to improve the classroom experience for the students. The teaching assistant has ten

years of teaching experience at a university in his home country in the Middle East.

Timing of the research. About half of the students in this class had the author as an instructor previously and understood his interactive style of teaching, which involved a constant dialogue between students and teacher. The students seemed to acclimate to this teaching style very quickly and students in both groups were prepared to respond to the instructor after just a few class periods. As the focus of this research is interaction in the classroom, it is important to have an instructor whose teaching style is interactive and to have a group of students who are willing to interact in return.

The first class session of the fall 2012 semester all of the students were brought into the same classroom for introduction and instruction. The room is designed to accommodate twenty-four students at tables. Along the back of the room there are twenty or more chairs that are typically not used. During this first class session, ten of the students had to grab chairs from the back and set them wherever they could find room. Most of them ended up in the aisles away from tables. This was done intentionally so the students would understand the need for splitting them up into two separate rooms. At the beginning of the second session, as students entered the classroom, they were asked to take a slip of paper from a hat. Printed on these slips were the numbers “1” or “2.” After the class started, the students with the number “2” were asked to get up and go next door to the “distant” classroom.

Once the students were all resettled, the instructor began the class session with the original front projection and audio operating. With about twenty minutes left in the

session, the instructor turned over the floor to the classroom observer and left the room. The classroom observer used the remaining time to tell the students about the research project, inform them of their rights to participate or not, and asked them to sign the appropriate forms.

Data collection methods. The following sections describe the various methods used to collect data during Phase II of the study.

Interviews. It was discovered during analysis of Phase I interviews that the depth of information from the students was somewhat lacking. It was felt that part of the problem was that the students were focused primarily on the poor audio and video quality and had difficulty moving past that. It was also surmised that since the interviews were held at the end of the semester students were glad to be done with classes and not very interested in discussing the past. It was further felt that students were having difficulty remembering detailed feelings and occurrences with the exception of the aforementioned poor quality of the audio and video. The lack of data was further compounded by the fact that only six of the eight students chosen to interview actually ended up being recorded.

For this reason, it was decided to select a group of four students who were interviewed on an ongoing basis. The four students were selected at random from the group of students who volunteered to participate in the interview process. Two of the four students were interviewed the first week with the other two interviewed the second week. This alternate week procedure was followed throughout the semester. All four students were asked the same questions during each two-week interval, with the

questions being changed for both groups every two weeks (for the list of questions reference Appendix D – IRB forms).

Focus groups. It was further decided to augment the responses obtained in the interviews with responses obtained from conducting focus groups. These focus groups were conducted at five-week intervals during the semester in order to keep the data fresh and relevant without overwhelming the students with too many out of class interactions with the classroom observer.

It was decided that the focus groups would elicit more information from a larger group of students. Creswell (2008) contends that focus groups are advantageous in gathering the best data when the group members are similar to and cooperative with each other, which the students in this class were. Six students were selected at random from the group of students who volunteered to participate in the focus groups. Selecting students at random for each focus group opened up the possibility that six to eighteen different students would be heard from. The focus groups allowed the students to express their opinions openly within a group of their peers who were experiencing the same phenomenon. Dillman, Smyth, & Christian (2009) contended that when focus group participants engage in expressing their own opinions this encourages others to listen and respond by expressing their opinions, as well. It is this exchange of opinions that enriched the data gathered from the focus groups.

Journals. The researcher as the active participant observer (Mills, 2011), continued to maintain the journal that was described in the Research Protocols – Phase I.

This included notes from meetings that occurred during the summer of 2012 when the new system was being engineered and contracted. It also included all of the meetings with administrators and vendors that occurred during Phase II, and all of the debriefings that occurred during that period with the classroom observer and the graduate teaching assistant (reference Appendix B – Author's Journal.)

Artifacts. There were artifacts collected during Phase II that include the following:

- Equipment specifications
- Photos of the room layout
- Drawings of the room layouts
- Photos of the rooms in use

Missing data and corroboration. In analyzing the data, Mills (2011) recommended trying to identify any missing data or remaining questions that needed to be asked. Pine (2009) further recommended examining the data from different perspectives with a fresh set of eyes in order to find themes that may not have been observed the first time through. He suggested conferring with students who were involved with the study and colleagues who might have an interest in the results. Creswell (2008) concurred with the idea of enlisting others' help in the matter. Because the same students were being interviewed bi-weekly, it was possible for the classroom observer to confer with students during the process to ensure that there were no missing data that were needed.

The classroom observer and the graduate teaching assistant were asked to read this report and offer suggestions as to missing information and corroboration of the facts.

Data compilation. As the interviews and focus groups were conducted, the classroom observer submitted them to an independent professional transcriptionist. They were sent in every two weeks so as not to inundate the transcriber with hours' worth of interviews and focus groups all to be transcribed at the same time. The resulting transcriptions were kept locked away by the classroom observer until the semester was over and grades were submitted.

Sampling method. The sampling method for Phase II was the same as for Phase I except that for this phase there were 40 students total. Of those, three were female, and three were international. There were no age related, non-traditional, or racially distinct students.

Data recording. The key to careful analysis of the data depended on the accuracy of the data collected. It was the primary concern of the observer to ensure that data were recorded carefully, objectively, and ethically (Mills, 2011; and Johnson, 2008.)

The interviews were scheduled and arranged between the classroom observer and the individual pairs of students. They were scheduled to meet privately in the classroom observer's office for one hour for each interview, during which time the audio was digitally recorded. Some of the actual interviews were shorter and some went as long as 90 minutes because the students had so much they wanted to discuss. The recordings were secured, delivered to the transcriptionist, and the original audio was erased. The

transcriptions were then stored in a locked drawer of the observer's office until it was time to deliver them to the researcher at the end of the semester, who kept them in a locked drawer in his office when not working with them. A similar process was conducted for the focus groups, with the only difference being where the students met with the classroom observer. The focus groups were held in the dean's conference room at a time mutually convenient for the students and the classroom observer.

Miscellaneous data. All of the students who originally volunteered to participate in the study were told they had access to the classroom observer and were given the opportunity to convey their input to him at any time. All conversations were voluntary, confidential, and not recorded, although, with their permission, their opinions were conveyed to the instructor as if they were the opinions of the classroom observer.

Data analysis. Qualitative analysis is a continual reflection of the data, which occurs concurrently with the data collection process (Creswell, 2009.) Phase II involved the analysis of open-ended data. The data from Phase II was analyzed in the same way as the data in Phase I. The only difference being that the interviews and focus groups were not analyzed randomly. Instead, the interviews were analyzed chronologically starting with the earliest and working progressively through to the last. The focus groups were analyzed in the same chronological manner.

Organizing the data. Once the qualitative data have been compiled, Mills (2011); Sagor (2005); Pine (2009); Hendricks (2009), and Creswell (2008) recommend organizing the data into themes and patterns, coding it, and creating a concept map to

assist in visualizing it. Creswell (2003) suggests following the eight steps reviewed in Research Protocols – Phase I. Creswell (2003, 2008) recommends selecting transcriptions in a number of different ways. In Phase I the questions were reviewed chronologically and the interviews were reviewed randomly. For Phase II, it was decided to review the transcriptions of the interviews and focus groups chronologically to be able to follow a progression of student opinions.

Validating the findings. Validation procedures in Phase II were very similar to those used during Phase I with the addition of the graduate teaching assistant being used in the peer debriefing and triangulation procedures in addition to the classroom observer.

Generalizability. Generalizability, or transferability, is typically linked with the postpositivist worldview, as it reflects a need for establishing absolute truths that can be repeated, and will hold true anywhere (Creswell, 2009.) Herr and Anderson (2005) point out that the original researcher cannot know what sites may choose to replicate the study, but that the original researchers are still responsible for the burden of proof that the method works.

It would be very plausible for someone else to replicate this study. While the same equipment could be used to replicate the same lack of interaction between the two classrooms it would not make sense. A more practical solution might be to replicate the installation of equipment used in Phase III of this study and dampening specific aspects of it to replicate the conditions experienced during Phase II of this project.

Ethical consideration. There is a definite need to protect students from harm and

not expose them to risk (Mills, 2011; and Herr & Anderson, 2005). For this study, it was essentially the distance delivery system that was being investigated, not the students, the content, or the instructor. The students were participating in a normal class, taught by the instructor in the same way he taught all of his other classes, with the only difference being the addition of equipment to broadcast information to a remote site. As opposed to studying the students, the students were asked to provide feedback about NUVIEW. Any information and feedback that they provided was kept anonymous, and was collected by the classroom observer to insure there was no appearance of coercion on the part of the instructor to elicit favorable data in return for grades or as punishment for not participating by awarding poor grades. To further protect students from risk or harm, the students alternated between classrooms to ensure equal face time with the instructor.

The concept of the technology, and the intent of the study, was explained to all of the students at the beginning of the semester, prior to the start of the testing, and they were asked to participate on a voluntary basis. The names of the students who agreed to participate were not shared with the instructor at any time, and the information they provided was kept anonymous, was not shown to the instructor until the semester was over and grades had been submitted, and the data were submitted to the instructor in aggregate form. Any photographs taken for the purpose of inclusion in the study were used with the expressed, signed permission of the students involved. All interaction with the students to obtain their views of the distance delivery system was conducted with the classroom observer and not the instructor. Students were not asked any questions about

the instructor himself, or his ability, but only about the technology and its affect on learner-learner and learner-instructor interaction.

It is safe to say that the students were not harmed at all by the poor quality of the video in the sidewall projections as this had no bearing on the quality of the content they received or their interactions with the instructor. The poor quality of the audio did reduce the amount of learner-instructor interactions, but no more so than one would expect in a classroom where the instructor lectures instead of interacting with the students. The only issues which seemed to be of concern to the students was the quality of the video in displaying some of the content. Due to the room lighting and glare from the projectors, the content was sometimes difficult for the students to see and read. In most situations this was quickly rectified, but not always and there may have been a few displays that the students did not capture. This problem was rectified in Phases II and III through improved lighting and display techniques. In Phase II software called "Joinme.com" was utilized to link the desktop computers in both classrooms. Content was then shown directly from the desktop to the whiteboard in both classrooms eliminating the problem with lighting and glare.

Research protocol – Phase III

Research sub-questions. The following questions were specifically addressed during this phase of the project.

1. Can a live, synchronous, two-way, audio-video distance delivery system be developed that will facilitate learner-learner interaction between students in

remote and contiguous classrooms?

2. Is direct learner-to-learner interaction prevalent in the traditional, non-distance education, engineering classroom and is it critical in the construction of a classroom learning community.
3. Does a live, synchronous, two-way, audio-video distance delivery system facilitate teacher-learner interaction between remote students and instructor?
4. Does a live, synchronous, two-way, audio-video distance delivery system facilitate teacher-learner immediacy between remote students and instructor?
5. Does a live, synchronous, two-way, audio-video distance delivery system facilitate presence (transactional, social, teaching, and cognitive) between learner and instructor?

Plan of action. The data collected from the students in Phase I led to the development of the plan of action for Phase III. In Phase I, the students expressed that they did not think the sidewall projection of the students facilitated learner-learner interaction. They felt the quality of the video was poor, the size of the students projected on the wall was difficult to relate to because they appeared oversized, and the picture did not show all of the students, only some of them. Their primary reason for not utilizing the sidewall projection though was that they rarely engaged in learner-learner interaction in a non-distance classroom so why would they bother in a distance classroom. Through further testing of the audio in both rooms it was determined that student interaction between rooms was difficult and disrupting and could not be studied.

It was therefore determined to engineer and install a new live, interactive, synchronous, two-way, audio-video, distance-learning system with equipment and configuration that would facilitate a classroom community with better video and audio. It was also decided that since the students were not comfortable using the sidewall projection, a 70" monitor would be placed at the front of the class, above the instructor projection, where the students could see their counterparts from the other classroom. Through the data collected from the students in Phase I, it was determined that the students would prefer to look up front to see the other students and that it would not be a distraction from the instructor. They felt they would only look at that monitor when a student from the other classroom actually was speaking.

It was further decided to test the capabilities of equipment to transmit the audio and video feeds across the Internet. Codec units were placed in each classroom at each camera to send and receive data from the other classroom. In Phases I and II data were transmitted directly between the equipment without going out onto the Internet. This was an initial test of the bandwidth requirements and the synchronicity issues that are inherent with using this type of setup. Phase III tested the capability of the equipment to transmit both student and instructor audio and video simultaneously with insignificant time delays. The results of this testing were used to determine whether further changes in the system were necessary before setting up an actual geographically distant classroom connection.

The new equipment configuration for Phase III is reflected in Figure 3.4 below. For the contiguous classroom the new configuration included all new audio amplification

equipment (reference Appendix C – Artifacts for equipment specifications) new speakers, new microphones, a new camera mounted at the back of the room to capture the instructor, a new camera and codec mounted at the front of the room to capture the students, a new 70” monitor mounted at the upper corner of the front of the room showing the remote students, and another 70” monitor mounted at the rear of the classroom for the instructor to be able to see the remote students. In the remote classroom new speakers and microphones, a new camera and codec mounted at the front of the room to capture the students, and a new 70” monitor mounted at the upper corner of the front of the room showing the students from the other classroom were installed. The projector used in Phases I and II to transmit the image of the instructor on the front wall remained.

During Phase III the graduate teaching assistant was assigned the task of monitoring learner-learner interaction using the Seating Chart Observation Records method (Acheson, K. A., & Gall, M. D., 1997.) He was stationed in the remote classroom where he observed the students and documented the number of interactions they had with the students in their own classroom, with the students in the other classroom, and with the instructor in the other classroom. The classroom observer and the graduate teaching assistant attended all classes, sitting in the remote classroom, observing the equipment and the interactions providing feedback to the instructor after each class.

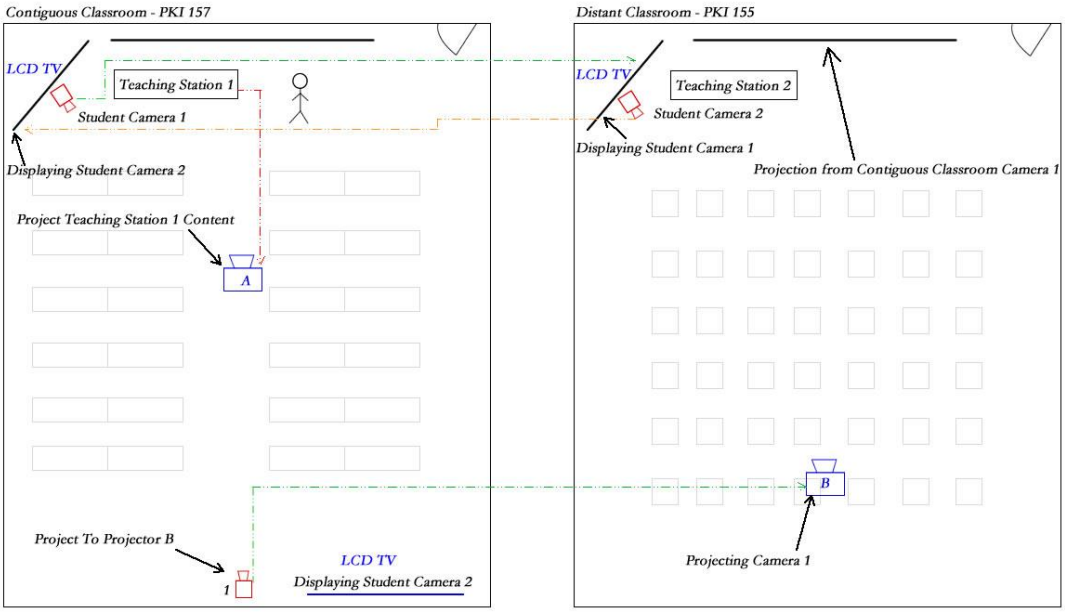

Figure 7: Phase III equipment layout

Introduction of project to the students. The students in CNST 3780 were already introduced to the project at the beginning of the Fall 2012 semester. The installation of the new equipment did not require re-explaining the intent of the research to the students again. The equipment made a difference in the quality of the audio and video transmissions between classrooms and the ability of the system to facilitate a true classroom community, but did not change the students' involvement in the study. Therefore the equipment was simply turned on and used without the need for further explanation of the project.

Classroom observer. The classroom observer was the same person used in Phases I and II. Because of his involvement in Phases I and II the classroom observer

brought fresh new ideas to the project both for gathering and analyzing the data from Phase III.

Classroom observer qualifications. The classroom observer's qualifications are the same as they were in Phases I and II with the added experience of performing a similar role during Phase II.

Graduate teaching assistant. The graduate teaching assistant monitored and recorded all of the student interactions that occurred in the distant classroom. He provided feedback to the instructor during the debriefing sessions, which were held after each class meeting. He also operated the equipment in the remote classroom when it was necessary, collected and returned quizzes, tests, and homework from the remote students, and graded all homework, quizzes, and tests for all of the students in this class.

Timing of the research. Phase III was timed to begin with the installation of the new equipment. The start of the installation was regulated by the time required to engineer the new system, put it out for bids, analyze the bids, select a vendor, have the university process a purchase order, order and receive the equipment, and program, install, and troubleshoot the system. The completion of the installation coincided with the midterm of the fall semester allowing for eight weeks to collect data.

Data collection methods. The following methods were used to collect data during Phase III of the study.

Interviews. The four students who were selected during Phase II continued to be interviewed for Phase III. The process of interviewing each pair on alternate weeks

continued until the end of the semester.

Seating chart observation records. The method that was utilized for recording the number of interactions that occurred between the two classrooms was the Seating Chart Observation Records (SCORE), as outlined by Acheson and Gall (1997), which monitors the frequency of interactions between students and instructor, between students within the remote classroom, and between students in both classrooms. This method uses a simple seating chart that showed each student as a square on a sheet of paper. When a student interacted with another student, and arrow was drawn between the two squares. When a student interacted with the instructor an arrow was drawn from the student square pointing toward the front of the room, indicating the instructor. The arrowhead placed at one end of the line indicated the direction the exchange took place. Notes were also kept on the chart as to whether the exchanges between students were class related or just "chit-chat." The teaching assistant kept these daily records throughout Phase III.

Journals. The researcher as the active participant observer (Mills, 2011), continued to maintain the journal that was described in the Research Protocols – Phases II and III.

Artifacts. The artifacts (Reference Appendix C – Artifacts) that were collected during Phase II continued through Phase III. They included the following:

- Equipment specifications
- Photos of the room layout
- Drawings of the room layouts

- Photos of the rooms in use

Missing data and corroboration. The classroom observer and the graduate teaching assistant were asked to read this report and offer suggestions as to missing information and corroboration of the facts.

Data compilation. As the interviews and focus groups were conducted, the classroom observer continued to submit them to an independent professional transcriptionist. They were sent in every two weeks so as not to inundate the transcriber with hours' worth of interviews and focus groups all to be transcribed at the same time. The resulting transcriptions were kept locked away by the classroom observer until the semester was over and grades were submitted.

Sampling method. The sampling method did not change from Phase II to Phase III.

Data recording. Interviews and focus groups continued to be held and recorded using the same methods as outlined in Phase II.

Miscellaneous data. The students continued to have access to the classroom observer and were given the opportunity to convey their input to him at any time. All conversations were voluntary, confidential, and not recorded, although, with their permission, their opinions were conveyed to the instructor as if they were the opinions of the classroom observer.

Data analysis. Qualitative analysis is a continual reflection of the data, which occurs concurrently with the data collection process (Creswell, 2009.) Phase II involved

the analysis of open-ended data, which was not quantified. The data from Phase III was analyzed in the same way as the data in Phase II.

Organizing the data. Once the qualitative data have been compiled, Mills (2011); Sagor (2005); Pine (2009); Hendricks (2009), and Creswell (2008) recommend organizing the data into themes and patterns, coding it, and creating a concept map to assist in visualizing it. Creswell (2003) suggests following the eight steps reviewed in Research Protocols – Phase I. Creswell (2003, 2008) recommends selecting transcriptions in a number of different ways. For Phase III, it was decided to review the transcriptions of the interviews and focus groups chronologically, as were the interviews and focus groups from Phase II to be able to follow a progression of student opinions, especially to reflect the change in opinions going from the old equipment to the new.

Validating the findings. Validation procedures in Phase III were the same as those used during Phase II.

Generalizability. Generalizability, or transferability, is typically linked with the postpositivist worldview, as it reflects a need for establishing absolute truths that can be repeated, and will hold true anywhere (Creswell, 2009.) Herr and Anderson (2005) point out that the original researcher cannot know what sites may choose to replicate the study, but that the original researchers are still responsible for the burden of proof that the method works.

It would be very plausible for someone to replicate Phase III of this study. The installation of the new equipment turned out to be a viable solution for testing its ability

to facilitate a sense of classroom community between distant classrooms.

Ethical consideration. The ethical considerations for Phase III were identical to those outlined in Phase II. No changes were made to the protocols, only the equipment.

The intent of obtaining IRB approval for any study is to ensure there are a minimization of risks to the students, and a maximization of benefits to the general population. This study did not expose the students to any risks that would not have been incurred in any standard classroom.

Chapter 4 – Report of Findings

Purpose of the Study

The purpose of this research project was to develop, test, and study a live, synchronous, two-way, audio-video distance delivery system that would be capable of facilitating an interactive classroom that would reduce and possibly eliminate the distant students' feelings of being remote from the instructor and the learning process.

Development of the Study

Origin of the study. This project began at the request of the dean of the engineering college at a Midwestern state university. The dean requested that a distance learning system be developed that would provide students in a remote classroom with the feeling that they were in the classroom with the instructor and not receiving a lesser educational experience. The dean suggested building a system around the concept of the Cisco TelePresence that creates a video link between two remote sites simulating the feeling of being in one room together.

Cisco TelePresence is designed for small groups that conduct their meetings face to face. The three side-by-side video displays at each location are intended to simulate the feeling of having both groups sitting around the same conference table looking directly at each other. It provides the participants with the feeling that both groups are together in the same room. While this configuration could be used advantageously in small discussion type classrooms, it is not the ideal layout for the typical engineering classroom, which often requires the instructor to be in front of the students at a writing

board (chalkboard, whiteboard, or interactive board.)

The college of engineering used in this study is located on two campuses approximately one hour apart. Many of the same courses are taught on both campuses requiring additional faculty or in some cases requiring the same faculty member to travel between the two campuses to teach the same course twice. The task from the dean was to develop a system that would facilitate teaching to multiple locations without making the students in either location feel remote and disconnected from the instructor and the learning process. The purpose of this study was to determine whether technology could be used to create the feeling of having a remote group of students in a standard classroom feel as if they were together in the same classroom with the instructor and the other students.

The question became whether there was a way to adapt the Cisco TelePresence concept for use in a typical engineering classroom. After some brainstorming the concept of providing a life-size projection of the instructor and what he was doing displayed on the front wall of the remote classroom was developed to simulate the feeling of being in the same room with the instructor. This was meant to insure the remote students were seeing and hearing the same thing as the contiguous students, providing them with the same instruction and the same opportunities for interaction. To facilitate the feeling of the students being in the same room with the students from the other classroom the concept of providing a life-size projection of the students from each classroom displayed on the sidewall of their counterpart classroom was also developed. The sidewall

projections were designed to make the classrooms appear as if they were a continuation of each other. The sidewall projections were intended to facilitate interaction between the two remote student groups.

Phase I

Background. The original intent of the project was to collect data from the spring 2012 session of CNST 3790, Construction Estimating II, to determine whether the technology installed would facilitate both learner-learner and learner-instructor interaction. It was apparent from the onset of the testing of the technology that the equipment installed did not live up to its original expectations. The audio equipment did not provide the sound levels necessary for the students to be easily heard between each room although the instructor was well heard in both rooms. Students often had to repeat themselves louder each time before they could be heard or before they gave up trying.

The cameras used to capture the students were not capable of capturing a wide enough angle to see all of the students without crowding them to one side of the room away from the camera. The size of the image was not 1:1 (life size) and the quality was grainy and washed out.

Figure 8: View of instructor in contiguous classroom with students projected on sidewall in the background – Phase I

The image of the instructor on the front wall was very life like and clear. What the instructor wrote on his whiteboard was clear and easy to read for the most part although there were areas of the board that had to be avoided due to excessive glare. Images that were broadcast to the instructor's board using the Elmo presenting tool or the computer were almost completely washed out by the glare created by the projectors and the room lights in both rooms.

Figure 9: View of students in remote classroom with front and sidewall projections Phase I

Sub-question 1. Sub-question 1 in Phase I was designed to determine whether the installed technology facilitated learner-learner interaction between the students in the two classrooms. This issue was put forward to the students through surveys that were administered on-line just prior to the equipment being installed and then after many of the classroom sessions. It was also addressed during the interviews that were conducted with the students and the classroom visitors at the end of the semester and the journals that were maintained by the instructor and the multi-media specialist.

In the survey that was administered to the students prior to them actually seeing

the technology in action, but after having it explained to them, the students were asked specifically about their opinion of the perceived effect the technology would have in facilitating interaction between the students in both locations. A Likert scale with 1 being least effective and 5 being most effective was used. The results of the 23 responses showed 26% of the students selecting 2, 48% selecting 3, 22% selecting 4, and only 4% selecting 5. This was a preliminary indication that students did not anticipate that the technology would be effective in facilitating interaction among the students in the two classrooms. The students were also asked specifically how they felt about seeing the sidewall projection of the students from the other classroom. With 1 being very distractive and 5 being looking forward to it 22% selected 2, 39% selected 3, 35% selected 4, and 4% selected 5. These responses indicated that the students were looking forward to seeing the sidewall projections even though they did not necessarily anticipate they would facilitate interaction between the two groups of students.

The students were surveyed after their third class in which the new technology was used. At that point in the experiment the lenses in the camera provided a very narrow view of the classroom that only included a few of the students and their projected image was much larger than life size. They were asked to provide feedback about the sidewall projection and whether they used it or not. Most of the comments from the students related to the fact they could only see a few of the students in the other classroom rendering it fairly ineffective in facilitating interaction between the two groups. One student stated, “I don’t look at it. Seems kind of pointless and awkward for

the people right in front of it. A screen with a front view of the whole class would be better." Another student commented that, "I don't think it should be used in the contiguous room. It's just a distraction." The first comment is interesting for the fact the student felt more comfortable looking toward the front of the room at a monitor or screen than he did looking to the side to see the students. The second comment was of particular interest with the thought being that if a student is in the room with the instructor there is no need for seeing the students in the remote classroom.

By the sixth class new lenses had been installed in the cameras providing a full image of all the students in each class on the sidewall projection. The images of the students were smaller than they had been, but were still larger than life size. After this class period the students were asked to comment on whether they felt remote from the other students. Some of the students who responded were still commenting on the quality of the audio and the video complaining that the low quality made it difficult for them to interact or even pay attention to the students in the other room. Others discussed a renewed interest in the sidewall projections because they could now see all of the students in the other room. One student said, "The new camera lenses gave a good picture of the other classroom. I felt as if we were on the left side of the classroom and the other classroom to our left." Another student said, "Maybe from the students because I can see them on the wall and I can't really hear them when they talk, but I'm getting used to it."

During another class period the instructor asked the students to break up into

groups that were comprised of students from both classrooms. The intention was to compel the students to interact directly with students in the other classroom. At first, a few groups of students lined up along each wall facing their teammates while others stayed in their seats and used other electronic devices (laptops, iPads, and phones) to communicate. The original intention of the audio equipment was to capture all of the sounds in one room delivering them to the other providing students in each room the full experience of being in one room together with all of its sound. All of these separate conversations coupled with the poor audio quality made it difficult for the students not using other devices to communicate effectively with each other. Afterward, students were asked for their opinions of the attempt at interaction. The only students who had any positive feedback were those who had used other devices to communicate with their partner. Two weeks later the students were told prior to the class meeting that they would be doing another team exercise between the two rooms. This time most groups brought electronic devices that allowed them to see and hear each other synchronously, and many of them set up accounts to share documents with each other. Those students who did not come prepared to work in this fashion were unproductive and their comments on the survey after this class were very negative.

Toward the end of the semester a guest presenter was brought in to work on a real life scenario with the students. The presenter worked for a contractor that has offices and collaborative partners around the world. As travel to these locations can be time consuming and costly the presenter's company had begun using teleconferencing on a

regular basis. Knowing how the rooms for this class were set up the presenter intentionally brought a project that would simulate the estimating conferences he was regularly involved with using distance communication means. For that exercise each room was a separate division. For the first half of the exercise the students worked together with the students in their own room preparing their estimates. In the second half, the presenter moderated a joint meeting between the two groups standing in the center of the room as if he was physically standing between them. Because of where the presenter positioned himself in the room the students were drawn to looking at and communicating directly with the students in the other room through the sidewall projections. This technique worked real well in getting the students to interact with each other across the distance and gave the students a better understanding of how important distance communication is not only in school, but also in industry. All of the responses to the survey that day were overwhelmingly positive. When asked how many times they directly or intentionally interacted with students in the other classroom one student replied, "Too many to count. It was fun."

In the interviews held with the students at the end of the semester the comments regarding the student-to-student interaction were generally negative. A few responded that the sidewall image actually hindered interaction. Others agreed that it slowed or lowered group work productivity. A few of the students suggested that having an image of the other students at the front of the room instead of the side would be helpful. One student went so far as to add, "Even in a contiguous classroom I do not typically turn to

look at other students when they speak." When that student was asked whether having an image of the students in the front of the room with the instructor would be a distraction he said, "If there were a monitor up front I would probably only look at it when a student started speaking."

The multi-media specialist who assisted in this project was interviewed at the end of the semester. In discussing the strengths of the system in facilitating student-student interaction, he brought up the fact that students could make eye contact with students in the other room and they were able to read their peer's body language. He felt it was important for classroom students to see the reaction of their peers to what they have to say, and whether they are being agreed with or not.

A professor from the Civil Engineering department was asked to sit in and observe one of the classes. He is well known for being a very interactive instructor who is well liked and respected by his students. When asked to comment on the student-student interaction he saw during that visit he admitted that he witnessed very little interaction among the students. While he had never taught a distance class, he also admitted that in his own classrooms he sees very little interaction between his students, and the little that he does see are students whispering to each other about matters probably not related to the class. Therefore he could not see how the sidewall projection would help to increase interaction among the students in the different classes unless they were forced to.

An industry representative who teaches distance classes for his company heard

about the experiment and asked if he could observe it in action. After his visit he was interviewed and asked about the student-to-student interactions that he had seen. He felt the sidewall projection was interesting, but did not see the students using it to interact with their counterparts and felt it was the responsibility of the instructor to initiate and facilitate those interactions. In response to the question of whether the sidewall projection facilitated learner-learner interaction he replied,

> I don't think it did. I think the reason why is because from a student's point of view I'm seeing the sides of the other students. If I had that side view and the front view then maybe that would facilitate that communication more. Generally, when you're looking at the side of someone like this that doesn't foster a whole lot of communication.

Sub-question 2. Sub-question 2 related to whether and how the technology installed for this study facilitated interaction between the instructor and the students. These data were collected from responses to the online surveys administered to the students during the semester along with the interviews that were conducted with the students and observers at the end of the semester.

In the survey administered prior to the start of the classroom experiment the students were asked how interactive they preferred their instructors to be in class with 1 being the instructor lecturing to the students the whole time and 5 being the instructor engaging the students in dialogue during the whole class. No students responded with 1 or 2, 35% responded 3, 48% responded 4, and 17% responded with a 5. This clearly

indicated that students preferred not being lectured to and would rather be engaged with the instructor. The students were then asked what their perception was of the effect the technology could have on student-instructor interaction. On a scale of 1 to 5 with 1 being least effective and 5 being most effective, 30% of the students responded 2, 35% responded 3, 26% responded 4, and 9% responded 5. These responses indicated that the majority of the students felt the new technology would facilitate interaction with the instructor positively to some degree.

After the sixth class taught with the new technology the students were asked whether they felt remote from the instructor. The comments were evenly mixed between positive and negative, but there were two specific quotes from different students that conveyed the effectiveness of the technology in facilitating student-instructor interaction. The first was both blunt and very positive. The student stated, "I am forgetting that the teacher isn't in the room." The second was negative, but did not entirely blame the equipment. The student replied,

> …more remote as I was tyred [sic] and when in the class I pay attention better as I can answer ?s and ask them as stu can see me better. Not sure how well he can see a raised hand in the opp [sic] room.

A week later the students were asked about their opportunity to interact with the instructor. Again the responses were split fairly evenly, but there were two responses that conveyed the students' frustration with the equipment. One of them said, "Not really. The mic in the remote class doesn't seem to pick up comments well without having to

talk very loudly." The other notable comment was, "No I could not hear, he couldn't hear us, felt like I couldn't participate." These comments exemplify the students' frustration with wanting to interact with the instructor and not being able to do so easily.

The following week the students were asked if they felt the instructor focused equally on both classrooms. The responses were mostly favorable. One student said, "Yes he does a good job of including both rooms." Another student said, "He tried to." A third student commented, "Thought pretty equal, seemed like he was having to repeat stuff so students could here [sic]." Two students commented they thought the split was about 60-40 favoring the contiguous classroom and one student reiterated the frustration with the audio equipment when he stated, "People at each classroom got called on but he could not hear us ever and we would have to yell to be heard."

Three guests were invited to present to the students for different class periods. Each one was told about how the equipment worked and how they needed to remember there was a remote class of students watching and listening. The first seemed to forget entirely about the remote students, never speaking to them directly and often stepping outside the range of the camera so she could not be seen. The remote student responses were collectively frustrated and it seemed that at some point many of them stopped paying attention to this speaker. This was conveyed to the second presenter who came a week later. This presenter knew some of the students in the remote classroom so he made sure to pay attention to both rooms. Unfortunately the audio made it difficult for him to hear their responses and after a few attempts at communicating with the remote

students he stopped asking for responses, but continued to acknowledge their presence. The students appreciated this effort, but still were frustrated by the inability to partake in the conversation and soon lost interest. The third presenter was briefed on what had happened previously and was fully prepared to engage both rooms of students. This is the presenter discussed previously who brought an exercise for the students to work on that teamed the students in each classroom together and impelled them to collaborate with the other team. As was previously conveyed the students felt this interaction worked out very positively.

There were no new comments from the student interviews that were conducted at the end of the semester relating to student-instructor interaction. For the most part they reiterated the comments that had already been made in the surveys. The most useful comments regarding instructor-student interaction came from the industry observer and the multi-media specialist. The industry observer had a number of interesting comments regarding how interaction with the instructor was mostly dependent on the instructor and his effort at keeping the students interactive. He also pointed out the need to work even harder to keep the remote group of students interactive. He commented that when the instructor noticed the remote students were not involved he would go out of his way to keep them engaged in the learning process. During the interview with the instructor, the industry observer said something very important about the quality of the front wall projection and its affect on keeping the students engaged. He stated, “When you got up there, there were times where I even caught myself thinking, “It’s almost like he’s in the

room." The multi-media specialist confirmed that opinion when he stated,

> I would look up maybe a half an hour into the class and suddenly my brain was tricking myself that I was actually in the classroom because as there were times where the teacher really seemed to pop out and become three dimensional.

These comments clearly indicated the potential for student-instructor interaction the video technology provided and the need for improvement of the audio in order to deliver a complete two-way learning package for the remote students.

Results. The expressed intent of an Action Research study is to improve specific actions (Sagor, 2005) and to bring about changes in teaching practices (Creswell, 2008). The data collected from the students, observers, and the instructor indicated a need for changing certain aspects of the technology used in delivering the distance-education classroom.

The data collected relating to sub-question 1 showed that the sidewall projection did not facilitate student-student interaction for two primary reasons. The first had to do with how students behave in a non-distance classroom where student-student interaction rarely exists. Many of the comments from the various people interviewed indicated that students do not interact with each other directly in the classroom except when discussing things privately. When interacting with something said by one of their classmates, most students will generally interact through the instructor instead of addressing the comments directly to the other student. Students also commented that in general they do not look around the classroom to observe other students when they are commenting on things

related to the class. With this being the case it would seem somewhat inane to expect students to use the sidewall projection for this purpose. To facilitate direct student-student interaction the instructor would have to develop methods that encouraged students to engage with each other bypassing the instructor as the middleman. This type of interaction has been developed in classrooms that are taught in the round or in conference room configurations, but is not natural in the type of classroom used in this experiment. It would take a concerted effort on the part of the instructor to change this learning paradigm in the students.

The second reason the sidewall projection did not facilitate interaction in this experiment was due to the equipment and technology. The equipment used did not deliver as intended. The images were supposed to be crystal clear high definition and life size, but instead ended up grainy and larger than life. The comments from the observers and students indicated that the quality of the image detracted from their usefulness and therefore ended up being more distracting than interactive. One of the issues was the need for a wide-angle lens that would capture all of the students in the room without having to move them away from the camera reducing the usable space in the classroom. Another issue was being able to create a projection that would span the length of the classroom and would display the students at a 1:1 ratio so the image realistically simulated the two classrooms appearing as one to the students and the instructor. While the technology possibly exists using Hollywood type equipment the cost would be prohibitively expensive for classroom use.

Many students and observers suggested the use of monitors in the front of the classroom to try and facilitate interaction between the groups of students. Since further development of the sidewall projections was not practical at this point it was decided to update the technology for this study using monitors in the front corner of each classroom to display images of the students from the other classroom with the intention of gathering further information regarding the facilitation of student-student interaction in this type of classroom setup.

The data collected in response to sub-question 2 indicated a need to improve both the audio and video technology in order to provide the remote students with an opportunity to interact with the instructor as if they were in the same room together. The concept of the 1:1 instructor image proved to be effective in facilitating that interaction. However there was a definite need to improve the room lighting, find a way to reduce the glare on the projected images, and improve the image quality. The other important improvement that was required was a change to the audio system. Something needed to be done to improve both the pick up and delivery of the sound between the two rooms. These issues were addressed moving into the Phases II and III. Vendors were invited in to work with the researcher and the multi-media specialist over the summer months to develop a new configuration of equipment that would address the issues uncovered in Phase I in order to improve the interactions among the students and between the students and the instructor.

The other issue addressed was the method of data collection. There were 19

student responses to the first survey and only eight to the final one of the semester. The open-ended questions that were put forward to the students often only elicited two or three word answers that did not lend themselves to providing a plethora of pertinent data for the researchers. In mining the data for valuable information it was also apparent that a number of the questions that were asked did not get to the issue of interaction. However they did provide a great deal of information that was critical in understanding how well or how poorly the equipment was performing. This information was invaluable in understanding the changes in technology that were needed. Also importantly was the timing of the interviews. It seemed the interviews conducted at the end of the semester were lacking in valuable information. It was surmised this was due to the interviews taking place too long after the occurrences happened. It was also possible the students had already forgotten important information and feelings about the system and it could also have been due to it being the end of the semester with the students just glad it was over.

Phase I was useful for another reason. It brought to light other important pedagogical issues that needed to be studied such as immediacy and social presence, which are important components in the development of classroom communities, especially those being developed in distance education settings. A literary review was conducted on these issues and they became part of the focus of Phases II and III.

Phase II

Background. After a review of the data from Phase I it was decided to

collaborate with audio-video vendors to engineer a new system that would do a better job of facilitating the original outcomes of the project. Four vendors and a manufacturing company were invited to consult on the process. One vendor offered to provide a design-build solution. His intention was for the college to provide him with the parameters for the system and then give him carte blanche to design and install the system with no limit on spending. That idea was immediately rejected and the vendor informed the college he was therefore no longer interested in participating. A second vendor stated that he would not spend the time or money to help test and design a new system. He asked that once the system was designed he be given a chance to bid on the specified equipment. This idea was also rejected as being disadvantageous to the vendors who did spend the time to help engineer the new system. The equipment manufacturer was very interested in working on finding a solution for the project, but did not do installations and therefore insisted on working through the other vendors.

The two remaining vendors worked directly with the researchers to test and develop the new system. New equipment configurations designed to deliver the sidewall projection were discussed and tested during the months of May, June, and July of 2012. None of them provided a viable solution and the idea of using the sidewall projection was scrapped in favor of installing a monitor at the front of each classroom that would display the students from the other classroom. At the same time various complex iterations of the front wall projection were tried and rejected. It was finally decided to stay with the existing concept for the front wall projection, but with a change in the quality of the

camera and a modification in the room lighting. It was felt the new modifications would eliminate the glare and clarity issues that plagued Phase I and bothered the students in the remote room so much.

By the time the new system was designed and selected and a purchase order for the equipment was issued it was realized it would not be installed in time to begin testing at the onset of the fall semester for use in the CNST 3780 Estimating I class. It was decided to change the focus of Phase II and to add a third phase once the equipment was installed later on in the semester. Phase II was conducted using the existing audio equipment, the existing equipment for the front wall projection, with the elimination of the sidewall projection. Without an image of the students in the other classroom being available and the poor quality of the audio it became painfully apparent that classroom-to-classroom interaction was near to impossible to study, and the focus once again shifted to discussing the hypothetical interactions that could occur if the right equipment were available. Student-student interaction within the confines of the remote classroom and how that led to the building of a unique classroom community became one focus, with the other being teacher-to-remote student interactions focusing on immediacy and social presence.

Figure 10 - Frontwall projection of instructor - Phase II

Since the poor audio quality limited the interaction the students in the distance classroom could have with the instructor there was some concern they might not receive the same educational opportunities as the students in the contiguous classroom. After the first few weeks it was decided to alternate the students between the two classrooms to provide all of the students equal opportunity to interact directly with the instructor. On Tuesdays one group of students would occupy the contiguous classroom while the other would occupy the remote room. On Thursdays the groups would occupy the opposite

classrooms.

Sub-question 1. Sub-question 1 related to the occurrence of learner-learner interaction within the confines of a single classroom, specifically in the remote classroom. Since some of the students in Phase I indicated they felt student-to-student interaction existed minimally in traditional classrooms, it was decided to focus on whether this was true and to what extent. Since the existing equipment would not facilitate the study of student interactions between the two classrooms, it was felt this would be a good opportunity to test whether student interaction occurred among students within the same classroom. Moore (1989) pointed out that inter-student interaction in the classroom may be most desirable for younger learners or in specific classes, but felt it could be invaluable for enhancing the learning situation in any situation. He further stated, "Researchers found they could not effectively facilitate interaction among members of a large undergraduate class in face-to-face classrooms…" (p. 4). Much of the current research on student-student interaction relates to online learning where the interactions are asynchronous written communications and not between live remote groups of students or within the confines of a traditional classroom.

The initial student interviews in Phase II were conducted while still attempting to have the students in the remote classroom interact with the students and the instructor in the contiguous classroom. The students were asked whether and how they interacted with students in the other classrooms. The following are some of the comments made by the students:

"…more like this doesn't even concern me, it's not happening in my classroom. If it's something I need to know Stu will clarify. Otherwise, I don't even need to know what's going on."

"There's something about talking to people you know or even people that you're getting to know. Something about putting a face to it that you're speaking or talking to someone you lose that if you can't see them."

“It's a little weird because I can't see them, so it's this voice from nowhere showing up. It's hard for me personally to engage when they're answering questions just because there's no interpersonal relation."

"…because you're not there you don't see their body language which is for the most part what will tell you pretty clearly whether they agree, whether they're listening, whether they're sleeping, whatever."

"…seeing students in the other classroom would really add to the experience. "

"Why would I learn these 20 people, their names, if we're always going to be in separate classrooms?"

"No, since we don't see them, we don't even know their names or what they look like."

“Yeah, because technically, we know they're right there, in a technical sense. As far as, they're always there. You'll hear when they've got somebody who speaks up. You don't feel like its two groups. I don't know. It feels like another student in the back of the classroom for the most part. It doesn't feel weird or anything.”

“I agree with that. When somebody is talking through the screen, it's not as though it's not important because it's coming from next door. They're still students in the same boat; we’re all pretty much in the same major. We’ve all taken the same class, coming from the same perspective as far as that goes. It doesn't feel like there's separation I wouldn't say. The only thing I would account to that is can we hear them or not? In your contiguous classrooms, if somebody talks, even if they're talking quietly you’ll be able to hear it. Where maybe the guys next door wouldn't be able to hear them as well.”

“It could be something important. I’m not going to disregard them because I'm talking through a screen, they still have something to say.”

Both groups of students were actually in the same program and had other

traditional classes with each other. Many of them had known each other from previous classes as well, and yet without the ability to actually see the students and know who was doing the speaking the overall impression seemed to be one of separation, distance, and disengagement. A feeling that interaction with students in the other classroom was not only difficult, but also impractical and useless, permeated the responses. It would be easy to imagine this feeling being exacerbated even more between students that had never met each previously who were taking synchronous classes without the aid of visual interaction or who were working online asynchronously without the advantage of any real time interactions. When one student was asked if not knowing someone in the other classroom would inhibit learner-learner interaction they replied, “It depends on the person, but I think yes.”

Once it was determined that the equipment would not feasibly facilitate interactions between the two classrooms it was decided to shift the focus of the interviews to finding out only about student-student interaction within the remote classroom. Because the remote students were nearly inaudible in the contiguous classroom, and vice versa, an interesting and unexpected dynamic occurred among the students in the remote classroom. The students created a self-supporting, social community within the remote classroom. This is evidenced by the remarks some of the students made.

> "…if the teacher's up there, you're completely silent. So, I think there are helpful benefits in being able to have those little side conversations. I'm still taking notes, I'm still paying attention, but I'm allowed to talk to my neighbor a little bit."

"…it makes it a better environment to learn in because it's more casual. Even if the comment that I make isn't directly related to the learning or isn't helping them any it's like I'm sitting in class with my friends and we're all paying attention. I think it's almost better to be paying 95% attention because I'm still getting the information but it makes the classroom experience more enjoyable."

"For me a big part of it is that it keeps me alert and keeps me awake. Being able to talk to the people next to me helps me to pay attention and focus more. So, it's a really big advantage to my learning."

"Even a bit more so because Stu is not in there. There's a little more communication than there would be in a normal classroom."

"If anything it's more entertaining. We're all forgotten together so his favorite is in the other room. It's not that we're bitter about it, it's just a different aspect of learning and it's different how the community is being formed. In the other classroom I would assume they're not talking to each other as much. If a community has formed it's because he is leading them that way; he's teasing them and making fun of them whereas we're doing it on our own."

"The closer I am with my classmates the more I want to come to class. I'm also listening. Maybe not 100%, but 95% of the lecture. If I'm keeping it at a quiet level and not disrupting anyone around me, it makes it more fun to come to class; I'm more comfortable with my classmates."

"I treat the classroom like a community as though we're partners in crime."

"It's those little things and the little challenges that we're having in the distance classroom that kind of give us a different bond."

"We have some challenges that the other class doesn't have. I think that, if anything, that's brought us together as a class."

"Even when he does glance at the screen, we're not full sized in front of him. We're up on the monitor; we're all little like the people in the back. There's a little more accountability but it's still not near the same as being in a room with him."

"They know what they can get away with. They know where they can push the boundaries, they know how much they can talk, how much the microphones can pick up. It's still better than if he couldn't see us at all but you're able to get away with more."

> "Last year I was in a distance learning class where we had to push microphones and we were also on a tiny screen. That more so was negative; people were not paying attention, some had crosswords out. So I would say this is a lot better than that. As far as pushing the boundaries, this is better."
>
> "I would say any disadvantage that we're at, we're filling the void with those things so it balances out. We have other resources right next to us that we are now able to use because we're in the distance room."
>
> "I'll listen to these guys bring up questions talk about things pertaining to class. So far they've picked up on things that I didn't even think of."
>
> "I'd say a lot of the time, too, the guys who have more of the hands on work experience that bring up questions that actually go on in the job site, since I don't have much experience with that its interesting to hear from their perspective, what are they thinking about and compare that to my thought process as just a student for right now."
>
> "Yes, it does in the same classroom, always. It happens in all classes, student will bounce ideas off of one another."
>
> "Mike, for example, always asks really detailed questions. He gets into stuff, so if he's going to ask a question, you probably want to listen up because he asks pretty good questions. I think that helps."
>
> "Yeah, I think I'd be more likely. I think if you're like me, and your comfort level goes up with people the more interactions, the more exchanges that you have with them. I think then you're even more likely to do what I was talking about earlier; ask questions, bounce ideas off of each other, reciprocate maybe what somebody else has said."

These statements point to an interesting dynamic created by the students in the remote classroom to compensate for the loss of interaction with the instructor. In some ways they had gone beyond compensating for that loss and created what they felt was a more comfortable learning environment. It was as if they created a learning community within the remote classroom where they could socialize and learn at the same time

without the drawback of disturbing other students in the process. Since the students were switching locations every other class they were experiencing the dynamics of the remote and contiguous classrooms. When asked about the synergy in the contiguous classroom one student replied, "You don't rely on each other to understand things where the professor can explain it more clearly to you because he's actually in the room." These comments gave pause to the instructor who felt it was important to maintain control over student conversations that were not subject related, but also understood the importance of developing a classroom community.

Considering the poor quality of the audio between classrooms and the elimination of video showing the students in each classroom, it was not surprising that the remote students created their own classroom community. It was disappointing in some ways as one of the original intents of this study was to look at the dynamics of creating a single community between remote classrooms through use of the technology and through teaching methods that facilitated interaction among the students. In some ways these results showed that creating a single community between the two classrooms may not be necessary and may actually be counterproductive. One of the important aspects of creating a single community between remote locations was to give students the opportunity to diversify their network by interacting with others outside their community. Developing this interaction between locations would probably take a concerted effort from the instructor. As one student put it, "Unless you knew somebody who was in the other class I don't think there'd be a reason to reach out to them."

Another important dynamic that was discovered through analyzing the student interview responses was how the students in the remote classroom not only did not feel remote, but actually felt as if the instructor was teaching only to them and to them directly. The following comments are indicative of this:

> "I honestly don't think the other classroom affects us at all because we can't see them. Especially with Stu being projected, it's like we're in his classroom. You don't even give a second thought to the fact that the other kids are there. Once in a while he'll throw out a name and we all look around thinking it's one of us and then realize, 'Oh yeah, there's another room.'"
>
> "No, I would say that we did not feel like a single group at all, but at the same time we didn't feel like an extra classroom. We felt like the only classroom. Which I think is just as good. Like I said. Since we can't see then they don't really affect us."
>
> "For sure, we feel like a normal classroom, especially if his back is to us and he's writing things, there is no difference. A lot of times it does feel like a normal classroom."
>
> "It's really comparable to a normal classroom."
>
> "I felt like it was a single classroom. We obviously, physically were not in the same area, but as a class I felt as one unit."

This was a pleasantly unexpected revelation. Inasmuch as the original intent of the research was to find a distance delivery system that would not make the students feel remote, this system went beyond that to give the remote students the feeling of being the only class being taught to. It also showed that the front wall projection exceeded expectations and in essence was delivering a traditional classroom to a remote location, turning the remote classroom into a traditional one.

Sub-question 2. Sub-question 2 was concerned with the interaction that occurred

between the instructor and the remote students and how well the selected technology facilitated that interaction. With some adjustments to the room lighting it was determined that the front wall projection developed for Phase I could continue to be used in the Phase II testing. It was also understood that the poor quality of the audio would make it difficult for two-way interaction to occur between the remote students and the instructor. For this reason it was decided to examine the two-way learner-instructor interaction that occurred between the contiguous students and the instructor and the one-way interaction that occurred between the remote group of students and the instructor.

In relating to the interaction that occurred in the contiguous classroom between the instructor and the students, the following comments are important in showing how the students felt about the importance of interaction with the instructor.

> "As far as the way the class flows, I think if you're in the contiguous classroom, it's a lot easier to be more involved and more interactive because the professor's there physically, not on a screen or projected. However, the way Professor Bernstein teaches makes it easy for everybody to participate somewhat."
>
> "I think that Stu's style of teaching, the way he uses the board, and engages the classroom, he goes out of his way to call on students in both classrooms really registers him as effective for this."
>
> "He actually personally invests in us and that helps the connection. There are other professors who do that and those are usually the professors whose classes I'm successful in because I feel personally accountable for measuring up. Where there are classes where there's not that, there's that wall kind of between the two. Then it's 'whatever, it's just a grade.'"

That final statement made by the student is very indicative of past studies, which have shown the importance to students of having interaction with their instructor. While it does not prove there is increased cognition it does show there was increased motivation

to learn. Another student commented about not being able to ask the instructor questions when in the remote classroom. When asked if the student felt this was a disadvantage he answered, "For some people it might be; for me, I don't need to ask questions. I can hold myself accountable for paying attention; I don't need a teacher calling on me to make sure I'm focused." This last statement is indicative of the importance of understanding there are different learning styles among the students. As such, there should be different teaching styles as well as different distance delivery systems.

The students were then asked about the interaction that took place between the instructor and the students in the remote class. It is important to remember that at that time it was difficult to hear the student's responses from the remote classroom so the interaction was basically one-way – from the instructor to the students. Even so the students felt there was a great deal of interaction, or the potential for interaction, between themselves, when they were in the distant classroom, and the instructor.

> "I see interaction with him. He makes sure he involves us. I think sometimes he'll forget or get on a roll with something and not really purposefully forget to interact with the other class."

> "Talking on experience in real classrooms I always become more comfortable with the teacher. When I have taken online classes it's been quite the opposite but not as in I'm becoming less comfortable with them. More so that I have the same comfort level with them because I had very few interactions with them. I took an online class at Metro, the only interaction I had with the teacher really, was at the end of the semester. That was a basic English Composition course, so my level of interest in getting better, improving, not my grade, but my skills in that class was very low. I really didn't care about my interaction. I definitely think that in this format, it would increase."

These last two responses seem to indicate the technology used in this study was

better at facilitating interaction with the students in the distance classroom than an online course would. That was not the intention of this study. If anything, the take-away from these two comments is that the interaction is more dependent on the instructor and the level of student interest than it is on the technology. In discussing the advantages or disadvantages of being in a remote classroom with a normally interactive instructor, the students had the following comments.

> "Not as far as learning goes. We still see the same things all of the other students are seeing. They do a good job making things clear. The video's pretty clear and you can see everything he's writing down. He makes sure to speak clearly so you can understand what he's saying. I wouldn't say there's a lot of disadvantage at all."

> "Still, you might become at a disadvantage if something technical happens, which I think they have had happen. I think something with technology could inhibit learning."

> "I felt like I was at a disadvantage because of physical noticeability when you're physically in the classroom and the way that Stu teaches he goes beyond the podium type traditional lecture. Then he'll say, 'Hey Austin, what's the answer to number nine?' It's not that specific but it's, 'How would you estimate this?' If I'm in there every day and him picking on me, not in the bullying sense, but him picking on me and saying, 'What's your answer?' That forces me to learn. I have to have an answer. Where if I'm in the other classroom and he never notices me because I go and sit in the back of the classroom I'm at a disadvantage because he doesn't get to individually mold me like a teacher in a physical classroom would."

> "I would say in terms of feeling involved maybe a little more involvement was felt in the contiguous classroom more than the distance. I think, for Stu, it's hard to make eye contact with somebody who isn't there. You're trying to make eye contact with somebody through a screen. It's not going to be the same. That's in terms of feeling like he knows you're there and making sure you're paying attention; making sure you're looking and nodding, and understands it so he moves on. If you're in the distance classroom, you may not be able to see that, so he may ask, 'Any questions next door?' Teachers sometimes have that sense of people aren't speaking up but they still don't get it; they don't want to sound dumb. If you're in the distance classroom, you may not be able to sense that very much.

That's the only problem I would see."

Sub-question 3. Sub-question 3 asked whether the installed technology facilitated immediacy between the instructor and the remote group of students. Mehrabian (1967) first defined immediacy as communicative behaviors, which "enhance closeness to and nonverbal interaction with another." (p. 203). Gorham (1988), Christophel (1990), Rodriguez, Plax, and Kearney (1996), and Titsworth (2004) all conducted studies showing the importance of both verbal and non-verbal immediacy in improving student learning. This sub-question looked to see if the technology, specifically the front wall projection, facilitated both verbal and non-verbal immediacy between the instructor and the remote students.

The following student quotes are indicative of what the students felt regarding the importance of immediacy and how well the technology was able to facilitate immediacy between the instructor and the remote students.

> "Really important. If I ask a question in class and they didn't answer it, one, I would cop an attitude, and two, I would keep asking the question until I get an answer. That's just the kind of person that I am. I would be very frustrated with the class and I just wouldn't want to care about it anymore."

> "That (online courses) is a terrible environment for my own personal learning because especially in that kind of situation, if it's something I'm thinking about right now, the gears are already turning; I have to put everything to a stop and wait a few days. Then, when I get the answer, I have no idea where in my own headspace I was when I was asking the question. My understanding is different if I have to wait a few days."

> "Yes, much more so and with this technology there is the immediacy."

> "This happens in a non-distant classroom - you raise your hand and the teacher doesn't see you. Maybe you're in the back of the room, maybe they're turned and

> writing on the board. So two minutes later when they turn around, you forget your question. I think that does happen where Stu might not always be looking for someone to raise their hand in the distance room. I know in his classes whether I'm in either classroom he's always trying to make the other classroom involved. He's always trying to find someone in that classroom or pick out a name, 'How about somebody from the other room?' I know he tries to work on that, I know that he's not always perfect so, sometimes somebody in the back of the classroom might be raising their hand for a while before they get a response."

The preceding responses from the students indicated the importance of immediacy for students who were in both the contiguous and remote classrooms. Their comments also indicate that while the equipment did not facilitate immediacy between the remote students and the instructor very well, the students did see the importance of developing immediacy between themselves and the instructor.

Sub-question 4. Sub-question 4 looked at whether the technology installed for this study facilitated social and transactional presence between the remote students and the instructor. Garrison, Anderson, and Archer (2000) defined the Community of Inquiry (COI) to include Cognitive, Social, and Teacher Presence and posited that the intersection of these three presences in the distance classroom was what made up the Educational Experience for the students. They further contended that the strong social presence of an instructor was necessary in establishing an academic community of inquiry. Shin (2003) defined transactional presence as the psychological availability and connectedness between remote students and instructors and hypothesized that a student's perception of the instructor's transactional presence can predict learning achievement, satisfaction, and persistence.

The students were asked a number of questions relating to the importance of

social presence in the classroom and how well the front wall projection facilitated that in this study. The following quotations from the students indicate the importance of social presence to them and how well it was facilitated through the used technology.

> "Yeah, especially the front projector. It is so much nicer than a TV screen. It's like he's actually standing up there in front. Also, his teaching style. He likes to pick on kids, so that's helping. So he's calling people out by name in our classroom."
>
> "Yeah, and honestly, it's like being at the very back of the classroom; I can whisper and he can't hear me. At the same time, I feel like I'm in class with him."
>
> "Yeah, I think so. It's important to me. I don't do online classes because I personally, as a student, like the personal connection with the professor so I feel I can be successful and ask questions in the class. So, for me, something like that being greeted the way I would if I were walking into a classroom it would build better connectivity."
>
> "He is life-size and you see him, his mannerisms, you still hear his jokes. He does, because he does know some of the kids in our classroom, he does poke fun at some of the kids in our class."
>
> "Super important, really, really, really important. I have one class in particular where honestly, it's like we're not even there. He (the instructor) gets up, says whatever and that's it. I'm already struggling so much with that class because there's this.... It's impossible for me to engage and I'm so wrapped around the axle for the fact that there's no connection with the content, as his presenting is almost lost on me."
>
> "For me, when I have a personal relationship with the teacher or when I feel there's a connection versus "here's some information," I feel personally accountable for understanding the information and I don't want Professor Bernstein…I would never want to disappoint him."
>
> "Mostly physical exchanges, I can see his hand motions, I can hear everything he says. I think one of the great things is anything he puts up on the projector as far as technology on a computer, visiting a website, things like that, are all the same. We're all getting the same homework, tests, they're all being graded the same. There's parity in all of those regards, which makes me feel like it's a fair, single classroom. Where if I was in another class with another teacher, he might grade

different. So, I felt like we're definitely one group."

> "If you had moved this program to greater distances than the two classrooms next to each other, I think that maybe in the middle of the test, somebody might be more passive, or not as willing to raise their hand and ask a question on the test."

All of the student responses indicate a preference for taking classes, both remote and traditional, with an instructor who displayed social presence. The last two student comments presented above also supports Shin's hypothesis regarding transactional presence.

The students were also asked to conjecture how they would feel about the social presence of their instructor if they were actually geographically separated from him. One student replied,

> "There's very much that opportunity outside of class time to see him. I usually have a personal conversation with professors every once in a while. It's always school based. I think I would feel differently if I were in Lincoln and he were in Omaha."

This statement moves into the realm of the importance of having "face time" outside of the classroom with the instructor in order to establish and maintain that feeling of social presence. This student made it very clear that the social presence established in this study, where the "remote" students were not geographically separated from the instructor outside of the classroom, might not be as prevalent in a situation where that interaction outside of the classroom was reduced due to the physical separation.

A second student tempered his comments regarding presence with the following

comments.

> “I think that presence is diminished with the distance classroom. You can feel his presence, you know he's in the other room, but a lot of my securities with his presence are based on knowing that he's an instructor here, his office is here, and he’s in the classroom next to us. If I have a problem, I can speak up in class; there's a proctor in there. I have a lot of securities that a lot of future systems may not guarantee.”

In mentioning future systems this student was referring to the next phase where the two classrooms would actually be separated by a geographical distance. This is an interesting opinion that has been discussed at length by faculty in the college regarding the necessity of having distance instructors make periodic physical visits to the remote sites in order to establish a sense of bonding with the students. Another student made a similar comment that opens the door to further studies on the importance of developing that physical face time with remote students. He said,

> "Since we switch every other day, so every other time we do have the traditional classroom with the professor, it feels less like, when I'm in the other room that I'm in the distance classroom. I'm just in the next room."

This reflection by the student might indicate the importance of having the instructor make a personal appearance at the remote location at least once, if not occasionally, to establish that bond that leads to interaction between himself and his students, that could then be further developed remotely through the use of the technology.

Results. Phase II further explored student to student and student to instructor interaction using the frontwall projection and audio from Phase I. Using the older audio equipment created some issues in facilitating two-way interaction between the remote students and the instructor and any interaction between the two groups of students. As a result a surprising and unforeseen dynamic did arise. This was the creation of a separate, but equal, community in the remote classroom.

This unexpected remote community became both a support and social community that, according to student comments, helped to increase learning and bonding in the remote classroom. Because the students could not be heard well in the contiguous classroom they felt free to be more sociable with their classmates creating a more relaxed and what they considered a more enjoyable learning environment. While all of the conversations were admittedly not class related many of them were with students asking each other for further clarification of issues being discussed by the instructor. The remote students also felt they were the only students in class with the instructor, which is to say they did not feel remote at all. Some expressed the opinion that they were aware of the students in the other class, but it was as if they were sitting way in the back of the class and therefore paid them little mind.

Phase II did reveal how the system facilitated immediacy and presence in the remote classroom through the front wall projection. It also showed that interaction in the classroom was a direct result of the instructor's methods and not necessarily the type of system being used. With that said the students did agree that this particular system did a

very good job of facilitating the interactive learning style used by this particular instructor.

Phase III

Background. Phase III commenced with the installation of the new equipment in the testing classrooms. The sidewall projectors and cameras were removed along with the audio equipment in both rooms, as well as the professor camera and "cheater" monitor in the contiguous classroom. A new 70" monitor was installed in the back of the contiguous room allowing for better viewing of the entire remote classroom. Also, a new Cisco camera was mounted at the rear of the classroom for better capture of the instructor, the white board, and the content projected from the computer and overhead projector. A 70" monitor was installed at the front of each classroom along with a Cisco camera to capture images of the students from the front of the rooms. These cameras were capable of capturing the entire room of students and displaying them on the monitors large enough to be distinguishable from anywhere in the room. The monitors were mounted at an angle in the front left-hand corner of the classroom at about five feet off the floor. New directional microphones and speakers were installed in both rooms along with supporting audio equipment that vastly improved the audio quality and made it possible to hear all of the students in each room.

Figure 11 - Frontwall projection of instructor and monitor (showing students from contiguous classroom) in remote classroom - Phase III

Whereas in Phases I and II where the equipment was hard-wired between the classrooms the new equipment was installed using Cisco C-20 codecs to connect each room across the Internet. A single, one-touch, control panel was installed in each room interconnecting all the equipment in both rooms. With a single touch of a button the equipment in both rooms was turned on and the dial-up connection was made linking the rooms together in the matter of only a few seconds. The existing room lighting was adjusted to reduce glare on the white boards in both rooms and to enhance the new, truly high definition image of the instructor and the content. This improvement made it possible for the students in the remote classroom to clearly see and read any of the

images that were broadcast from either the computer or the overhead projector as well as the information written on the whiteboard. With the new audio equipment everyone in each room could be easily heard in the other room without raising their voices. In fact, even the quietest conversations in the corners of the rooms could be heard even better than if they were in the same room.

The students had a few comments and suggestions regarding the updated equipment although for the most part they found it to be a vast improvement over the configuration from Phase II. Two of the students commented on the placement of the cameras being used to capture their images. They were concerned the camera was mounted too low and did a better job of capturing the students in the front of the room, but made it difficult to see the students towards the back of the classroom. There was also some complaints about the audio being too good because it captured every sound made in either classroom. As one student stated,

> "You could hear everything. If somebody was messing with their notes, you could hear it no matter where you were in either classroom as opposed to a normal classroom you would only hear if you were sitting next to them. All of the noises are amplified and shared with every classroom."

The student further added that in some situations this type of audio system would be preferable to having push button microphones on the desk, but not in this classroom.

> "I would say the microphone at the desk especially for this type of class where you're mostly listening to the professor and if you have a specific question or he

> asks you a specific question you're expected to respond. In a less traditional classroom where there's lots of group discussion and everybody is sharing all the time, I could see the total audio system. I'm just not sure that's necessary for Stu's teaching style."

The student then conceded that even with the drawbacks this open microphone system was advantageous in facilitating immediacy.

> "For sure, that was one of the reasons that the audio system, even thought it was overly sensitive and had a few drawbacks, you didn't need to wait for a pause and push a button. If you said anything, Stu could immediately hear you."

Even considering these comments the new improvements in equipment made it possible to return to the original intention of the study – looking at student-student and student-instructor interactions between classrooms.

Sub-question 1. Sub-question 1 explored whether the new equipment facilitated learner-learner interaction between the groups of students in the two classrooms. The perceived degree of success of learner-learner interaction varied among the students interviewed. The following comments were from students who felt the new equipment facilitated this interaction.

> "I definitely do think that the TVs that show the other class, I think those are extremely important for the overall cohesiveness, making it feel like one classroom. I think without those, I could definitely feel less cohesiveness other than the fact that we already do know each other."

> "I think there was more interaction."

> "Definitely. I felt that there was actually another class there as opposed to Phase

> II where we just felt like we were on our own."
>
> "Yeah, I would say there's a little more connection because we could better understand, better hear each other. We were a little more apt to speak up maybe comment on somebody else's comment or say we thought of it in a different way because we knew it was easier for everyone to hear."

A few of the students did not feel that this class was conducted in a way that facilitated interaction among the students. They felt the interactions were more student-instructor focused as opposed to student to student. When asked whether they thought the equipment would facilitate student-student interaction if the instructor had conducted his classes differently they had the following comments:

> "Yeah, I think the technology has the capability."
>
> "I would say it would. Especially if the teacher made it clear, 'It's an open floor, everybody can talk. If you have something to say, go ahead.' It would be very easy to do that through this system."

The students were further asked whether they found the location of the 70" monitor at the front of the room to be distracting. All of the students interviewed agreed that it was not distracting and that they only looked at it when there was actually a student talking, and then not all of the time. One student put it this way,

> "Not really, the only time I looked at them was when someone else was talking or someone else had a comment. Most of the time there wasn't really all that much going on that would have been distracting. Yes, unless I know that person's voice well enough to know who is talking. I like to put a face with a name; put a face with a voice. Some people's opinions I value more than others."

Another student added a similar sentiment with the following comments.

> "I don't think that it would because if you're trying to gain knowledge, you're trying to gain content, you're trying to understand, to communicate, share meaning, how is that going to help because you can see the other students? If you're only trying to gain it from the teacher it's not going to help, the way I look at it."

These last comments harken back to some of the opinions expressed by the students in Phase I where they opined that they often do not bother looking around the room they are in to see who is talking so why would they look at a screen projection of students from another class. Their focus is primarily on the instructor.

Many of the comments made by the students, faculty, and visitors who witnessed this system in action attest to the opinion that student-to-student interaction in a synchronous live classroom is less critical than student to instructor and student to content interactions.

Sub-question 2. Sub-question 2 explored whether learner-learner interaction continued within the remote classroom at the same level as found in the previous phase. This is a slight re-working of the original question, which asked whether learner-learner interaction occurred within a contiguous classroom. One of the unexpected results that was discovered was the creation of a strong, unique learning community within the remote classroom that developed as a result of the partial isolation that was caused by the poorly functioning equipment. Since the new audio was able to pick up all conversations in the remote room, it was decided to explore how that affected the remote community

that was created in that room during Phase II. One student expressed it as follows:

> "I think it was pretty similar. We developed those little habits of helping each other out. Yes, our questions were answered easier and noticed faster but we would still help each other to understand if we didn't hear a word. We still had that sense of community, I think."

The rest of the students interviewed had somewhat different opinions about the importance of student-student interaction. These were the same students who were interviewed during Phase II who felt somewhat strongly about how they had built up student-student interaction within their remote community. It seems their opinions regarding student-student interaction changed once the new equipment was installed and student-instructor interaction was more fully developed.

> "Not very much. When Stu's interacting with the classroom, he asks a question and directs it to a specific student; if they can't answer it he'll open it up to another student. There are not a whole lot of things that he opens up to the whole lass. There weren't really any times where he opened it up for a whole class discussions."

> "I didn't see a whole lot of it. It was more of the learner-teacher interaction. That may have been due to the fact that that's how the class is set up. Maybe it didn't require a lot of interaction between the learners because we didn't know a whole lot. So, it was more of questions the teacher could answer instead of questions the learners could answer."

> "I know for most of us, the content of the class is relatively new and there's a lot of them who don't have a lot of experience. It's like writing on a clean slate where we don't really have any input on the actual content. We may have questions that come up that other people may respond to, but ultimately it's questions that you have for the professor."

> "As far as our class went, I don't think so. Not all that often. Again, what I was saying, usually the questions are directed at the teacher. There was certain times,

> especially one of the students who was in the same room that I was had some experience with mechanical, electric, and plumbing. So, he had some really good insight when we were going over those sections that prompted some discussion in our classroom. Normally, there wasn't a whole lot going on even in the contiguous classroom."
>
> "That's what we're here to do, learn form someone who knows, not from someone who is learning at the same time."
>
> "I know my English and gerontology classes I took my freshman year; English composition I and II that was the majority of the lecture. It wasn't a lecture; it was a discussion. They built the curriculum around that. It was a class that was well designed to carry on that way."
>
> "It depends on the subject matter, I would say. If it's stuff that you can have your own opinion about and you can speak your mind about in a comfortable setting. You could say what you want; nobody is going to judge you for what you think. It was interesting to hear opinions of students. Everybody comes from a different background with different priorities, different morals, and different things that they focus on. It was very helpful to see where someone was coming from. It depends on the subject matter for sure."

All of these previous student opinions indicate the feeling that student-student interaction is primarily dependent on the class topic and method of teaching as opposed to the technology used in its delivery.

Sub-question 3. Sub-question 3 looked at how the new technology facilitated teacher-learner interactions between students in the remote classroom and the instructor. Overall the student opinions indicated that the new technology did facilitate teacher-learner interaction. The improved front wall projections provided an even clearer, distinct image of the instructor further creating the illusion and the feeling that the instructor was actually in the room with the students and not in a remote location. The improved audio made a remarkable difference in how students felt toward the ability of

the system to facilitate student-instructor interaction. With the improvement in the equipment students agreed there was no disadvantage to being in the remote classroom in regards to interaction with the instructor.

However, there were students who expressed that they felt that interaction between themselves and the instructor was not entirely necessary. Two students expressed that opinion with the following statements.

> "It would help to be able to see them, or it would help, if they were talking, to have a handout or power point. Some other form to go along with it. I don't think I need to see their face."
>
> "I could watch a video. I don't ask a lot of questions."

It has been stated in previous chapters that live synchronous learning is not for everyone and this system is not meant to be a panacea for all distance-learning issues. One student did voice a very important opinion regarding the importance of building face-to-face rapport between the instructor and the remote students in order to solidify interaction between them at a distance. During this experiment it was accomplished by having the students switch back and forth between classrooms.

> "I think the technology does help with that but I think more so than anything it really helped when Stu had us switching between classrooms. So, in theory, if the class was in Lincoln he wouldn't want to be doing it every time. But, if he was in that classroom once every couple of weeks, they would feel like there's less of a distance and they know the professor."

Sub-question 4. Sub-question 4 asked whether the new technology facilitated

immediacy between the remote students and the instructor. Immediacy includes both verbal and non-verbal behaviors that bring people together during the process of communication. The distance learning system used in this experiment was specifically designed to facilitate both the verbal and especially non-verbal cues of the instructor. These include hand gestures, looking at the class and making eye contact, smiling at the students, moving around the classroom, and removing barriers between themselves and the students. The systems used in Phases I and II accomplished that very well and from the comments made below by the students the equipment used in Phase III improved upon that facilitation of immediacy between the instructor and the remote students with higher quality audio and video outputs.

> "They can immediately judge by the reaction if they need to slow down, if the content is over people's heads."
>
> "If I have to keep repeating myself, I'm not going to talk again. If you don't think it's an important comment, it's just a comment, you may not say it. Where if it's good audio and everyone's going to hear it, you may just say it even if it's not the most important thing in the world."
>
> "I would say definitely. Whenever I had a question, he was willing to answer. I would say it was definitely there and it was pretty easy once the new audio was in place to ask a question without having to repeat yourself or say it a different way."
>
> "Yeah, if I don't know something and the professor doesn't notice, I feel a little left behind. Sometimes, it doesn't just happen in that classroom, it happens in my other classes as well. In one class, I asked a question and still felt left behind. I would say it definitely matters at least somewhat. You want the professor to know where you're at."
>
> "Usually it was something they brought up and there was a discussion about it. I

> think it helped a lot, again, it's like a non-audio response and audio response at the same time they're discussing because they don't understand it and Stu would key on that."
>
> "It beats an online class for sure because you're not sending an email; you're talking with an actual person and getting that response not exactly immediate but pretty close."
>
> "It didn't look like a small picture. It felt like when he looked back at the camera he was looking at you and it wasn't just the video. It definitely made me feel like that."
>
> "Yeah, I would say most of the time you felt like you were just another class. I may have been getting used to it also, but the disconnect kind of went away. Especially with life sized Stu."

These comments by the students show the importance of immediacy to the students and their opinion that the new system did a very good job of facilitating those behaviors between the instructor and the remote students effectively.

Sub-question 5. Sub-question 5 explored how the new technology facilitated the various forms of presence between the remote students and the instructor. Anderson, Rourke, Garrison, and Archer (2001) describe teaching presence "as the design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes (p.5). A big part of that model is the facilitation of discourse among the students and between the students and the instructor. In defining discourse as the verbal interchange of ideas the following student comments show that the new system effectively facilitated the cognitive and social processes of teaching presence.

> "I think Stu did a good job of involving both classrooms; it didn't feel like there was a priority in one class as opposed to the other. I've felt that disconnect in a

> large lecture classroom. If you sit in the top row, you feel like you're a spectator instead of actively involved. I would say it was definitely not a big deal at all. I didn't feel that at all."
>
> "I had one class where I sat in the front row and still felt distant. The instructor didn't involve the class at all. He wanted you to speak up if you had a question but he didn't really care what your opinion was because he knew his was right. Stu wasn't like that. It seemed like he really liked hearing our opinions. That was huge as far as keeping us involved."
>
> "Stu did a great job of handling the NUVIEW and including both classrooms. I think other professors may not have done so well including both sides and there may have been more disconnect because of that. I would say it relies a lot on the teacher and keeping everyone involved, keeping everyone awake, valuing everyone's opinion, and not discouraging comments. There's no such thing as a stupid question so if you have anything, bring it up because it prompts discussion even if it is something we just talked about, maybe he goes and reinforces it and people think about it in a way they didn't think about it before."
>
> "Most of the time, yeah, just because it wasn't like he was focused on one class. It felt like he was there. He was interacting and helping both classes. NUVIEW definitely helped with that. Stu could hear you and you cold hear him."

Results. Phase III provided an opportunity to review the technology's ability to facilitate interaction among the students and instructor between remote classrooms. The data collected from the students reinforced the findings from Phases I and II that the primary interactions which were important to the students were the ones between the students and the content and the students and the instructor. With the type of teaching method used by this particular instructor, students did not see a great deal of relevance to student-student interaction either within the classroom or between classrooms. The students appreciated being able to see the students who were doing the speaking in the other room, but did not focus on interacting directly with those students. The consensus among the students was that in this type of teaching and learning environment most

interaction occurred through the instructor.

The new equipment provided a much clearer image of the content that was projected from the contiguous room to the remote classroom so the students were able to read and understand what was being projected on the wall as if they were in the classroom with the instructor. With the vast improvement in the audio equipment two-way interaction between the remote students and the instructor became possible and seamless. Students felt comfortable being able to ask and answer questions and benefitted from hearing responses from students in the other classrooms.

Chapter 5 - Discussion

Chapter Summary

Distance learning has been around for more than a century. It has gone through many iterations from courses being sent through the mail, to courses being listened to on radio, watched on television and in the past few decades it has gone online. With the advent of new teleconferencing technologies synchronous, interactive distance platforms have come into use. This final chapter will serve to sum up the results of the testing of a new distance-learning platform that was created with the intention of replicating an interactive classroom experience in a location remote from the instructor and creating a single learning community between the two groups.

In this project an interactive classroom is considered one where communication and development of content takes place collaboratively between the instructor and the students and is predicated on immediacy and presence between and among learners and instructors. This chapter will offer discussions of what was learned from the findings, how this study adds to, agrees with, or contradicts previous studies, and recommendations for future studies that will further the research into best synchronous distance teaching practices and the development of technology for synchronous distance-learning platforms.

Project Overview

Action research. Action Research was selected as the methodology for this study because it supports and encourages the changes that needed to be made during the

beta testing of the equipment and concepts of this distance-learning platform. As Elliot (1991), Adelman (1993), and Mills (2011) pointed out Action Research allow teachers to study their methods and use of technology in an attempt to improve their delivery and outcomes. Action Research served as an iterative process in the initial development, testing, redevelopment, and retesting that might not have been possible using other methodologies. For example, a critical discovery in Phase I shaped major changes that were made for Phases II and III. There was an eighteen-month span of time from the inception of this project to the completion of the testing phases during which a number of changes were made to the equipment configurations and to the teaching concepts used in the study.

Initial goals. This project began with the intent of developing a single classroom community consisting of two geographically separate groups of students where neither group of students would feel removed from the instructor and the process of immediately interacting in the exchange of ideas. Using the Cisco TelePresence room as a starting reference point for the development of the technology, a platform called NUVIEW was developed in which a sidewall projection of the students and a front wall projection of the instructor were combined to create the illusion of two separate classrooms being in the same location together. A search of the existing literature on best classroom practices and distance learning suggested that the pedagogical focus of the study should be the importance of immediacy and presence in the classroom for both student retention and learning producing the following questions:

Grand Tour Question:

Can a live, synchronous, two-way, audio-video distance delivery system positively shape or play a role in students' and instructor's interaction, immediacy, and presence in distance education classrooms?

Research Questions:

1. Can a live, synchronous, two-way, audio-video distance delivery system be developed that will facilitate learner-learner interaction between students in remote and contiguous classrooms?
2. Is direct learner-to-learner interaction prevalent in the traditional, non-distance education, engineering classroom and is it critical in the construction of a classroom learning community?
3. Does a live, synchronous, two-way, audio-video distance delivery system facilitate teacher-learner interaction between remote students and instructor?
4. Does a live, synchronous, two-way, audio-video distance delivery system facilitate teacher-learner immediacy between remote students and instructor?
5. Does a live, synchronous, two-way, audio-video distance delivery system facilitate presence (transactional, social, teaching, and cognitive) between learner and instructor?

Discussion of Findings

The study developed into three phases in which the equipment was studied to see if it facilitated immediacy and interaction, and how important these pedagogical concepts

were to the students in developing their feeling of being part of a single classroom community.

The first six months of the project were used collecting data on the equipment available and designing the configuration that was thought would deliver the best results. Even with that amount of time spent in the planning and development stage it turns out that the equipment did not deliver the desired results for a number of reasons. The first was cost. It was decided to begin Phase I testing with a focus on the practicality and acceptance of the concepts as opposed to achieving the highest quality audio-video output. The thinking was if the concepts worked the equipment could be upgraded. If they did not then the cost would be minimal.

Phase I focused on the importance of learner-learner interaction between the groups of students in the two classrooms, and learner-instructor interaction between the instructor and the students in the remote classroom in the development of a single classroom community. It was hypothesized that learner-learner and learner-instructor interactions would both prove to be of importance in the development of an interactive classroom experience and that the platform being tested would strongly facilitate both. The students indicated that interaction among their peers in a traditional classroom was typically limited in most of their other classes so why would they try to facilitate interaction with students who were in a remote classroom. In 1989, Moore editorialized on the three interactions necessary for a high quality distance learning experience. These were learner-learner, learner-instructor, and learner-content. He further admitted that in

his own opinion the least important of these was student to student in the classroom and was entirely dependent on circumstances. Where Moore felt student to student interaction was important to cognition was outside the classroom, particularly in distance learning situations, where students become dependent on communications with their peers for the sharing and building of knowledge through such venues as online discussion groups. Student responses in this study showed they did not think that student-to-student interaction in the classroom was necessary for building an interactive classroom community and therefore the sidewall projection was not useful or relevant to their classroom experience.

Figure 12 - Students in the remote classroom with front and sidewall projections - Phase I

This finding was important in the design of Phases II and III. To learn more about whether student-student interaction was relevant to the development of a single interactive classroom the sidewall projection was discontinued in Phase II. The audio quality between the two rooms had deteriorated to the point where students in neither room were able to hear the students in the other room, although the instructor could be heard very well in both. This issue eliminated interaction between the two groups of students and made the communication between the instructor and the distant students one-way and therefore not interactive. As a result, the students in the remote classroom

indicated during the interviews that they created their own separate classroom community in which student-student interaction became both a way of increasing cognition and a way of establishing a social presence among themselves. The students discussed how they were able to talk amongst themselves without being heard by the instructor or the students in the other classroom. They used this freedom openly to ask each other questions about the class content to help clarify or fill in missed information. They also used the opportunity to socialize among themselves while still listening to the instructor and taking notes, creating a more informal and social atmosphere in which to learn. In essence, through need or lack of interaction with the instructor and the students in the contiguous classroom, they created their own learning community within their remote classroom.

Many of the students commented that they felt student-instructor interaction was preferred in the classroom as this helped them to feel more involved in the learning process and therefore more engaged with the class itself. This was not the case for all of the students, though. For some that interaction was not necessary, and in some cases not even desired. One student felt they were completely capable of learning the content on their own and did not find coming to class to be a necessity. For this student taking the course online might be the preferred situation. Again, this is in keeping with Moore's (1989) editorialization that learner-instructor interaction is valuable, but not necessary for student cognition. One of the more interesting outcomes expressed by the remote students during this phase was since they had no contact with the students in the other

room they began feeling they were actually the only group of students being taught to, and that the instructor was teaching to them only. This outcome more than satisfied the original intent of not having them feel remote.

Figure 13 - Frontwall projection of instructor with students in remote classroom - Phase II

Phase III commenced with the installation of the new equipment that permanently removed the sidewall cameras and projectors replacing them with 70” monitors at the front corner of each classroom from which one could view the students in the other classroom. It also included a completely new audio system that delivered high quality sound between the two rooms and new high definition cameras to capture the images of

the students and the instructor. Finally, it included codecs to transmit the audio-video outputs between rooms via the Internet.

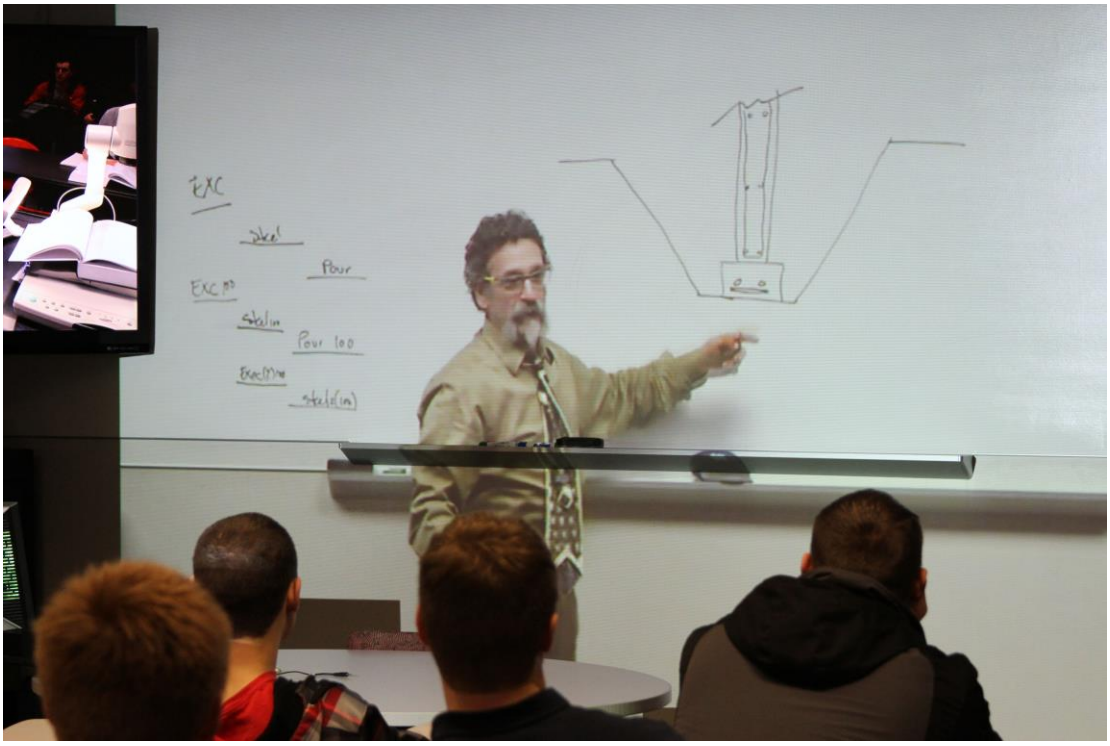

Figure 14 – View in the remote classroom of the frontwall projection of the instructor - Phase III

In Phase III responses the students opined that the quality of the frontwall instructor video was much improved and further developed the impression that the instructor was actually in the remote room with the students, especially since the audio allowed for full interaction between themselves and the instructor. The finding on the new student monitors, though, was in keeping with the opinions delivered in Phase **I**. The students admitted they would glance at the monitors from time to time when a student in the class would speak, but this did not facilitate a direct interaction between the

two groups. It was still akin to the traditional classroom where interactions between students tended to pass through the instructor first making the interactions more closely related to learner-instructor interactions. The students and the instructor were mostly of the opinion that while this instructor's style of teaching was interactive it did not facilitate student-to-student interaction in the classroom. Some of the students discussed other classes they have taken where student-to-student interaction is the norm. Based on this information it is surmised that in the right venue a technologically improved sidewall projection or the front of the room monitors would facilitate student-to-student interaction between remote classrooms.

In Phase II the focus was also on immediacy and presence. Mehrabian (1967) first defined immediacy in relation to communicative behaviors that "enhance closeness to and nonverbal interaction with another (p. 203)." These included eye contact, facial expressions, and other body language indicators. In 1988 Kelley and Gorham conducted a study, which showed a significant relationship between immediacy and students' cognitive skills. This study did not include an analysis of the students' cognitive skills relative to the distance-learning platform, but instead focused on the students' perception of whether the equipment facilitated immediacy between the instructor and the remote students. The instructor studied for this project was dependent upon immediacy in his traditional classrooms, so this was an ideal venue to test whether that immediacy could be conveyed to the remote room via the platform. Students agreed that even though the quality of the video projection was not the best the immediacy being conveyed by the

instructor was still very strong and well facilitated by the platform. The student responses in all three phases showed overwhelmingly that all three iterations of the technology facilitated immediacy exceedingly well, with the improvements made in Phase III resulting in the best facilitation. With the new equipment students and instructors were able to see and hear the verbal and physical responses made by the people in the other classroom. Responses were immediate and interaction was very well facilitated between the groups of students and between the students and the instructor.

Garrison (2000) developed the concept of the Community of Inquiry as an educational process in which learning occurs through three essential presences: cognitive, social, and teaching. The second major focus of Phase II was to determine whether the platform would facilitate and support these essential elements in a remote classroom. The cognitive presence, or the communication of the learning material via the given medium, was a little disappointing for the students, but at least improved from Phase I. During Phase I, the quality of the projection coupled with the glare on whiteboard from the projectors and the room lights made it very difficult for the students to read all of the content being conveyed by the instructor especially the digital projections. The information printed on the whiteboard by the instructor could be adjusted in size and location so that it was readable by the remote students. During Phase II the room lighting was adjusted to reduce glare on the board when the instructor was writing directly. This made quite a difference in the conveyance of information. It was also discovered that the instructor could remotely control the computer in the distant classroom to display what

was being conveyed digitally directly through a different monitor eliminating the glare completely and making all digital information completely readable to the remote students. This accounted for a big improvement in the responses the students relayed regarding cognitive presence in the remote classroom.

Social presence is described as the ability of the students to participate both emotionally and socially in the learning process. It is further described as the difference between the students participating in the development of their learning and simply having them download information that is being presented to them. This was not one of the aspects studied during Phase I, but if it had been it would have related to how well the remote students were able to interact with the instructor and the students in the contiguous room. The responses that the students gave to other questions, though, indicated that the platform adequately facilitated social presence between the classrooms. However, since the remote students were virtually cut off from interacting with the other classrooms during Phase II a different concept of social presence emerged. Because the students could not interact with the other classroom, they were virtually only able to download the information and not share in its development. To compensate for this loss of interaction with the other classroom and instructor the students created a social presence within their classroom that allowed them socially and emotionally to share in the development of cognitive presence among themselves. This concept of the students supplementing the content provided by the instructor is woven through many of the responses from the students occupying the remote classroom during Phase II. The

students discovered they could talk among themselves to verify and reinforce the information being conveyed by the instructor, without disturbing the flow of the instruction. While the students still focused on the frontwall projection of the instructor and the information being conveyed through that medium, they supplemented their learning through this newly created social learning community, which many of the interviewed students found to be more satisfying than being in a traditional classroom where that degree of social interaction in the classroom would not have been tolerated by this particular instructor. This aspect of social presence disappeared during Phase III when the equipment was updated and interaction between the two classrooms was at peak performance. The social presence returned to what was originally expected by the researchers, facilitating a single learning community between the two classrooms.

The third leg of the Community of Inquiry is the teaching presence, which is described as the element that binds the social and cognitive presences through the building of understanding, the initiation and facilitation of discussions, and the sharing of personal interpretation. According to the students the teaching presence has been at the forefront of what worked effectively throughout all three phases of the testing. From the beginning of Phase I the students and guests who experienced the distant room in action agreed that the frontwall projection provided a projection of the instructor that was lifelike enough for the participants to feel as if they were in the same room as the instructor. While interactive classroom discussion with the remote students was not possible during Phase II it was well facilitated in Phase I and very well facilitated during

Phase III. Even though in-class discussion with the remote students was not possible in the classroom during Phase II the students still felt very strongly about the presence of the instructor in their classroom to the point where they felt they were the only group of students to whom the instructor was talking and emphatically expressed this during their interviews.

Moore (1991) described transactional distance as a separation between learners and instructors that was due to a lack of understanding and perception that could be further exacerbated by a geographical distance. In a play on Moore and Garrison's themes Shin (2003) coined the term transactional presence to describe a student's sense of connectedness with his distant counterparts. It is clear from the overwhelming student responses that they felt this new distance-learning platform facilitated a reduction in the transactional distance between classrooms and increased the transactional presence of the instructor.

The focus of the research was on the capabilities of the platform to facilitate interaction between the two remote classrooms. It was not on the merits of interactive teaching and learning versus non-interactive styles even though the instructor in this study is a strong proponent of Dewey's constructivist philosophy that favors student involvement and interaction in the classroom, and Vigotsky's social learning theory that posits that students will learn better when they interact with an experienced instructor. Nor was it intended to show that a non-interactive instructor would become a better or more interactive instructor by using this platform. The importance of the quality of the

instructor over the platform was made very clear in the many discussions that were held with the students, guests who observed the room in action, and others who became part of the many conversations that took place relating to this platform in particular and distance learning in general. It was about developing a platform that would enable an instructor to continue doing what he does in the traditional classroom and replicating it at a distance, and specifically whether the platform would facilitate replication of an interactive teaching and learning style. Based on observation and student feedback this has been accomplished.

Quality of the Data

Prior to and during Phase I the author kept a journal of all activities and meetings related to this project (see Appendix B). This started with the initial meeting in which the idea was conceived, carried through the process of brainstorming the desired effects and outcomes, meeting with various vendors to discover what was possible technologically, selecting the vendor, and finally installation, troubleshooting, and use of the system. The data available from this journal would be valuable to anyone desiring to create a new distance learning platform, as it contains all of the pitfalls, mistakes, and successes that occurred during the process, which became a learning experience in itself. It also contains self-reflections and discussions with the classroom observer after most of the class meetings during Phase I providing an insight into the instructor's impressions of using the new platform.

The classroom observer also kept a journal during Phase I reflecting on his visits

to the classroom (see Appendix A). Most of his time was spent in the remote classroom observing the students' reactions to the technology, as well as observing the instructor's ability to make best use of the system, and noting what was working well with the technology and what was not. After each class the observer and the instructor sat down to review the observer's notes. The results of these meetings are included in the instructor's journal.

Toward the end of Phase I a number of guests were invited to sit in on the classes. These guests included other instructors from the college as well as instructors and administrators from a local training facility sponsored by a national construction contractor. Two of the instructors and one of the visitors from the contractor were interviewed after their visits to share their opinions of the system. Each of these interviews lasted about an hour each and provided a plethora of valuable feedback and data. The transcriptions from two of these interviews are included in Appendix C – Artifacts. The names of the interviewees are included with their expressed permissions.

The bulk of the data used in this research came from the interviews conducted by the classroom observer with the students. The first group of interviews was conducted at the end of Phase I, which was also the end of the semester. Many of the responses seemed to be lacking in depth. It was surmised this could have been the result of a number of factors. The first being the semester was over and the students were not interested in making the extra effort. The second being that the questions were being asked after the fact and the student recollections may not have been as sharp or detailed

as they would have been if the students had been questioned during the study. A third possibility was the interest of the students who had been selected at random. A fourth possibility could have been the quality of the questions.

To supplement these interviews with more and richer data a second group of interviews was conducted with a select group of students after the semester was over and grades had already been submitted. The instructor himself conducted these interviews with a whole new set of questions that were still focused on the two issues of whether the system facilitated learner-learner and learner-instructor interaction (reference Appendix C – Artifacts; Supplemental Interview Questions for Students – Phase I). The results were somewhat better, but it was determined that the wrong research questions were being pursued. In keeping with the tenets of Action Research a new tact was developed focusing on more precise and in depth research questions that related specifically to aspects of interaction such as immediacy and the various presences.

Whether it was the change in research questions, the students being interviewed, the fact the interviews were conducted periodically during the semester as opposed to the end of the semester, or a combination of them all, the interviews conducted during Phases II and III were as rich and in depth as could be hoped for and expected. The data collected from the students during these two phases provided the information necessary to substantially answer all of the research questions.

Significance of the Findings

Distance learning has been around for more than a hundred years taking on many

shapes and forms. With the advent of the Internet, distance education is going through a powerful resurgence and acceptance across the planet. Both synchronous and asynchronous online and broadcast courses have been available for over a decade and now the development of the technology has improved the quality of the delivery platforms and its acceptance by the general academic population even more. New distance education platforms continue to emerge, but it is the contention of this researcher that there remains a need for the traditional type of classroom instruction that facilitates interactions between the instructor and the students. This project intended to show, and succeeded in showing, that the traditional classroom could be replicated in a remote location without the loss of interaction between the two locations.

It is obvious that many people prefer the asynchronosity of online courses, but there are still a number of students and instructors who prefer and thrive in the personal, interactive community that one gets from being in the classroom, with the instructor and their peers, with the opportunity to ask questions, obtain immediate responses, and be able to make eye contact with each other. This is where the development of a synchronous platform, such as the one that has been researched here, becomes so important. Through a search of the available literature, this appears to be the first reported full size projection of the instructor to a distant classroom that has been attempted and discovering whether the idea was feasible and the equipment available was invaluable. Because of the testing, development, and demonstrations performed using this platform, other instructors have opined that they would like to try it themselves, and

some have expressed they would like to see new features added to the platform and plan to use it as soon as it is fully functioning between the geographically remote campuses.

The most significant finding of this research is that the platform was not only able to facilitate the delivery of an interactive classroom experience in a remote location, but that it replicated that experience so well that the students not only did not feel remote from the instructor, but at times actually felt they were the only group of students to whom the instructor was speaking. Other researchers have studied and shown the importance of immediacy and presence in regards to student cognition and retention. This study accepted those hypotheses and went on to develop and demonstrate that this new platform would strongly facilitate immediacy and presence between the instructor and the remote students without a loss of either for the students in the contiguous classroom. It also showed that an interactive instructor who already employs immediacy and presence in his classrooms does not have to alter his teaching methods, style, or delivery in any way to fully utilize the platform effectively.

In regards to student-to-student interaction within the classroom, the study did not identify it as important to the development of a single learning community between multiple classrooms. In Phase I student-to-student interaction was mostly non-existent. In Phase II it was not possible between the two groups of students, but became important within the remote classroom in building that community. In Phase III being able to see and hear students in the other classroom was accepted and even welcomed by many of the students who were interviewed, but it was not deemed necessary based on the

particular teaching style utilized during this experiment. Some of the students did add that they had taken other classes in the past where interaction among the students in the classroom was essential to learning and, for classes such as those, being able to clearly see and hear students in a remote location would be critical to maintaining the integrity of a single classroom community. So, while the sidewall projection did not prove to be feasible or acceptable in this experiment, pursuance of its further development would still be desirable in classes where student-to-student interaction is fostered and emphasized in the classroom.

The original intent of this experiment was to develop a completely immersive classroom that would replicate the feeling and experience for remote groups of students of being together in a single classroom. The original vision of having two remote rooms appear to be side-by-side in the same room through the use of sidewall projections was not fully realized in Phase I. This is due in part to the equipment not delivering the images necessary. It was also due in part to the way the class was taught where the instructor did not emphasize student-to-student interaction and most student interactions passed through the instructor first. However, enough steps were taken in the right direction that student opinions showed feasibility and acceptance of such a platform if used in the right situation. Through further developments in the technology and honing of the delivery system complete fulfillment of the original goal would be very possible and well accepted.

The most important finding of this project was how well the platform facilitated

interaction between the instructor and the students in the remote room without a loss of interaction occurring between the instructor and the students in the contiguous classroom. The full size projection of the instructor in the remote classroom fully facilitated immediacy and presence between the instructor and the students enabling synchronous, real-time interactions to the point where the students and guests claimed to have become so immersed that they suspended belief they were not actually in the same room with the instructor. This function of the platform was highly successful and bears to be further studied and developed.

Recommendations for Future Research

As has already been discussed a continued improvement in the equipment used to deliver and accept the projections of the content, the instructor, and the students would be critical areas for future research. Whether as solo or combined studies, experts in the fields of acoustics, lighting, IT, and AV equipment could investigate and further improve upon the technology currently being used to be able to create a fully replicable and affordable room in which, and from which, to deliver this type of interactive, synchronous, classroom community.

Another suggestion for future research would be to continue investigating the importance of interaction in the classroom, furthering current and past research into immediacy and presence, and expanding beyond those facets of interaction and into others. This could also lead to an investigation of the effectiveness of interaction using this platform on the actual cognition levels of the students in comparison with traditional

classrooms, asynchronous and other synchronous distance education platforms. Another focus could be on what types of class activities and teaching styles make best use of interactions in the classroom.

The continued study and development of the sidewall projection could be a viable area of research. In Phase III the students did indicate that they used the monitors for limited student-student interactions and some students related stories of other classes they had taken where student-student interaction was integral to the function of the class. Therefore it might be found that to create the fully immersive classroom between remote groups of students it will be important to fully develop both the front and sidewall projections to create a platform that will facilitate interactions between multiple groups of students and between each group of the students and the instructor with each group of students feeling equally part of the whole classroom.

Bibliography

Acheson, K. A., & Gall, M. D. (1997). *Techniques in the clinical supervision of teachers: Preservice and in-service applications* (4th ed.). New York: Longman.

Adelman, C. (1993). Kurt Lewin and the origins of action research. *Educational Action Researcher,* 1 (1), 7-25.

Anderson, T., Rourke, L., Garrison, D.R. & Archer, W. (2001). Assessing teaching presence in a computer conferencing context. *Journal of Asynchronous Learning Networks, 5 (2), 1-16*

Anderson, L., Evertson, C. & Brophy, J.(1979). Teacher effectiveness in the elementary school. *Journal of Teacher Education, 30 (2), 52-64*

Battalio, J. (2009). Success in distance education: Do learning styles and multiple formats matter? *American Journal of Distance Education, 23*(2), 71-87. doi:10.1080/08923640902854405

Bauer, J. W., & Rezabek, L.L. (1992). The effects of two-way visual contact on student verbal interactions during teleconferenced instruction. *Proceedings of the Association for Educational Communications and Technology. 1992, 1-13.*

Bernard, R. M., Abrami, P. C., Lou, Y., Borokhovski, E., Wade, A., Wozney, L., . . . Huang, B. (2004). How does distance education compare with classroom instruction? A meta-analysis of the empirical literature. *Review of Educational Research, 74*(3), 379-439. Retrieved from http://search.ebscohost.com.leo.lib.unomaha.edu/login.aspx?direct=true&db=aph&AN=15196042&site=ehost-live

Bloom, B.S. (1956). *A Taxonomy of Educational Objectives. Handbook 1: The Cognitive Domain.* New York. Longmans, Green. Boyatzis, R. E., & Kolb, D. A. (1991). Assessing individuality in learning: The learning skills profile. *Educational Psychology, 11*(3), 279. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=aph&AN=9707160497&site=ehost-live

Booker, K. C. (2008). The role of instructors and peers in establishing classroom community. *Journal of Instructional Psychology, 35*(1), 12-16. Retrieved from http://search.ebscohost.com.leo.lib.unomaha.edu/login.aspx?direct=true&db=aph&AN=31780824&site=ehost-live

Borup, J., West, R. E., & Graham, C. R. (2012). Improving online social presence through asynchronous video. *Internet & Higher Education, 15*(3), 195-203. doi: 10.1016/j.iheduc.2011.11.001

Bretzing, B. H., & Kulhavy, R. W. (1979). Note-taking and depth of processing. *Contemporary Educational Psychology* 4, 145-153.

Brophy, J., & Evertson, C. (1976). *Learning from teaching: A developmental perspective*. Boston, MA: Allyn & Bacon.

Brubaker, N. D. (2012). Negotiating authority through cultivating a classroom community of inquiry. *Teaching & Teacher Education, 28*(2), 240-250. doi: 10.1016/j.tate.2011.10.002

Burroughs, N. F. (2007). A reinvestigation of the relationship of teacher nonverbal immediacy and student compliance-resistance with learning. *Communication Education, 56*(4), 453-475. doi: 10.1080/03634520701530896

Campbell, J., & Mayer, R. E. (2009). Questioning as an instructional method: Does it affect learning from lectures? *Applied Cognitive Psychology, 23*(6), 747-759. doi:10.1002/acp.1513

Carr, S. (2000). As distance education comes of age, the challenge is keeping the students. (cover story). *Chronicle of Higher Education, 46*(23), 39. Retrieved from http://search.ebscohost.com.leo.lib.unomaha.edu/login.aspx?direct=true&db=aph&AN=2760978&site=ehost-live

Casey, D. M. (2008). A journey to legitimacy: The historical development of distance education through technology. *TechTrends*, 52(2), 45-51.

Chickering, A. W., & Gamson, Z. F. (1987). Seven principles of good practice in undergraduate education. *AAHE Bulletin*, 39(7), 3–7. http://www.aahea.org/bulletins/articles/sevenprinciples1987.htm

Chiou, S. & Chung, U. (2003). Development and testing of an instrument to measure interactions in synchronous distance education. *Journal of Nursing Research, 11* (3) 188-196.

Christophel, D. M. (1990). The relationships among teacher immediacy behaviors, student motivation, and learning. *Communication Education, 39*(4), 323. Retrieved from

http://search.ebscohost.com.leo.lib.unomaha.edu/login.aspx?direct=true&db=ufh&AN=9103181859&site=ehost-live

Creswell, J.W. (2003). *Research Design: Qualitative, Quantitative, and Mixed Mehtods Approaches. 2nd Edition.* Thousand Oaks, CA: Sage Publications

Creswell, J. W. (2008). *Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research.* Upper Saddle River, NJ: Pearson/Merrill Prentice Hall

Creswell, J.W. (2009). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches.* Thousand Oaks, CA: Sage Publications

Darabi, A., Arrastia, M. C., Nelson, D. W., Cornille, T., & Liang, X. (2011). Cognitive presence in asynchronous online learning: A comparison of four discussion strategies. *Journal of Computer Assisted Learning, 27*(3), 216-227. doi: 10.1111/j.1365-2729.2010.00392.x

Dewey, J. (1959). *Dewey on education. Selections with an introduction and notes by Martin S. Dworkin*. New York, Bureau of Publications, Teachers College: Columbia University.

Duff, A. S. (2003). Higher education teaching: A communication perspective. *Active Learning in Higher Education, 4*(3), 256. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=aph&AN=11429909&site=ehost-live

Dupin-Bryant, P. A. (2004). Teaching styles of interactive television instructors: A descriptive study. *American Journal of Distance Education, 18*(1), 39-50. Retrieved from http://www.leaonline.com

Elliott, J. (1991). *Action Research for Educational Change.* Milton Keynes, UK: Open University Press

Erazo, E., & Derlin, R. L. (1995). *Distance learning and libraries in the cyberspace age.* Retrieved from ERIC

Erdogan, I., & Campbell, T. (2008). Teacher questioning and interaction patterns in classrooms facilitated with differing levels of constructivist teaching practices. *International Journal of Science Education, 30*(14), 1891-1914. doi:10.1080/09500690701587028

Everton. C. M. & E. T. Emmer. (1982). Effective management at the beginning of the school year in junior high classes. *Journal of Educational Psychology*, 74 (4), 485-498.

Farber, J. (2008). Teaching and presence. *Pedagogy,* 8(2), 215-225. doi: 10.1215/15314200-2007-038

Fish, W. W., & Wickersham, L. E. (2009). BEST PRACTICES FOR ONLINE INSTRUCTORS: Reminders. *Quarterly Review of Distance Education, 10*(3), 279-284. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=aph&AN=48074516&site=ehost-live

Frymier, A.B. (1994). A model of immediacy in the classroom. *Communication Quarterly*, 42, 133-144.

Fulford, C. P., & Zhang, S. (1993). Perceptions of Interaction: The critical predictor in distance education. *American Journal of Distance Education,* 7 (3), 8-21.

Gagne, R. M., & Rohwer Jr., W. D. (1969). Instructional psychology. *Annual Review of Psychology, 20*(1), 381-418. Retrieved from http://search.ebscohost.com.leo.lib.unomaha.edu/login.aspx?direct=true&db=aph&AN=11325899&site=ehost-live

Garrison, D.R., Anderson, T., & Archer, W. (2000) Critical inquiry in a text based environment: Computer conferencing in higher education. *Internet and Higher Education, 2 (2-3), 87-105.*

Garrison, D.R., Anderson, T., & Archer, W. (2010) The first decade of the community of inquiry framework: A retrospective. *Internet and Higher Education, 13, 5-9.*

Garrison, D. R., Cleveland-Innes, M., & Fung, T. S. (2010). Exploring causal relationships among teaching, cognitive and social presence: Student perceptions of the community of inquiry framework. *Internet & Higher Education, 13*(1), 31-36. doi: 10.1016/j.iheduc.2009.10.002

Gorham, J. (1988). The relationship between verbal teacher immediacy behaviors and student learning. *Communication Education, 37*(1), 40. Retrieved from http://search.ebscohost.com.leo.lib.unomaha.edu/login.aspx?direct=true&db=ufh&AN=9339022&site=ehost-live

Guba, E.G., & Lincoln, Y.S. (1994). Competing paradigms in qualitative research. In Denzin, N.K., & Lincoln, Y. S. (Eds,), *Handbook of Qualitative* Research (pp.

105-117). Thousand Oaks, Ca. : SAGE Publications

Hansen, B. (2001). Distance learning. *CQ Researcher, 11*(42), 995. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=aph&AN=5760356&site=ehost-live

Hendricks, C. (2009). *Improving schools through action research :A comprehensive guide for educators* (2nd ed.). Upper Saddle River, N.J.: Pearson.

Herr, K., & Anderson, G. L. (2005). *The action research dissertation :A guide for students and faculty*. Thousand Oaks, Calif.: SAGE Publications.

Hillman, D. C. A., Willis, D. J., & Gunawardena, C. N. (1994). Learner-interface interaction in distance education: An extension of contemporary models and strategies for practitioners. *The American Journal of Distance Education,* 8 (2), 30-42.

Johnson, A. P. (2008). *A short guide to action research* (3rd ed.). Boston: Pearson/Allyn and Bacon.

Kay, D., Summers, J. J., & Svinicki, M. D. (2011). Conceptualizations of classroom community in higher education: Insights from award winning professors. *Journal of Ethnographic & Qualitative Research, 5*(4), 230-245. Retrieved from http://search.ebscohost.com.leo.lib.unomaha.edu/login.aspx?direct=true&db=aph&AN=65031236&site=ehost-live

Kelley, D. H., & Gorham, J. (1988). Effects of immediacy on recall of information. *Communication Education, 37*(3), 198. Retrieved from http://search.ebscohost.com.leo.lib.unomaha.edu/login.aspx?direct=true&db=ufh&AN=9339896&site=ehost-live

Kim, J. (2011). Developing an instrument to measure social presence in distance higher education. *British Journal of Educational Technology, 42*(5), 763-777. doi: 10.1111/j.1467-8535.2010.01107.x

Kim, J., Kwon, Y., & Cho, D. (2011). Investigating factors that influence social presence and learning outcomes in distance higher education. *Computers & Education, 57*(2), 1512-1520. doi: 10.1016/j.compedu.2011.02.005

Kolb, A. Y., & Kolb, D. A. (2009). The learning way: Meta-cognitive aspects of experiential learning. *Simulation & Gaming, 40*(3), 297-327. Retrieved from

http://search.ebscohost.com/login.aspx?direct=true&db=aph&AN=42117453&site=ehost-live

Kolb, D.A. (1984). *Experiential Learning: Experience as the Source of Learning and Development.* Englewood Cliffs, N.J.: Prentice-Hall.

Kolencik, P. L., & Hillwig, S. A. (2011). *Encouraging metacognition : Supporting learners through metacognitive teaching strategies*. New York: P. Lang.

Kornelsen, L. (2006). Teaching with presence. *New Directions for Adult & Continuing Education,* (111), 73-82. doi: 10.1002/ace.229

Lewis, C. C., & Abdul-Hamid, H. (2006). Implementing effective online teaching practices: Voices of exemplary faculty. *Innovative Higher Education, 31*(2), 83-98. doi:10.1007/s10755-006-9010-z

Lowman, J. (1995). *Mastering the techniques of teaching* (2nd ed.). San Francisco: Jossey-Bass Publishers.

Mayer, R. E. (2008). Applying the science of learning: Evidence-based principles for the design of multimedia instruction. *American Psychologist, 63*(8), 760-769. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=aph&AN=35355357&site=ehost-live

Mayer, R. E., & Anderson, R. B. (1992). The instructive animation: Helping students build connections between words and pictures in multimedia learning. *Journal of Educational Psychology*, 84, 444-452.

Mayer, R. E., Moreno, R., Boire, M., & Vagge, S. (1999). Maximizing constructivist learning from multimedia communications by minimizing cognitive load. *Journal of Educational Psychology, 91 (4), 638-643*

Mayer, R. E., & Sims, V. K. (1994). For whom is a picture worth a thousand words? Extensions of a dual-coding theory of multimedia learning. *Journal of Educational Psychology*, 86, 389-401.

McKinney, J.P., McKinney, K.G., Franiuk, R., & Schweitzer, J. (2006). The college classroom as a community: Impact on student attitudes and learning. *College Teaching*, 54 (3), 281-284.

Meeuwisse, M., Severiens, S. E., & Born, M. P. (2010). Learning environment,

interaction, sense of belonging and study success in ethnically diverse student groups. *Research in Higher Education, 51*(6), 528-545. doi: 10.1007/s11162-010-9168-1

Mehlenbacher, B., Miller, C. R., Covington, D., & Larsen, J. S. (2000). Active and interactive learning online: A comparison of Web-based and conventional writing classes. *IEEE Transactions on Professional Communication,* 43 (2), 166–184.

Mehrabian, A. (1967). Orientation behaviors and nonverbal attitude communication. *Journal of Communication, 17*(4), 324-332. doi: 10.1111/j.1460-2466.1967.tb01190.x

Mills, G.E. (2000). *Action Research: A Guide for the Teacher Researcher.* Upper Saddle River, NJ: Merrill/Prentice Hall

Mills, G.E. (2011). *Action Research: A Guide for the Teacher Researcher, Fourth Edition.* Boston, MA: Pearson

Moore, M. 1972. Learner autonomy: The second dimension of independent learning. *Convergence* v.(2):76-88.

Moore, M. (1989). Editorial: Three types of interaction. *The American Journal of Distance Education.* 3 (2), pp. 1-6.

Moore, M. (1991). Editorial: Distance education theory. *The American Journal of Distance Education*. 5 (3), pp. 1-6

Moore, M. (1993). Theory of transactional distance. In D. Keegan, (Ed.), *Theoretical principles of distance education.* New York: Routledge.

Moore, M., & Kearsley, G. (2005). *Distance Education: A Systems View of Online Learning.* Belmont, CA. Wadsworth, Cengage Learning

Moore S., & Kuol N. (2007). Retrospective insights on teaching: exploring teaching excellence through the eyes of the alumni. *Journal of Further and Higher Education*. 31(2):133–143.

Murphy, E., Rodríguez-Manzanares, M. A., & Barbour, M. (2011). Asynchronous and synchronous online teaching: Perspectives of Canadian high school distance education teachers. *British Journal of Educational Technology, 42*(4), 583-591. doi: 10.1111/j.1467-8535.2010.01112.x

Northrup, P. T. & Rasmussen, K.L. (2000). Designing a web-based program: Theory to

design. Paper presented at the annual conference of the Association for Educational Communications and Technology, Long Beach, CA: February 2000.

O'Hair, M., O'Hair, D., & Wooden, S. (1988). Enhancement of listening skills as a prerequisite to improve study skills. *Journal of the International Listening Association, 2,* 113-128.

Oz, H.H. (2005). Synchronous Distance Interactive Classroom Conferencing. *Teaching and Learning in Medicine***,** *17*(3), 269–273

Pine, G. J. (2009). *Teacher action research: Building knowledge democracies*. Los Angeles: Sage

Richmond, V. P., Gorham, J. S., & McCroskey, J. C. (1987). The relationship between selected immediacy behaviors and cognitive learning. *Communication Yearbook 10* (pp. 574-590). Newbury Park, CA: Sage.

Rickards, I., & Friedman, F. (1978). The encoding versus the external storage hypothesis in note taking. *Contemporary Educational Psychology, 3,* 136-143.

Rodriguez, J. I., & Plax, T. G. (1996). Clarifying the relationship between teacher nonverbal immediacy and student cognitive learning: Affective learning as the central causal mediator. *Communication Education, 45*(4), 293.

Rovai, A. P., & Lucking, R. (2000, September). Measuring sense of classroom community. Paper presented to Learning 2000: Reassessing the Virtual University, Virginia Tech, Roanoke, VA.

Rovai, A. P. (2001). Building a classroom community at a distance: A case study. *Educational Technology Research and Development.* 49 (4), pp. 33-48

Sagor, R. (2005). *The action research guidebook :A four-step process for educators and school teams*. Thousand Oaks, Calif.: Corwin Press.

Schutt, M., Allen, B. S., & Laumakis, M. A. (2009). The effects of instructor immediacy behaviors in online learning environments. *Quarterly Review of Distance Education, 10*(2), 135-251. Retrieved from http://search.ebscohost.com.leo.lib.unomaha.edu/login.aspx?direct=true&db=ofs&AN=508035659&site=ehost-live

Sharp, J.H., & Huett, J.B. (2005). Importance of learner-learner interaction in distance education. I*nformation Systems Education Conference proceedings.* 22, pp. 1-8.

Shin, N. (2003) Transactional Presence as a Critical Predictor of Success in Distance Learning. *Distance Education.* 24(1), pp. 69-86.

Summers, J. J., & Svinicki, M. D. (2007). Investigating classroom community in higher education. *Learning & Individual Differences, 17*(1), 55-67. doi: 10.1016/j.lindif.2007.01.006

Sutton, L. A. (2001). The principle of vicarious interaction in computer-mediated communications. *International Journal of Educational Telecommunications.* 7(3), pp. 223-242.

Tinto, V. (1997). Classroom as communities. *Journal of Higher Education, 68*(6), 659-623. Retrieved from http://search.ebscohost.com.leo.lib.unomaha.edu/login.aspx?direct=true&db=aph&AN=9711171514&site=ehost-live

Tinto, V. (2000). Linking learning and leaving: Exploring the role of the college classroom in student departure. In J.M. Braxton, (Ed.), *Reworking the student departure puzzle,* (pp. 170-195). Nashville: Vanderbilt University Press.

Titsworth, B. S. (2004). Students' notetaking: The effects of teacher immediacy and clarity. *Communication Education, 53*(4), 305-320. Retrieved from http://search.ebscohost.com.leo.lib.unomaha.edu/login.aspx?direct=true&db=aph&AN=15537623&site=ehost-live

Titsworth, B. S., & Kiewra, K. A. (2004). Organizational lecture cues and student notetaking as facilitators of student learning. *Contemporary Educational Psychology, 29,* 447-461.

Traphagan, T. W., Chiang, Y. V., Chang, H. M., Wattanawaha, B., Lee, H., Mayrath, M. C., . . . Resta, P. E. (2010). Cognitive, social and teaching presence in a virtual world and a text chat. *Computers & Education, 55*(3), 923-936. doi: 10.1016/j.compedu.2010.04.003

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes.* Cambridge, Massachusetts: Harvard University Press.

Appendix A – Classroom Observer's Journal

Day 2

- Teacher image is dark
- Teacher/front room image should be on a screen or solid painted wal.
- The marker holder in distant room breaks p the professor
- Difficult to see writing that is higher on the board. Must be a glare
    - Glare might be coming in from the side
    - When moving hand up on the image the shadow improved the image or reduced the glare
- It's good that the students have their own set of plans to review
- Maybe the rear camera should be closer
    - Image quality improves as you et closer to it
- Hearing students
    - They need to speak up
- Cheater image should be closer to the rear camera
- The disproportion of the student camera was distracting
- Sound is an issue
    - There is a student who is getting frustrated because when he gives a response he isn't heard
- Students looked at the student speaking

Day 3 (March 1)

- The glare issue needs to be worked out
- Cameras might be a little out of focus
- Students might help each other out with responses when called on.
    - There were some soft answers being thrown around for the student to use when called on
    - Student raised his hand but was not called on
- Student projection image got bright with blue hue
    - Did go back to normal, not sure what happened
- The book on the doc cam looks much better
    - Not near the glare
- The calculators are going on in that room so we are okay
- Seems like there is more interaction in your room today
- Talking in the back of our room goes unnoticed
    - Could be a distraction for others over here
        - It was a class related discussion

- I think the sound could be a little louder

March 13

- Both student cameras need to be moved up
- We should try focusing the camera with text on the overhead
- Students were replying to you
    - I thought they were plenty loud, but they weren't heard
    - They had the correct responses
    - Then a student was specifically called on and students told him "geez just use the answer we gave"
    - There was frustration

March 15

- Today is group work
- As students incorporate their own video conference tools, sound echo becomes an issue, distracting others
- One group is using the Facetime on phones while working on a shared document in Google docs.
    - Seems to be working very well
- It was difficult to hear between the rooms when the student asked the teacher a question
    - The other group conversations made it difficult to hear
- Sound in the room is not even.
    - While teacher was in the back of the room it was difficult to hear
    - After moving to the front it became clear
- I don't think using the technology present for group work isn't a viable option
- The student projector in the teacher room is blinking
    - It's still working but looks like a blue emergency light

March 27

- We flipped the classrooms
    - Today begins our second 4 weeks of this experiment
- Zooming in on certain sections of the overhead document makes it readable
- Students new to the distance classroom are feeling the effects of not being heard when responding
- The class is very attentive, just not feeling the participation
- Great participation in the activity

    - Most of the students are working together

March 29

- 6 students were looking at the other class while students there were speaking
- Students periodically gave more attention to the other class today
- Image clarity and sound
- The positioning of the students in the room might benefit our situation with camera and visual perceptions of who the teacher is looking at

April 3

- I wonder if it would be possible to mount a microphone on the sidewall
- Students were prepared for the group work and did a good job of shrinking the gap
- We lost you a couple times as you walked towards the door
    - The shadow of Stu – that's odd
    - We can't hear them over there
        - These comments were made when Mike arrived

April 5

- Guest speaker – Marie H. from local contractor today
- Presented using a Power Point
    - Speaker is too far to the right so we cannot see her
        - Could be that all of the lights are off
            - She is standing next to the Power Point projection image so she is too dark
- No problem hearing the presenter
- I wonder why there are not more speakers mounted in the ceiling
- Turning the lights on helped with the glare of the power point
- Dark text on dark background does not show well
    - In this case, black text on red background – hard to read
- Feeling remote today
- The class is doing a nice job keeping attention
    - Except for one student (concrete guy)

April 10

- Class went well technology speaking

    - For whatever reason the front and side images look clearer than usual
- Students broke into groups
    - They are doing a nice job working across the distance

April 12

- Guest speaker today – Pat C. from local contractor
- Today the images are off for whatever reason.
- The student image is not as clear and the front image is not level
    - Could be that the lighting is different
- I t would be helpful if instructor and room assistant in distant room had some sort of life line to communicate for feedback for the speaker
- When speaker moves t the computer he is easier to hear
- Someone in the instructor's room needs a tissue
    - The class is picking up on that
- Because our equipment is mobile I should be set p 60 minutes prior to class to allow 40 minutes of setup and testing
- I think this classroom is feeling remote and left out
    - The are paying attention but frustrated by not being heard, not hearing well when others speak, and not seeing the content very well
- A question was asked at the end but our class had started packing up so we missed the question but caught part of the response

April 19

- Guest speaker – Darren M. from local contractor
- Great interaction between classrooms
- Speaker moved to the middle of classroom so attention is 75% on student wall
- The problem with presenter walking among the students is his attention on his class means we ended up looking at his backside most of the time

Appendix B – Author's Journal

9/16/2011 10:30am

- Brett and I videotaped the first ten minutes of Keith's class to explore camera angles
- Brett taped from the back of the center aisle, center of center aisle, and back of the class
- We did not tell Keith much about the project and asked him to teach as if we weren't there
- We spent about 2 minutes at each location
- In obsdrving the recording we noticed that Keith had focused his attention to the right side of the room (his left)
    - Because of this we noticed that it appeared on screen that he was ignoring the students on the other side
        - This was true at each angle
        - If this had been broadcast to a distance classroom the students might not have felt a connection with him
- We decided to run a test when the room was empty with me as teacher

9/16/11 11:30am

- Brett and I went back to 248 and placed chairs in the center aisle to simulate a partition wall
- We then tested the range of camera from the same 3 locations to see the limitations of the camera to keep me in picture as I moved across the front of the room
- I experimented looking at different seats in the locals and distant rooms from different locations in the front of the room
    - Brett videotaped a few minutes of footage from each of the locations
- Brett played the recording back on the front screen to simulate what students in the distant room would see
    - The location of the camera did not help
        - As I looked at a specific seat in the distant room
            - What the students saw was me looking off at a different angle and not looking into their eyes
- We calculated what adjustments I needed to make when I looked at the distant student and we re-filmed the sequence
- The result worked well. I had figured out how to make it appear that I was looking directly at the student I was speaking with

    - When filming from the side of the room I needed to adjust my angle of observation slightly
        - This could be compensated for by shifting the eventual dividing video screen so that when I looked at the student's image it would appear to the student I was looking into their eyes
- When filming from the back of the room it became apparent that I could look at the student in the corner in the local room and it would appear that I was looking at the student in the distant room
- While this worked for the camera, Brett and I agreed that it might creep out the local students if it appeared I was speaking to them but I was actually looking at the distant student

9/26/11

- Looking at the number of students I will have in my CNST 1120 and CNST 3790 classes to determine which one to use, or both
    - 1120 has 35 + students
        - I could coordinate with Lincoln's students but the class is at a different time
    - 3790 has two sections with 13 and 14 in each respectively

9/28/11 Meeting with John H. of UNO Ed Ad program and member of the UNO IRB board

- We discussed the following issues that I must be aware of when dealing with students in my experimental research project
    - There must be no coercion of the students to participate
    - They should be able to self select which room they will be in
    - This will be a cross over study
    - There should be an intervention available for distant students to protect them from harm
    - Standards of care in both rooms
        - Best practice is face to face and distant teaching
        - Best didactic (?)
    - Students should be made to feel comfortable in both rooms
    - Not DE naïve students (?)
    - I should be available to my students out of class
    - Equi-poise (?)
    - Ethically I am obligated to interact with all of my students equally
    - I cannot try to fix the n in both of the classes

- The key to the research is whether the students are mastering the content
- Routinely administered evaluation could be a base to start with
  - Revise questions to become a pre-evaluation
    - "list 5 construction estimating concepts"
    - "List 5 things I hope to learn in this class"
    - Ask students technical questions to measure their competencies
- I should be going for exempt status
- This is routine not experimental
- Independent variable = Classroom settings
- Conditions
  - Remote site
  - Local classroom
- Dependent variable = student opinion of classroom setting
  - Measurement = pre-evaluation
- Dependent variable = Technical knowledge of student
  - Measurement = Pre-evaluation
- Dependent variable = Achievement
  - Measurement = Course grade average
- Use the 2x4 chi squared
- Have consent of students waived
- Use naturally formed groups
  - Quasi-experimental
- Question becomes how can PKI position itself for distant education

10/3/11 Discussion with Gary K., Libby J., Bob H., and Brett

- Gary's major concern is administrative
  - How am I going to be compensated for doing DE
  - Design classes have issues
    - Use of software is a problem
    - Being able to do derivations on a long chalkboard
- Libby's concerned that faculty ability has not developed with technology
- Libby and Gary have had years of poor anecdotal experiences
  - Gary through discussions with colleagues
  - Libby through personal experience
- It's not what the technology is but what you want to do with it that is important
- Look into 'Access Grid'
  - This is the technology being used in Bing's room

- Is there research on the type of furniture that is best suited for the DE classroom
    - Does it have to be the same in both rooms
- Being able to project entire white board to remote location is important
- Need to look at surrounding schools to see what they have done already

10/4/11 Bob and Stu visit the DE labs (160 and 164)

- Room 164
    - Instructor can project content or video but not both
        - Content including document camera, computer, and laptop
        - Video including student image or instructor image
- Room 160
    - Lincoln sees content all the time
    - Lincoln can see either students of faculty from Omaha but not both
    - Omaha sees all three
        - Students in Lincoln
        - Faculty live
        - Content
    - Omaha camera picks up all students
- John G. is the UNL video counterpart of Bob
- Room 111 is used in Lincoln
- Lincoln students can only see either faculty or students
- We might be able to use the same equipment we have now or similar to it
- 237 is another DE room in Scott Hall

10/7/11 Tim Wei, David Jones, Stu

- I should present my idea at an ESAB meetings to get student feedback
- Tim wants me to continue working with Gary and Libby to increase my leadership skills
- ESAB
    - Beta testing
    - Distance opportunity for international education
    - Try to get their feedback and advice
- We discussed the following
    - Rear screen is necessary for professor to see remote students
    - Possibly setting tables at a V formation to video display wall similar to what Brett suggested
    - Tim and David like the idea of using current available equipment that can be reused if idea does not work

- They like the idea of teaching the two separate classes
  - One with new technology (CNST 3790)
  - One with new and existing technology (CNST 1120)
    - Lincoln CM would have new setup
    - Omaha would use 160 as exists
  - They think we should use a tracking camera for following the professor similar to those used on football fields

10/10/11 Dissertation committee meeting 3:30pm

Dr. O'Hanlon
Dr. Cjeda
Dr. Bryant
Dr. Walter
Stu Bernstein

- The committee raised the following questions and issues
  - Will I share my time between the two rooms
  - I need to review literature on shared experiences
  - Switching will allow for comparative data between the student groups
  - I need to be gathering data while in progress
  - If students are to have equal opportunities should I communicate digitally with the remote students.
  - It was suggested that I try not looking at the students on particular days to give them different views of me and my involvement with them
  - I need to collect data on a daily basis
  - Use an action research model
  - Use a surrogate to gather data
    - Students can't be identified to me as it will appear they may have been coerced to participate
  - Observe and manipulate classroom behavior
    - What kind of contact am I really making
  - Are students actually suing the side screens to interact
  - Dakotas are linked already
    - Already doing synchronous sharing
  - Look in the medical literature for synchronous learning
  - Everyone on the committee agrees that I should switch locations and hire a data gatherer
    - Switching locations for the students so they all have opportunity to be in both classrooms
  - I should consult with IRB in Lincoln as opposed to Omaha

- Consult with the Dean for his approval of this study
- Collect written student data
- Research questions should not ask anything about the instructor
- Having observer should lead to questions to ask
- No reason to teach both classes (1120 and 3790)
- If technology fails during one class period I have to stop teaching both classes
- Need to find IRB
    - What and how to tell students
- What info to gather
    - Must be tied to the technology
    - Not tied to instructor
    - Not tied to student learning
- Observer not required every class period
    - He should be observing the following
        - Are students interactive
        - What am I doing with remote group to keep them interactive
        - What is the behavior of the remote group
            - Where are they looking
- Student interviews need to be done by the observer
    - Some of the questions to ask
        - How did the technology make you feel
        - Did you feel more interactive
        - Attendance
            - Do remote students use up their free passes to miss classes more than contiguous students
        - What are the signs of attentiveness observer should look for
            - Body language
        - Did I do anything different to encourage responses
        - Am I making proper use of the technology
- My journal should include
    - What do I need to do to make the technology work
    - What did I do to make the technology work or not work
- This should be a supplementary question
    - How do I get students to interact period

10/12/11 Presentation to dissertation writing class

- The following are comments from my peers

- Quasi experimental
- What do students say about feeling of remoteness
- I should analyze my own behaviors
- I need to read from the book Bryant loaned me
    - Especially the part about verbal analysis
- What is my grand tour question

10/21/11 Meeting with Bob H and Brian (media company vendor)

- Explained the concept of the room for Brian
- Had some problems with Bob
    - He forgot about the professor camera
    - He was also being difficult about placement and type of equipment
    - Bob seems to becoming proprietary about "his rooms" and what equipment gets installed
        - This is understandable, but he seems eager to accept and spend money that I may be able to garner from the dean
    - I need to get Bob on the same page as me instead of fighting me to use his own concept of what my idea for my distance room needs to contain
    - Brian seems to grasp my concept and agrees it could be a very good idea
        - Bob suggests that camera be placed in the rear corner so professor can look directly at the camera without looking at the local students
        - We spent an hour reviewing ideas and coming up with what seemed to be a feasible solution
            - Brian said he needed to bring his engineer back for a second look
                - Before leaving it dawned on me that Brian did not realize the alpha test would be between 160 and 164 in Omaha
                - He said this might make it easier and less expensive
        - Bob and I stayed and hashed out some of that seemed to be our disagreements
            - I tried to impress upon Bob that he was jumbling all of my ideas from the beginning instead of understanding this was an iterative and progressive process and that things changed as we gathered more information from more people

- I also had to impress on him that we were basically looking at two systems
    - The first was the base system which was needed in 164 to bring that up to the same standard as 160
    - The second would be like an overlay, being the components I want to add to make the rooms compatible with my concept
- I needed to get Bob to understand that I appreciated everything he was doing and that I wanted his help but that he was not in control of this project or the selection of the equipment
    - Things seemed to get tense between us because we were looking at this so differently
    - I was able to clam things down (hopefully)
        - This was a good learning opportunity for me on how to get along with someone I was disagreeing with without getting upset myself

10/25/11 Aaron G. and Scott D. (media vendors)

- Both men felt this was a great idea and concept
- We discussed different equipment scenarios
- Still need to impress on Bob that the overlay system I am working on is my bailiwick and not his
    - He needs to understand that he can control the base project for 164 but not the overlay
- Scott and Aaron felt it was remotely possible to have this accomplished prior to the start of the spring semester
    - It would mean having a PO in hand by Nov. 1
        - This means I have to have a quote from them this week or early next
    - I will need to set up a meeting with Tim Wei and David Jones to discuss this further
- It is looking more and more like it will be happening in the fall instead of the spring because of the time frame
    - If this is the case, I may want to change the idea to go between Omaha and Lincoln
        - Using PKI 160 and Lincoln's new CM DE lab
    - It would probably be more cost productive to add on to PKI 160 and room in Lincoln

        - It might also be a more realistic trial
- I need to continue writing proposal as if it is going to happen in Jan
- If I see it is going in the fall, I need to contact my committee to make the adjustment

10/31/11 Meeting with Dr. Bryant to discuss proposal

- Change abstract
    - Include the what, why, and how (300 words)
    - Title and abstract are advertising for the proposal
        - They need to pop
- I need to train the observer on higher order questioning
    - Specifically what things I am looking for
        - Need to provide empirical data
    - How to determine interactivity
    - I need to include categories or actual questions in my proposal that I plan to use in my research
- I need to have data to back up my ideas and conjectures
    - The observers journal becomes a transcript document
- Have observer chart communication with students using the seating chart method
- Use recordings of classes for data
    - Do not transcribe
- Observer feedback during the semester is a benefit to the student in ensuring that students receive a quality education in class
- Need to talk to Jim again about going in the spring and not waiting for the fall
- Use 'factors' not 'variables' (confounding)
- Delimitations
    - Changes in the technology

11/3/11 Phone conversation with James Y. of Polycom

- He put me in touch with Drew S.
- Spoke with James and explained my idea of the classroom to him
    - This is my second conversation with Jim
    - He responded to my original email sent to Polycom about a month ago
    - He put me in touch with Drew S. who put me in touch with Scott D.
- I told James I wanted to look at partnering with Polycom to establish a learning lab where we could test different equipment configurations
- James said that he would put me back in touch with Drew who might be able to arrange a meeting with Polycom sales engineers

11/4/11 10:15am Phone conversation with Drew S

- Drew feels that projector and screen will give me the experience I want
- Talked about the Eagle Eye camera
- He will talk to upper management about trying to establish a relationship for research
- He will also ask Amanda S., a Polycom sales engineer to contact me for a site visit

11/7/11 Meeting with Scott D.

- Is not coming in today as scheduled

11/7/11 Phone conversation with Amanda S.

- She says she can provide demo equipment for us
- She can provide referrals to other schools
- She wants to host us at the Chicago event center
    - Executive Briefing Center
- Channel partner (?)

11/8/11 Conversation with Brett Meyer

- Discussed our strategy for presenting the project to the ESAB students tonight
- We plan to start by asking about their experience with DE
- We will then segue into their opinions of interactive classrooms in general
- We then plan to have them perfrom the little skit with us to demonstrate the DE classroom concept
- Finally we plan to show them the picture Brett created showing our DE concept

11/8/11 Meeting with Matt P. and two techs (media vendor)

- From the very onset Matt and his techies bought into the concept and worked with us by brainstorming ideas
- We discussed using the Eagel Eye camera and Matt suggested using a smart board to wirte on
    - Portable ones are 80” diagonal and are available and are somewhat lightweight

- We left room 160 and reconvened in 265 to look at how we could transform a similar pair of classrooms
    - The brainstorming continued with a number of excellent ideas discussed including a one touch control to turn the rooms on
- I asked Matt if installing the equipment was possible by spring and what the budget price would be
    - He said it was possible and gave me a budget of $26K as a rough guesstimate
        - I agreed that I would not hold him to that cost

11/8/11 Presentation to Lincoln ESAB

- We asked the students to wear name badges so I could identify them by name
- About 30 students showed up
- We started by asking students to discuss their experiences with DE
- None had done synchronous video
- Only a few had done asynchronous Blackboard
    - They were satisfied with the ease and convenience
    - One student admitted that it was real easy because they read on line, took quizzes online, and were given 3 chances to pass quizzes
        - He also admitted he didn't really learn anything
- We then set up a demo pretending ½ the room wa in Phoenix and the other half in Omaha
    - I stood in front of half the class while Brett mimed me on the other side of the room
    - We finished by projecting Brett's drawing on the screen
- We then spent about 30 minutes answering questions
- The studnets brought up great issues, made great suggestions, and gave us a few new things to ponder
- There was an overwhelming acceptance of the idea

11/10/11 Meeting with Tim Wei and David Jones

- Reviewed the agenda items
    - Tim and David have no problem with the costs proposed
    - Tim was less excited than I hoped about going to Chicago to visit Polycom
    - Regarding getting the equipment for free from Polycom or buying it ourselves Tim was good with buying it

- David was at part of the ESAB presentation, but he and Tim were both pleased the students accepted it so warmly
- Tim has been talking with Mike M. and gave me his approval to go forward with talking to Mike
- They joked around about the name for the system but left it up to me
- Met with Kathe before the meeting to arrange a meeting date with David C. and Stuart M.
- Tim spoke with board member who suggested we apply for a process patent
- Tim also wants me to present to the Omaha ESAB on Friday the 18th around noon

11/14/11 Conversation with Matt P.

- Does not remember giving me a budget number of $25K
- Justified his quote of $125k based on equipment needs
- I told him that I needed a bare bones installation with no distance equipment
- He said he would revisit his number and get back to me

11/15/11 Phone conversation with Dave E. (media vendor)

- Dave said he had sent the price quote to Bob H. last week
  - I had never received it
  - Seems I'm still having trouble with Bob and the vendors
    - They think he is in charge of the project and so does he, and I am being left out of the loop

11/7/11 Visited local contractor's video conferencing room

- They were using an NEC projector and screen
  - The clarity was excellent and definitely sufficient for our purpose
- Looked at two different rooms
  - Both had white boards and both were able to project what was written on the board clearly on the monitor
  - One room used the golf ball mikes hanging from the ceiling
    - Did not see them in operation but reports were excellent on their effectiveness
- The showed me the Smart Board they used in connection with other sites
  - This could definitely add to the room
- John L. from contractor sent me the contact info for Keith S. who installed their equipment

11/22/11 Meeting with Keith S.

- Introduced by John L. at contractor
- He did their video conference rooms
- Keith listened to the concepts from me and Brett
- Keith thought the project was doable
- He thought we could actually get it done and ready for spring
- Wants to bring in his engineer

11/29/11 Met with Keith S. and his engineer

- Brett and I reviewed the project with the engineer
- Brainstormed with the engineer and came up with viable solutioons
- Keith needs to review and develop a budget for this project

12/7/11 Meeting with Amanda S. and Brett Meyer

- Amanda told us about how Nebraska secondary schools are doing a great deal of DE
    - She suggested we get in touch with Gordon R. and John S. from ESU 10 to see what they are doing
    - She mentioned that there is something at the Durham Museum we should go see and something in Kearney on Feb 16th
- We reviewed what we want for a system with Amanda
    - She said they would be willing to loan us equipment to experiment with
    - She is also willing to work with any of the vendors we have talked with
        - We said we liked working with Keith
        - Amanda will contact Keith
    - I need to get Tim or David to commit to Chicago
        - If they can't go then Brett and I will go alone
    - Amanda will send me their non disclosure form

12/8/11 Meeting with Dennis, David and Ken from (media vendor)

- It seemed to me that Dennis was the one who was going to give us a demo and then never got back to me, but he says no
    - I will have to check my notes and talk with Brett about that

- Dennis said that he could put together the room for $15k as we had previously discussed
- We spoke about some of the new information we had and how it would mean more equipment
- Dennis told me that he was used to dealing though Bob
    - I had to assure him that this was my project and that I was working directly for the dean and he needed to deal with me directly, although he could keep Bob in the loop
- We discussed putting together an equipment demo next week and he promised to get back to me

1/3/12 called Amanda S.

- Wanted to discuss Chicago dates but there was no answer
- Also wanted to ask her why I had quotes from $15k to 80k

1/6/12 Pilot test of equipment

- Dennis brought three people with him to set up and test the equipment
    - They set up the camera in 157 and the projector in 155
    - Rosemary and Brett joined me for the test
    - The first test was simulating the professor camera
        - The test was successful
            - Everything written on the white board was easily readable
                - Even colors were recognizable
            - Digital projection from the Elmo was perfectly readable
            - Digital projection from the computer was a little difficult to read the smaller print
        - The second test was the sidewall projection
            - We worked with size of projection until people were of similar size to those of us in the room
            - Projection was perfectly clear
    - Dennis and I discussed working with Polycom to use their loaner equipment
        - We also spoke about putting together a price
        - Dennis will have on to me this week
- After the demonstration was over I contacted Mike M. for an appointment which was granted for 10am Monday
- I then contacted Amanda S. and expressed the importance of speaking with her immediately

1/10/12 Butch Baker in UNO facilities

- Spoke with Butch about painting the North wall of each room
    - Butch budgeted it a t $300
    - Asked me to send him a confirmation email request

1/11/12 dissertation committee

- Met with the committee today at 2:00pm
- Presented them with my proposal
- Comments from committee will be typed up and included in project binder
- Outcome is they approved me to go forward and want me to change my methodology
    - They do not think this is a grounded theory
- They also want me to change my survey questions

1/12/12

- Spoke with Dave M. in facilities today regarding cutting a hole between 155 and 157 to run cable
    - He told me it was a stud framed wall and not a fire wall
    - He also said I could cut the hole myself (vendor)

1/18/12 Phone conversation with Tim Wei

- Discussed the differences between vendor contracts
    - He was okay with my decision and the costs
- Asked if he wanted to accept money from Eddy to help fund project
    - He preferred not to at this point
- What is the purchase order process
    - He referred me to Jenny L.
- Would he be okay if we had to buy additional equipment
    - Yes

1/23/12

- I received an email from Becky F. at UNL IRB
    - There is a list of issues which need to be corrected
        - One of them was CITI training
    - I called Becky to let her know I had taken it through UNO

        - She had me send her a copy for her approval

1/24/12

- I received an email from Becky confirming my UNO CITI training counted

1/31/12 Meeting with NU lawyers

- This was a discussion regarding the patent for our DE project
    - Provisional patent versus non-provisional
- Off site learning (multi-site learning project – this is the Dean's term)
    - Teaching in the epicenter
    - Everyone else looking on
    - NUVIEW provides opportunity for everyone to feel they are in the epicenter and not remote
- If we update the technology or process we need to let Marv know so they can file a new provisional patent
    - Will need to do this at the beginning of the summer
    - If I prepare a presentation (paper, etc.) I should send them the manuscript first
- We should have people complete a confidentiality disclosure agreement

1/24/12

- I contacted M. in the dean's office about starting the PO process
- Jenny L. got involved and helped move PO along

2/02/12

- Roger S. contacted me about the discrepancy in the vendor quotes
    - Concepts AV was considerably lower than the other two vendors
    - He wanted an explanation for the difference
- I wrote to him explaining we had basically issued a performance spec and the other two vendors had provided more equipment than was necessary

2/06/12

- PO was issued

2/06/12

- PO was sent to Dennis P. I asked for some assurance that he could be done by the 25th of Feb. We spoke and he told me his intention was to come in the 17th and be done by the 19th
- He also asked if I could get more money to cover the overtime which hadn't been anticipated or included

2/07/12

- I contacted Roger S. about money for the overtime. He called back on the 8th and asked me to send him an email explaining the purpose.

2/17/12

- Eric and Paul from media vendor arrived about 9:30
- We met in 155 and they were concerned they wouldn't be able to work today since access to 157 was limited
    - I explained that Dennis had the schedules for both rooms and that we had discussed the situation and he had assured me the work could progress
    - Eric and Paul agreed to do what they could even though they were a little shaky on equipment details
        - Student camera set up seemed to be very questionable
- Brett and I visited the classrooms periodically during the day, monitoring progress. Even though they had access to 155 all day and 157 much of the day they only had one projector and one camera mounted before leaving around 3:30
- I took Rosemary and Eddie in to show them progress around 3:30

2/18/12

- Eric and Paul arrived around 9:05am with equipment and set right to work
- We discussed location of cheater cam and professor projector in 155
- Student projector in 155 location and size were determined by the location of existing projector and size of wall between cross beams in 157
    - The width is limited, but we will have to work around it
    - Placement of student cams will be determined once cables are run
- A few minor issues were addressed and resolved during the day
- I left around 3:30 after being assured I would not be needed any longer
- One issue that came up was the power for the projectors. I thought I had resolved that issue with Dennis, but it had not been conveyed to Pau and Eric. Paul said he would be able to get us up and running for Monday.

2/19/12

- Paul and Eric arrived around 9:00am
- They had worked until 7:30 the night before
- Most cables were run and equipment was being installed
- They thought they would get to a camera placement test in the afternoon and should be functional by end of day
- Brett showed up about 12:30 and we visited the rooms
    - Things seem to be progressing nicely
- At 1:30 we went back to rooms and Eric and Paul were getting ready to do a demonstration of the student camera
- The camera provided does not have a wide enough lense to pick up the number of students we wanted to project
- At this point Brett and I are concerned that we will have to swap out the cameras or at least the lenses
- We checked with Paul and Eric again to reassure ourselves that the professor camera would work and they felt it would
- Brett and I left around 3:00 after making sure we weren't needed
    - I asked Eric to save the boxes for the cameras and lenses in case they needed to be returned
    - Eric will place all manuals, remotes, etc. in one box for me to pick up in the morning
    - Eric and I spoke about controlling new projector in 157
        - I told him it needed to be separate from the other equipment and not connected to central controller
        - It needs to remain on its own

2/20/12

- I came in around 6:00 to look over the system
    - I noticed that cameras did not work
    - Cheater cam only picked up 3 rows of 4 seats which is no good
    - I removed 'Crestron' and 3 cameras and took them back to my office for safe keeping

2/20/12

- I called Dennis after class at 10:00
    - He told me the cables were too short which is why cameras did not work

    - I also told him about lenses
        - He said he could order new wider angle ones and would
        - He said that cables would be switched out on Friday when they could get back in to the rooms again
- I talked to John Thorp
    - Brett saw him and Bobby coming out of 155/157 together
    - There seemed to be a problem with the side projector coming on in 157
    - He wanted to know where the old projector we took out was
- Brett and I went down at 1:15 to look over the rooms to figure out problem
    - Problem was with side projector:
        - NEC remote in 157 turns on new data projector and side projector
            - May be able to tape over remote sensor on sidewall projector
            - In the meantime we unplugged it
    - Sound is working very poorly with temp mikes.
    - We need to have a way to turn off amp with Crestron
- On a personal note, I do not like the professor projection
    - It make me look like a dwarf when I move away from white board

2/21/12

- I stopped class ½ hour early this morning and re-adjourned class in 248
- Brett read them the script we had prepared
- I added a few comments to assure them that I would not know their identities or even whether they participated and then left before Brett distributed the consent forms to them

2/22/12

- I spoke with Paul from media vendor
    - They will be here Friday at 11:00 for four hours to address punch list items

2/23/12

- Brett and I arrived in 157 at 7:10 to set up and power up equipment
- Everything worked at first for a few moments (=/-60 seconds) then the screen image from the professor cam turned off

- Brett and I tried powering down, re-hooking the camera, changing the settings on the projector but nothing worked
- We decided to keep the students together for this class although we planned to try the equipment again before the class ended
- 15 minutes into the class I powered everything up with Brett in the other room, but it still didn't work so we kept everyone together in 157 for the remainder
- Brett stayed in 155 and listened because the audio was working
- After class Brett and I spoke about what happened
    - It dawned on me that I should have split the class and taught to 155 with audio only, as this would have replicated what would happen if we were truly remote
        - We then talked about how we could share documents if this happened again
        - As we spoke I remembered my obligation to the students for this project to deliver content
            - I will try keeping them separate, but if it seems content is not being delivered I will bring them back
        - Brett and I looked at using BB 'Collaboration' to deliver content, but it did not seem to work with document sharing
            - I will contact Erin King for advice
        - We then discussed Adobe Connect and how it could be used if we lose audio, video or both
            - Brett to research AC further
            - If it can delivery computer, Elmo, and Skype photos along with audio it should work as a backup
        - We also talked about (or revisited) using a Smart Board to deliver content to both locations
            - As we talked I remembered why we had ruled it out previously
                - It would limit mobility of instructor in his ability to stay on camera and not replicate content
        - Brett commented that he was bummed about the equipment failure
            - My view is that it has given us opportunity to look at problems and try to develop solutions

2/24/12 Eric and Paul

- Eric and Paul arrived at 10:30
    - I got them into 155 and 157 to start working

    - New lenses had not arrived but new mikes were in
    - We talked about some of the issues and left them alone Brett had a meeting at 11:00 and I had one at 11:30
- When I got back at 1:00, Brett and I went to 155-157 to view the progress
- Audio mikes were going in and video was still being worked on
- We came back around 3:00
    - Brett and I worked with Paul and Eric to get the audio quality to a very acceptable level
        - For awhile they thought we might have to go to a personal mike for the instructor, but it turned out we didn't
        - We also talked about installing dummy proof knobs on the amp so no one couled change the settings and making the wall audio control in 155 change proof
- At 4:20 they called us to come back down to view the video
    - We played with camera settings to optimize the prof cam
    - They did something to widen other three camersa but we still need new lenses on those three
    - We labeled cams so they would each go back in the same locations
    - The plan is to see them again in a week hopefully with new lenses

2/28/12 First actual test

- We divided the students randomly into the two classrooms at the beginning of class
- The following is based on Brett's comments during our debriefing after class
    - Room lights need to be on
    - Glare on board is an issue
    - Chalk tray may need to be painted
    - I need to focus on camera not cheater monitors
    - I need to have students speak up and more clearly

3/1/12

- Glare issue needs to be addressed
- Out of focus issue on cameras
- Talking amongst students in 155 about classroom discussion
    - Need to get those students to talk directly to me instead
    - Their conversations are distracting to other students
- I tried focusing on camera as opposed to the monitor
    - We should have mounted the monitor above the camera
- I also tried to call on students alternating which classroom they were in

- I called Dennis about the new lenses after class
    - He inadvertently admitted he had not ordered them even though I was told he had the day after the system was initially installed
    - He now says he only ordered one lens in order to see if it would work and it should be in tomorrow

3/2/12 called Dennis

- Lenses not in yet
- May be in this afternoon

3/5/12 called Dennis

- Lenses should be in tomorrow

3/6/12 Discussion with Brett on issues

- How to deal with exams
    - Proctor controls environment but can't answer technical questions
        - This will require a competent graduate assistant
    - Does the proctor grade exams for his students
    - Is there an added technology that can be used to communicate verbally between students and instructor individually
        - i.e. adobe connect
        - We need a camera that will allow us to communicate via Skype
- Part of this issue was raised because Brett was late for class so I made the decision to keep all the students together in 157 to accommodate IRB mandates that the students receive equal education – this is in contrast to what would happen if we were really distant
    - This does raise an issue of what would happen if this happened in a distance situation
- Paul P. has agreed to install Adobe in 155/157
- Brett and I need to test system outside of class

3/6/12

- Received an invoice from UNO from Concepts AV
    - Dennis added $1300 for over time although I had not yet approved it
    - Invoice should have gone to UNL
    - I contacted Joyce K. (UNO finance office) about the mistake

- I also contacted Roger S. (UNL procurement) about not paying it until the work was complete

3/7/12 called Dennis about the lens

- He said it wasn't in yet but should be this afternoon
- Got a message that the lenses had come in
- Called back to clarify lens vs lenses since he had said that he was only ordering one
  - He now says he decided to order four (even though we only need three)
    - Since he told me on Monday that he had only ordered one I am led to believe he hadn't ordered them at all
    - Sat and talked with Brett about this
      - We are both very disappointed that he didn't order these on Feb 19th when we first told him the existing would not work
        - We now have wasted three weeks working with a system that is inadequate
- Dennis is now scheduled to switch out the lenses Friday at 11:00

3/8/12

- Set up classes by myself today
  - Brett is presenting to the board
    - Was not able to align professor camera alone and I noticed it was out of alignment by about 12" vertically
    - We reviewed the exam and the homework in class and the discussions in both rooms were fairly equal and continuous
    - After class the students lined up at my desk from both rooms to discuss their individual grades
      - This would be a good place to have the Adobe Connect so we could communicate individually between classes
    - I also forgot to turn off the system before talking to the individual students and I found out afterward that people had entered 155 for the next class and had been listening in
      - I MUST BE MORE CAREFUL

3/9/12 lenses were changed today

- There is a big difference but it is still not what we were led to expect or what we were hoping for

3/13/12

- We need to adjust the height of the student cameras to focus more on ceiling than on desks to get more of an eye to eye view
- Need to get the students to speak up

3/15/12

- Tried having groups communicate across the two rooms
    - Some groups glommed onto the concept of using the wall projections or other methods
        - Apple phones
        - Facetime on macs
        - Google docs
        - Text messaging
- Wall became problematic because of the volume of noise coming from the many groups all talking at once
    - Voices were being raised to compete
- Echoing from multiple devices was an issue
- Volume of my voice changed from front to back of room as I walked down the aisle
    - Need to ask Dennis if volumes of mikes are different
- Brett does not think the technology we have is conducive to this type of group work
    - Too much rabble and crossing of voices to be able to do this
    - Need to investigate other equipment or limit student exchanges between rooms to alternate devices only
- Possible idea is to have mikes and speaker along wall in tandem to divide into discrete groups

3/15/12 Called Dennis

- Called Dennis to discuss invoice and mikes
    - His new invoice was increased by $2400 instead of the originally discussed $1300. We were able to determine that they actually spent more hours (28 as opposed to 17) during the weekend than anticipated. We agreed on $2100
        - I contacted Anne E. to make that adjustment

- I asked Dennis to ask his men if the mikes front to back were adjusted for different levels of input
- I also asked if he could come down sometime to see a demo and to consult on improvements

3/19/12

- Brett and I visited with Jenni L. in Lincoln to review our project and to look at various rooms in Lincoln to set up as a NUVIEW room
- We also explained to Jenni the red tape we needed to clear in order to coordinate schedules and classes between Omaha and Lincoln
- Jenni took us through various rooms in Scott, Othmer, and Nebraska Halls, the best of which seems to be 110 in Othmer
- Jenni is coming to Omaha for a meeting tomorrow
    - We asked if she could come early to see 155/57 in operation
    - We also tried to get on Tim's calendar to give him a demo and to discuss next fall
        - Kath will try to arrange that meeting for us

3/20/12

- Brett and I set up 155/57 for the demo
    - Jenni brought Kay McClure with her
        - Jenni and I went to 155 and Brett and Kay stayed in 157
        - We described and modeled how the equipment worked currently and what improvements we were planning
    - Jenni mentioned using it for committee meetings also
    - Jenni and Kay were very excited about the concept of NUVIEW and how well it was working

3/13/12 demonstrated rooms to Dean Wei and his graduate student Erica

- We spent 30 minutes discussing how the system worked, what features did not work, what improvements we need to make and began to touch upon what we need to do to make this work out in the Fall
- We discussed joining in the renovation of PKI 164 and Tim suggested I meet with Mike M. to offer a "partnership" to piggy back our system with what he is doing with the building renovation
- We discussed the problem with the current cameras and how they shoot a triangular pattern where as we need to find someone who can manufacture a camera that can shoot a rectangular pattern

- We discussed moving to t a tiled wall system using monitors for the sidewall projections
- We discussed moving the professor camera lower on the wall and mounting the monitor directly above it
- I asked Tim for help in helping me to coordinate courses to teach in the fall using NUVIEW
- I asked I he wanted to offer time to CE
    - He did not so I asked if he could help with Eddy or if I should speak to him directly
    - Tim decided to bring Eddy down to discuss the situation first hand
    - When Eddy and Tim returned we ran another quick demo for Eddy's sake and then discussed options for rooms and classes
        - We discussed the need for a larger space with better lighting
        - I reminded Eddy about my suggestion for using the lighting lab
            - He ignored me again
        - Tim suggested using 155 or 157 but rotating the space 90 degrees to give the student camera more length to capture the students
            - Brett and I will look at this possibility
            - I am also thinking we might split the room between live feed and digital
                - i.e. Smart board on one end, digital projection in the center, and white board/teaching space at the other end
        - When we brought up the question of courses to teach in the fall Eddy said Avery would be teaching a course across both campuses
            - I asked if it would be a Blackboard course or it it would be synchronous real time audio video
            - Eddy admitted that Avery wants to use BB
            - I need to contact Tim about not wanting to work with Avery in any way
        - Brett and I have our work cut out for us

3/27/12

- Students from 155 are responding but not being heard by me
- Students worked well once the Elmo image was blown up larger so they could see it
- Stud4ents in 155 were involved just not too responsive

3/29/12

- Student in 155 are beginning to use the student wall
    - I notice students in 157 are not
- Students in both rooms need to speak up
- Now that students have shifted in 155 to one side of the room I can now address the cheater monitor to appear as if I am facing them
- I also need to avoid looking at student sidewall when talking to the students in the other room
- Brett and I discussed the angle am looking at and how it appears to the students
    - It seems that by moving them to one side using the cheater monitor works better
        - If I look directly at the camera it now appears I am looking to the students left
    - We then discussed how this might work to our advantage in setting up a permanent classroom
        - If students in each classroom are moved toward one side or the other it will avoid confusion of who I am talking to

4/2/12 Mike M., Brett and Stu

- Match screens with Othmer 110
    - Need to find out size of existing screens
- Discussed need for a room to update over the summer to be ready for the fall
    - Choice is 164 or 155
    - 155 would turn sideways
        - Mike is okay with turning and changing current equipment and board layouts
    - 164 would rotate 180 degrees and would need to be completely updated

4/3/12

- Mike M. visited class for a very few minutes
    - He didn't seem interested or impressed
    - One student mentioned not being able to hear
- Brett suggested adding another mic
- Brett felt students were prepared electronically to work on group projects today

4/3/12

- Brett and I went to Kiewit corporate offices to meet with Darren M. and John L. to tour their teleconference center to get some ideas for our next phase
    - They were using Smart board technology which allows parties in both locations to write on the board simultaneously
    - They were using both monitors and projectors and the images on both were phenomenal
    - We tested writing on their white board and the camera did a great job of delivering that – the writing was very clear on the screen

4/5/12

- Found out today that camera cuts off top of power point slides
- 155 students were able to hear well but seemed to be glazed over today
- Students in 155 felt very remote to me
- I need to look at having 4 mikes and 4 speakers in each room
- Turning on more lights in 157 cut down glare on board in 155
- Students in 155 cold make out text on slides better today

4/5/12 Spoke with Libby J. after class today

- She is very enthusiastic about the system and wants to try it out in the fall
- She definitely sees the potential as well as the need for improvements and sees them as manageable

4/5/12 Meeting with Jim R., Kris H., and Ron H. (contractor)

- Spent an hour over lunch talking about how the system works, how it was developed, what the current drawbacks of the technology are, and what we see the future of NUVIEW is
- Kris and Ron expressed a desire to visit my classroom and observe NUVIEW firsthand
    - We agreed to coordinate a date for their visit
- Jim expressed an interest in being able to use our facility during the summer months
    - I told him I would be happy to look into it
- Jim asked me if I would be interested in working at Kiewit U during the summer
    - I explained I would be working on my dissertation but would be happy to work part time

- We agreed to explore it soon

4/6/12 Dennis from media vendor came to give us a demo of some new equipment

4/10/12 Meeting in Roskens with Mary S. – Cisco rep

- Brett and I met with Mary to see what the College of Education is doing with distance learning labs
- Mary works as liaison between Cisco and the COE
- COE is setting up a number of different types of DE labs which we toured
- All of them were interesting and gave me and Brett ideas for future phases, but they were doing nothing similar to what we are proposing, but they are interested in working with us further

4/12/12 Gary K., Ron H., and Kris H. (contractor) observed 3790

- After class we discussed many of the positives and negatives of NUVIEW
  - Everyone agreed the video and audio need to be improved for better sound and picture
    - There were students in 155 who were trying to be recognized but I was not able to hear them from 157
      - This frustrated the students
  - Everyone also agreed that NUVIEW had great potential for teaching and interactive class
  - We did have a guest lecturer that day, so there was a great deal of comments regarding their poor usage of the technology to interact with the students
    - I took the blame for this since I did not prep my guest on how the system works
      - I was thinking this would be a good test of how the system works for someone unfamiliar with it to show they could do it without training
      - I should have at least laid out some of the parameters we had discovered about
        - Where not to stand to make sure you don't walk out of the picture
        - How to interact with the students in the other class

            - Problem with using PowerPoint with small fonts being hard to read
                - Prep guests ahead of time about this
        - Students could hear guest but could not always see them or see them clearly
        - Guest did not interact well with students in the remote room
            - They were not as involved with the learning as much today as they normally are
    - We did discuss how this could be used by industry to deliver courses across the country
    - We also discussed how this could be used by someone at a remote job site
        - One example would be someone on site wearing a "helmet cam" and walking through the project and having this live action broadcast back to the classroom
    - Ron asked if he could come back to watch me present to one of my classes to see how I interact with the students
        - I agreed to schedule one of my 1120 classes the following week and have him come back

4/16/12 Meeting with Scott D. (media vendor)

- We demonstrated what we were doing in 155/157 and explained what we were trying to accomplish in Phase II
- Scott sort of understood what we were trying to accomplish and suggested that we hire his firm on a design/build contract, but that he was not interested in doing any engineering of a new system and giving us a price
    - That was not acceptable to us and we told him so

4/17/12 Met again with Dennis to discuss further thoughts

- Dennis stopped by again to discuss ideas he had and to try and explain to us why the current equipment was not delivering the hi-def images that we had been promised
    - He tried to blame it on us saying we had changed the settings on the cameras
        - I assured him we had not
        - He said he would check further with his technicians

4/20/12 Teleconference with Anne E., David Jones, Stu and Brett

- We told David that the phase II system still has to be engineered before it can be contracted and we are in the process of making that happen
    - There are at least 4 weeks before we will get that completed
- It is possible that we delay installation and pay up front
    - Money from the school is available now for this school year and needs to be spent
    - There may be other ways to spend the money later and there may be more money available
- I may need help from David procuring a room in PKI to set up the phase II
- May also need help from him to get classes scheduled for me to teach in the fall
- There is technology money available
    - PO's cut and posted to SAP by June 15
    - Can get some of them
- Sept. 1
    - Funds available up to $140k
- David suggested we look into using the rooms to present pedagogical papers to share them across campuses
- There is an ASEE Regional meeting coming up in Lincoln
    - It would be nice to have the rooms up and ready
    - It would also be nice to have a paper to present

4/20/12 Matt and his techs met with Brett and me in 155 to discuss options

- Matt and the techs listened to our ideas and needs and we discussed a number of options and problems
    - They suggested dividing long wall into multiple short throw projectors and possibly adding a Smart board on the end
    - The reason for the multiple projectors was to be able to switch between professor and content on at least one board
        - We discussed whether content board should be a projector or a Smart Board
        - Either way teaching space and projection would be limited to 2/3 of the front of the room (which is now the long wall as the intention is to rotate the room 90 degrees) with 1/3 showing only content
            - This would mean instructor would not be seen at remote site if he steps into that third of the room

4/20/12 Mike B. and Nick H. (local contractor) came by to see what NUVIEW

looked like

- Mike is an alum who now works for contractor; Nick works for contractor's university and is charge of their IT network
- Both men are interested in what NUVIEW can accomplish and whether it is possible for them to incorporate the concept into their classrooms or teleconferences
- They were impressed with what they saw

4/23/2012

- Received a communication from Matt M. (media vendor)

5/3/12 Filming of 3790 class for college video

- Dean Wei arranged for a video crew to come and video students in 3790 using NUVIEW
    - Video will become part of a marketing piece

5/9/12 Demonstration in 155 for Mary S.

- Brett and I demonstrated NUVIEW for Mary to see so she could understand what we are trying to accomplish
- She was impressed and suggested that we meet with Cisco reps to further the discussion

5/10/12 David, Dennis, Brett and Stu

- What do we need for bandwidth
- Extron
    - Streaming connection
    - Cost issue
    - Bandwidth issue
- Video wall processor
    - Building multiple views into a single signal (image)
- Student projection wall
    - Angled to the front presentation wall
- Budget: $300 – 500k
- I need to talk to the university about dedicated bandwidth for this project
    - 500meg needed
    - Can mount angled monitors from ceiling

- Can do a drop down screen

5/16/12 Matt, Adrian, Rylie, Brett and Stu - Demonstration of Polycom equipment

- Matt and Adrian from CC brought a Polycom camera and codex unit to show us what they have in mind for equipment
  - What we saw in the image was completely different than what we currently have projected
  - After inspecting the current cameras, Adrian informed us the cameras we have were connected using standard video ports instead of hi-def
    - Brett and I will have to contact Dennis to find out why
  - We discussed what we want to accomplish with phase II of NUVIEW
    - We are considering rotating the room 90 degrees so the south wall of 155 will be the teaching wall
      - We are hoping this will give us more room for the cameras to pick up the students
    - We discussed a number of different options and configurations including adding a Smart board at the end of the white boards
    - Matt suggested using short throw projectors in the front to reduce glare in the instructor's eyes.

5/23/12 Meeting with James O'Hanlon to discuss dissertation

- Met with Jim in Lincoln to discuss the data that had been collected and what suggestions he had for next steps
- Both of us were concerned with the quality and quantity of the data we had collected from the students
  - Student pool was only 24 and daily responses to survey questions varied from 6 – 18 for each survey
  - 8 students agreed to be interviewed, only 7 showed and one did not get recorded
- I also had one interview with Bret
- There were also the daily logs that Brett and I had each kept
- Jim felt this semester's research should be considered a pilot test and that I should repeat a more thorough research project in the fall
- I asked if I could instead conduct more interviews with students and the instructors and visitors who had sat in on some classes
- Jim said that I should go ahead and collect the additional information and begin writing up the results and at the end of the summer we would meet with the entire committee to discuss whether the data would be acceptable or whether I would need to conduct new research

5/30/12 Interview with Gary K. to discuss his opinions of NUVIEW

- Gary and I spent an hour discussing what he had seen when he visited my class and witnessed NUVIEW (see transcripts of that interview)

6/1/12 Met with Keith Sandy to discuss having him bid on Phase II

- Brett and I met with Keith to show him what we had and what we wanted to do
- He seemed interested and said he would get back to us but preferred if we sent him an exact specification for the room so that he would not have to engineer a solution

6/4/12 Meeting with Matt M. to review proposal

- We met with Matt to discuss the proposal he put together for the rooms
- We told him we liked his ideas but needed to see a demonstration of the equipment to ensure that it was going to do what we wanted it to before we could agree to any contract

6/8/12 Interview with Ron H. from contractor's university

- Met for about an hour with Ron to discuss his opinions of NUVIEW (see transcription)

6/8/12 Teleconference with Kane S. (Cisco Systems) and Mary S.

- Brett and I met at Mary's office in Roskens Hall
- We had a teleconference with Kane and two other primary members of Cisco to discuss our ideas and their involvement in the process
    - The three Cisco reps were very excited about what we were trying to accomplish and wanted to discuss their involvement further and will get back to us

6/27/12 Meeting with Dennis P

- Dennis came by to look at current equipment layout to try and explain why we were not receiving true hi – def

- Dennis made a bunch of claims (none of which were factual) and excuses as to why we were not receiving hi def
- After Dennis left, Brett and I found a ladder and looked above the ceilings in 155 and 157 to see if the converter boxes were actually installed as claimed
    - We did find the boxes but they were not connected to two of the projectors (one in each room – the student cams)

6/29/12 Met with Dennis and Eric (technician who did the installation)

- The claim they made is they did not connect the cameras using the hi-def ports because the quality of the video was the same
- They did some demonstrations showing the camera connected using the hi-def and the low def ports on the camera and the quality was very similar

7/10/12 Teleconference with David Jones

- Brett and I met with David to discuss the options for the fall
- We explained to David that we had found some new information through our research on Immediacy and Social Presence and felt that we might want to take the research in a new direction
    - We felt that the front board had accomplished what we had hoped regarding transactional presence and that we had recently learned about further studies of immediacy and social presence in the classroom and that we felt we could further our research on that.
    - We also felt that the side wall projection of the students was a bust in many ways
        - Our primary issue was that the technology did not exist to allow us to accomplish what we wanted
            - Cameras would not pick up enough of the rooms and we could not size the projection to make it look life size
        - We had also looked at the data from the students and determined that the students would not use the sidewall no matter how good the quality of the picture was
            - Students claimed they did not look sideways at their peers even when they were in the same classroom so why would they do so in a distance situation
            - Some of the students had suggested mounting monitors in the front of the room to see students in the distant room

- David suggested that we set up the rooms to study student to student interactions in a distance classroom
    - He suggested dividing the semester into three studies
        - The first study would only have audio between the two rooms
        - The second phase would use the existing sidewall projections
        - Phase three would use the new front wall monitors
    - Doing it this way we could try and determine if student to student interaction was valid in the classroom and whether the type of equipment made a difference.

7/19/12 Demonstration with Dennis and techs from Extron

- Dennis arranged a demonstration with reps from Extron to show how he intended to join and divide images using multiple cameras to create a single image on the far end
    - The demonstration was a failure
    - The resulting images were unacceptable

7/25/12 Meeting with Jim O'Hanlon

- Met with Jim to discuss progress and outlook
- Jim suggested we call the committee together to let them decide

7/27/12 Dissertation Committee Meeting

- Presented to Jim O, Jim W, and Brett C
- Explained what we had done and accomplished
- Explained the new tact I wanted to take exploring immediacy and presence and focusing mostly on the front projection of the instructor
    - I explained that I felt I had enough data to show how effectively that worked and how well it was received by the students and visitors and that further testing would not make it any more conclusive
- I also gave them the option that I had discussed with David Jones about studying Student to Student interactions
- The committee decided to have me conduct further research in the fall setting up the room as David had suggested studying the student to student interaction and further studying instructor student interaction looking at it in regards to immediacy and presence

8/2/12 Demonstration with Dennis P with Vaddio HD - 19 camera

- Dennis brought in a Vaddio camera to test glare and projection issues
    - The camera actually made the projection worse because the iris could not be manually controlled to eliminate the glare created when the content projector was being used

8/6/12 Discussion of proposal with Matt and Adrian

- Matt and Adrian came to us with concerns they have for delivery of what we are expecting
    - In order to do what we want they say we will need a codek at each camera in each room
        - We explained that Kane from Cisco had told us the C90 would be capable of multiple images in and multiple images out
        - Adrian did not see how that was possible so we suggested he contact Kane directly
    - Brett raised the issue about synching multiple codeks to work in unison with each other
        - Adrian had not thought about that and admitted he would have to look into it
- We discussed possible work arounds to what we could do to make Phase II work if we could not get the equipment to do what we wanted
    - Brett and I discussed having a person in the remote room running the teaching station when necessary instead of trying to send content
    - Adrian suggested using a sharing software so content could be shared between the two computers
        - This would mean having to mute the video on instructor projector while content is being shown
            - Brett and I will have to test this
    - We left it that Matt and Adrian would contact Kane and get back with us.

8/7/12 Teleconference with Matt and Adrian

- Matt and Adrian spoke with Kane
    - The C90 will accept multiple images but will not project them all at once at the far site
    - Adrian thinks that it will accept two images and deliver two images at the far site though
        - This will mean providing one codek in each room for the instructor and one in each room for both camera images
    - Adrian will look into this further

        - If this is the case then this is what we will have to go with

8/13/12 Dissertation meeting with Jim O

- Updated Jim on the progress and problems occurring since the last time we met
- Also discussed my idea to use phenomenological approach to research
    - Jim agreed that this would work
    - He thought two students to interview would be fine
        - I suggested that we look at four
        - We will interview the same four throughout the semester so we can discuss their opinions on the various phases
        - Jim suggested that I alternate meetings with the students meeting with each pair every other week during the semester
            - I agreed
    - We also discussed using focus groups
        - I explained that I thought this might provide richer data and enable more students to participate
        - I suggested we conduct them 3 times, once every 5 week session
        - Jim agreed
    - We also discussed having Brett conduct the interviews and focus groups to keep me out of it again
        - Jim agreed and suggested that I discuss it with Becky Freeman in IRB

8/13/12 Met with Becky F. from IRB

- Updated Becky on what had occurred and what my new intentions were
- Becky suggested that I start a whole new project
    - She created the project which transferred all my information from the first project to the second except for the attachments
    - She said that I should still fall under the exempt status and that they should be able to turn it around in about 7 days
    - I assured her I would have the protocol updated today

8/14/12 Demonstration and discussion with Aaron G. (media vendor)

- Brett and I set up the equipment in 155/157 to give Aaron a demonstration of what we had and what we were intending to do

- It took Aaron awhile to understand what we were trying to accomplish
- He did have a good suggestion regarding using only one tracking camera in the front of the room to capture the students
    - I thought if we used a Polycom Eagle Eye, which has two cameras built in this would work to pick up students when they speak and zoom out to show the whole class when they didn't
- Aaron had to leave at 3:30 but promised to back the next morning to spend more time in the room

8/14/12 I called Matt P. to discuss the idea of the tracking camera

- Matt pointed out that side conversations would also be captured by the camera
- He also pointed out that the Cisco codeks he was specifying would not work with the Polycom camera

8/15/12 Aaron G. returned to look at the rooms

- Aaron was still having trouble understanding the concept of what we were trying to accomplish which was frustrating Brett and me
- While he was taking notes on the existing equipment and taking measurements Brett and I worked with the cameras and projectors to make sure they were still working properly
    - We discovered that the student camera mounted at the front of 155 had been zoomed in and when we zoomed it out we were able to capture more than the entire room
    - We also agreed that we would crazy glue the screw that holds the rear camera so we would not have to take it out every day

8/15/12 when I returned to my office I called Matt P.

- Matt and I discussed eliminating one of the cameras and monitors in the front of each room because of the capability to capture the whole room with one camera
    - This would also eliminate one set of codeks and make the sync issue between sets of codeks less of a problem
- We also discussed the bid that Matt had sent

- Brett and I had tried to review the schematic but could not understand the equipment included
- Matt explained the bid contained the following
  - 4 speakers in each room
  - 2 microphones in each room
  - 1 equipment rack in each room
  - 1 new professor camera
  - 1 lapel microphone for the instructor
- They had only bid on what they thought was phase I
  - I reiterated to Matt that we need everything included in one bid and that only the installation and use would be divided up into different phases
- There was also quite a bit of discussion relative to the number of codeks which would be required to run the system
  - Matt kept insisting that there needed to be a pair of codeks for each camera device, one codek in each room
  - I disagreed and pointed out that with only one camera and one monitor in each room we were doing nothing more than creating a teleconference situation where only one codek is needed, similar to the set up we have in 100A which communicates with Lincoln's dean's office
  - We could not agree on the number of codeks needed so I dropped the topic asked Matt to send me a new quote with the new configuration of equipment
- I then sent an email to Kane Siefer at Cisco to find out what he would say about the number of codek units
  - I asked him if I had one camera and one monitor in each room, how many codeks would I need in each room
  - Kane replied that I would only need 1
  - He also suggested using CX20 instead of the C20

8/16/12 I forwarded Kane's email to Matt who insisted that Kane did not know

what he was talking about but would look into it further

8/16/12 Steve E. from CEEN stopped by

- I had called and emailed Steve yesterday to ask him the same question about the codeks
- I reviewed the requirements of 1 camera and 1 monitor per room and Steve insisted that I would only need 1 codek per room

9/10/12 Phone conversation with Jim O about problems with rooms (21 min.)

- Explained to Jim the problems we are having with the audio in both rooms that we are not able to hear the students from room to room although they can hear me in both rooms
- Jim decided we should revise our protocol to eliminate the sidewall projection during the second five weeks
    - There seems to be no point in having the video if the students can't be heard talking
        - There basically won't be any interaction between the students
- We are now going to divide the semester in half and conduct two different phased testing
    - The first phase will be using the equipment we have now including the audio problem
        - We will move the students from class to class alternately each class period
            - This will give each group of students the opportunity to be in the contiguous classroom once a week and be able to interact with me
        - We will basically be simulating the system that used to be in place years ago where the students who were offsite were not included in the conversations
            - Communication was (and will be) only one way – from the instructor to the students
            - Switching the students will simulate having the instructor teach from alternating sites
        - We will be discovering whether having the instructor travel between sites is more feasible than installing expensive equipment to stimulate interaction
        - We will need to look at the students' attitudes during this
            - Will they be fine with this
            - Will this piss them off and turn them against the next phase of the testing with the new equipment
            - Will they like this system
        - As the instructor my interactions with the students will be as follows:
            - Students in both rooms will be able to hear me
            - I will interact as I normally do with the students in the contiguous class
                - Asking them questions

            - Writing their responses on the board
            - Having students interact with each other in the contiguous room
            - I will condense and repeat what students say in the contiguous classroom for the remote students to be able to hear what was said
            - I will not be asking students from remote classroom any questions or taking any input
            - I can ask students to email questions to me ahead of time or have them send them during class (ipad maybe)
    - The second phase will begin with the installation of the new equipment and will be conducted as planned with the following additions
        - We will now be looking at the change in attitude of the students in the remote classroom
        - We will now look at the level of interaction between the instructor and the students
        - We will look at the comfort level of the instructor
- Overall we will be testing
    - Technology vs. no technology
        - Would the students have been better off with nothing
        - Is a traveling instructor as effective as NUVIEW
            - At facilitating learner-learner interaction
            - At facilitating learner-instructor interaction
    - How did the students feel about being used as guinea pigs
        - During the first phase
        - During the second phase
        - Did it affect their attitude towards the experiment
- Questions we still need to answer
    - Will we alternate students from classroom to classroom once the new equipment in
        - Every class period
        - Every week
        - Once at four weeks
- How I will write up chapter 4
    - It will be episodic
        - There will be three stories to tell
            - The spring semester – Phase I
            - Phase IIa – no tech.
            - Phase IIb – full NUVIEW

- Each story will be divided into three main components
    - Describe what I did (methods used to accomplish goals)
        - Equipment
            - Getting rooms designed
            - Getting PO
            - Getting equipment installed
            - Dealing with equipment problems
        - Actual classroom procedures
            - How did I have to adjust my teaching
            - What new things did I try
            - What outside of classroom procedures did I have to institute
            - What inside of classroom procedures did I have to institute
                - Quizzes and tests
                - Group projects
    - Describe the student data (codes and themes from the interviews)
    - Describe what I learned

Appendix C – Artifacts

- Interview with Gary Krause
- Interview with Ron Hackbart
- Supplemental Interview Questions for Students (Phase I)
- Equipment list for Phase I
- Equipment list for Phase III

Interview with Gary Krause

Stuart Bernstein
NuView Feedback Interviews
Transcribed by Nicole Effle

Interview Date:
Transcription time:
Gary Krause

Q: What type of media do you use in the classroom?
A: Predominantly white board; me writing on the white board. I use the ELMO system a fair amount. If I have something prepared and I want to take the students through it and I don't want to bog them down with writing or anything. Like, and example problem that's pretty involved with a lot of steps and calculations, I'll work it out on paper, I'll put it on the ELMO camera, give them copies of it, then we'll kind of go through step by step. Most of the time it's white board.
Q: You basically use the system that we learned.
A: Basically questioning people, what I always tell people is it's- what we're trying to do essentially is to get the students to tell me to write my notes on the board. If I question them correctly, that's exactly what will happen. They'll come up with things for me to write on the board that are exactly the notes that I have prepared that I want them to see.
Q: What would you describe as your teaching style?
A: It's mostly lecture. People would call it maybe interactive lecture due to the questioning methodology that's from the [Inaudible at 6:04 sounds like "Exceed"] Program where you're not just talking, you're asking questions of the students, trying to get them to give you responses that you can put on the board. We'll do an example problem, but all I do is transcribe on the board all of the things they tell me are the answers and steps for the sample problem. So, it's a fairly interactive lecturing, it's still mainly lecturing.
Q: Is a lot of it problem based, or is it notes?
A: Usually, with a typical class of mine, it's maybe half and half. We'll talk concepts for a little while, maybe we have to go through a [Inaudible at 6:46] to get to a formula. And then usually there'll be an example problem or two to work out, where we'll apply that formula, but typically with an example of mine, the students have to go through all the steps of statics first. So there's a lot repetition of those basic principles that goes on with the example problems. Usually I'll put the problem up, and then insert the question, "What do we do first?" and as they tell me what the steps are, what we need to do, then I'll draw things on the board. I make them punch all the numbers in and give me the numbers for the example problem and stuff. It's a reasonably interactive format. It's not quite so much the

kind of stuff the lecturing that you and I may have had where the professor starts writing on the board, starts writing answers, and writing numbers without really saying where the numbers came from. I remember as a student one time, I asked the professor what that "12" was for, because he was converting from feet to inches, and I didn't recognize it. I got reamed out for really, what was I even doing there if I didn't know what that "12" was for. Yeah, it's a different style than what I think a lot of people would call lecturing.

Q: You told me- and I thought you had taught some, but-have you taught any distance learning classes?

A: I've basically been avoiding it as much as I can get away with. That's solely based on- well, there are other things involved- but essentially, in talking to other faculty in Civil who are and have been teaching [inaudible at 8:45, sound like "TV"] classes for maybe 20 years or better, it's not something that I'm eager to get involved in.

Q: Have you seen any, have you seen any of the styles? The blackboard versus TV or anything else?

A: Not really, I guess. Have I seen a class that way? Yes. I took a class that was kind of that way at Michigan, I was in my graduate program. I guess you could say I taught a class this way. I taught a senior high class back in '99 the first year it was over TV but I didn't actually lecture by TV. There was a professor on the other end and we had guest speakers that came in and talked and we- I worked with students on this end, that faculty member worked with students on that end. So there was never the necessity to drive down and work with those students, or for me to lecture or work over the TV. The main thing that I've seen or worked with I guess, just from contact with faculty is the TV teaching- what you call synchronous, because it's simultaneous at two sites, right? [Q: Yeah] And the blackboard, those kinds of tools, I'm not familiar with.

Q: So the synchronous TV that you've seen, have you seen interaction that much? Or how much interaction have you actually seen amongst the students or between the students and faculty?

A: I guess my general impression of it is typically the faculty interacts reasonably well with the students in the room that they're in, and there's little interaction with the students on the other end. In most cases the faculty that I've seen don't really know the names, necessarily, of the students at the other end. And, just the general impression that I get- I'll be honest- sitting in our faculty meetings that are put on TV. Right? It's the same way, the faculty on one end, now as we've found out- as I've found out the hard way- is that mic's are live. But, when they're not, and that was the way it was in civil engineering for decades, the faculty on one end, if the chair is in one place, with the faculty in the other place, will have all types on conversations amongst themselves, but no interaction of any kind with the other end, other than listening to the department chair on the other end speak or talk about whatever they're doing. It almost became problematic in that area because faculty would have their own little meeting separate from the

rest of the faculty and talk about and discuss things that would probably be better discussed with the whole group, but they weren't because they didn't want to include the other half of the faculty. So, I've seen similar things with students. Not quite to that extent probably, but just in general, the general feeling that, "Well, I'm here, but my professor isn't, even though he's there on the TV, he's really not". So, there's a lot more laid back approach, I guess, to the class. If the notes have been handed out, we'll, I've got the notes, so why do I need to even listen to this. So, they'll be reading papers, or doing things under their desk where the camera can't see.

Q: So there's a lot of disconnect?

A: I think so. That's certainly the impression I get from talking to the faculty is that it's very difficult to motivate people in the room with you, let alone motivate the people fifty miles away in a room who really are not very happy that they are having to sit there and listen to you on TV. I think civil as a class is a classic example of that. There's a whole host of faculty sitting in their offices twenty yards away from them, one of whom could probably be teaching this class to them live, and isn't. They don't know the reasons, and they don't care. All they know is they paid money and they're getting this. They're getting a TV show instead of a class.

Q: The next question was about the things that you've used. Obviously you haven't used them, so we'll change them up a bit. What things have you found positive about distance learning methods that you've seen?

A: I would guess the only positive I would point to is you can get a larger group of people through a class with less resources- although I think that's questionable- you could easily make a point that it costs just as much to teach a class by the TV as it does to hire a teacher to teach on the other end.

Q: As far as the equipment, or the method, have you seen anything that was actually positive that you'd like to try in your classroom?

A: No. Everything that I've heard from people who do this is that the equipment breaks down at least once a week. Sometimes to the point that class has to be cancelled because they can't make the equipment function properly to get the connection down to Lincoln up and running. Other times, things don't work, sound doesn't work, video doesn't work. We see these same things in our faculty meetings all the time. It's technology- it doesn't necessarily always function correctly. Unfortunately, in our business, if it doesn't function like it's supposed to, we're hosed. It's not like you can reschedule the class for 10 minutes later like you could with a meeting. If a meetings scheduled for a certain time you say, "Well, everybody's still going to be there for their 8 hours, so we'll schedule it for a half hour later after the technicians can fix it". That doesn't work here, everybody is on a timed schedule, so we need- if we're going to use this stuff, we have to use technology that does not break down, and we have to have enough technicians to make sure it doesn't.

Q: What about the negative things that you've seen or heard about.

A: I'm not sure that I can say there are specific negatives. That the things I can actually say are anecdotal discussions with other faculty and the students are that they don't like it.

Q: Any particular reasons why?

A: I think faculty don't like it because it's more difficult to do. It requires significantly more time than a regular classroom, despite the impression on the administrative level that, "gee all you're doing is speaking into a microphone- what's the big deal?" The functions of dealing with homework, tests, collecting those items. Having office hours where students can reach you. Sorry, email doesn't' work if you're trying to write a fine element program, or solve a truss, or solve a frame. You really can't do those things on email. You need to sit down with a person and sketch it on a piece of paper. As of yet, I have not seen anybody really hold that technology up on these things. That would be a big benefit if there was a way to email or Skype or some other interactive connection with people that you could share an electronic pad that you could actually draw pictures on, or write formulas on by hand. I don't know if that exists.

Q: I think it does and we're looking into it. I think the iPads now are making it…

A: From a faculty perspective, that's the- I think that's the biggest rub right now. It's more work than a single course. Years ago, people at the college were able to recognize that by…giving you money to spend, to put in your [Inaudible at 17:45, sounds like "F&A"] account or whatever. Over the last ten years or so, it's been going away. People have had to say, "Well, you just have to do that." I think, for me personally, when I was asked to do it last year, I said, "No." I didn't want to do that. The person asking me thought that he really didn't have to ask me, that he could just tell me I had to do that. He found out he was wrong. That's where, if you're not going to be nice to people doing this stuff. Eventually, they're going to say, "Why am I doing this?" Because it is more work, and no one wants to recognize it. No one has ever been willing to say, that's two classes, to do this by TV. Even though I think most faculty would say it's pretty close in terms of the workload. In our department right now, we have people who are co-teaching classes by TV, one faculty in one room, one in the other, and they're both taking credit for teaching that class. And then they want other people to teach them by TV by themselves. Now, why would people do that? On the student end, I think it's just the same perspective of, this is what we're doing, currently, it's just teaching by TV. Everyone now hates that terminology for good reason- because it has bad connotations to it, but that's what it is. And that's the students recognize it as- and no one appreciates it. No one likes to take a class by TV when they know there's faculty in the building who could teach it to them live.

I'm not sure students have much qualm with the difficulty with collecting homework, or grading things, or getting things back, I haven't heard too much in that regard. And certainly, I would say there are students here who are appreciative when the

classes are taught by TV wouldn't otherwise be available. Certainly the grad students are that way. And, when people from Lincoln have offered a class that they didn't necessarily have to do, there is definitely some appreciation for that. I don't know if that appreciation outweighs the pain and difficulty of dealing with the course by TV. But, for them, maybe it does, because otherwise- it's a case where it's either that or nothing, so of course that's better than nothing. I think that's the general crux with the students. If they see that there's some other way to get the same thing, without having to do it by TV, they would always opt for that.

Q: What were your impressions and opinions of NuView after observing the demonstration that you came in on.

A: Well, the demo that I came in on was not you presenting, it was a guest speaker. The general impressions were, a lot of the same problems with this as with the TV teaching model. The presenter was in a room with students, had much more interaction with those students that with the students from the room that I was in. You know, technical difficulties of being able to see the board, see the writing on the board. Those kinds of things. At that point it would have been, I think probably having a document camera like they do in the other TV rooms, then projecting that on the screen probably was better than what I was seeing, as far as on the board. In talking with you, I came to understand that's not always that difficult to see, kind of thing.

Q: I'll tell you, we hired this "thunder" he sold us on this hi def equipment and installation and we were going to get great pictures. Well, now that we're doing phase two, we've had other vendors come in and look at what we're doing, and every one of them has looked at what we had and have said, "This isn't high def. They sold you high def cameras and hi def projectors, but they didn't wire them up hi def, so you're getting regular pictures. That's why the quality was so sucky. I talked to the vendor afterward, the vendor that put it in. We had a demonstration just last week and it was unbelievable what you could see with real high def. I'm looking forward to this fall. You were saying you couldn't really see?

A: Yeah, the speaker was visible but as they moved out of range, or moved forward, or worse, when he sat down, then he was pretty much lost. Most cases he was mostly just a shadow on the wall, more than an actual face and a body. The interaction from the students in my room wasn't really there. Again, the impression that I got from sitting there was that the same thing we talked about earlier. They're kind of in their own place, they can have their own little conversations, and kind of do their own stuff. And, what's happening up front is just- it's like watching a movie at your house. You can read the paper, you can do other stuff, every now and then you look up, you write something down, that kind of thing. That's why I say, my guess is, without having seen it, that it would have been better with you up front. I'm sure you would have more interacted with the students in both rooms than that particular person was. It seemed like, again, couldn't read the board very well. Students that I talked to were writing stuff down as it was spoken, because

they could get it written down that way, and they couldn't get it written down from seeing it up on the board. It's- I don't know that I can describe it as being a whole lot better than what I've seen in other situations with distance learning.

Q: With the side wall projection, did you see where that might be helpful? Or a better way of teaching might be advantageous to both the students and the faculty that you haven't seen in other TV rooms?

A: I guess I didn't get much of a sense for it as being an improvement necessarily. I guess I can't say too much, it was interesting to see the students there, it really didn't feel like we were all in one room.

Q: If it was working properly, if it was good video and audio, do you see that as helping you be more interactive or the students be more interactive with each other.

A: I can definitely see how it would be helpful to the faculty to have that group projected on the wall like that. I didn't see any specific benefit to them, having it projected on their wall.

Q: Do you think there's a way that NuView would adapt to your teaching style? Do you see how that having both locations with you being interactive, problem solving?

A: Yeah, I think you could- the question always is, if I can look and see the students in some form that's close to life size, then that makes me feel like I'm being interactive with them. If I can-obviously it's best if I know their names because pointing at them isn't going to necessarily work as well- but if they could be called on, if I could gesture for them, or if they can raise their hands to ask question and I could see it. Again, that's the big thing with the TV interaction thing, if you're trying to ask a question from the remote sight, you simply have to press the button and butt in. You know, with the typical camera capabilities, you're not going to see someone in the back of the room with their hand up. I think most students are pretty reluctant to do that- most faculty are reluctant to do that in meetings quite frankly. So, having that be the case if the students understood that, yes, they can be seen in that size, and that they're basically right there present to the room with the faculty member, it might make their interaction a little bit better. I'm not sure how you can do that short of bringing them to the other classroom first and say, "See, this is what you guys look like on the wall, and I can see you, and if you raise your hand I can call on you." That kind of stuff. So, yeah, I think there's a way where a more interactive approach can be utilized in this environment. Yeah, I think there is.

Q: The idea of the sidewall projection is more for the student to student interaction. Do you feel the students interact better with you if they see you but not the other students, so they don't interact there at all, they can't see who's talking when the students are interacting. So, if they're actually able to see those students, will they feel more like being a part of the classroom and joining in?

A: I suppose that's possible. Unfortunately the way that you are arranged right now with everybody in one half of the room and the other half empty and then the wall. [Q: Yeah, that didn't work.] You're not going to get much of that kind of interaction.

I'm not sure what kind of interaction you would get if they were sitting there right next to the wall, because it's still a wall. The person right next to them they can turn and whisper to them. I would hazard to guess that the vast majority of student to student interaction is that way. They talk quietly so that they don't interrupt me. There's rarely-other than the times when I script it for them to work together and they can talk, they can shout, they can do whatever they want in that time frame- the rest of the time, student to student interaction is usually limited to whispering or pointing at each others' notes, or writing something down for the other person to read. I'm not sure the wall projection is necessarily going to help that. It may help them feel like they're in the same classroom. That would be something that one of your students could probably answer.

Q: Can you see how having that side wall projection you might be able to get them to work across the wall?

A: Maybe. I think the biggest- you know, it would be possible to make that happen. My general sense of that is, what I do is actually part of the lab portion of the class and I do it in the fall. I give them an assignment, they break up into groups and start working things out. As they have questions, I'll circulate the room, and they can ask me questions. TO me, the wall- I guess I could see having 2 people on one side of the wall and 2 people on the other side of the wall being grouped. Again, having that difficulty in being able to share and see paper that they're working on, and there's also the problem that I can't go and talk to those people other than through the wall. I'm not going to be physically there where they can simply just ask the question, or even quickly talk to me while I'm sitting there. So, I would see some drawbacks in trying to do some of that. There's people out there now who are trying to make this concept work where you have students read the lecture on blackboard the night before, then they come to the classroom and spend class time trying to solve the problem in groups. They all have clickers, so you can ask them who understands, who has the right answer, etc. There's a lot of ballyhoo about that and I think probably rightly so. It seems like a pretty decent concept. I'm not sure how that interaction will carry through the wall. If I had d class like that that I was trying to do that with, both classes could easily get to BlackBoard to read stuff ahead of time, and then both classes could assemble to start working in groups on projects. But, I'm going to be in one place, and the best I could probably do is have a TA or someone else in the other place. Which is maybe good enough, maybe it isn't. I don't know.

Q: You personally, would you have problems talking to the wall?

A: I'm sure I would, but I'm sure I could get used to it.

Q: After a while, you're looking at the students, it's like you're' talking to them.

A: Yes, I guess what I'm talking about, the ability to circulate the room. So when, in the room that I'm in, when the group in the far right corner has a question, I can walk back there, I can stand right next to them, I can look at their paper, I can see what they're working on, I can see where they're mistakes are, without having to ask

them, “What have you done?” And we can work through their question. In that case, the group in the far left hand corner of the wall, they’re going to be where they are, I’m going to be where I am. I can’t get to them, all I can do is look at the camera, and maybe if I know their names, I can tag them with their name. It could be where they can point to their paper and say, “Do this to that”, or “What do you think about doing this rather than that?” I would have to- if I was going to do something- would have to go back to the board or the ELMO and say, “What about this, what about that?” I’d have to get their work projected somewhere that we could both see it.

Q: That’s what we’re working on right now where we can try doing those things. What we’re learning is that either through laptops, or stations, or the iPads, you can actually bring up their work. If they’re sitting there working on something, they’re plugged into the control thing, the teacher/instructor can actually, “I’m going to bring your stuff up on the board.” And see what they are doing. I’ve seen that limitation, and we need to figure that out. Cisco, which does a lot of computer equipment, has actually got a whole bunch of labs set up in the new education building that they’re experimenting with stuff. Do you have any suggestions for improving NuView?

A: I guess I really don’t what I would like to see- not necessarily from only what you’re doing- but at some point it has to be “eval-ed”, are we improving student learning? You can talk about whether you can facilitate the interaction, or we could do this or we could do that. The bottom line is, if the people at the remote site aren’t learning as well as the people at the host site, then all the technology, all the wizardry, doesn’t mean anything. At some point, it has to start being about how can we check- how can we look at the learning of the students. How can we look at learning of students if they are in the classroom with just the professor and without anything else versus if they’re in the classroom with this gizmo. The people at host site, the people at the remote site. We have to start somehow looking at engaging whether this is actually helping the learning. Whether it’s improving their learning, or at the very least, at least it’s not hindering their learning. My impression, again anecdotal impression, from talking to people here for 20 years, who have been teaching is that it hinders their learning. Whether it does or doesn’t, I don’ think anybody here has ever done a study, any kind of real research to probe into it for several reasons. One of which being, they don’t really want to know. But, ultimately, that’s what’s got to happen. Otherwise, we’re just playing games with people’s education. We’re just trying new things to be trying new things. It goes on all the time, but I don’t think that’s what we want to do. We should be able to do enough research to say, at minimum it’s not hurting anything. Again, sometimes, something is better than nothing. If people in Scottsbluff want a class, and we can send it out to them, we don’t have to worry about whether their learning is improved, because their learning was zero to start with. In our situation, that’s not necessarily the case, and I think that’s something

that, regardless of how the rest of it, we have to be cognizant of these people, and we want to improve them through these things.

Q: I'll be the first to admit that at his point, it doesn't improve, it probably does detract. I think your second point is that we need to figure out a way to deliver classes. To places that don't have, like we're actually going out to New Mexico to look at the Tribal Colleges. They don't have faculty out there that can teach these courses. So, if we can teach them, we're taking them from zero to something. It wouldn't be a distraction or detraction, it would at least be some type of improvement. Once we determine how to improve the system, and perfect that, I think we'll be able to say, "Yes, we are able to improve student learning at all levels". Even if it's just from here to Lincoln, where Lincoln already has faculty, but we can do it just as well. But, everybody wants to be with Gary, because Gary's got all these awards, he does a great job of teaching. The guys out of Lincoln, frankly, we just don't like taking classes with them. So, we'd rather take Gary's class than TV, than… That's where I'd like to get with this thing. That's where I see teaching, is in the interaction. I know that's where you see it also. The systems that we have now are not at all conducive to interaction. So, that's how I view NuView. It's ability to create interaction. Once again, you have to have the right instructor in front of the camera, or ….

A: That's a given in any classroom. You're not going to get interaction unless you get somebody up there who wants to do it, has some clue how to do it, and is willing to put in the effort to do it.

Q: My contention when we first started this was, "At least we're not going to do any damage". But, like you mention, with some of the guest speakers that we had, there could have been some damage there.

A: That's always going to be an unknown. Any time you bring someone in, you can't expect them- they're not a teacher by profession. It's not their job. So, that's….

Q: Even if I brought you in, as a tried and true teacher, you might have made similar mistakes with the system. With the shadowing, the lightings not good, and all that. At least I figured it out because I had Brett there to help me. Where I could and couldn't stand, where to sit. Even you could have done some damage so to speak, or be less effective. That bothers me, because I swore up and down that anybody could walk in and use this and not lose at least some degree of effectiveness. I was wrong. That's what research is all about, engineering. We talked a little bit about bringing in the iPads, possibly bringing in SMART boards. Do you see how any of these technologies might improve how NuView is used?

A: I guess I'm not sure how, what the SMART board would do exactly.

Q: that was the problem with not being able to read what was being written, or seeing what was being projected from the projector. The SMART Board, they would see directly, so whatever my computer sends to my SMART Board here, would also send to the SMART Board in Lincoln, so they would see it just as crystal clear, on a beautiful monitor, as the students here would, so there would be no loss of

resolution.

A: Definitely would be an improvement. The difficulty with SMART Boards, is that you're, you have a limited space. In our rooms, even with the old white boards, certainly with the new wall things, you've got a lot of space and what one of the exceed things again, is about keeping everything up on the board. And the SMART Boards are a little bit harder to do that, although the one they had was better at it than ones I've seen before because you could simply move to the next page, you didn't lost that stuff, you could move it back and bring it back into view. It's still not up there, so it's kind of a loss, but compared to what was happening in the room that I saw, it would be an improvement, even if you're losing a little bit of that continuity of having everything up on the board. The fact that it can be seen and copied down is the big thing.

Q: That's how we saw it too. The same thing we were talking about earlier with the iPads. If you could actually see what other students are working on in their groups, and be able to work with them one-on-one, [A: Are you talking about every student having an iPad?] Yeah, you'd basically be equipping a room with either computers- so let's say 248, if you went in there and did it, or you would have a special teaching room, or students would have iPads, which, I don't personally feel we're that far away from. We've talked about laptops in classrooms for a long time. Mandatory for students having to buy laptops, I think iPads are inexpensive enough, that we might want to explore that. We need to be able to block all of the email functions during the class time. Which they have that- if they're plugged into the room, than you could block certain things from happening. Any other comments, or suggestions?

A: I guess I really don't. I mean, like I said, the thing that I see as being critical to all this is starting to investigate what it's doing for the students. You said your general feeling was that it wasn't necessarily helping, and that's, again, the general anecdotal impression I've gotten from folks, or you, who have told me. But, realistically, we should study it. We should do some studies of that exact thing if we're really wanting to do this it needs to be studied, because we should know, if we're doing it, what we're doing, what's happening. I think right now, we don't', we just kind of have general impressions and ideas and we have student comments, and our feelings, and our opinions. But, no real avenues to suggest that what we're doing is not as good. It could be, right now, that TV teaching, as it's currently being done, is working fine. I don't think anybody thinks that, it's just that we don't know either. It could very well be that the performance is not that much different from site to site. And that we're seeing and hearing negative things, but, in fact, the students are still performing well. We just don't know. It's like a lot of other things, you want to get started on it, you want to start pushing it forward, but at the same time—you probably see it with your kids, or saw it with your kids, and I saw it with my kids. There's a whole lot of experimentation that goes on with education. Its like, "Do you know this will work?" "Well, no, we're

just trying it out." "Geez, thanks a lot for using my kid as a guinea pig." That's the way I saw a lot of stuff in the school my kids were in. Things would change from year to year, kid to kid, they would do something different. We'd ask at student teacher conferences, "Well, we're trying this." "You're trying this? What's the benefit?" "Well, we think it will…." "Really? Ok." I mean, that's my big thing with a lot of teaching stuff in general, is that there's way too much of that, even at the Universities. Your research has to be nailed down to the last inch, everything documented, everything proved, everything researched, everything checked out. But, teaching, "We'll try this." People are willing to, well, let's bump it up from 30 to 50, well, why would we want to do it? Are we doing something good or bad for our students? That seems to be immaterial. Maybe we should actually check into it, maybe it isn't bad- maybe 50 can be taught just as easily as 30. It would just be nice to know that someone's actually looked into it and come to those conclusions. Instead of us going, "Well, we have to do it because we have to do it", we don't *have* to do it, we're choosing to do it. We're choosing to let people teach class so they can research more, what is that doing to our students? Way beyond what we're doing here, what are we doing to our students in general? We don't really seem to care.

Q: I think anecdotally we do know, we just don't care. We think that somehow it won't be a problem.

A: When I talked to some of the big researchers in our department. They're always, "These students from China, they are always way better than our students." That's because nobody is teaching our students anything. You're not teaching our students anything. Why do you think our students aren't as SMART as these guys?

Q: We haven't taught them how to learn, I think that's the big thing. We haven't taught them to think creatively, solve problems, so they don't know how to.

A: They get into our classes, and certainly the predominant attitude that I've seen here is, "Let's see, I need to get my grade, and I need to move onto the next class." The thinking seems literally to be, "Well, that class is over, I'm in this one now." When I make them recall stuff from the previous class, I get, "This isn't stats!" Sorry, you're not allowed to forget anything. But, the general idea is, you push them on through, don't give a whole bunch of "F's", we don't get too strenuous in our grading and no one complains. They all get their degrees, and they move on, they go out and do stuff. The people in the industry know the students that we've had over the years, they know where the students are in terms of what they can do, what they understand. They've kind of adapted themselves to taking that product and moving forward. I think we could do a much better job teaching how to learn, teaching how to think, but that would take requires way more effort than anyone other than the faculty are willing to put into it. And the faculty aren't willing to do it if they're not going to be punished for it. The obvious thing around here is, you are going to get punished for it.

Q: Even the faculty, like you do a great job of teaching. But what difference does that make when you're teaching one course out of the 30 or 40 that these kids are going to take. Maybe a little spark- obviously they appreciate you. The t-shirts and all that; they appreciate that they've actually learned something, they've learned to think a little bit in your class. To some degree I think they appreciate that.

A: By the time I get them for the first time, they're two years in, almost. They've had math and science, and physics and chemistry from people on UNL's campus, and I don't know what they've been taught, or what they've learned. It seems like a fair amount of the time, they've never taken the time to think about what they've learned. They can usually do the things they're supposed to do, but they have a hard time recognizing, here's a place I can apply that thing that I learned way back in Calc. II, here's a place where it goes, where it fits, I can use it and solve something. They definitely need that pointed out for them. I don't remember as an undergraduate, I was probably the same way. I don't know if there's a good way to make them do that stuff. We're certainly not killing ourselves trying to figure it out, on any kind of broad level. It's not the money maker. [Q: That's a whole other research topic.] I've probably said this before; it really seems to me that this is something we need to look at. Are they at least not being, like you said, harmed, by changing these kinds of things. That would be a helpful thing; I think that would be helpful for a lot of faculty to get buy in. There would be some evidence, there's been some work done to look at and say, there's really not any harm here, there's actually benefit in whatever areas. I think, more faculty would be willing to consider doing it. What you said is where everybody's at. We generally think that this is not a beneficial thing, and probably most of us probably think it's probably hurting. Again, better than zero, but not as good as it should be, in terms of people getting what they need to out of it. If we can show some of that, then, really maybe this isn't too bad. Those folks that are grumbling, complaining, they don't like it, but they're really learning just as much as they would be if I were standing in the classroom with them. That would be a big thing for the faculty to consider it. The other thing is no one is going to do it if they're not going to see some appreciation for it. That's the biggest problem here and probably anywhere else. It's a lot of work- what you're is a lot of work. Who's going to do all that work if their end result is going to be [INAUDIBLE at 54:55, sounds like "me"], why would they do that?

Interview with Ron Hackbart

Stuart Bernstein
NuView Feedback Interviews
Transcribed by Nicole Effle

Ron Hackbart

Q: What was your overall impression of NuView when I was describing it to you before you actually saw it?

A: You did a great job of explaining what it was you were explaining what it was you were doing in the classroom, what it was you were trying to capture, how you were doing it. So, I had a very clear picture in my mind what you were trying to do before we even got there.

Q: Did the concept make sense to you?

A: It did. And I think part of it is because I've had some experience in that about the last 10 or 15 years or so, I've-maybe it was a little bit easier for me to try to grasp what it was you were trying to accomplish and how it is you were doing it. It was a twist on some of the things that I have done, been a part of, and facilitated myself. So, I'm very interested to see how that whole aspect of it was going to go, especially in an academic environment as opposed to a business environment. I, like I said, you did a great job of explaining what you were doing, how you were doing it, why you were doing it that way. I had a pretty clear picture in my head. I think a lot of times from a vendor perspective, what they see it as is more as-you have this vast audience that's maybe at their own computer, maybe they're in an auditorium setting, but I think kind of the set up as far as that having that side view, and what it is you wanted to do with that. I think that concept was kind of new to them. They couldn't understand what it was you wanted to do.

Q: After seeing NuView presented by the guest presenter, what was your overall impression of it? Do you feel that NuView lends itself to easy use by a novice?

A: Easy use? Yes, provided that-like what you did-you had everything set up for him to come in, be able to do it. Effective use and I think this is some of the stuff that we talked about, I think that there has to be some prep and maybe even at least one walk through as far as how to use that. You know? We had talked about it too, after we debriefed that. The person came in there, and he facilitated like he would, for the folks that he had in the room with him. And, understanding you have that second room over there you have to work with, you have to force more conversation and interaction with that group, and be familiar with them as well. I think that was one thing that he just wasn't prepared for. That's one of the, I guess, pluses and minuses of it. Easy to come in, it's set up, you get up here, you just present, you use white board like you usually do. Both rooms are going to see

it. But, it's that interaction piece of it, that a lot of people don't grasp or understand exactly how or what they're supposed to do.

Q: That was my short coming. I'd like to say that I did it on purpose to test it, but that would be a lie.

A: Here's the thing of it too. I'm going to put some "onus" on it on the teacher, presenter, whatever you want to say. Maybe this is just me. But, when I come into an environment like that, I'm going to say, ok, so what are we doing? We'll have two rooms here, you'll be in one and I'll be in the other right next. So I would be like- I would want to think through that process. Even if I came in there brand new, and it was still like that. I would want to think through that a little bit more, and I might say-I might talk to the experts and say, "Hey, do you have some tips for facilitating with people in two different rooms?" So, I think for some degree, you're guest speaker came in there with "Well, I'm just going to get up and we're going to talk about it and they're going to get what they're going to get". Which is the wrong focus, the focus needs to be on the kids that are in the room.

Q: Would it have been better with someone who had more distance experience? It's not even that, it's somebody who understands that you have to know the room, you've got to be there before hand, you have to know your audience and the room.

A: I totally agree. I think that's something that even if that's something you've participated in, to understand how that happens. I think that as a society we're getting there, but we still have a lot to learn about the right way of doing it. A lot of people still have this misconception that, "Well, let's just throw a video camera out there, and everybody can join in, and it will be great." And, you don't understand, there's a lot of things you have to do-think through and actually force during that session in order to keep their attention, keep them engaged and keep them involved [Q: And not overwhelm them.] And not overwhelm them.

Q: that's the great thing about having Brett, he's got a background about both pedagogy- and he's telling me now it's androgogy- have you heard that? [A: I hadn't heard that.] Because, "peda"[sp] is child, so "pedagogy" typically- is supposed to refer to K-12. And "andragogy" now is the adult learner. [A: I hadn't heard that] Yeah, apparently this is a new term for me.

Q: Was there anything else that you saw with NuView as far as the guest presenter?

A: I just think-the biggest thing out of that-was there needed to be some prep work ahead, and whether that's pushed by the facilitator/owner of it, or the actual person who is coming in there to provide the information. One way or the other there needs to be some contact ahead of time to say, "This is what's going to happen…" "This is what to expect…". I think a list of the students names, because you know, when you know them, you've seen them a few times, you get somewhat familiar, you kind of know what they're going to do. But, that first day, there would have been nice be able to say, "These are the people who are over there, these are the people that are over here. Even if he doesn't know them, just to be able to call out, "Is

[student name] here? Ok, what do you think about that?"

Q: Before, about the interaction, because that's the key to us, with the NuView, is the interaction.

A: It was vastly different when you did it. And it's because you knew the people in the room, you called on them, and even to some degree, which I thought was great. When you noticed students in our room, who maybe weren't as tuned in, you'd call on them and ask them questions to get them back, and to get them engaged. That's the same thing you would do in a regular classroom. But, not being intimidated by the technology of, well, they're actually in another room, even thought I can't see them face-to-face truly, it's still being able to see, "looks like he's daydreaming, I need to get him back pulled in." And it happens.

Q: To us, that's the key to it. To me, a good classroom is an interactive classroom. Right now, the distance learning that we have or the technology that we have, doesn't allow you to have that interaction-doesn't' facilitate that interaction. I think that was one of the other things we wanted to see with our guest presenters. What we're claiming is that NuView can be used by anybody under any type of teaching experience. So, if you have a professor that walks in there and doesn't want to be interactive, just wants to lecture, then that facilitates it. They're not going to engage the students any more or less-so there's no detriment to it.

A: you're right. The second key to that is getting the white boards lined up the same in the distance room as the presenter room. I mean, I thought that that whole one-to-one aspect ratio, that was key too. Stu, when you got up there, there were times where- I even caught myself thinking, "It's almost like he's in the room." I remember one time when you leaned over and it was just so that when you leaned over to your right to pick up something, it took you out of the camera view. It was weird- all of a sudden your head went through the wall. I was like, "Oh yeah. He's not really in here." It really helped facilitate more the fact that you were in there- with the one-to-one aspect ratio, getting the white boards lined up, that helps to facilitate from the new person coming in, if everything that he's set up the way it is there, matches in the other room. Like you said, if he wants to come in, jot a few notes on the white board or whatever, he could do that, it doesn't drastically alter their presentation or training-teaching style. At the same time, just a few things that they have to be aware of. That's another thing-the markers. Making sure the markers that are being used in the room are clear in the other rooms. That's going to be key to that as well. I don't know, you may have to go to a little bit wider tip, or something like on the markers as well. There were some times-I know we talked about the markers-there were some times those markers were a little bit…

Q: After seeing NuView, what was your overall impression?

A: I see the application, the use for it. Again, having the skills, the comfort level with the technology, the set up, the students, it was just a vastly different delivery. Far more effective in what you said, at times it really did feel like you were in there. I

really that that one-to-one ratio, lining up with the white boards, and everything that's what facilitated that.

Q: So far, you've concentrated on that front board, what about the side board?

A:The side board, from my perspective was, it was interesting to see because it was a different view of the students that were there. There were a couple of students that were- it amazes me that they know there is a camera on them from the side, and they are still on their phones texting- not paying attention. I pointed it out to a few [other individuals], like he doesn't know that we can see he was texting under there? Maybe you couldn't because you were up there in front, but I knew that we in the other room sure could see that in there.

Q: Do you feel that the overall NuView concept promotes and facilitates interaction between the teacher/instructor and the students in each location?

A: It lends itself to it, but again, it's just like a real class. It has to be the responsibility of that person that's up front forcing that interaction. Even if its' not activities or group work or anything like that. Calling on people, getting engaged in the conversations, it can take place in a very natural way with people that are not present in that very same room. I thought too, when you did the session where they had the group work, they had to get out the plans and go through that. I think, from what I saw in our room, it wasn't necessary for you to be in that room. In other words, the students knew what to do, they got it out, they were asking questions. Just like a regular room, they were looking around for things, the few times that they had questions they asked you about it and it was just like a classroom. The only difference was there wasn't an actual physical presence in the room, even though there was a "virtual" presence there. That's the stuff that you want to see. You don't want to have people go "Well, he's not here, so what's he going to do?" You want them to be engaged. It all goes back to, if you're calling on them and getting them involved, forcing them to interact.

Q: We know for a fact, that this tool-a bad teacher with a good tool is still a bad teacher. Did you see-you were in the remote classroom, so you were only seeing that. You could see the students in the contiguous classroom. Do you see how one room might get more interaction that the other-either way? Maybe as an instructor I focus more on the remote than the contiguous.

A: Here's the thing. I think that yes- there would be the tendency for interaction with the students that you're actually present with. But, again, I go back to that, if you understand the technology, and you know how to utilize that. As a teaching professional, you just know, that you have to interact with them. Your comfort level was to that point that you were comfortable enough with it that your interaction was-it wasn't like, "Oh. I need to talk to the other room." It was pretty open and it was pretty natural back and forth. Yeah, I can see, especially for the guest speaker, it was easy for him to focus here because everybody's there, you kind of forget about those people who are over there. But I think for someone who has had experience with it it's just very natural to work with. You just learn- it's

like anything, the tools, practices that you have, when you practice them over time, become second nature to you.

Q: I hadn't thought of this before, but it's very similar to-as you said it before and your brain-Brett had said this before too- you brain tricks you into thinking that I was in the room with you. I realize now, that when I was teaching, my mind would shift, take a look at that camera, take a look at that projection, take a look at that projection, see what the students are doing there, and there, and there. The same I would do if I were thinking look at these students, then look at these and these students in the same classroom. So, it does- it becomes second nature, and I'm not seeing projections as much as I'm seeing those students.

A: And, you know, even when you get into large class sizes, and it's face-to-face, you have to be conscious that you don't just focus on one side of the room. Sometimes people have that tendency well I have a comfort zone here- and that's where they're going to. You have a whole group of students who, after a short period of time, are going, "Do we not exist?" So, again, you're comfort level with that was naturally flowing back and forth. The way I equated it to was basically if you had a smaller class in a large auditorium and you had half of the students that sat here, and half of the students that sat here. You'd have to work that whole front of the auditorium in order to get to the two groups. In my mind, one of the differences in it, but not a huge overall difference, was the fact of, "well, I can't go over to the people on the other side, I've got a wall there." So, with the set up that you have, it still facilitates that large auditorium, push to the front, wider stage, it's just that you have a wall there so you just can't physically go into the other room. The more I think about that set up, that's what I kind of like about that is. From your perspective, do you ever get to the point where you feel like that's just an extension of the room right over there?

Q: Yeah, that's what I was just saying; I did, without realizing it until we were sitting her talking about it. I actually did. Those were the students.

A: That's, the technology and all the 2D, 3D stuff, kind of just… it's just no longer a huge factor to it. You just have to know how to facilitate it.

Q: You said something really important because- and it's been pointed out to me because I've taken a lot of training for myself, so I focus on it myself, is that you do have a tendency, whether you're right brain or left brain, whichever it is, to focus on a certain area of the classroom. When we first started experimenting, Brett and I, we actually photographed one of my colleagues for about ten minutes, just so that we could get a feel on how to place camera's and stuff. When we walked away, I said, "he never- and it was a big room, and it was basically an aisle down the center- he never looked at the right side of the room." And he was standing on the right side of the room, but he talked the whole time to those students. I don't know if you've read Moore, but he talks about that transactional distance. He had that transactional distance right there in the classroom. When you see someone else do it, you really pay attention to yourself, so it's that one more thing that you

keep in the back of your mind. Am I focusing?

A: You're conscious of it. That's the thing of it. The other thing too, is thinking through the activities that you're going to have the groups do, in my experience, and personal experience myself. Yeah, that activity works great for the people that are there- and sometimes it's like, "Wait a second, maybe that doesn't go that good over there." And there might be a variety of reasons as to why. Maybe they have to show other people, or share with other people. Sometimes that doesn't always work out as smooth as it is. As smooth as what you would like it to be. So, I think that that is another key part of it. Again, it goes back to the basic philosophies of teaching. You have to think about what you're going to do. You can't just throw it out there without really thinking, "is this going to be effective?" "Is this going to achieve what I want it to achieve?" "Am I doing stuff that's adding value or am I just doing stuff to do stuff?" So, that is on the group work that you had going on through one of the sessions. One suggestion is if it's going to be a class where there's a lot of group work, the one thing in a live environment that we have the ability to do is to walk up to the groups and look down on what it is they are doing. That would be nice in that environment if there was a camera that was- whether it's above the room, or a few cameras that are looking down- to help facilitate. Then again, if there's not a lot of group work where you need to look in and see what they're doing and everything, maybe it's not a big deal. Maybe there's some type of ELMO or something like that in the other room that allow them to share their stuff back so that everybody can see what it is that they're working on there. That is the one thing and I don't know if I've even thought through a truly effective way as far as if there's group work off site, how can I-I can see that they're working on it-but I need to see what they're pointing to. They could be pointing on the paper, and they're up in the right top quadrant, and they need to be down in the lower left. To me, in that environment, it looks like they're working, but it would be nice if there was some sort of overhead.

Q: I like the idea of them walking up and using the ELMO, and you know yourself, it's better if you are in their own space, if you can come to them. One of the things we've talked about, Brett and I, is iPads or laptops that are linked in and I can see what they're actually doing and working on.

A: I think that is a great alternative. The key to it is you want to be able to interact with them and see what they're doing. You don't necessarily need to see body movements, expressions, that kind of stuff. You can still pick up that kind of stuff off of the cameras. Again, it's that facilitation, what are they working on. Do they look like they're getting it? Are they faking it? You know as well as I do, that's a big key is when they're sitting there saying, "I've got it." And you're saying, "no, I really don't think…" Then you can see what it is they're working on and you still have the opportunity to see what their body language. Is one person driving the group, doing all the work, or is it everybody.

Q: We've looked at-like Cisco has a system already- that, you can actually plug in all of

the computers, so I guess the room kind of becomes like a cloud. So that you can then go ahead and call up any laptop that's plugged into the system and either see what they're doing, or bring that laptop up to the display.

A: I've heard- I'm trying to think where this was at- they have like a, I call it a "light desk". Basically it's the same thing. Let's say you have some diagram or plan that you want to work off of. You can bring that up digitally onto that desk. On that desktop, when people are drawing and doing things up here, same thing, you have the ability to see that, but it's all kind of digitally done there.

Q: I haven't seen that- that would be pretty cool. [A: It was really awesome when I saw that. The thing that I liked about it was that it gave me the ability to see exactly see what it was they were working what they were doing. Because it was all digital, I could see everybody's work-if I wanted to, or not. Or if everything was screwed up, I could say, "Let me clear it all out". Go through some additional teaching points, bring it back up again, and say, "Let's start over." It's as almost as if you had the smart board/whiteboard technology literally as a desktop as opposed to a laptop.

Q: That would be interesting. Do you feel the sidewall projection of the students promoted or facilitated interaction between the two groups of students?

A: I don't think it did. I think the reason why is because from a student's point of view, I'm seeing the sides of the other students. If I had that side view and the front view, then maybe that would facilitate that communication more. Generally, when you're looking at the side of someone like this, that doesn't foster a whole lot of communication. [Q: Even though that's what you'd be seeing in the same room? Looking down the row, seeing them from the side?] I think from a training or facilitation point of view, we would need to encourage that. They've got to get comfortable with that technology too. Let's say it's just one large auditorium, wide up front. You're absolutely right. If Tom gives you this answer over here, and you turn to Chris, and say, "Chris, what do you think about that?" That helps to facilitate that and, a lot of times, even in that environment, they'll still want to carry on the conversation with you. Until they get comfortable with- even there- go ahead and talk to Tom, or "Tom, what do you think about that?" You have to facilitate that cross discussion. I think it's the same thing there. I think it's that you have to ask the questions of one group, and facilitate discussion from the other group in here. I think it goes back to the same thing where you say, "Don't tell me, tell them." Just like you would do in a regular classroom to facilitate that discussion. Then I think they would. They'd turn this way so that they could see that person that was over there.

Q: Now that you say that, I failed to do that.

A: In a classroom environment, we do that almost second hand. In that environment though, we forget that we still have to do that. And, a lot of times, you just will facilitate the conversation without really saying, "Talk to each other about that kind of stuff." I think again, you know, the group work piece of it can help that

cross communication, sharing of information back and forth as well too. Just like anything, you have to facilitate that. "Group 3, you guys are working on something, looks like you're going down the same path as Group B in this room." "Group B, why were you going that way?" "Group 3, why were you going that way?" You have to facilitate some of that dialogue between the two groups. I think it can be done, once again, you have to be aware of it. It's something we're not used to doing.

Q: It's funny you mention that front projection, seeing the students from the front. I sent an email to Brett just a couple of days ago that I just envisioned- and I think it might have been one of the comments the students made in their evaluation- what do you think about having the-what I called "the cheater" monitor- up front. So the students could actually look up front and see the students in the other classroom. I don't want them to interact with that. That's why I checked with Brett- I don't want that to become a distraction, they're watching that- not that I'm on stage- but watching me, and getting the content. This should just be kind of a, when I'm not looking off to the side, but somebody's speaking so I can look up really quick and see their face talking. S, you think that would be a good idea?

A: I don't think it'd be a distraction. I think it's like anything- honestly this is the way I view it. The novelty of it, the first two times they're in class. Maybe they'll be up there doing that kind of stuff. We saw that to some degree when you were going through as you were getting set up even with the side camera. I think it's just like anything, once that novelty wears off of it, then it becomes second nature. Then it's no longer a distraction, it's used for the intended purpose. I just, to me I think it would help foster that, "Ok, you're looking at me, I'm looking at you." So we're talking back and forth. As opposed to- like I said- expecting that person to have to turn this way to talk.

Q: That's something to think about. I think it's certainly not something you would have in the classroom. We're trying to replicate *a classroom*. You wouldn't have that if you were in a single classroom. Maybe in an auditorium situation you might have camera's focusing in on students so you can look forward and see what's going on and you don't have to look. But in a normal classroom, you wouldn't be able to look up front and see the other person talking; you'd actually have to do that. But, at the same time, we understand that we're trying to facilitate learning, and we're going to break some rules, and we're going to add some technology- maybe this is one of them.

A: It would be interesting to see. Maybe you set up one room and have that up front to see how that is facilitated.

Q: Right now, we're thinking duplicate, we're trying to get a contract to do that- one here and one in Lincoln- that might be an idea to just put one in one room. Besides the quality of the audio and video, what suggestions would you have for improvement?

A: The overhead camera I think would be one, or the ELMO, something where you could

see more of the stuff that they're working on. Whether it's an individual student, or group work. I don't know, I know they have- I'm not all up to speed on that- but I know some of the security cameras and stuff like that, you have a little room you can toggle around, look at different things, zoom in, zoom out. Maybe that would be enough. In some cases you may not need to get to the detail. It would be one of those instances where I don't see it would be a necessity every time, but at the same time, it's something that I think if you had it there, maybe there'd be an opportunity there for more group work and those kinds of things. It's kind of one of those "the dog chasing its tail". Do you put the camera in so you can use it more, or do you create the stuff that says, "Now we need a camera so we can see it?" That would be one suggestion. I think that- I just really think that one to one aspect ratio, getting that virtual room set up there with the white board and everything like that, identical to the other. I thought that was key. You talked about the whole, when I walk from front to back, getting shorter, I'm just not an audio visual person enough to know, what is the technology that keeps you in the same perspective whether you're moving forward or backward. [Q: It's actually just move the camera down. When the camera is pointed up, it cuts across the same plan. When you put the camera level, it keeps it on the same plane, that's a simple fix.] That, maybe some markers, maybe a little bit wider tipped there, and the other thing was the glare off of the white board. I don't know- we've got some white boards up there that are typical white boards. They've got some other ones that are painted. Because of the fact that stuff is painted on, when you get really close you can see that it's pitted. I don't know if that would cut down the glare or not. [Q: That was a huge issue.] The lighting in the room, that's all stuff that, again, you've got to have those professionals who work with that stuff, that come in there and say, "Ok, from the camera's perspective, this is what the lighting has to be", "From a student perspective it's too dark." They're the ones who have to figure that stuff out. I thought the acoustics worked really well in the room. It was easy to hear and understand once you get the volume control set, I think that was fine. I think that would be the biggest thing. In the set up you had here, you had that ability to pull up something and walk over to the room to see how that displayed up there. That is one thing that we always struggle with. The way that it looks here, is not the way that it works there, and definitely not the way it looks somewhere else. Its tough understand how to get that colors, images, the zoom in ratio, all that stuff just right so it's easy to see.

Q: One of the things we're struggling with right now, if we showed the white board and we had the chalk tray, it kind of cut my body in half and= but my legs, where you could see them on the wall. If that disappeared, and all we projected was white board from the teaching room to the student room, so all you saw was the head and torso, you didn't see the legs.

A: Again, I think that after a while, the students would adapt to that, it would be a non-issue. But, I think to help to lend that real perspective of you being there, I think

you almost need to have- because I think maybe, because when you're facilitating a lot of times, you're behind the desk there. So, your legs at that point, even in the real classroom, were cut off. [Q: But you expect that. When I walk out into the open area, to see a floating torso…maybe eventually you'll get over it. But, if you're tricking your mind…] Here's my initial reaction. My initial reaction would be that, showing that lower part would be key to making the transition over to more of a, "oh, he's here in the room with us." Is it a necessity? No.

Q: We're struggling with that because some of the technology that we can use. One of the vendors wanted to mount a "short throw projector". But, the short throw projector is only going to project to here. So, when we project in the other room, we're going to lose the bottom half. I already struggled with getting shorter, I don't know about the floating torso idea. Do you see how NuView could be used in your industry?

A: Most definitely. You don't- especially if you can get creative with the camera placements. Here we had one room and one room. What happens if you add another room? Where do they go on the wall? What if they have two other rooms? [Q: We've talked about wall, wall, and back wall, so we've gotten to three.] There are some things you could do, but you would have to make sure that room can facilitate that. You'd have to make sure that the walls are the right level so that those images display- the last thing that you want is that nice, dark, gray wall, "ok, I can't see." I definitely see how it could be used in the industry. I think, I think what it does is it gives us an environment that is a little bit easier to use as opposed to the standard video conferencing set up. What I mean by that is, what I'm limited to in the video conferencing set up, is that if I have 3, 4, 5, 6 rooms that people are attending in, and I have it all on a large size TV, what I'm limited to is I have all 6 of those people that are on there, so I still have smaller images of that. Whereas in your particular environment there, you're getting to that- it's more life seized, so it's more real to interact with those people. Especially if you have those staggered around the room just right, then it gives the feeling that this is more of a larger room.

Q: In your situation, are they typically sending one person from, say, each city, or- if you were to try this, would you have a group of people that could do it then, in that city?

A: We've actually done it both ways. There will actually be times when we have both scenarios going on at the same time. In other words we'll be doing training and we'll have person that's at their desk that's going through the training with us. Then, we'll have another group of people in a conference room, that now we have video conferencing set up, so we're seeing all six, or five or whatever it is in that room, at the same time. In this case here though, I think what you'd want to do is you'd want to do it one way or another. In other words, you'd need to say, "I need you to join us individually", or "I need you to join us in a large group." All because of the fact of how you are projecting it on your walls. That's- the last

thing you want is, “I have 50 individual shots” I’ve got to figure out where I’m going to put everybody at on the wall. The other thing is, in your case, where it’s training that you’re going to repeat itself time after time after time. Then you’d almost want to say, “ok to some degree, I want to keep these virtual students in a similar location on the walls” because it helps your frame of reference. Human nature from a student perspective is, once they come in they sit in a place. Unless they have a friend who comes in or whatever, generally they’ll sit in that same general locale every time. [Q: And thank goodness, because my brain learns their names by where they sit too.] I find myself, then as I’m thinking through, I remember when he said this one thing, I’m thinking through, “Ok, he was kind of up over in there.” That’s that whole spatial representation thing. So, yeah, I think for us most definitely, when we have those training sessions- we’re taking a look at doing something like that now- where we’re having to facilitate for a group- most definitely for a group. The individual one on one stuff, though, like I said, I think you’d just want to say, “Either all of you join by your own laptop, and we’ll bring you into the session that way” or “let’s just be large groups”.

Q: With the way you’re doing it when you do it now, are the students able to see the other groups? [A: Yes] So, the people in the conference room can see the classroom? [A: Yep]

A: It’s like I said, with the video conferencing that we have set up, it’s considered large screen TV, we have Room A here, Room B, Room C, D, E, F, G, H. So, on their end, they’ve got the same thing. The only difference is instead of seeing their room out there, they see our room. So, you can see all the different video conferences that are going on. [Q: So, you are able to create interaction then?] Yeah, you can. It’s not quite as easy, like I said; you’re dealing with 8 images on a screen this size, as opposed to 8 images that are more life sized in the actual room environment. [Q: We’ve talked about trying to bring in individual students; we’re not trying to advocate that. But, say we had two big groups then we had some student in China that wanted to join us, where would we put that projection, how would we get them to see the other two groups then. That’s one we haven’t figured out yet.] It can be done.

Q: I sat here with a vendor the other day, they’re heading to Vegas next week because there’s this big video com show and they’re going to look for new equipment. I said, “Here’s the thing, here’s why I want to partner with the vendor and the manufacturer, like a Polycom or a Cisco. When you go to these shows, you’re seeing at new inventions that are based on old ideas. They’re inventing things to do for people are ideas for things that people have been doing for years. Nobody’s looking at this side wall projection and why it’s so important to learning, so no one’s invented a camera yet that’s going to pick up the students, 180 degree camera that won’t have any distortion to it. What we need to do is get that out there, so people go, “Oh, well, I can invent a camera that does that.”

A: You’re right. Think about it like this, if you’re in an auditorium. You’d have multiple

rows up there. You may still walk up this row here, turn and talk to somebody that might be two sections over. You still might do that if you're facilitating the whole room, not just up front. Do you know what I Mean? You can do that same thing in your environment there, and how effective would it be if you could walk up into the students, and turn, and to your image on the wall, and talk to somebody that's in the room there. So, from your perspective, "Ok, that looks great", I'm like, "what does that look like in another room?" In another room, they're watching Stu walk up here, because he camera is this way. If Stu turns to talk to the wall this way, now what do they see? They're seeing your side. So it's almost like you have to have multiple camera's and be able to switch- I know Cisco's got some sort of system, so as you walk through a room, the cameras will automatically switch from where it is you're at and your perspective. You met Nick Holm, right? He actually has a video of that and its Cisco learning. They've talked about that.

Q: We're meeting with Cisco later today. We're going over- because they're doing a whole crap load of stuff in the new education building. Nick was the one that actually turned us on to that. Oh man, what we saw they had was amazing, and they're adding new stuff that we haven't seen. So, we're going over there today, because we want them to help us [A: Think through this part of it?] Yeah, we've had them once already, so that's what we're meeting about them, so that's one I'll have to talk to them about. That's one of the things we talked about was, "oh great, I'm going to walk up, but- you're right- if I talk to that side thing, they're seeing me over there, unless they're looking at the side projection and seeing me talk to them from that camera, because we have two cameras. But, at the same time, if I'm talking to these students, they're seeing my ass, we got that comment. I'm not sure- it wasn't the day you were there, we had Darren from engineering. He came and taught a class for us also. He did that, he came in and facilitated, but one of the comments we got was, "Well, when he was talking to those students all we saw was his backside." You need to be careful of that. [A: In a real classroom that happens too. When you turn to address a student, especially if you walk up into where they're at, you turn to address them, and there's a group that's going to be behind you. It's just that for some reason it's- I don't know why- again I guess it's just…[Q: the thing is bigger when it's projected!]

Q: So, what other things do you see? Any other comments, general comments on anything, suggestions?

A: Not that I can think of, not that we haven't discussed already. I think that the key to this is just like what we've been doing all three times, four times that we've been gathering- is talking about, how can you simulate this, in that environment. How could you get that 360 effect, I'm here, I'm here without me having to manually do something, or have somebody else in the room- a director- who's going through there getting the right camera shots. How are you going to facilitate that? Is it more cameras? Is it more monitors for the students to see? That kind of stuff.

I think, again, it goes back to that, we have to make sure that we're creating the learning environment to facilitate what they need to get. In other words, don't say, "Well, I've got a camera in the top of the roof, so I need to have something where I can look down and see what it is that they're doing." It needs to be a, "It's vitally important to see what it is they're doing". Ok, maybe we need to figure out a way that we can get a camera in there. Sometimes what happens, and I'm just as guilty as anybody else, we see the whiz bang technology and go, "Great- I've got to have that." The truth of it is, "That's really cool, but I just really don't see how I'm going to use that in my training." So, WebEx is another great example, they have a lot of great functionality. There's stuff in there that I'm like, "Ah, I've got to use this sometime." Keep thinking, keep thinking, keep thinking, I'm saying, "I don't see how this can be used for the training that I'm doing and the way that I'm doing it" So, it's one of those, "Ok, well, that's a tool I don't have to use." But I think that's what's key, is talking about what it is we'd like to do, and how can we do that and what if you did this, and what if you did that. And take you through that, and finding out, what can be done out there. You're right, the technology piece of it- they're always looking at, when somebody says, "We'd like for it to be able to do this." They're always able to say, "Let's come up with something that helps facilitate that" as opposed to always saying, "well, what do we really need?" I mean, this is what I say all of the time, I can't wait for the day when in a classroom, we're able to project the holographic images so now, instead of us looking at computer monitors, I'm looking at a system of lasers, lights, whatever instead of me seeing a flat screen where I see Stu walk down, it actually does feel like Stu walking right up to me. And, it's really not that far away. [Q: Isn't it amazing? I think back and I don't' know how old you are, but I'm old enough to remember the Dick Tracy comics, and he had the two way wrist radio, they called it. But, he could see…we have that, basically, if we wore our phone on our wrist, that's exactly what it is. But, when we were kids, it was like, "that's cool, but like that will ever happen." And, we're saying things now, and now it's different. It's like, "I can't wait til that happens", it's not "that ain't going to happen." Like time travel, "it's going to happen".] The other thing, we talked about this a little bit is, is there a way, like a portable or movable smart board, so that when you're up here writing on the white board, instead of having to wait for that image to be displayed through video, that image is displayed on that actual board. [Q: You guys have that.] Yeah, we have a smaller version of that. I would like to have a large, it's almost like a full sized white board size. Now, I know that at the high schools up here, they've got the smart boards, but they're locked into the wall. I would like to see something that maybe you can move around, so if one day you don't need it, you just push it up out of the way. They have those. [Q: The big screens, they have more that are portable.] But, I have no experience on those, and I would like to see, that I think would be key. That would be another way you can cope with some of that stuff.

Q: We're looking at that stuff. The one thing with that, if you…divide your front board in, say two white boards and smart board. If you're going to photograph the whole thing, well, then you're virtually photographing that smart board twice, because you're photographing it once, and projecting it in the other room here, but then you have the smart board again, so you're seeing the smart board smart board, and that's too confusing. Or, if you have it where you're only going to pick up this, and project this, and have the smart board in both rooms, well, then if you cross in front of the smart board and start writing on it, then you just passed onto the camera, and you're no longer in the room with the students. That's the one thing we're kind of struggling with now. We want that smart board. [INAUDIBLE at 58:28]

A: Is that that thing where, does it replace the white boards up at the front, or is it in addition to the white boards up in front, but yeah, you're absolutely right, it's like…Maybe then the standard white board is used to capture any notes, or anything like that, and the smart board, then, maybe that's used to bring up more of your graphical images that maybe you wanted. Do you remember when you went through and you were looking at the plans, so maybe the smart board then brings up like that. That would be a clear image that you could see then, and annotate.

Q: But as soon as you go over to annotate on that, you're out of camera, but what I'm saying is, "Ok, well, I could deal with that if the smart board was here, as long as I stay here in the camera shot, all you're going to lose is my arm. So, the camera is still picking me up here. As soon as I step over here, now you've lost me completely. If I'm standing- but as a good teacher I shouldn't be standing in front of my content board, in front of my students anyway. I should be off to the side like this so, I think it'll work, I think, again, it's one of those things you kind of have to keep in the back of your mind- "Ok, don't cross in front of, or cross out of the camera".

A: Again, that's that, I hate to say it, but you have to play with it to figure out how best that would work.

Q: Imagine trying to do this with vendors. Going back and forth, "Tell me what you want". No, you're the experts, I'll tell you what I want it to do, and you tell me how you can do it.

A: Their brains are thinking about all of the stuff they could sell you.

Q: Now I've got to tell you, this is kind of funny. We found out- because the ideal quality wasn't too bad, not as good as we wanted, we can do better, couple more mics, maybe a couple more speakers. The video quality was pretty bad, we'll be the first to admit that. [A: We talked about that.] We thought a lot of things. We found out these cameras, this guy sold us a bill of [?] I tell you, if you ever have the option to pick vendors, don't ever pick Concepts AV. [A: Concepts A.V. you said?] Yes, stay away from them, I'd hate to put it bluntly, but lying crooks is kind of what I would say. We have these two ports lined up. Here's the HD, here's the CVBS. I

don't know if you know these, I'm just learning. The HD is HD. The CVBS is common video. See the tape? [A: Yeah] They taped over these ports, so I would know which one to plug into each time. They wired this thing so all I was getting was common video not high def. We bought a high def. system; all high def. camera's, high def projectors. They demonstrated a high def camera to us. [A: How did you figure that out?] When we went into phase two, and started bringing different vendors in, and we're displaying for them, they said, "Well, you're not getting high def." What do you mean? Here's the port right here, the high def. port. You're using that port. Then, when I confronted the vendor about it he goes, "No, no, no, that's not,…" I said, "It's labeled right here." I had three different people, including our IT guy who said, "definitely you're not getting high def. you've got the equipment, it's just not wired up the right way." The vendor's going, "What? No, no, I'm going to look into it and get back to you." He was bugging us, and we were making excuses that it was the lighting, and the board, and you know, they wired it up wrong. That's why one of the vendors we're working with now, he's saying, "Maybe you don't need the smart board. The reason for the smart board was they couldn't see the content. I'm guaranteeing you when we give you real high def, maybe that will take care of it." I'm reluctant at this point to say, "yeah.." I'm still more comfortable with having the smart board.

A: The pluses and minuses of that smart board could- the thing I like about it, is it goes beyond the white board stuff. When I write stuff up here on the white board, I'm hoping that they copy it down. If I wrote something up here, and then I change it and erase it, well, again, I hope that somebody wrote it down, or that they wrote it down twice, so they have what we had down before we erased, then we have it down here. That's what I'm hoping, whereas when you have smart board technology, it's saved.

Q: And when I'm the teacher, it's the same way because I've used…I don't use power points any more, because what I want to do is get the students to interact. So I'll write notes, but I'll call on students and ask, "What would one of these scheduling techniques be?" and when they tell me, I write it down. They may come up with things I hadn't thought of, so I'm going to put it on the board. I'm not going to say, "Well, no, that wasn't in my notes, but thank you very much." I'll say, "That's a great idea!" Now, it's in those notes, but not in my notes. I don't want to stop the class and change my notes, so I don't ever have a record of what I put on the board. [A: That great idea they had- that's the other thing too, if you get the iPads or something for those kids, and they're going along, now you've taken it from a teaching environment to some degree, almost a collaborative environment. Now, when that student says, "Well, I put together this spreadsheet with all of these drop down menus, let me show you what that looks like", that's the kind of stuff that, from a teaching perspective, that's what I like. When the students are sharing and coming back because- as a student when the light bulb comes on for a

lot of us, is when we realize, that guy has a lot of answers, but maybe not all of the answers. That's ok. We're all here to learn, and he's going to facilitate, he's going to teach us, but if there's something we can come up with- I love as a facilitator, trainer, teacher to go, "I've never thought about that, and it's a great idea." I think it shows that it's ok to not have to know everything about something.

Q; I remember one of the first times teaching, I said to the students, "That's a little out of my realm, and I'm not real learned on that part of it." The kids in the back, "I've got it right here on my phone, "according to this…". I'm going, "There you go- there's your answer."

A: Isn't' that funny. I started working with people when I was first in the Air Force, as far as how to become good presenters, trainers, teachers, that whole learning aspect of it. There are some people who are ok with saying, "I don't know what that answer is- wait, you got it, that's great, what is it?" Because they understand the learning is what's [INAUDIBLE at 1:06:38] it's not me up here. It's we need to learn this stuff, whether it comes from me or somebody else in the room, as long as the learning is taking place, that's great. But it's interesting when you see some people who are not comfortable with somebody else in the room having to challenge their authority. You know, I tell people now, when we go through that, I ask them. We really do stress, focus on the learner, not you, focus on the learner. It's all about them. If you take them out of the picture, you have no reason to be here. They've got to get what it is they need. If they have a question that you can't answer, and somebody else in the room can, well, that's great, because they're getting what they need, even though it's not from you. They're getting what they need.

Q: You have a roomful of content experts, the whole class is full of content experts.

A: And we have some people who *think* they're content experts. WE get those all of the time too. That's ok, because, again, you facilitate that so that you increase their level of knowledge and really get them to that level where they need to be. This is the kind of stuff that I think through how we can do this stuff, and how we can use it best when we use this kind of stuff. It's like what we talked about, there's a lot of stuff you just have to say, "I won't know until I get the stuff in there and have a chance to kind of play and practice to say that's the best way to use that stuff. It will be different in different environments. Somebody that's lecture heavy, they may not need that smart board. But if you get somebody like in our case, there's so many things that are graphic in nature, and that engineering side to be able to see those things, then I can see it's huge to be able to, instead of projecting that image up there, to literally have the image up there on the board.

Q: We also talked about, sending a guy out in the field, having him walk through a tunnel, and he has the helmet cam on. To be able to throw that through a smart board so it's direct as opposed to through the computer, through the projector, through the distance, and then… So…

A: That would open up a LOT of opportunities for things like that. We talked about that as a company too. We have a [INAUDIBLE at 1:09:23] that happens, what do we do now? First of all, we go in there, we check to see what are things that are around there that may compromise the mess we're trying to get through. We take our video, we take our snapshots, we send it to somebody, they go through, they take a look at it, they edit it, they get it down to the folks on exactly what it is we want to say, then we send it out. It's now been a week or two since that's happened. If we're quick, it might be a couple of days. There are some cases, with some of those things, we have to take that chance and say, "We have to get this out now, people have got to see exactly what happens so that they're not doing the same things on their job. A day or two could be disastrous in some of those cases." You have to forego the…if we're doing everything right, we shouldn't worry about whether there's other safety instance, or safety issues, if we're doing our due diligence, they shouldn't be there. I just see that as one thing that Kiewett's a little reluctant to do that with, and I understand. I do see a huge benefit to being able to do so. Or, like when we have large meetings, when we have our annual meeting every year. Not every piece of that meeting needs to be broadcast to everybody, but there are certain parts of it where, "It would be great if everybody could see this right now as it's going on when it's happening. As opposed to waiting for a month from now to get to that conversion.

Q: So you don't broadcast your meeting live anywhere?

A: No, two years ago they were thinking about doing that. And then, because there's so much stockholder information that's provided during that time, they drew back from, because they were just a little bit cautious about, "Gosh, if we throw that out there, and somebody hacks into it…" We were all set up to go with that, literally almost until the last minute. W were warming up and ready to kick it off they said, "No, we're not going to do it"

Q: It would be interesting, expect for that information to be able to broadcast meetings.

A: It was kind of one of those things from the beginning where we were, "Gee whiz, it would be really neat to be able to do this." And nobody really thought through that whole aspect of it. And, so, I think what they need to do is they need to go back and revisit that. Instead, they need to say, this would be something that could be broadcast, this would be something that would be ok to broadcast, but not this, and not this. They can get that later on. I do think they could be a little more judicious as far as what it is they allow people to see. We had last year, we did something completely new, which would have been absolutely fabulous for people who couldn't come there to be able t go. They had kind of an expo. So, they had our annual meeting going on at Century Link, and we had our Expo going on at the Civic Center, so we had some vendors that came in, but a lot of it was just people from our different districts that were doing something really neat or cool, well bring it in and share it with the rest of us. That would have been awesome to have people with a camera or camera's going around to that expo and

showing different things as far as what's going on. It would have been an effective way to show those great practices as opposed to, well, five people from your district, hopefully they saw that and can come back and relay all of that back to them. That was the biggest part, people said they really loved it. It would have been nice to have some of that live.

Supplemental Interview Questions for Students (Phase I)

- What was your overall impression of NUVIEW as a system for delivering distance education?
    - Did you feel more remote while in either classroom?
    - Did it help you to learn?
    - Did you enjoy it?
    - How was it different being in the remote classroom from the contiguous classroom?
- Given the choice between being in an interactive classroom or not, which would you choose and why?
    - Have you been in any other interactive classrooms? What were they like?
    - Do you enjoy interacting with students during class? Why or why not?
    - What facets of taking a class with an interactive instructive do you like and dislike and why?
- Do you feel that NUVIEW facilitated or hindered interaction between students in both classes?
    - Did you feel like interacting with students in the other classroom?
    - Did NUVIEW facilitate dialogue between you and students in the other classroom?
    - Was the sidewall projection of the other students a distraction during class?
- Do you feel that NUVIEW facilitated or hindered interaction between students and the instructor?
    - What specifically made you feel that way about it?
    - Did the front wall projection in the remote classroom facilitate or hinder dialogue between students in that room and the instructor?
- What methods or technology would you change or add to NUVIEW to improve its effectiveness and why?
    - Regarding the sidewall projections, the front wall projection, the sound, the video
- If you were given an option to take another class using NUVIEW, would you do so and why?
- If you were given an option to take another class using NUVIEW would you prefer to be in the remote room or the contiguous room and why?
    - What do you see as being the benefits of being in one room over the other?
    - What do you see as being the detriments of being in one room over the other?
- If you were given an option to take another class using NUVIEW would you recommend that your friends do the same and why?

    - Is it something worthwhile you would want your friends to experience?
- Is it something you might enjoy more if you had your friends in the class?
- If you had to take another distance education class would you prefer to use NUVIEW or another delivery system, which system would it be and why?
    - Would you prefer synchronous over asynchronous and why?
    - Would you prefer online versus video conferencing and why?
- If you had the option between taking a distance education using NUVIEW or taking the class as a non-distance education class, which would you choose and why?
    - Do you prefer being in a smaller classroom with fewer students?
    - Was there something about the NUVIEW class, which disturbed you?

Invoice for Phase I Equipment

P.O. Number	Terms	Rep	Ship	Via	F
450025115/01/31/...	Net 30	DK	3/2/2012		

Quantity	Item Code	Description
2	M-300W	WXGA, LCD, 3000 Lumen Projector w/2000:1 Contrast with IRIS, 10W speaker, HDMI Input, USB Display/Viewer Capability
2	NP-PA550W	WXGA LCD, 5500 Lumen Integration Projector 2000:1 Contrast (with iris), Center lens design, HDMI, 2 analog RGB Inputs, DisplayPort Input,
4	RPMAU	Projector Ceiling Mounts
4	CMS440	Above Ceiling Mounting Hardware
4	HDT-470	HD CCTV Cameras with SDHDI Video outputs
4	DV10X7B-SA2	Lens for Speco CCTV Camera
4	HDUTY SDI-HDMI	SDI to HDMI Converter
2	42-120-13	FlatField full range speakers Sold in Pairs
1	280A	Audio Amplifier
1	Nexia CS	Audio Mixer DSP
1	Volume 8	Volume Control Panel
1	60-804-01	ASA 141 Audio Summing adapter
4	PZM-11	Ceiling Boundary Microphones
1	60-1026-81	IPL 250 Controller
1	60-1077-02	TLP350MV Touch Panel Controller

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P.O. Number	Terms	Rep	Ship	Via	
450025115/01/31/...	Net 30	DK	3/2/2012		

Quantity	Item Code	Description
1	60-1098-02	Touch Panel desk stand
1	V462	46" LCD Monitor
4	CWM	Camera Wall Mounts
1	Cables and Connect...	Cables and Connectors
1	Programming	Programming
1	TS318SU	Medium THINSTALL™ Dual Swing Arm Wall Mount - 18" Extension
1	NP13ZL	NEC 1.5-3.0:1 Zoom Lens
1	Installation	

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Phase III Equipment Invoice

Customer P.O.	Ship Via	Due Date	
4500258470	BEST	10/31/2012	DUE

Item	Description	Qty Open	Qty Shipped	Pri
LC-70LE640U	Sharp 70" LED Display		3.00	
	H209853214 H209853215 H209853216			
PAC715	CHIEF VIDEO CONFERENCING 9 INCH CAMERA SELF		2.00	
CVA 3200 16 BULK	COVID BULK CABLE (2) 16 AWG COND PLENUM		700.00	
COM 3400 BULK	COVID BULK CABLE (2) 18 AWG (1) 22 AWG P		28.00	
C2N-IO	Crestron Control Port Expansion Module		8.00	
C2N-HBLOCK	CRESTRON MULTI-TYPE DISTRIBUTION BLOCK		2.00	
CM42-EZs-II-WH	SOUNDTUBE 4" CEILING SPEAKERS, WHITE		8.00	

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4500258470	BEST	10/31/2012	DUE

Item	Description	Qty Open	Qty Shipped	P
CSP 3200 22 BULK	COVID 22-AWG PLENUM SHIELDED TWISTED		354.00	
CAT 3800 5EF BULK	COVID BULK CABLE CAT 5E SHIELDED PLENUM		700.00	
MC2E	Crestron Ethernet Control System		2.00	
910-001-013-W	CLEARONE White Ceiling Microphone Array kit including white microphone array, white ceiling mounting base, 12" white drop-down cable, 24" white drop-down cable, 25' RJ-45 plenum rated cat 5 cable, RJ45 receptacle to mini-phoenix mixer adaptor cable		4.00	
NEXIA VC	BI-AMP VC DSP AUDIO PROCESSOR		2.00	
VP-CSP 1455-06	COVID 2 RCA(M) TO 2 RCA(M) 6'		4.00	

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Item	Description	Qty Open	Qty Shipped	P
VP-CSP 1222-06	COVID 3.5MM STEREO TO 3.5MM STEREO		4.00	
MIC-MB-10	COVID XLR (F) TO 6' BLUNT END		4.00	
HD 28-06-M	COVID NON PLENUM HDMI 6' CABLE		6.00	
HD 28-03-M	COVID NON PLENUM HDMI 3' CABLE		4.00	
PT-571	KRAMER HDMI OVR TWSTED PAIR TRANS UTP CA		4.00	
PT-572+	KRAMER HDMI TWISTED PAIR RECEIVER		4.00	
SFG-1	RAXXESS STEEL FLANGED PANEL-1 SPACE		12.00	

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Item	Description	Qty Open	Qty Shipped	F
PL-8C	FURMAN RACK MOUNT POWER CONDITIONER		4.00	
1R0001-BA-X-A-CCS7	COVID 1 RU FLAT, BLACK ANOD; LOGO SILK SCREEN, TELEPHONE NEBRASKA/IOWA CCS		2.00	
UNS-1	RAXXESS UNIVERSAL SHELF - 1 SPACE (Q.D.E		2.00	
MC-HD-03-M	COVID MICRO HDMI CABLE M?M 3'		4.00	
SDR-2	RAXXESS SLIDING DRAWER-2 SPACES		2.00	
NE1F2028	Raxxess 28" 20U Rack		2.00	
NAC25H	CHIEF 2.5" HEAVY DUTY RACK CASTERS		2.00	
TBL	RAXXESS L SHAPED TIE BAR (Q.D.E)		16.00	

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Item	Description	Qty Open	Qty Shipped	P
NE1D20F	Raxxess 20U Rack Door		4.00	
RK-4PT	KRAMER RACK ADAPTOR FOR 4 PICO TOOLS		2.00	
535-2000-217	VADDIO MODEL HD THIN PRO WALL BRACKET		2.00	
MATERIALS	Installation Materials		1.00	
INSTALLATION	Installation Services		1.00	
PROGRAMMING	System Programming		1.00	
Engineering	Engineering		1.00	
SHIPPING	Shipping and Handling		1.00	

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Item	Description	Qty Open	Qty Shipped	P
XTMU	CHIEF UNVSL TILT WALL MOUNT FOR 55 -75		1.00	
PT-571	KRAMER HDMI OVR TWSTED PAIR TRANS UTP CA		3.00	
PT-572+	KRAMER HDMI TWISTED PAIR RECEIVER		3.00	
RK-4PT	KRAMER RACK ADAPTOR FOR 4 PICO TOOLS		2.00	
TPMC-9-B-T	CRESTRON Isys® 9" Tilt Touch Screen, Black Textured; includes TPS-6X-IMCW & PW-2407WU		2.00	
PWRUB	CHIEF LARGE FLAT PANEL SWING ARM WALL MOUNT- 25" EXTENSION		2.00	
QMAMP3X80SR	Crestron Audio Amplifier		1.00	

PLEASE REMIT TO:
11041 "O" Street
Omaha, NE 68137

NuView System - C20

Subtota

Sales Ta:

CCS Federal Tax ID :

Payment/Credit Amoun

Balance

Invoices subject to 1 1/2% Interest charge per month if not paid within terms. Returns are subject to a 15% restocking fee.

CCS This information is confide privileged. It is intended so

Customer P.O.	Ship Via	Due Date	
4500258470	BEST	10/31/2012	DU

Item	Description	Qty Open	Qty Shipped	F
SFG-1	RAXXESS STEEL FLANGED PANEL-1 SPACE		2.00	
PSC-1	Raxxess Perforated Security Cover-1 Spac		4.00	
SFT-1	RAXXESS STEEL FLAT PANEL 1 SPACE (Q.D.E)		3.00	
W1152-CA-P-A	COVID SINGLE GANG WALL PLATE W 1" HOLES		3.00	
MISC	Miscellaneous		1.00	
L-QSC20-DD	Cisco C20 System, 1 Year Service Agreement Cisco C20 Dual Display Option		1.00	
L-QS-PAK	Cisco Electronic Delivery PAK		1.00	

PLEASE REMIT TO:
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Appendix D – IRB Documents

Phase I Documents

Script for Recruitment of Students into the Study

Script for Interviewees

Interview Questions

Informed Survey and Questionnaire Consent Form

Informed Interview Consent Form

Informed Consent Form

Email to Students Selected to be Interviewed

Confidentiality Agreement for Transcription Serivces

List of Periodic Questions

Phase II and III Documents

NU Photo Release

Email to Students Selected to be Interviewed Phase II

Informed Consent Form Phase II

Informed Focus Group Consent Form Phase II

Informed Interview Consent Form Phase II

Interview and Focus Group Questions Phase II

Script for Focus Group Participants Phase II

Script for Interviewees Phase II

Script for Original Recruitment Phase II

NUVIEW Script for Recruitment of Students into the Study

Hi, my name is Brett Meyer and I will be working with your instructor, Professor Bernstein, in this class on a research study I would like to tell you about. The college has installed a new distance learning system that is called NU Virtual Interactive Educational Walls (NUVIEW) and is designed to facilitate interaction between students in remote classrooms and between students in both classrooms and the instructor. The equipment is designed to function as follows.

There is a camera placed on the sidewall of each classroom that will capture the images of the students in one classroom broadcasting it to the other. Each classroom will also have a projector that will be mounted to project the incoming student images onto the sidewall. The intent of these projections is to give the appearance that students in the remote classroom are actually sitting side-by-side with the students in the contiguous classroom and vice versa. With microphones and speakers mounted in the ceiling, students in each classroom should be able to hear and see everything going on in both classrooms, simulating the feeling that all of the students are together in one classroom. This means students in one classroom will actually be able to see, hear, and talk with students in the other classroom at all times during class.

The second major function of the NUVIEW system is to convey all information that is being relayed by the instructor at the front of the contiguous classroom to the front of the remote classroom at a ratio of 1:1. This will be accomplished by using a single camera that will capture everything occurring in the front of the contiguous classroom and broadcasting it to a projector that will project the image to the front of the remote classroom. In this way, students will be able to see the instructor, what is being written on the white board, and what is being projected digitally onto the front wall of the contiguous classroom. With the microphones and speakers in place, the students will be able to hear and see everything the professor is saying and doing.

The concept of the NUVIEW classroom system is to prevent students in remote classrooms from feeling remote. Whether students are in the contiguous classroom or the remote classroom, they should feel they have the same access to each other and to the instructor at all times during the class. Having equal access to each other and the instructor should facilitate interaction in the classroom, which the investigators feel is the best way for students to learn, and instructors to teach. The purpose of this study is to see if NUVIEW actually does facilitate this interaction between remote locations.

As part of the study, you will be asked for your opinions relating to the operation of NUVIEW, whether you feel it does facilitate interaction, and what suggestions you might have for its continued use and improvement. You will not be asked questions about the teaching style or ability of your instructor, except where it directly relates to the use of NUVIEW. Your ability to learn or comprehend the information will not be called into question. You will only be asked whether you were able to receive the information equally from both classrooms. The testing will commence starting with the next class period and will continue through to the end of the semester.

You will not be coerced in any way to participate in this study, although your participation is welcome and will be greatly appreciated. The data for this study will be collected through two surveys, a set of questionnaires, and from individual interviews. A short survey will be administered after this presentation, which should take no more than 15 minutes of your time. After each class, you will be asked one or two questions pertaining to the operation and effect of NUVIEW for that day. Each of these questionnaires should only take 1 – 5 minutes each. At the end of the semester, another survey will be administered, which again should take less than 15 minutes to complete. All of the surveys and questionnaires will be administered on line. Your identities will be kept anonymous at all time. At the end of the semester, you will be asked if you would like to participate in an interview with me. This interview will take about an hour during which time I will ask you questions about your experience with NUVIEW and will give you the opportunity to openly express your opinions about its effectiveness and how you think it could be improved.

Your decision to participate in this study will not affect your grades or your standing in this class, in the college, or with the university in any way. I will be the only person who knows your identity and whether you have selected to participate or not. Your instructor will not ever know whether you participated or not and he will not see any of the data until after the semester is over and the grades have been posted. All of your interactions with the study will be through me directly, and no one else. If you agree to participate, you may select to opt out at any time with no consequences. Only those students, who agree to participate, and sign the consent form, will be given access to the on-line surveys and questionnaires. Access to each questionnaire will only be open for 24 hours. In the interest of communicating the data while it is still fresh in your mind we ask that you respond to the questionnaires as quickly after the end of class as possible.

If you have any questions, please ask me now or at any time during the semester. *(Side note: After all questions have been answered, Stuart will leave the room and Brett will hand out the consent forms.)* I will now pass out the consent forms. After reading the form, if you would like to participate, please print your name legibly, sign and date it, and return it me. I would ask that everyone stay in their seats, whether they agree to participate or not, until I have collected all of the consent forms. In this way, there will be no indication of who agreed to participate or not, and even your peers will not know which you decided to do.

NUVIEW Script for Recruitment of Students for Interviews

Hi. Stuart and I would like to extend our sincere thanks to all of the students in the class for your patience and understanding during this study. We have come a long way since starting the study, and we are looking forward to analyzing the data that the participants have provided us. Regardless of whether you opted to participate in the study, your participation in the class has made this a remarkable experience for all of us. Potentially, because of the unique nature of NUVIEW and the fact it has never been implemented before, this could have been a potentially disruptive element in the class. On the contrary, though, you have made this a very positive and enlightening test for us all.

We feel the best way for us to gather as much valuable data as possible would be to talk with each of you individually, giving you the opportunity to express in your own words how you have feel about NUVIEW and its effectiveness. While nothing would give me more pleasure than to interview each one of you, that would be difficult and time consuming since each interview is intended to last for approximately one hour, and has to be transcribed verbatim. For this reason, we have decided to only interview six students. The participants will be selected at random from all of the students who volunteer to participate and sign the consent form.

Your responses given during the interviews will be kept strictly confidential. Nobody except me will know your identity. After the interviews are complete, I will deliver them to the transcriber, who will type them up verbatim providing you and any other students mentioned in the interview with aliases. After she has completed the transcriptions, the recordings will be destroyed and the typed manuscripts will be delivered back to me. I will then wait until the semester is ended and all grades have been submitted before sharing the manuscripts with Professor Bernstein. Your name and identity will not be disclosed at any time to anyone else. However the data may be seen by Ethical Review Committees and may be published in journals, at conferences, and elsewhere without giving your name or disclosing your identity, and no one will be able to determine your identity at any time. Mr. Bernstein will not know whether you participated or not at any time.

At any time before or after the interviews begin, you may feel free to ask me questions about the process and may select to opt out at any point. If the interview has already begun, you will be given the option of letting us use the completed portion or not. Before sitting down to the interview, you may feel free to share your opinions with your classmates, as well as solicit them for theirs. If you are not selected as one of the interviewees, but feel you have something you want to discuss with me relating to NUVIEW, you may feel free to contact me at which time you can express to me whether you want our conversation to be on record or not.

Thank you again. (*Stuart will now leave the room.)* I will now hand out the consent forms and ask you to print your name, then sign and date the form if would like to be considered for an interview. I ask that everyone remain in their seats until all of the

forms have been collected so there will be no indication of who has agreed to participate. If you are one of the students who are selected at random to participate, I will send you an email later today asking you to respond with available times and dates.

Student Interview Questions

The interview will consist of open ended questions that are designed to solicit the students' honest opinions of effectiveness of NUVIEW in distance education. The interview questions are in **bold font** followed by sub questions that will be used if it is necessary to prompt the interviewees further:

1. **What was your overall impression of NUVIEW as a system for delivering distance education?**
    1. Did you feel more remote while in either classroom?
    2. Did it help you to learn?
    3. Did you enjoy it?
    4. How was it different being in the remote classroom from the contiguous classroom?
2. **Given the choice between being in an interactive classroom or not, which would you choose and why?**
    1. Have you been in any other interactive classrooms? What were they like?
    2. Do you enjoy interacting with students during class? Why or why not?
    3. What facets of taking a class with an interactive instructive do you like and dislike and why?
3. **Do you feel that NUVIEW facilitated or hindered interaction between students in both classes?**
    1. Did you feel like interacting with students in the other classroom?
    2. Did NUVIEW facilitate dialogue between you and students in the other classroom?
    3. Was the sidewall projection of the other students a distraction during class?
4. **Do you feel that NUVIEW facilitated or hindered interaction between students and the instructor?**
    1. What specifically made you feel that way about it?
    2. Did the front wall projection in the remote classroom facilitate or hinder dialogue between students in that room and the instructor?
5. **What methods or technology would you change or add to NUVIEW to improve its effectiveness and why?**

1. Regarding the sidewall projections, the front wall projection, the sound, the video

6. **If you were given an option to take another class using NUVIEW, would you do so and why?**

7. **If you were given an option to take another class using NUVIEW would you prefer to be in the remote room or the contiguous room and why?**
    1. What do you see as being the benefits of being in one room over the other?
    2. What do you see as being the detriments of being in one room over the other?

8. **If you were given an option to take another class using NUVIEW would you recommend that your friends do the same and why?**
    1. Is it something worthwhile you would want your friends to experience?
    2. Is it something you might enjoy more if you had your friends in the class?

9. **If you had to take another distance education class would you prefer to use NUVIEW or another delivery system, which system would it be and why?**
    1. Would you prefer synchronous over asynchronous and why?
    2. Would you prefer online versus video conferencing and why?

10. **If you had the option between taking a distance education using NUVIEW or taking the class as a non-distance education class, which would you choose and why?**
    1. Do you prefer being in a smaller classroom with fewer students?
    2. Was there something about the NUVIEW class, which disturbed you?

Signed Survey and Questionnaire Consent Document

Title of Research:
NUVIEW: A Distance Education Classroom Designed to Enhance Interactivity Among Instructor and Learners

Purpose of Research:
The purpose of this study is to learn the opinions of the students and the instructor in CNST 3790 regarding the effectiveness of NUVIEW in facilitating classroom interaction among students and the instructor. You must be 19 years of age or older and in order to participate in this research.

Procedures:
Data will be collected using a brief survey at the beginning of the project, questions asked after each class, and a brief survey at the end of the semester. You may opt to cease participation at any time. Participation in this study will require approximately 15 minutes for each survey and 1 – 5 minutes at the end of each class for each questionnaire, all of which will be administered on-line . You will be asked your opinions relating to the effectiveness of NUVIEW to facilitate interaction in the classroom.

Risks and/or Discomforts:
There are no risks or discomforts involved in this study.

Benefits:
The results of this study will influence future uses and developments of NUVIEW in the classroom.

Confidentiality:
Your responses to the surveys and questionnaires will be kept anonymous. Nobody except the principal investigator and the classroom observer will have any access to it. Your name and identity will not be disclosed at any time. However the data may be seen by Ethical Review Committees and may be published in journals, at conferences, and elsewhere without giving your name or disclosing your identity. Survey and questionnaire data will be kept on a secure server and no one will be able to determine your identity at any time. Your instructor for this class will not know whether you participated or not at any time.

Opportunity to Ask Questions:
You may ask any questions concerning this research at anytime by contacting Stuart Bernstein, 402-554-3274. You may also contact Dr. James O'Hanlon, 402-472-5310, johanlon@unlserve.unl.edu, or Brett Meyer, 402-554-3333, bmeyer5@unl.edu. .If you would like to speak to someone else, please call the Research Compliance Services

Office at 402-472-6926 or irb@unl.edu.

Freedom to Withdraw:
Participation in this study is voluntary. You can refuse to participate or withdraw at any time without harming your relationship with the researchers or the University of Nebraska-Lincoln, or in any other way receive a penalty or loss of benefits to which you are otherwise entitled.

Consent, Right to Receive a Copy:
You are voluntarily making a decision whether or not to participate in this research study. Your signature certifies that you have decided to participate having read and understood the information presented. You will be given a copy of this consent form to keep.
Signature of Participant:

_____ _____

Name of Participate *Signature of Research Participant Date*

Name and Phone number of investigator(s)

Stuart Bernstein
402-554-3274
sbernstein2@unl.edu

James O'Hanlon
402-472-5310
johanlon@unlserve.unl.edu

Brett Meyer
402-554-3333
bmeyer5@unl.edu

Signed Interview Consent Document

Title of Research: NUVIEW: A Distance Education Classroom Designed to Enhance Interactivity Among Instructor and Learners

Purpose of Research:
The purpose of this study is to learn the opinions of the students and the instructor in CNST 3790 regarding the effectiveness of NUVIEW in facilitating classroom interaction among students and the instructor. You must be 19 years of age or older and in order to participate in this research.

Procedures:
Data will be collected at the end of the semester during an interview with Brett Meyer. You will be asked if you are willing to volunteer to be interviewed. Of the students who volunteer to participate in the interview, six will be selected. You may opt to cease participation at any time. Participation in this study will require approximately 1 hour for each interview. You will be asked your opinions relating to the effectiveness of NUVIEW to facilitate interaction in the classroom. Participation in the interviews will take place in the office of Brett Meyer, PKI 112A.

Risks and/or Discomforts:
There are no risks or discomforts involved in this study.

Benefits:
The results of this study will influence future uses and developments of NUVIEW in the classroom.

Confidentiality:
Your responses given in the interviews will be kept confidential. Nobody except the classroom observer will know your identity. Only he, the transcriber, and the principal investigator (PI) will have any access to it. Your name and identity will not be disclosed at any time to the transcriber or the PI. However the data may be seen by Ethical Review Committees and may be published in journals, at conferences, and elsewhere without giving your name or disclosing your identity, and no one will be able to determine your identity at any time. Your instructor for this class will not know whether you participated or not at any time.

Opportunity to Ask Questions:
You may ask any questions concerning this research at anytime by contacting Stuart Bernstein, 402-554-3274. You may also contact Dr. James O'Hanlon, 402-472-5310, johanlon@unlserve.unl.edu, or Brett Meyer, 402-554-3333, bmeyer5@unl.edu. If you

would like to speak to someone else, please call the Research Compliance Services Office at 402-472-6926 or irb@unl.edu.

Freedom to Withdraw:
Participation in this study is voluntary. You can refuse to participate or withdraw at any time without harming your relationship with the researchers or the University of Nebraska-Lincoln, or in any other way receive a penalty or loss of benefits to which you are otherwise entitled.

Consent, Right to Receive a Copy:
You are voluntarily making a decision whether or not to participate in this research study. Your signature certifies that you have decided to participate having read and understood the information presented. You will be given a copy of this consent form to keep.

Signature of Participant:

_____ _____

Name of Participate *Signature of Research Participant* *Date*

Name and Phone number of investigator(s)

Stuart Bernstein
402-554-3274
sbernstein2@unl.edu

James O'Hanlon
402-472-5310
johanlon@unlserve.unl.edu

Brett Meyer
402-554-3333
bmeyer5@unl.edu

NUVIEW: A Distance Education Classroom Designed to Enhance Interactivity Among Instructor and Learners

The following information is an abbreviated version of the presentation you saw in class to help you decide whether you wish to participate in the present study. You should be aware that you are free to decide not to participate or to withdraw at any time without affecting your relationship with this department, the instructor, or the University. Further, the instructor of this course will not know the identities of the participants, so your participation in the study will not affect your grade in any way.

The purpose of this study is to learn the opinions of the students and the instructor in CNST 3790 regarding the effectiveness of NUVIEW in facilitating classroom interaction among students and the instructor.

Data will be collected using a brief survey at the beginning of the project, questions asked after each class, and a brief survey at the end of the semester. At the end of the semester you will be asked again if you are willing to volunteer to be interviewed. Of the students who are willing to participate, six will be selected. By participating in the study through to the conclusion of the data collection process, your name will be entered into a drawing. By participating in the interviews, your name will be added to the drawing a second time increasing your odds of winning.

Do not hesitate to ask the classroom observer questions about the study before agreeing to participate or at any time during the study. We will be happy to share the findings with you after the research is completed. Your name will not be associated with the research findings in any way, and only the classroom observer will know your identity.

There are no known risks and/or discomforts associated with this study. The expected benefit associated with your participation is in knowing that you assisted in the development of a new distance learning technology that will help to decrease the transactional distance in future distance education classes. If this study is later submitted for publication, a by-line will indicate the participation of all students in the class.

Please sign this consent form. You are signing it with full knowledge of the nature and purpose of the procedures. A copy of this form will be given to you to keep.

_____ _____

Signature Date

Dear [name],

Thank you again for volunteering to be interviewed regarding your opinions of NUVIEW and its effectiveness this semester in your CNST 3790 class.

Your name was randomly selected from the group of students to be one of six students I will be interviewing. The interview will last for approximately one hour and will be conducted in my office at PKI 103A. During the interview I will be asking you questions relating to NUVIEW such as your overall impression, whether you feel it facilitated interaction among students and instructor in both locations, what changes would you make to it, and if given the option would you take another class that utilized NUVIEW. You may also feel free to volunteer any other insights or opinions you have regarding the use of NUVIEW.

There are no known risks or discomforts associated with this interview and your responses will be kept anonymous and confidential. I will be the only person who knows your identity. I will be using an audio recorder to record our conversation. After the interview is complete, I will submit it to a professional transcriber who will transcribe our conversation verbatim, sanitizing it to insure your name and identity, and that of your classmates is not revealed to anyone who reads the document. The recording will be destroyed and the sanitized transcription will be given to Professor Bernstein for him to write up the results of his research. The results of the research will be used to further develop how NUVIEW can be used to further facilitate classroom interactions between distant classrooms.

You may ask any questions concerning this research at any time by emailing me at bmeyer5@unl.edu or by phone at 402-554-3333. You may also contact Stuart Bernstein at sbernstein2@unl.edu or 402-554-3274, or Dr. James O'Hanlon at johanlon@unlserve.unl.edu or 402-472-5310. If you would like to speak to someone else, please call the Research Compliance Services Office at 402-472-6926 or irb@unl.edu.

Participation in this study is voluntary. You can refuse to participate or withdraw at any time without harming your relationship with the researchers or the University of Nebraska-Lincoln, or in any other way receive a penalty or loss of benefits to which you are otherwise entitled. If you are still interested in being interviewed please contact me to set up a time that will be convenient for you to meet with me.

Brett Meyer
Multi Media Specialist
Research Project Classroom Observer

NUVIEW Confidentiality Agreement with Transcription Services

I, _____, transcriptionist, agree to maintain full confidentiality in regards to any and all audiotapes and documentation received from Stuart Bernstein or his classroom observer related to his doctoral study entitled NUVIEW: A Distant Education Classroom Designed to Enhance Interactivity Among Instructor and Learners. Furthermore, I agree:

1. To hold in strictest confidence the identification of any individual that may be inadvertently revealed during the transcription of audio-taped interviews, or in any associated documents;

2. To not make copies of any audiotapes or computerized files of the transcribed interview texts, unless specifically requested to do so by Stuart Bernstein or his classroom observer;

3. To store all study-related audiotapes and materials in a safe, secure location as long as they are in my possession;

4. To return all audiotapes and study-related documents to Stuart Bernstein or his classroom observer in a complete and timely manner.

5. To delete all electronic files containing study-related documents from my computer hard drive and any backup devices.

I am aware that I can be held legally liable for any breach of this confidentiality agreement, and for any harm incurred by individuals if I disclose identifiable information contained in the audiotapes and/or files to which I will have access.

Transcriber's name (printed) _____

Transcriber's signature_____

Date _____

List of questions to ask the students during the semester

At least one of the following questions will be delivered to the student after each class, except for question 1, which will be asked each time in addition to the other question. Some questions will be asked more than once during the period the students are in their respective rooms. Students will switch rooms after four weeks to give each student equal time in each location. Your identity will remain anonymous and your responses will have no effect on your grades in this or any other class.

1. Which room were you sitting in today? (this question will be asked each time)
    a. Contiguous
    b. Remote
2. How many times did you directly and intentionally interact with students in the other classroom today?
    a. _____
3. How many times did you directly and intentionally interact with the instructor today?
    a. _____
4. Discuss whether or not NUVIEW was effective in facilitating your interaction with students in the other classroom today.
5. Discuss whether or not NUVIEW was effective in facilitating your interaction with the instructor today.
6. Discuss whether or not the digital media used by the instructor was effectively conveyed to you today.
7. Discuss whether or not the work done on the white board by the instructor was effectively conveyed to you today.
8. Discuss whether or not you think the instructor focused equally on each classroom today.
9. What are your overall perceptions of NUVIEW to date?
10. What suggestions would you have for improving the NUVIEW delivery system?
11. Discuss whether or not you found the NUVIEW equipment today to be an annoyance?
12. Did you feel you were remote from the instructor or from the other students today? Why?
13. Do you feel the NUVIEW configuration helped you to learn in class today?
14. Did the NUVIEW configuration make you feel like interacting today? Why or why not?
15. Did you feel you had the same opportunity to interact with the instructor as students in the other classroom today?

Personal Image Use

I hereby grant to the Board of Regents of the University of Nebraska, its component campuses, its representatives, employees, agents and assigns, the irrevocable and unrestricted right to use, reproduce and publish photographs of me, including my image and likeness as depicted therein, which are identified in Appendix "A" hereto, for editorial, trade, advertising or any other purpose and in any manner and medium; to alter the same without restriction, and to copyright the same. I hereby release the University of Nebraska, its component campuses and its Regents, officers, employees, agents, legal representatives and assigns from any and all claims, actions and liability related to its use of said photographs. IN WITNESS WHEREOF, the undersigned, intending to be legally bound hereby sets their hand and seal the date written below.

General campus photos for promotional purposes

Printed name	
E-mail address	
Telephone number	
FACULTY/POSTDOC/STAFF Department Title	**STUDENTS** Major/Department Expected graduation term Current status ☐ Undergraduate ☐ Masters ☐ Doctoral ☐Other_____ Gender ☐ Male ☐ Female What are you wearing?
Signature & Date	

FOR OFFICE USE Photo shoot location & term

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Email to Students Selected to be Interviewed

Dear [name],

Thank you again for volunteering to be interviewed periodically regarding your opinions of NUVIEW and its effectiveness in your CNST 3780 class during the semester.

Your name was randomly selected from the group of volunteers to be one of four students I will be interviewing. Each interview will last for less than one hour and will be conducted in my office at PKI 103A. During each interview I will be asking you questions relating to NUVIEW such as your overall impression, whether you feel it facilitated interaction, immediacy, and presence among students and instructor in both locations, what changes would you make to it, and if given the option would you take another class that utilized NUVIEW. You may also feel free to volunteer any other insights or opinions you have regarding the use of NUVIEW.

There are no known risks or discomforts associated with these interviews and your responses will be kept anonymous and confidential. I will be the only person who knows your identity. I will be using an audio recorder to record our conversation. After the interviews are complete, I will submit it to a professional transcriber who will transcribe our conversations verbatim, sanitizing them to insure your name and identity, and that of your classmates is not revealed to anyone who reads the document. The recording will be destroyed and the sanitized transcription will be given to Professor Bernstein for him to write up the results of his research. The results of the research will be used to further develop how NUVIEW can be used to further facilitate classroom interactions between distant classrooms.

You may ask any questions concerning this research at any time by emailing me at bmeyer5@unl.edu or by phone at 402-554-3333. You may also contact Stuart Bernstein at sbernstein2@unl.edu or 402-554-3274, or Dr. James O'Hanlon at johanlon@unlserve.unl.edu or 402-472-5310. If you would like to speak to someone else, please call the Research Compliance Services Office at 402-472-6926 or irb@unl.edu.

Participation in this study is voluntary. You can refuse to participate or withdraw at any time without harming your relationship with the researchers or the University of Nebraska-Lincoln, or in any other way receive a penalty or loss of benefits to which you are otherwise entitled. If you are still interested in being interviewed please contact me to set up a time that will be convenient for you to meet with me.

Brett Meyer
Multi Media Specialist
Research Project Classroom Observer

NUVIEW: A Distance Education Classroom Designed to Enhance Interaction, Immediacy, and Presence Among Instructor and Learners

The following information is an abbreviated version of the presentation you saw in class to help you decide whether you wish to participate in the present study. You should be aware that you are free to decide not to participate or to withdraw at any time without affecting your relationship with this department, the instructor, or the University. Further, the instructor of this course will not know the identities of the participants, so your participation in the study will not affect your grade in any way.

The purpose of this study is to learn the opinions of the students and the instructor in CNST 3780 regarding the effectiveness of NUVIEW in facilitating classroom interaction, immediacy, and presence among students and the instructor.

Data will be collected using a series of interviews conducted every other week. Of the students who are willing to participate in the interviews, four will be selected at random. Three focus groups will be conducted at five-week intervals. Of the students who are willing to participate in the focus groups eight will be selected at random.

Do not hesitate to ask the classroom observer questions about the study before agreeing to participate or at any time during the study. We will be happy to share the findings with you after the research is completed. Your name will not be associated with the research findings in any way, and only the classroom observer will know your identity.

There are no known risks and/or discomforts associated with this study. The expected benefit associated with your participation is in knowing that you assisted in the development of a new distance learning technology that will help to decrease the transactional distance in future distance education classes. If this study is later submitted for publication, a by-line will indicate the participation of all students in the class.

Please sign this consent form. You are signing it with full knowledge of the nature and purpose of the procedures. A copy of this form will be given to you to keep.

_____ _____

Signature Date

Signed Focus Group Consent Document

Title of Research: NUVIEW: A Distance Education Classroom Designed to Enhance Interaction, Immediacy, and Presence Among Instructor and Learners

Purpose of Research:
The purpose of this study is to learn the opinions of the students and the instructor in CNST 3780 regarding the effectiveness of NUVIEW in facilitating classroom interaction, immediacy, and presence among students and the instructor. You must be 19 years of age or older and in order to participate in this research.

Procedures:
Data will be collected during the semester during focus groups with Brett Meyer conducted three times during the semester at five-week intervals. You will be asked if you are willing to volunteer to participate in the focus groups. Of the students who volunteer to participate in the focus groups, four to eight students will be selected for each group. You may opt to cease participation at any time. Participation in this study will require no more than 1 hour for each focus group. You will be asked your opinions relating to the effectiveness of NUVIEW to facilitate interaction in the classroom. Participation in the focus groups will take place in Conference Room, PKI 100.

Risks and/or Discomforts:
There are no known risks or discomforts involved in this study.

Benefits:
The results of this study will influence future uses and developments of NUVIEW in the classroom.

Confidentiality:
Your responses given in the focus groups will be kept confidential. Nobody except the classroom observer will know your identity. Only he, the transcriber, and the principal investigator (PI) will have any access to it. Your name and identity will not be disclosed at any time to the transcriber or the PI. However the data may be seen by Ethical Review Committees and may be published in journals, at conferences, and elsewhere without giving your name or disclosing your identity, and no one will be able to determine your identity at any time. Your instructor for this class will not know whether you participated or not at any time. By keeping your identity confidential, especially from your instructor, your decision to participate or not, and any opinions that you express will in no way be able to affect your grade or standing in this class.

Opportunity to Ask Questions:
You may ask any questions concerning this research at anytime by contacting Stuart

Bernstein, 402-554-3274. You may also contact Dr. James O'Hanlon, 402-472-5310, johanlon@unlserve.unl.edu, or Brett Meyer, 402-554-3333, bmeyer5@unl.edu. If you would like to speak to someone else, please call the Research Compliance Services Office at 402-472-6965 or irb@unl.edu.

Freedom to Withdraw:
Participation in this study is voluntary. You can refuse to participate or withdraw at any time without harming your relationship with the researchers or the University of Nebraska-Lincoln, or in any other way receive a penalty or loss of benefits to which you are otherwise entitled.

Consent, Right to Receive a Copy:
You are voluntarily making a decision whether or not to participate in this research study. Your signature certifies that you have decided to participate having read and understood the information presented. You will be given a copy of this consent form to keep.

Signature of Participant:

_____ _____

Name of Participate *Signature of Research Participant* *Date*

☐By checking this box you also agree to be audio recorded during the focus group.

Name and Phone number of investigator(s)

Stuart Bernstein
402-554-3274
sbernstein2@unl.edu

James O'Hanlon
402-472-5310
johanlon@unlserve.unl.edu

Brett Meyer
402-554-3333
bmeyer5@unl.edu

Signed Interview Consent Document

Title of Research: NUVIEW: A Distance Education Classroom Designed to Enhance Interaction, Immediacy, and Presence Among Instructor and Learners

Purpose of Research:
The purpose of this study is to learn the opinions of the students and the instructor in CNST 3780 regarding the effectiveness of NUVIEW in facilitating classroom interaction, immediacy, and presence among students and the instructor. You must be 19 years of age or older and in order to participate in this research.

Procedures:
Data will be collected during the semester during interviews with Brett Meyer conducted every other week. You will be asked if you are willing to volunteer to be interviewed. Of the students who volunteer to participate in the interview, four will be selected. Each pair of students will be interviewed on alternate weeks during the semester, totaling 7 – 8 interviews per pair. You may opt to cease participation at any time. Participation in this study will require no more than 1 hour for each interview. You will be asked your opinions relating to the effectiveness of NUVIEW to facilitate interaction in the classroom. Participation in the interviews will take place in the office of Brett Meyer, PKI 112A.

Risks and/or Discomforts:
There are no known risks or discomforts involved in this study.

Benefits:
The results of this study will influence future uses and developments of NUVIEW in the classroom.

Confidentiality:
Your responses given in the interviews will be kept confidential. Nobody except the classroom observer will know your identity. Only he, the transcriber, and the principal investigator (PI) will have any access to it. Your name and identity will not be disclosed at any time to the transcriber or the PI. However the data may be seen by Ethical Review Committees and may be published in journals, at conferences, and elsewhere without giving your name or disclosing your identity, and no one will be able to determine your identity at any time. Your instructor for this class will not know whether you participated or not at any time. By keeping your identity confidential, especially from your instructor, your decision to participate or not, and any opinions that you express will in no way be able to affect your grade or standing in this class.

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You are voluntarily making a decision whether or not to participate in this research study. Your signature certifies that you have decided to participate having read and understood the information presented. You will be given a copy of this consent form to keep.

Signature of Participant:

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Name of Participate *Signature of Research Participant* *Date*

☐By checking this box you also agree to be audio recorded during the focus group.

Name and Phone number of investigator(s)

Stuart Bernstein
402-554-3274
sbernstein2@unl.edu

James O'Hanlon
402-472-5310
johanlon@unlserve.unl.edu

Brett Meyer
402-554-3333
bmeyer5@unl.edu

Questions to ask during the interviews and focus groups

Mutual attention and support

Did you respect the other students' opinions regarding issues raised in class.
When they were in your classroom.
When they were in the other classroom.
Did you feel the other students respected your opinions regarding issues raised in class.
When they were in your classroom.
When they were in the other classroom.
Did what the others did and said affect what you did or said.
When they were in your classroom.
When they were in the other classroom.
Did you find you had problems concentrating on your classroom discussions.
When they were in your classroom.
When they were in the other classroom.
Did you pay close attention to the other students.
When they were in your classroom.
When they were in the other classroom.

Affective connectedness

Were you able to be personally close to other students in the class.
With those in your own classroom.
With those in the other classroom.
Did you enjoy sharing personal stories about NUVIEW with the other students from your class.
Did you enjoy sharing personal stories about NUVIEW with people from outside of the class.
Did you get to learn a great deal about the other students in the class.
Mostly with the students in your own classroom.
Equally with students in both classrooms.
Were you influenced by the other students' moods.
In your own classroom.
In the other classroom.
Did you call the other students by their names.
In your own classroom.
In the other classroom.

Sense of Community

Even though you were not physically together in a traditional classroom, did you still feel you were part of a single group.
Even though you were not physically together in a traditional classroom, did you feel the other students felt they were part of the same group as you.
Did you feel you were able to develop a sense of community.
Within your own classroom.
With students in the other classroom.
Did you feel the other students tried to form a sense of community.
Within their own classroom.
With students in the other classroom.
Did you work with the other students to answer questions and complete in class assignments.
Within your own classroom.
With students in the other classroom.

Distant classroom

Did you feel you were at a disadvantage being in the distant classroom
Were you able to overcome that disadvantage and how
Do you think the other students in the distant classroom with you felt the same way
Did that bring you closer with the students in your classroom
Do you think you were able to create a strong sense of community within your classroom as a result

Open communication

Did you feel the other students acknowledged your point of view.
Within your own classroom.
With students in the other classroom.
Did you feel your opinions were clear to the other students.
Within your own classroom.
With students in the other classroom.
Did you enjoy engaging in exchanges of ideas with the other students.
Within your own classroom.
With students in the other classroom.
Were you able to easily understand how the other students reacted to your comments.
Within your own classroom.
With students in the other classroom.

NUVIEW Technology

Do you feel the audio technology used in the NUVIEW classroom facilitated student-to-student interaction between the students in the two different classrooms?

Do you feel the sidewall video projection used in the NUVIEW classroom facilitated student-to-student interaction between the students in the two different classrooms?

Do you feel the front wall monitors broadcasting the student images used in the NUVIEW classroom facilitated student-to-student interaction between the students in the two different classrooms?

Do you feel the instructor demonstrated immediacy between himself and the students in the contiguous classroom?

Do you feel the front wall projection, of the instructor, facilitated immediacy between the instructor and the students in the remote classroom?

Do you feel the instructor facilitated a sense of social presence in the contiguous classroom?

Do you feel the front wall projection, of the instructor, facilitated a sense of social presence in the remote classroom?

Do you feel the student projections in each classroom facilitated a sense of social presence between students in each classroom?

NUVIEW Script for Recruitment of Students for Focus Groups

Hi, Stuart and I would like to thank you all in advance for your participation in this groundbreaking research. Whether you intend to participate in the interviews or the focus groups, your participation in the class itself will be very valuable to the outcome of this experiment. However, Stuart and I are both hoping that you will want to participate in the interviews, the focus groups, or both.

We feel the best way for us to gather as much valuable data as possible would be to conduct focus groups, giving you the opportunity to express in your own words how you have feel about NUVIEW and its effectiveness. The focus groups will give us the opportunity to bring a group of students together in one room where they can all be asked the same questions at the same time. This type of platform provides you the opportunity to speak freely in front of your peers, to build on, or disagree with, what they are saying, much the same way we conduct discussions during class. Only eight students will be selected for each focus group. We plan to conduct three focus groups during the semester spaced five weeks apart. The participants will be selected at random from all of the students who volunteer to participate and who sign the consent form.

The responses given during the focus groups will be recorded and will be kept strictly confidential. Nobody except me will know your identity. After the focus groups are complete, I will deliver them to the transcriber, who will type them up verbatim providing you and any other students mentioned during the focus groups with aliases. After she has completed the transcriptions, the recordings will be destroyed and the typed manuscripts will be delivered back to me. I will then wait until the semester is ended and all grades have been submitted before sharing the manuscripts with Professor Bernstein. Your name and identity will not be disclosed at any time to anyone else. However the data may be seen by Ethical Review Committees and may be published in journals, at conferences, and elsewhere without giving your name or disclosing your identity, and no one will be able to determine your identity at any time. Mr. Bernstein will not know whether you participated or not at any time.

At any time before, during, or after the focus groups begin, you may feel free to ask me questions about the process and may select to opt out at any point. If any focus group has already begun, you will be given the option of letting us use the completed portions or not. Before sitting down in the focus groups, you may feel free to share your opinions with your classmates, as well as solicit them for theirs. If you are not selected to participate in a focus group, but feel you have something you want to discuss with me relating to NUVIEW, you may feel free to contact me at which time you can express to me whether you want our conversation to be on record or not.

Thank you again. I will now hand out the consent forms and ask you to print your name, then sign and date the form if would like to be considered for participation in the focus group. I ask that everyone remain in their seats until all of the forms have been collected so there will be no indication of who has agreed to participate. If you are one of the students who are selected at random to participate, I will send you an email later today asking you to respond with available times and dates.

NUVIEW Script for Recruitment of Students for Interviews

Hi. Stuart and I would like to extend our sincere thanks to all of the students in the class for your patience and understanding during this study. We have come a long way since starting the study, and we are looking forward to analyzing the data that the participants have provided us. Regardless of whether you opted to participate in the study, your participation in the class has made this a remarkable experience for all of us. Potentially, because of the unique nature of NUVIEW and the fact it has never been implemented before, this could have been a potentially disruptive element in the class. On the contrary, though, you have made this a very positive and enlightening test for us all.

We feel the best way for us to gather as much valuable data as possible would be to talk with each of you individually, giving you the opportunity to express in your own words how you have feel about NUVIEW and its effectiveness. While nothing would give me more pleasure than to interview each one of you, that would be difficult and time consuming since each interview is intended to last for approximately one hour, and has to be transcribed verbatim. For this reason, we have decided to only interview six students. The participants will be selected at random from all of the students who volunteer to participate and sign the consent form.

Your responses given during the interviews will be kept strictly confidential. Nobody except me will know your identity. After the interviews are complete, I will deliver them to the transcriber, who will type them up verbatim providing you and any other students mentioned in the interview with aliases. After she has completed the transcriptions, the recordings will be destroyed and the typed manuscripts will be delivered back to me. I will then wait until the semester is ended and all grades have been submitted before sharing the manuscripts with Professor Bernstein. Your name and identity will not be disclosed at any time to anyone else. However the data may be seen by Ethical Review Committees and may be published in journals, at conferences, and elsewhere without giving your name or disclosing your identity, and no one will be able to determine your identity at any time. Mr. Bernstein will not know whether you participated or not at any time.

At any time before or after the interviews begin, you may feel free to ask me questions about the process and may select to opt out at any point. If the interview has already begun, you will be given the option of letting us use the completed portion or not. Before sitting down to the interview, you may feel free to share your opinions with your classmates, as well as solicit them for theirs. If you are not selected as one of the interviewees, but feel you have something you want to discuss with me relating to NUVIEW, you may feel free to contact me at which time you can express to me whether you want our conversation to be on record or not.

Thank you again. (*Stuart will now leave the room.)* I will now hand out the consent forms and ask you to print your name, then sign and date the form if would like to be considered for an interview. I ask that everyone remain in their seats until all of the forms have been collected so there will be no indication of who has agreed to participate. If you are one of the students who are selected at random to participate, I will send you an email later today asking you to respond with available times and dates.

NUVIEW Script for Recruitment of Students for Interviews

Hi, Stuart and I would like to thank you all in advance for your participation in this groundbreaking research. Whether you intend to participate in the interviews or the focus groups, your participation in the class itself will be very valuable to the outcome of this experiment. However, Stuart and I are both hoping that you will want to participate in the interviews, the focus groups, or both.

We feel the best way for us to gather as much valuable data as possible would be to talk with each of you individually, giving you the opportunity to express in your own words how you have feel about NUVIEW and its effectiveness. While nothing would give me more pleasure than to interview each one of you, that would be difficult and time consuming since each interview is intended to last for approximately one hour, and has to be transcribed verbatim. For this reason, we have decided to only interview four students every other week during the semester. The participants will be selected at random from all of the students who volunteer to participate and sign the consent form.

The responses given during the interviews will be kept strictly confidential. Nobody except me will know your identity. After the interviews are complete, I will deliver them to the transcriber, who will type them up verbatim providing you and any other students mentioned in the interview with aliases. After she has completed the transcriptions, the recordings will be destroyed and the typed manuscripts will be delivered back to me. I will then wait until the semester is ended and all grades have been submitted before sharing the manuscripts with Professor Bernstein. Your name and identity will not be disclosed at any time to anyone else. However the data may be seen by Ethical Review Committees and may be published in journals, at conferences, and elsewhere without giving your name or disclosing your identity, and no one will be able to determine your identity at any time. Mr. Bernstein will not know whether you participated or not at any time.

At any time before or after the interviews begin, you may feel free to ask me questions about the process and may select to opt out at any point. If any interview has already begun, you will be given the option of letting us use the completed portions or not. Before sitting down to the interview, you may feel free to share your opinions with your classmates, as well as solicit them for theirs. If you are not selected as one of the interviewees, but feel you have something you want to discuss with me relating to NUVIEW, you may feel free to contact me at which time you can express to me whether you want our conversation to be on record or not.

Thank you again. I will now hand out the consent forms and ask you to print your name, then sign and date the form if would like to be considered for an interview. I ask that everyone remain in their seats until all of the forms have been collected so there will be no indication of who has agreed to participate. If you are one of the students who are selected at random to participate, I will send you an email later today asking you to respond with available times and dates.

NUVIEW Script for Recruitment of Students into the Study

Hi, my name is Brett Meyer and I will be working with your instructor, Professor Bernstein, in this class on a research study I would like to tell you about. The college has installed a new distance learning system that is called NU Virtual Interactive Educational Walls (NUVIEW), which is designed to facilitate interaction between students in remote classrooms and between students in both classrooms and the instructor. The equipment is designed to function as follows.

There is a camera placed on the sidewall of each classroom that will capture the images of the students in one classroom broadcasting it to the other. Each classroom will also have a projector that will be mounted to project the incoming student images onto the sidewall. The intent of these projections is to give the appearance that students in the remote classroom are actually sitting side-by-side with the students in the contiguous classroom and vice versa. With microphones and speakers mounted in the ceiling, students in each classroom should be able to hear and see everything going on in both classrooms, simulating the feeling that all of the students are together in one classroom. This means students in one classroom will actually be able to see, hear, and talk with students in the other classroom at all times during class.

The second major function of the NUVIEW system is to convey all information that is being relayed by the instructor at the front of the contiguous classroom to the front of the remote classroom at a ratio of 1:1. This will be accomplished by using a single camera that will capture everything occurring in the front of the contiguous classroom and broadcasting it to a projector that will project the image to the front of the remote classroom. In this way, students will be able to see the instructor, what is being written on the white board, and what is being projected digitally onto the front wall of the contiguous classroom. With the microphones and speakers in place, the students will be able to hear and see everything the professor is saying and doing.

The concept of the NUVIEW classroom system is to prevent students in remote classrooms from feeling remote or at a disadvantage because of being in a distant location. Whether students are in the contiguous classroom or the remote classroom, they should feel they have the same access to each other and to the instructor at all times during the class. Having equal access to each other and the instructor should facilitate interaction in the classroom, which the investigators feel is the best way for students to learn, and instructors to teach. The purpose of this study is to see if NUVIEW actually does facilitate this interaction between remote locations.

As part of the study, you will be asked for your opinions relating to the operation of NUVIEW, whether you feel it does facilitate interaction, immediacy, and presence, and what suggestions you might have for its continued use and improvement. You will not be asked questions about the teaching style or ability of your instructor, except where it directly relates to the use of NUVIEW. Your ability to learn or comprehend the information will not be called into question. You will only be asked whether you were

able to receive the information equally from both classrooms. The testing will commence starting with the next class period and will continue through to the end of the semester.

You will not be coerced in any way to participate in this study, although your participation is welcome and will be greatly appreciated. The data for this study will be collected from individual interviews and focus groups. Your identities will be kept anonymous at all time. Not all students who volunteer today will end up being selected for the interviews or focus groups. Four student volunteers will be selected at random from the pool of students who volunteer today for the interviewing process. The interviews will each take about an hour during which time I will ask you questions about your experience with NUVIEW and will give you the opportunity to openly express your opinions about its effectiveness and how you think it could be improved. These interviews will occur every two weeks during the semester. Focus groups will be conducted three times during the semester at five-week intervals. Four to eight student volunteers will be selected at random for each focus group.

Your decision to participate in this study will not affect your grades or your standing in this class, in the college, or with the university in any way. I will be the only person who knows your identity and whether you have selected to participate or not. Your instructor will not ever know whether you participated or not and he will not see any of the data until after the semester is over and the grades have been posted. All of your interactions with the study will be through me directly, and no one else. If you agree to participate, you may select to opt out at any time with no consequences. Only those students, who agree to participate, and sign the consent form, will be able to participate in the interviews and focus groups.

If you have any questions, please ask me now or at any time during the semester. I will now pass out the consent forms. After reading the form, if you would like to participate, please print your name legibly, sign and date it, and return it me. I would ask that everyone stay in their seats, whether they agree to participate or not, until I have collected all of the consent forms. In this way, there will be no indication of who agreed to participate or not, and even your peers will not know which you decided to do. Once again, not everyone who volunteers today will be selected to participate in the interviews or focus groups but Professor Bernstein and I would both like to thank you all in advance whether you participate or not.