VICARIOUS INTERACTIONS AND SELF-DIRECTED LEARNING OF STUDENTS BY COURSE DELIVERY STRATEGY

A Dissertation

by

EDMUND THEODORE SEIDEL

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

May 2012

Major Subject: Agricultural Leadership, Education, and Communications

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Approved by:

Chair of Committee,	James Lindner
Committee Members,	Kim Dooley
	Tim Murphy
	Larry Dooley
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ABSTRACT

Vicarious Interactions and Self-directed Learning of Students by Course Delivery Strategy.

(May 2012)

Edmund Theodore Seidel, B.S.; M.S., Texas A&M University

Chair of Advisory Committee: Dr. James Lindner

The critical outcome of education is learning or competency development and the application of new knowledge, skills, and abilities in a variety of settings. This study identified and analyzed Texas A&M University students regarding interaction between learner and other learners, the instructor, the content, and the technology. In addition, satisfaction, quality, and learning are also examined.

The population for this study is students at Texas A&M University. Inferences to other similar populations should be handled with caution as other organizations may differ greatly from this one.

Data was collected using a web-formatted survey (see Appendix A) delivered to the learners using the Internet. An analysis of the data was then conducted as described below using SPSS 18. Potential participants were given the web address and entered their assigned number to confirm consent. Non-response was handled by sending reminders electronically at random intervals.

It may be concluded from the data that the most import interactions are between the learner and the content and between the learners themselves. Despite significant

single order correlation between enhancing interaction and learner to learner, learner to instructor, learner to content, and learner to technology our regression modeling shows the most effective way to predict learning and satisfaction is through student to content interaction. We see the most effective way to predict quality is through student to student interactions. We found no interaction effect between student to instructor interaction and increased learning, quality, or satisfaction. We found no interaction effect between student to technology interaction and increased learning, quality, and satisfaction.

It is our recommendation that in order to achieve increased perceptions of satisfaction, quality, and learning, opportunities for interactions between the learner and the content should be provided. Utilizing and evaluating the technologies of online exercises, online instructional materials, online support materials, and interactive video is a great place to start. Instructors should consider evaluating these and other technologies to insure purposeful use of technologies and appropriateness.

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DEDICATION

I dedicate this document to all the working adult learners out there who strive through great odds to continue their education. Gig'em.

ACKNOWLEDGEMENTS

I would like to thank my committee chair, Dr. James Lindner, and my committee members, Dr. Tim Murphy, Dr. Kim Dooley, and Dr. Larry Dooley for their guidance, support, and encouragement throughout the course of this process and my educational career.

Thanks also go to my friends and colleagues and the department faculty and staff for making my time at Texas A&M University a great experience. I also want to extend my gratitude to the students who were willing to participate in the study.

Finally, thanks to my mother and father for their encouragement and to my wife for her patience and love.

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CHAPTER I

INTRODUCTION AND THEORETICAL FRAMEWORK

A challenge facing implementation of new technologies is skepticism. Black (1992, p. 16) found that "the transition from elite to mass higher education, with its tremendous growth in the numbers of both faculty and students from more diverse backgrounds, results in a greater variety of notions about what university education should be and whom it should serve." In order for faculty to support innovation, it must be considered congruent with the beliefs and values already held about university education (Black, 1992; Rogers, 2003).

One way to focus time and effort, increase effectiveness, and, in turn, decrease skepticism is to study how to interact with students at a distance. Dooley, Lindner, and Dooley (2005) stated "an instructor needs to know how to make the best use of technologies available in order to personalize instruction and actively involve students in the learning experience. Michael Moore (1989) put forth the theory of transactional distance to accomplish this goal.

Moore's (1997) theory of transactional distance states that it is the separation of learner and teacher that greatly affects teaching and learning. This separation creates a psychological and communications space, where misunderstanding can take place. This space is the transactional distance.

This dissertation follows the style of the *Journal of Agriculture Education.*

The transactional distance theory (Moore, 1989) included three types of interaction: learner-to-learner; learner-to-content; and learner-to-instructor and was expanded by Hillman, Willis, and Gunawardena (1994) to include learner-to-technology interaction. Dooley, Lindner, & Dooley (2005) further hypothesize that the greatest amount of learning occurs when all four interactions are constant, overlap, and successful. They coin this as "vicarious interaction" as does Fulford and Zang (1993). Moore (1989) carries forward the idea that a weakness of many education programs is their commitment to only one type of interaction. When only one technology is utilized it is feasible that only one type of interaction is allowed or successful. This agrees with my statement "I think it is important (especially at a distance) to supply the learner with material in many different forms to allow the student to control how they take in the information and thereby being more self-directed." It is also found that increased interactions promote the learners ownership of the material thereby increasing self directedness (Dooley, Lindner, & Dooley, 2005).

The theory of transactional distance is important because it assists the educators in determining what type and how much dialogue must take place when considering the transactional distance between the educator and the learner. It also helps determine the communications media that can be used depending on what is available and in turn the design of the course. These decisions also allow the educator to decide how much autonomy a student will have during the course of instruction.

An advancement in transactional distance theory is the addition of the fourth variable by Hillman, Willis, and Gunawardena (1994). It strengthens the theory by

showing that learner-to-technology interaction is important.

Other variables examined are the student perception of quality, satisfaction, and learning in relation to increased opportunities to interact and specific technologies.

Statement of Problem

Although there is a growing body of literature on the perceptions of teaching faculty at universities towards technology, little research has been reported in the literature assessing the student perception regarding technology especially when used to bridge the gap between instructor and student despite physical proximity. This is what Moore (1997) describes as the transactional distance.

When teaching it may not be possible for the instructor to have a physical a presence thereby increasing transactional distance and decreasing learning outcomes. For this reason alternative means to instructor presence must be researched to determine if these means can compensate to decrease transactional distance and increase learner outcomes.

Some researchers have called into question the reliability of studies confirming Moore's (1989) theory. Gorsky and Caspi (2005) state that "either data only partially supported the theory (Chen 2001a, 2001b: Chen & Willis, 1998) or, that if they apparently did so (Bischoff et al., 1996; Bunker et al., 1996; Saba & Shearer, 1994) the studies lacked reliability and/or construct validity" (p. 2) This research seeks to confirm Moore's theory by testing for learner-to-learner; learner-to-content; and learner-to-instructor interaction using various technologies as well as the students' perception of satisfaction, quality, and overall learning.

Purpose of Study

The purpose of this study was to describe students' level of self-directedness, engagement, and interaction in a course delivered using multiple delivery strategies. The purpose was deduced from and tests Moore's (1989) theory of transactional distance variables with the addition of the learner-to-technology variable by Hillman, Willis, and Gunawardena (1994). We will also ascertain the students' perception of satisfaction, quality, and overall learning.

Objectives

The objectives of the study were to:

1. Describe and explore learner to learner interactions
2. Describe and explore learner to instructor interactions
3. Describe and explore learner to content interactions
4. Describe and explore learner to technology interactions
5. Describe and explore student perceptions of satisfaction in a course, quality of the learner experience, and increases in learning as a result of increased interactions
6. Describe how different elearning technologies can be used to enhance learner to learner interactions, learner to instructor interactions, learner to content interactions, and learner to technology interactions
7. Explore the relationships between learner to learner interactions, learner to instructor interactions, learner to content interactions, learner to technology interactions and satisfaction, quality, and learning

8. Explore the relationships between elearning technologies and satisfaction, quality, and learning

Theoretical Framework

Transactional Distance

Moore (1989) states that it is the separation of learner and teacher that greatly affects teaching and learning. This separation creates a psychological and communications space, where misunderstanding can take place. This space is the transactional distance. For instance, an instructor would feel closer to a distance student with whom he has many conversations over some communications media than to an on campus student that sits in class and never interacts with the professor in any way.

The transactional distance theory (Moore, 1989) included three types of interaction: learner-to-learner; learner-to-content; and learner-to-instructor and was expanded by Hillman, Willis, and Gunawardena (1994) to include learner-to-technology interaction.

Dooley, Lindner, and Dooley (2005) further theorize that maximum learning occurs when all four of these interactions are ongoing, overlap, and successful and term this as “vicarious interaction” as does Fulford and Zang (1993). Moore (1989) carries forward an idea discussed earlier in this paper.

One advancement in transactional distance theory is the addition of the fourth variable by Hillman, Willis, and Gunawardena (1994). It strengthens the theory by showing that learner-to-technology interaction is important. If the learner is not able to interact with the technology then distance education is almost impossible.

Distance Education

For the purpose of this study, the term distance education is defined as when the instructor and learners are separated by location and/or time (Lindner & Murphy, 2001). This separation is what must be overcome when delivering a distance education class. While this definition is general it is the generality that allows it to take in all forms of distance education.

Elearning is a term often associated with distance learning. Elearning is defined by Clark and Mayer (2007) as training delivered on a computer and supports individual learning goals. However, this may be too limiting as some instruction may delivered using other technologies such as television.

Self Directedness

Knowles, Holton, and Swanson's (1998) principle of the learners self concept in addition to the rest of the principles alluded to the self-directedness of adult learners. When the learner feels responsible for their own learning, tie the learning to experience, and are motivated they become self-directed.

Grow's (1991) staged self directed learning model provides a framework to determine the level of self-directedness of the learner and the role the instructor should play to facilitate learning.

Instructional Design Models

There are many models to guide the design of instruction. For the sake of expedience, the behaviorist based models of Dick and Carey (1990), Smith and Ragan (2000), and the ADDIE model will be discussed. The constructivist models of

SCenTRLE (Hirumi, 2002), and the minimalist framework of Carroll (1990) will also be discussed.

The behaviorist models base themselves on the link between stimulus and response, in this case, instructional materials and learning. Dick and Carey (1990) break instruction down to specifically target the knowledge, skills, and abilities to be passed to the student and help select the conditions for learning.

The Smith and Ragan (2000) model breaks down instructional design into three steps: analysis, strategy, and evaluation. According to Dooley, Lindner, and Dooley (2002) the analysis step includes considering the learning environment, learners, learning task, and writing the test items.

The ADDIE model is a general purpose model consisting of five stages: Analyze, Design, Develop, Implement, and Evaluate (Hall, 1997). During the analysis stage some of the needs are examined such as an audience analysis, budget, and due dates. Components of the design stage are selecting the environment, writing instructional objectives, the overall approach, and developing the course content (Driscoll, 1998; Porter, 1997). Creation/collection of media and appropriate interaction for support are acquired during the develop stage (Porter, 1997; Simonson, Smaldino, Albright, & Zvacek, 2003). During the implementation stage the materials and technology are put into use and made available. Preparing for technical problems and researching alternatives are also conveyed during the implementation stage (Simonson et al. 2003). During the last stage, evaluation, assessment and evaluation procedures are determined (Powers, 1997).

The constructivist models of Hirumi (2002) and Carroll (1990) follow a somewhat different approach. Constructivism is stated as “a self regulatory process of struggling with the conflict between existing personal models of the world and discrepant new insights, constructing new representations and models of reality as a human being – making venture with culturally developed tools and symbols, and further negotiating such meaning through cooperative social activity, discourse, and debate” (Fosnot, 1996, p. ix). Hirumi’s (2002) model is termed the SCenTRLE model which stands for Student-Centered, Technology-Rich Learning Environment. The model sets the following eight instructional stages (Tynan, 2005):

- Event 1: Set learning challenge
- Event 2: Negotiate learning goals and objectives
- Event 3: Negotiate learning strategy
- Event 4: Construct knowledge
- Event 5: Negotiate performance criteria
- Event 6: Conduct self, peer and expert assessments
- Event 7: Monitor performance and provide feedback
- Event 8: Communicate results

Jim Carroll’s (1990) minimalist theory is not truly a design model, but the principles involved are important when designing constructivist instruction. "One of the key ideas in the minimalist approach is to present the smallest possible obstacles to learners' efforts, to accommodate, even exploit, the learning strategies that cause problems for learners using systematic instructional materials” (p. 77-78).

Learner centered instructional design is defined by the APA (1997) as any formal or non-formal education that is responsible for a learner's cognitive, metacognitive, motivational, affective, developmental, and social factors as well as individual differences. Dooley, Lindner, and Dooley (2005) define these as follows; cognitive and metacognitive factors include the nature of the learning process, goals of the learning process, construction of knowledge, strategic thinking, thinking about thinking, and context of learning.

Knowledge, Skills, and Abilities

It can be difficult to measure knowledge, skills, and abilities; however, Dooley, Edmundson, and Hobaugh (1997) suggest using the authentic assessment methods of the three P's: papers, projects, and portfolios. They state that this assessment is particularly powerful for distance applications.

Assessment of Learning Outcomes

There are many ways to assess learning in addition to the authentic assessment methods listed above. A few formative methods are the minute paper, muddiest point, one sentence summary, application cards, approximate analogies, and turn to your partner.

Effective Use of Technology

Kinshuk and Young (2003) identified five limitations to asynchronous learning: lack of match between course material and its explanation; lack of contextual discussion; lack of human teacher expression and explanation; lack of human interaction, and lack of contextual understandings. Technology can bridge all these gaps when used correctly.

Faculty Attitudes Toward Distance Education

The expanding adoption of distance education has led researchers to explore faculty attitudes. Many studies have questioned the educational equivalency of distance courses when compared to the traditional classroom. According to Black (1992), "Distance education is often viewed as second-best to classroom, face-to-face instruction" (p3). According to Miller and Pilcher (2001) faculty philosophically believe that distance courses result in lower levels of cognition. This author, however, found that the level of cognition is equal in both traditional and distance courses.

Significance of Study

The refining and examination of methods with regard to Moore's theory of transactional distance will enable educators to utilize available technologies. This will better serve the student population and decrease the perception of distance between the student and instructor.

Definition of Terms

Adult learning – "description of the process in which adults learn. Those whom are goal oriented, relevancy oriented, practical, autonomous, self-directed, have prior knowledge and experience, and require respect from instructors" (Dooley, Lindner, & Dooley, 2005, p. 270)

Asynchronous – "Communication in which interaction between parties does not take place simultaneously" (Dooley, Lindner, & Dooley, 2005, p. 271)

Competencies – "the knowledge, skills, and abilities needed to perform certain tasks" (Dooley, Lindner, & Dooley, 2005, p. 274)

Distance Education – "an educational method in which the professional and client are separated in time or space for the majority of the learning process" (Dooley, Lindner, & Dooley, 2005, p. 276)

Distance Learners – "learners who are separated from the instructor by distance or time and, often, supported by communications technology" (Dooley, Lindner, & Dooley, 2005, p. 276)

Information Technologies – "any technology that can be used to design, develop, install, store, transmit, implement, and manipulate information" (Dooley, Lindner, & Dooley, 2005, p. 282)

Instructional design – "a systematic process or organized procedure for developing instructional material" (Dooley, Lindner, & Dooley, 2005, p. 282)

Learner to content interactions – "process of interacting with the content to affect the learner's understanding" (Dooley, Lindner, & Dooley, 2005, p. 284)

Learner to instructor interactions – "student-teacher interactions undertaken to attempt to motivate and stimulate the learner" (Dooley, Lindner, & Dooley, 2005, p. 285)

Learner to learner interactions – "interaction that occurs between on learner and another learner" (Dooley, Lindner, & Dooley, 2005, p. 285)

Learner to technology interactions – "interaction between the learner and the technology such as installing software, file management, downloading plug-ins, and online tutorials" (Dooley, Lindner, & Dooley, 2005, p. 285)

Listserv – "a program that allowed for the creation of a mailing or distribution list, in the classic, non-computer sense of those terms" (Hyman, 2003, p. 19)

Multimedia – "bringing together diverse technologies for the purpose of communicating" (Dooley, Lindner, & Dooley, 2005, p. 287)

Quality – operationally defined as a scientifically based, updated, and easy to navigate course with defined educational objectives that stimulates learning at a level appropriate for the intended audience (Spallek, Berthold, Shanley, & Attstrom, 2000, p.54)

Synchronous – "Communication in which interaction between participants is simultaneous" (Dooley, Lindner, & Dooley, 2005, p. 291)

Transactional distance – "measure of distance as a pedagogical phenomenon" (Dooley, Lindner, & Dooley, 2005, p. 292)

Vicarious interaction – "intersection of various interactions that promotes learning" (Dooley, Lindner, & Dooley, 2005, p. 293)

Video conference – "A conference including two way video "(Dooley, Lindner, & Dooley, 2005, p. 293)

World Wide Web (WWW) – "network of information that includes text, graphics, sound, and moving images" (Dooley, Lindner, & Dooley, 2005, p. 294)

Assumptions

1. Respondents will complete the instrument honestly to the best of their ability.
2. The data and analysis of the data will reflect the respondents' answers accurately.

Limitations

1. This was a convenient and small sample so caution is warranted as the findings, conclusions, recommendations, and implications may not be generalized to larger populations.

CHAPTER II

REVIEW OF LITERATURE

Transactional Distance

Although many have put forth theories/thoughts that contain pieces of the transactional distance theory, Moore (1972) was the first to tie these pieces together and call it transactional distance in 1972. Moore (1989) states that it is the separation of learner and teacher that greatly affects teaching and learning. This separation creates a psychological and communications space, where misunderstanding can take place. This space is the transactional distance.

Moore (1989) continues asserting that transactional distance is a continuous rather than discreet variable, relative rather than absolute. It is a function of three variables; dialogue, structure, and learner autonomy. Dialogue refers only to positive interactions created when instruction is applied and there is a response. Structure refers to design and is determined by the nature of the communications media being employed. Learner autonomy is the extent to which the relationship is androgogical.

The transactional distance theory (Moore, 1989) included three types of interaction: learner-to-learner; learner-to-content; and learner-to-instructor. This was expanded by Hillman, Willis, and Gunawardena (1994) to include learner-to-technology interaction. Examples of these interactions are listed below (Dooley, Lindner, & Dooley, 2005, p. 80):

> Learner-to-learner – online chats, threaded discussion, email, point-to-point video conference, audio calls, etc.

Learner-to-content – online books, online instructional materials, support materials, worksheets, case studies, etc.

Learner-to-instructor – lecture, email, online editing and feedback, evaluation of learning, interactive television, streaming video, voice-over PowerPoint, etc.

Learner-to-technology – online tutorials on the use of technology, online help, downloading plug-ins, installation of software, file management (including downloading and uploading of files), electronic libraries, search engines, etc.

Dooley, Lindner, and Dooley (2005) further theorize that maximum learning occurs when all four of these interactions are ongoing, overlap, and successful and term this as "vicarious interaction" as does Fulford and Zang (1993). Moore (1989) carries forward an idea discussed earlier in this paper; "The main weakness of many distance education programs is their commitment to only one type of medium. When there is only one medium it is probable that only one kind of interaction is permitted or done well" (p. 3). Dooley, Lindner, and Dooley (2005) also agree stating that "maximizing interactions also promotes self directedness among learners" (p. 81).

One advancement in transactional distance theory is the addition of the fourth variable by Hillman, Willis, and Gunawardena (1994). It strengthens the theory by showing that learner-to-technology interaction is important. If the learner is not able to interact with the technology then distance education is almost impossible.

I believe advancement will be the further conceptualization of the different types of interaction. Again, these are learner to learner, learner to instructor, learner to content, and learner to technology. I believe of particular interest are the learner to content and learner to technology interactions simply because I feel the rapid growth of technology will create the greatest amount of change in these two areas. Learner to content interaction should encourage the instructor to keep up with the new delivery mediums and incorporate them into the curriculum to maximize learning. Learner to technology interaction can pose many problems. For instance, is the learner technically savvy? What are the technical capabilities in hardware, software, and access of the learner? These questions partly determine the transactional distance and will change constantly as technology changes so they need to be addressed before the course can be fully designed and scrutinized each time the course is delivered.

According to Gorsky (2005), the theory continues due to its high face validity and seeming obviousness of its core proposition; that as dialogue increases transactional distance decreases. For the purposes of this paper we will define transactional distance as the perceived and real space between the instructor and student.

Quality

Nelson & Thompson (2005) found that

> the perceived lack of personal contact between students and instructor is also often associated with lower course quality. Increasing and maintaining high course quality, increasing and maintaining instructor responsiveness, and increasing opportunities for students to interact among themselves, with the instructor and with outside expertise are objectives that would begin removing the personal contact barriers. (p. 44)

Spallek, Berthold, Shanley, and Attstrom (2000) developed and evaluated criteria for quality assurance in online instruction. These course criteria are:

- be scientifically based
- be regularly updated (current)
- be easy to navigate through
- have defined educational objectives
- stimulate learning
- be created by appropriately qualified academics
- be at an appropriate level for the intended participants
- be peer reviewed
- be structured so that the participant can determine the pace
- give prompt feedback to any answered question
- contain context sensitive help
- have a consistent look and feel; aesthetics
- include self assessments
- adapt to the performance of the participant

Of these criteria regular updating, defined objective, stimulate learning, and scientific basis were perceived as the best criteria for quality while the criteria of consistent look, adapting to the participants' performance, self assessments, and context sensitive help were seen as less important. For the purpose of this study we will operationally define quality as a scientifically based, updated, and easy to navigate course with defined educational objectives that stimulates learning at a level appropriate for the intended

audience (Spallek, Berthold, Shanley, & Attstrom, 2000, p.54).

Satisfaction

Gunawardena, Linder-VanBerschot, LaPoint, and Rao (2010) hypothesized that learners have increased levels of satisfaction when there is increased participation and learning gains which leads to continued enrollment and that increased satisfaction leads to success. Gunawardena, Linder-VanBerschot, LaPoint, and Rao (2010) focused their study on four variables leading to increased satisfaction; online self efficacy, course design, learner to learner interaction, and learner to instructor interaction. Rhode (2009) expanded this idea when finding that learner to instructor and learner to content interaction was preferred over learner to learner interaction. The study by Gunawardena, Linder-VanBerschot, LaPoint, and Rao (2010) used the dependent variable of 'learner satisfaction' and the independent variables online self efficacy, course design, learner to learner interaction, and learner to instructor interaction to predict the dependent variable 'learner satisfaction' and found that online self efficacy to be the best predictor of satisfaction.

Learning

Learning has been described as by Cronbach (1963) as behavior changes that result from experience. Boyd and Apps (1980) describe learning as the act or process by which behavioral change, knowledge, skills, and attitudes are acquired. Kolb (1984) defines learning as the process by whereby knowledge is created through transformation of experience. Learning is a change in human disposition or capability, which can be retained, and which is not simply ascribable to the process of growth is the definition

given by Gagne (1965). Smith (1982) has an even more complicated definition stating that learning is used to refer to one of the following:

1. The acquisition and mastery of what is already known about something
2. The extension and clarification of meaning of one's experience
3. An organized intentional process of testing ideas relevant to problems

For the purpose of this paper we will use Cronbach's (1963) definition due to its simplicity. Many of the definitions given by other theorists state the same main idea as Cronbach but tend to make them overly complex especially when using catch words or phrases of the day. These more complex theories can be limiting by their complexity and ignore some of the more basic learning that takes place. There have been questions regarding learning when comparing the traditional form of face to face education and distance education. Russell (1999) complied over 400 reports of research and found no significant difference in learning.

Learning has also been defined as the transfer of knowledge. Lobato (2008) found no consensus among researchers as to the nature of this transfer or its underlying methods. Transfer is the critical variable in Baldwin and Ford's (1988) model of transfer which is one of the most commonly cited in the study of transfer. Baldwin and Ford (1988) looked at three factors. These are trainee characteristics, training design, and environment. Trainee characteristics include ability, personality, motivation, and commitment. Training design is defined as the extent that the design of the course supports transfer. These factors are not part of this study.

Effective Use of Technology

One way to close the transactional distance is through the effective use of technology. Kinshuk and Young (2003) identified five limitations to asynchronous learning: lack of match between course material and its explanation; lack of contextual discussion; lack of human teacher expression and explanation; lack of human interaction, and lack of contextual understandings. Technology can bridge all these gaps when used correctly. Much of the problem can be rectified with thorough lesson plans and schedules in conjunction with technology such as video, discussion boards, and projects. It is essential that material be prepared in advance and presented through the delivery medium. The lack of matching between the course material and its explanation can be dealt with by using live video of the professor during a presentation, video of a PowerPoint presentation using Smartboard technologies to point out main concepts, audio recordings, and annotated documents, among others. The lack of contextual discussion can be solved using electronic chat rooms and electronic discussion boards. Video can be a solution for the lack of teacher expression and explanation as well as lack of human interaction and contextual understandings. In general, all these technologies can be useful and need to be applied as whenever possible, depending on the circumstances.

Self Directedness

By allowing the learners to take courses at a distance and take control of their curriculum by applying their learning to current projects/problems in their professional lives it enhances learning. This directly follows what Knowles (1998) describes in his core adult learning principles. These principles are (within the context of practice):

1. Learners need to know
2. Self concepts of the learner
3. Prior experience of the learner
4. Readiness to learn
5. Orientation to learning
6. Motivation to learn

These core principles provide the foundation for planning adult learning experiences.

Knowles' (1998) principle of the learners self concept alludes to the self-directedness of adult learners. When the learner feels responsible for their own learning, tie the learning to experience, and are motivated they become self-directed. This can close the perception of transactional distance.

Grow's (1991) staged self directed learning model provides a framework to determine the level of self-directedness of the learner and the role the instructor should play to facilitate learning. The model is split into four stages. During stage one the student is dependent and the teachers' role is to be an authority figure or coach. During stage two the student is interested and the teachers' role is to be a motivator or guide. During stage three the student is involved and the teachers' role is to be a facilitator.

During stage four the student is self-directed and the teachers' role is to be a consultant or delegator.

The benefit of Grow's (1991) model is that it gives the teacher a tool to classify a learner and then determine what role to play in the learning. This can greatly increase a student's success and retention of the material.

The limitation of Grow's (1991) model is that it is situational or subjective. The learner is not consistently at the same stage over different subject areas. This requires the educator to re-classify the learner multiple times and be cognizant of any changes. Additionally, learners that have a high degree of autonomy but choose a highly directed setting because of convenience, speed, or learning style Knowles (1998). For many adult learners the traditional form of directed instruction is preferable when they know little about a subject. Lindner, Dooley, and Williams (2003) found that identifying learners' level of self-directedness is difficult and in my opinion it is more difficult to classify students at a distance. Therefore, any mismatches can leave the student highly frustrated and discouraged. For this reason I think it is important (especially at a distance) to supply the learner with material in many different forms to allow the student to control how they take in the information and thereby being more self-directed.

The question left is how to determine the learners' level of self-directedness. Dooley, Lindner, and Dooley (2005) give us the following questions to attempt this task:

1. How did the learner respond to structured writing assignments?
2. Did the students need repeated help to complete the assignment?
3. Were learners able to jump in to threaded discussion or did the need help

getting started?

4. Were learners able to run with self-guided projects or did they need assistance in selecting a topic?

Dooley, Lindner, and Dooley (2005) continue stating "instructors might also use strategies such as providing examples/samples or sufficient details in course syllabi or assignment descriptions to help learners who are not as self directed feel more self-assured" (p. 89). This is especially true when conducting an online course.

Self directedness is closely related to self efficacy. Self efficacy or the belief that self directed learning can produce desirable outcomes must precede the actual learning. Bandura and Locke (2003, p. 87) alluded to this when stating that:

> Self-efficacy beliefs regulate human functioning through cognitive, motivational, affective, and decisional processes (Bandura, 1997). They affect whether individuals think in self-enhancing or self-debilitating ways, how well they motivate themselves and persevere in the face of difficulties, the quality of their emotional well-being and their vulnerability to stress and depression, and the choices they make at important decisional points.

Students will not engage in self directed learning unless the student feels efficacious in the implementation of learning.

Knowledge, Skills, Abilities

Another method to close the perceived transactional distance is to account for the knowledge, skills, and abilities of the student. It can be difficult to measure knowledge, skills, and abilities; however, Dooley, Edmundson, and Hobaugh (1997) suggest using the authentic assessment methods of the three P's: papers, projects, and portfolios. They state that this assessment is particularly powerful for distance applications. Samples of

papers are critiquing a story or article, reporting an event, etc. It is suggested that papers be graded on a rubric as developed by Murphy, Lindner, and Kelsey (2002). Projects are an assignment over time that requires goals, planning, using resources, organizing, making judgments, and crafting a presentation of material (Huba & Freed, 2000). Portfolios are a collection of work that allows for self reflection, and a set of criteria should be provided (Paulson, Paulson, & Meyer, 1991). These activities are an excellent way to determine if the student is thinking critically and contextualizing the material as a type of evaluation rather than as the only activities the students pursue. Feedback and clear objectives are also very important to overall learning.

Faculty Philosophical Position

Faculty philosophical position can affect the perception of transactional distance between the student and instructor. Jones, Lindner, Murphy and Dooley (2002) found that the majority of educators are not philosophically opposed to distance education and related technologies. From their data the Total Distance Education Score, Distance Education Competency Score and Distance Education Information Technology and Support Score were not significantly related to the philosophical positions towards distance education of the participants. However, the Distance Education Value Score was directly related to the philosophical position of the respondents. The faculty who had higher distance education value scores had low philosophical opposition scores. This leads to the belief that the increasing value of distance education must be communicated more effectively in order to impact the philosophical positioning of those opposed to distance education.

This supports Black's (1992) findings that in order for faculty to support the distance education model it must be congruent to their current beliefs and values held about university education. Those faculty members who did not believe distance education was the educational equivalent to traditional courses had lower distance education value scores and therefore are philosophically opposed to distance education.

The findings also support Dooley and Murphy's (2001) assertion that the ability of an organization to adapt to these changes is influenced by: competence (knowledge, skills, and abilities of its staff) and value (amount of importance the staff places on the role of these technologies to accomplish teaching and learning).

Faculty Attitudes Towards Distance Education Technologies

Distance education types technologies can be utilized to affect the perceived transactional distance. Research in the field of distance education has recognized the need for a change and modification of the faculty role in teaching at a distance (Wedemeyer, 1981; Beaudoin, 1990; Dillion & Walsh, 1992; Purdy & Wright, 1992). Many studies cite faculty resistance to instructional technology as a primary barrier to the continued growth of distance education programs (Gunawardena, 1990; McNeil, 1990). How faculty perceives and reacts to these technologies is more important than the structural and technical obstacles in affecting the use of technology in distance education (McNeil, 1990).

Those involved in delivering college-level instruction in agriculture, faculty members and administrators alike, are placing new emphasis on quality teaching (Board on Agriculture, National Research Council, 1992). The primary clients of higher

education, the students, consider teaching as the most important function of the faculty member. In a study of students at 17 institutions, Weidmer (1994) reported that 96% believed that teaching was the most important job of the professor, followed by service, then research. Boyer (1990) cited a written comment on a questionnaire by a professor of mathematics at a comprehensive university, "Good teaching is assumed, not rewarded" (p. 32).

Dooley and Murphy (2001) found that College of Agriculture faculty lacked experience in teaching learners at a distance, and that they were much more confident in their technical competence than they were in their methodological ability to use modern technologies in their teaching. These authors further found that training and assistance in the use of instructional technologies were less available than equipment and facilities.

Further, faculty members who had not participated in distance education perceived the level of support as lower than those who had taught courses at a distance. Faculty generally did not perceive the climate to be supportive of the use of technology. The ability of an organization to adapt to change is influenced by: competence or the knowledge, skills, and abilities of its staff; value or the amount of importance the staff places on the role of these technologies to accomplish teaching and learning; information technology support or the availability of high quality facilities, equipment, technical support, and training (Dooley & Murphy, 2001). Little is known, however, about how these factors affect faculty adoption of distance education.

Many studies have questioned the educational equivalency of distance courses when compared to the traditional classroom. According to Black (1992), "Distance

education is often viewed as second-best to classroom, face-to-face instruction" (p. 3). According to Miller (2001) faculty philosophically believe that distance courses result in lower levels of cognition. This author, however, found that the level of cognition is equal in both traditional and distance courses. In order to ascertain equivalency, a standard of measurement must be agreed upon for effective communication. According to Rogers (2003), communication is essential if innovation is to spread.

Changing the philosophical nature of how courses are measured is key to communication. Currently the Carnegie unit (time based) is used to show the equivalency of traditional courses. Watkins and Schlosser (2000) found this unit of measure to be inappropriate for distance courses. Their research indicated that the Capabilities-Based Educational Equivalency model is a more practical instrument for both traditional and distance courses. This model relies on academic achievement rather than time to measure the class equivalency.

There is also a current view that distance education courses require a greater effort and time commitment. Visser (2000) found that distance education courses can call for up to twice as much time and effort to accomplish a specific task. However, the findings also support the need for further research in this area to investigate what implications the course content and distance technology used has on the requirements for instructor preparation and delivery of the class. This may also impact philosophical opposition to distance education.

Another challenge facing implementation of distance education is faculty skepticism. Black (1992, p. 16) found that "the transition from elite to mass higher

education, with its tremendous growth in the numbers of both faculty and students from more diverse backgrounds, results in a greater variety of notions about what university education should be and whom it should serve." In order for faculty to support distance education, it must be considered congruent with the beliefs and values already held about university education (Black, 1992; Rogers, 2003). In turn, for universities to remain competitive, they must find ways to employ new models of instructional delivery. To accomplish this task the administration has to first persuade faculty to adopt the model.

Faculty Tenure Status and Adoption

A major barrier to the adoption of new technologies can be tenure status. Lindner, Murphy, and Dooley (2001) found that tenure status and academic rank have an effect on the adoption of distance education technologies. Non-tenured, Assistant Professors had the highest distance education competency scores. This led to the conclusion that newer faculty are being hired with the expectation of using distance education technologies and already possess the self-efficacy and skills to integrate technology. It is further noted that faculty who have the comfort and competence are the ones discouraged from participating in distance education due to current policies for promotion and tenure. The study also found that female faculty had the highest distance education value scores and stated a need for further research in this area.

Adoption of Innovation

To affect the perception and attitudes toward new technologies it is important to understand how innovation adoption takes place. Roger's (2003) stages of the adoption

process are as follows:

- Knowledge
- Persuasion
- Decision
- Implementation
- Confirmation

Knowledge is the stage when the adopter learns that the innovation exists but needs more information about it. This is when interest builds and more knowledge is gathered. The persuasion stage is when the potential adopter begins to weigh the alternatives and tries the innovation mentally on a small scale. During the decision stage the adopter decides to reject the innovation or adopt the innovation. Rejection can take the form of passive rejection where the adopter never tried the innovation or active rejection where the adopter considered the innovation but decided not to adopt. The implementation stage is when some adopters fail to fully implement the innovation or they can continue to use the innovation. One reason for failure to implement may be buyers remorse. During the confirmation stage adopters are looking for reassurance that the choice was sound. Positive confirmation can come from others, true success with the innovation or negative confirmation can result in discontinuance.

There are similarities when comparing Rogers' (2003) model with Grow's (1991) Stages in Learning Autonomy. Grow's stages are:

1. student is dependent and the teacher is the authority figure
2. student is interested and the teacher is the motivator

3. student is involved and the teacher is the facilitator
4. student is self-directed and the teacher is the consultant

The first similarity is in the role of the student or adopter during the different stages. The first stage is a direct correlation to the knowledge stage of the adoption process. Here the student or adopter have knowledge but are seeking more. The second and third stages in Grow's (1991) model can be linked to the persuasion stage of the adoption process where the adopter or student is interested and may become involved by trying the innovation. The last stages are similar in that the adopter and learner are both self-directed and have adopted the innovation or learning as their own.

Another similarity of these two models is the role of the teacher and/or change agent during the different stages. During Grow's (1991) first stage and Rogers' (2003) Knowledge stage the teacher and change agent both give basic information. Rogers' uses the terms develop the need for change (learning) and establishing an information exchange which is very similar to the terminology Grow uses; informational lecture and overcoming resistance. The second stages are similar as well where the change agent would diagnose the problem and create an intent to change while the teacher would set up goals and learning strategies. The similarities continue at the third stage in Grow's model and the third and fourth stages Rogers' model where the change agent would engage in translate the intent into action and the teacher would facilitate groups or seminars and participate as an equal. The last stages of the models are where the agent would stabilize the adoption and foster self reliance in the adopter which sounds like the teacher's role of consultant/delegator when the student is self-directed.

Distance Education

Distance education technologies and methods are favorable tools to decrease the perception of transactional distance. Distance education is not a new form of instruction. There is an established history of distance education going back 150 years with the advent of correspondence study (Holmberg, 1986).

Sir Geoffrey Holland penned this prediction, “by the year 2020 every education and training programme leading to a qualification or a credit towards one will be available in three modes: full time, part time, and through distance education” (Spodick, 1995, p. 1).

Fulton (1992) claims the largest use for distance education has been to bring new technology to farmers and small businesses. Spodick (1995) affirms this assumption and estimates that distance learners in China range between one and two million and Day (1994) goes farther to assert that the rapidly developing technology will lead to increased development through non-traditional educational institutions and methods.

Further research indicates that the format for the instruction has little to no effect on the achievement of the learner provided that the technology is matched with the acceptable content and there is equal access (Willis, 2002).

Distance educators must take into consideration that they are properly trained in use of techniques and equipment to successfully complete the large amount of planning and preparation that is required when delivering instruction through distance education technologies (Schlosser & Anderson, 1994). Egan, Sebastian, and Welch (1991) state that instructors that seem comfortable with technology, repeats questions, has a sense of

humor, and maintains eye contact pass more information to their students.

There are many different definitions of distance education. One definition comes from Ian Mugridge (1991, p. 313): “a form of education in which there is normally a separation between teacher and learner and thus one in which other means; the printed and written word, the telephone, computer conferencing or teleconferencing, for example; are used to bridge the physical gap.” Spodick (1995), however, reflects that Mugridge fails to realize that separation may not only be physical but in time as well. He also maintains Mugridge implies that face-to-face classroom settings are the ideal learning situation.

For the purpose of this study, the term distance education is defined as when the instructor and learners are separated by location and/or time (Lindner & Murphy, 2001). This separation is what must be overcome when delivering a distance education class. While this definition is general it is the generality that allows it to take in all forms of distance education.

Value and Educational Equivalency of Distance Education

Jones, Lindner, Murphy and Dooley (2002) suggest that the expanding adoption of distance education has led researchers to explore faculty attitudes. Many studies have questioned the educational equivalency of distance courses when compared to the traditional classroom. According to Black (1992, p. 3) “Distance education is often viewed as second-best to classroom, face-to-face instruction.” According to Miller (2001) faculty philosophically believe that distance courses result in lower levels of cognition. This author, however, found that the level of cognition is equal in both

traditional and distance courses. In order to ascertain equivalency a standard of measurement must be agreed upon for effective communication. According to Rogers (2003) communication is essential if innovation is to spread. Changing the philosophical nature of how courses are measured is key to communication. Currently the Carnegie unit (time based) is used to show the equivalency of traditional courses. Watkins and Schlosser (2000) found this unit of measure to be inappropriate for distance courses. Their research indicated that the Capabilities-Based Educational Equivalency model is a more practical instrument for both traditional and distance courses. This model relies on academic achievement rather than time to measure the class equivalency.

Elearning

Elearning is a term often associated with distance learning. Elearning is defined by Clark and Mayer (2007, p. 7) as "training delivered on a computer and supports individual learning goals". However, this may be too limiting as some instruction may delivered using other technologies such as television. Clark and Mayer (2007) also discuss two elearning goals: inform and perform. Lessons that build awareness or provide information satisfy the goal of informing while programs that build specific skills are satisfying the performance goal.

Adult Learning

Adult learning should be pragmatic in nature. One of the educational methods that I believe are guided by this pragmatic philosophy is Knowles' Core Adult Learning Principles.

Knowles' Core Adult Learning Principles are as follows:

1. Learners Need to Know – why, what, how; tell them what to learn, why they need to learn it, and how they will learn it
2. Self Concept of the Learner – autonomous, self-directing
3. Prior Experience of the Learner – resource, mental models; building on the prior experience
4. Readiness to learn – life related, developmental task
5. Orientation to Learning – problem centered, contextual
6. Motivation to Learn – intrinsic value, personal payoff

These principles closely relate to pragmatism in that they center on usefulness and real world problems with immediate value to the student. An educational practice that is guided by the pragmatic philosophy is individual or group project assignments especially when the students are allowed much of the control. This allows the student to tailor the project to their own experiences and may even allow them to use it at their current jobs. Another practice would be to utilize real world examples in the classroom. Rather than discussing theoretical situations the instructor could use articles, stories, video, etc. that are based on real world events to more thoroughly engage the student.

Learner Centered Instructional Design

It is important to design instruction so that it can best be interacted with by the learner. Learner centered instructional design is defined by the APA (1997) as any formal or non-formal education that is responsible for a learner's cognitive, metacognitive, motivational, affective, developmental, and social factors as well as individual differences. Dooley, Lindner, and Dooley (2005) define these as follows;

cognitive and metacognitive factors include the nature of the learning process, goals of the learning process, construction of knowledge, strategic thinking, thinking about thinking, and context of learning. Motivational and affective factors include the emotional influence on learning, intrinsic motivation to learn, and effects of motivation on effort. Developmental and social factors include developmental and social influences on learning. Individual differences factors include differences in learning, diversity, standards, and assessment.

Instructional Design Models

There are many models to guide the design of instruction with a varying degree of interaction with the student. For the sake of expedience, the behaviorist based models of Dick and Carey (1990), Smith and Ragan (2000), and the ADDIE model will be discussed. The constructivist models of SCenTRLE (Hirumi, 2002), and the minimalist framework of Carroll (1990) will also be discussed.

The behaviorist models base themselves on the link between stimulus and response, in this case, instructional materials and learning. Dick and Carey (1990) break instruction down to specifically target the knowledge, skills, and abilities to be passed to the student and help select the conditions for learning. The first three steps in Dick and Carey are to identify instructional goals, conduct instructional analysis, and identify entry behaviors/characteristics. All these steps involve analysis in some sort or fashion. The second grouping includes writing performance objectives, developing criterion referenced tests, revising instruction and developing instructional strategy. These steps could be called the design stage. The developing stage engages in developing and

selecting instructional materials and the final stage takes in the designing and conducting of formative and summative evaluations which could be considered implementation as well.

The Smith and Ragan (2000) model breaks down instructional design into three steps: analysis, strategy, and evaluation. According to Dooley, Lindner, and Dooley (2005) the analysis step includes considering the learning environment, learners, learning task, and writing the test items. The strategy step involves determining organizational strategies, delivery strategies, management strategies, and writing and producing instruction. The evaluation step includes conducting formative evaluations, and revision of previous steps.

The ADDIE model is a general purpose model consisting of five stages: Analyze, Design, Develop, Implement, and Evaluate (Hall, 1997). During the analysis stage some of the needs are examined such as an audience analysis, budget, and due dates. Components of the design stage are selecting the environment, writing instructional objectives, the overall approach, and developing the course content (Driscoll, 1998; Porter, 1997). Creation/collection of media and appropriate interaction for support are acquired during the develop stage (Porter, 1997; Simonson, Smaldino, Albright, & Zvacek, 2003). During the implementation stage the materials and technology are put into use and made available. Preparing for technical problems and researching alternatives are also conveyed during the implementation stage (Simonson et al. 2003). During the last stage, evaluation, assessment and evaluation procedures are determined (Powers, 1997).

The constructivist models of Hirumi (2002) and Carroll (1990) follow a somewhat different approach. Constructivism is stated as "a self regulatory process of struggling with the conflict between existing personal models of the world and discrepant new insights, constructing new representations and models of reality as a human being – making venture with culturally developed tools and symbols, and further negotiating such meaning through cooperative social activity, discourse, and debate" (Fosnot, 1996, p. ix). Hirumi's model is termed the SCenTRLE model which stands for Student-Centered, Technology-Rich Learning Environment. The model sets the following eight instructional stages (Tynan, 2005):

- Event 1: Set learning challenge

  The first event is to set the learning challenge

- Event 2: Negotiate learning goals and objectives

  Here the lecturer facilitates a discussion with the students

- Event 3: Negotiate learning strategy

  This event requires the students to think aboutlearning goals and objectives

- Event 4: Construct knowledge

  Here students work individually and in groups to construct their skills and knowledge

- Event 5: Negotiate performance criteria

  This event is designed to assist the students in defining performance criteria

- Event 6: Conduct self, peer and expert assessments

  Students are required to self-assess and peer-assess which is a .key characteristic of self-directed, lifelong learners
- Event 7: Monitor performance and provide feedback

  Occurs throughout the learning process. The facilitator monitors discussion, provides feedback, answers email and assists students
- Event 8: Communicate results

  Students are required to formally communicate the results of their learning

The SCenTRLE model is an excellent interpretation of the constructivist theory and it should be implemented more often throughout the range education levels. I feel enabling the students to take more control in their education will lead to more engagement and more success in any level of education.

Jim Carroll's (1990) minimalist theory is not truly a design model, but the principles involved are important when designing constructivist instruction. He sees a key idea as the presentation of the small obstacles to learners' efforts and to include, even exploit, strategies that cause problems for learners through the use of systematic instructional materials. (Carroll, 1990) Carroll's principles for minimalist instruction are:

1. Training on Real Tasks
2. Getting Started Quickly
3. Reasoning and Improvising
4. Reading in any Order

5. Coordinating System and Training
6. Supporting Error Recognition and Recovery
7. Exploiting Prior Knowledge
8. Using the Situation
9. Developing Optimal Training Designs

Assessment of Learning Outcomes

There are many ways to assess learning in addition to the authentic assessment methods listed above. A few formative methods are the minute paper, muddiest point, one sentence summary, application cards, approximate analogies, and turn to your partner. Minute papers entail two questions asked at the end of instruction (Angelo & Cross, 1993). The student has one minute to answer the questions. The questions are:

1. What was the most important thing you learned during the session?
2. What important question remains unanswered?

Huba and Freed (2000) discuss the following methods. The muddiest point asks, what was the muddiest point of the lesson? If there are many similar responses, then modifications may need to be made to the instruction. One sentence summaries asks the student to summarize the learning and answer who does what to whom, when, where, how, and why. To use application cards students are asked to write down a real world application for the instruction they just received. With the turn to your partner technique the instructor gives the students a question that they reflect upon; then the students exchange thoughts with their neighbor with whom they formulate a new answer.

Approximate analogies (Angelo & Cross, 1993) have the learner complete a

simple analogy to contextualize the learning. The instructor gives the students “A is to B” and the student answers “as X is to Y”.

Conceptual Framework

Figure 1 shows the conceptual framework for our study. Figure 2 show s where maximum learning should occur.

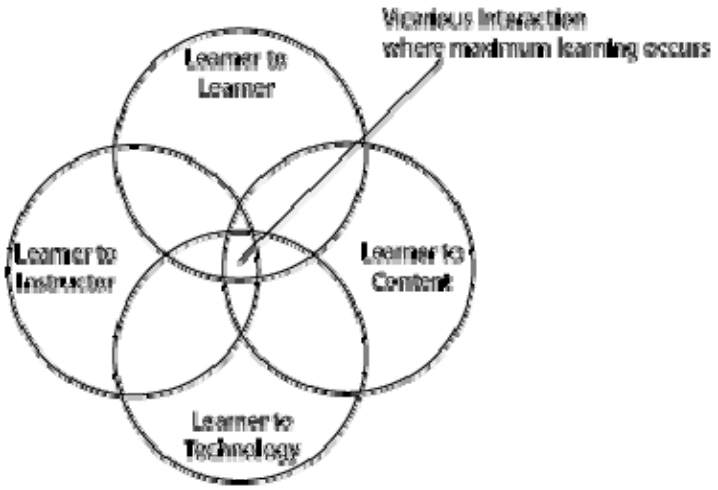

Figure 1. Vicarious interaction and the point when maximum learning occurs

Figure 2. Perception of student and where maximum performance should occur

CHAPTER III

METHODOLOGY

Purpose of Study

The purpose of this study was to describe students' level of self-directedness, engagement, and interaction in a course delivered using multiple delivery strategies. The purpose was deduced from and tests Moore's (1989) theory of transactional distance variables with the addition of the learner-to-technology variable by Hillman, Willis, and Gunawardena (1994). We will also ascertain the students' perception of satisfaction, quality, and overall learning.

Research Objectives

The function of this study is to identify and analyze Texas A&M University students regarding technology and the perception of enhancement when used to interact with the other students, the instructor, the content, and the technology. The respondents were also asked about their perception of satisfaction, quality, and learning when opportunities for interaction are provided. Specifically the objectives of the study are:

1. Describe the population by perceived learner to learner interaction.
2. Describe the population by perceived learner to instructor interaction.
3. Describe the population by perceived learner to content interaction.
4. Describe the population by perceived learner to technology interaction.
5. Describe the population and perceived satisfaction, quality, and learning when opportunities for interaction are provided.
6. Describe the data using Pearson correlation coefficient.

7. Describe the learners perception of interaction enhancement
8. Predict learning, quality, and satisfaction from interaction

For the objective of this study distance education is defined as an educational method in which the professional and client are separated in time or space for the majority of the learning process.

Selection of Respondents

The population for this study was university graduate students, both master and PhD at Texas A&M University in ALEC 695 – Frontiers in Research. Inferences to other similar populations should be handled with caution as other organizations may differ greatly from this one. The population was determined to be 55 (N). A total of 55 responded for a response rate of 100%. This was a convenient and small sample so caution is warranted as the findings, conclusions, recommendations, and implications may not be generalized to larger populations.

Instrumentation

The instrument is a six-section questionnaire (see Appendix A). A four-point Likert-type response scale was employed for Sections II to V. The response choices are: 1 = "Strongly Disagree," 2 = "Disagree," 3 = "Agree," 4 = "Strongly Agree."

The items in Section I were designed to measure the level of interaction between the learner and other learners through the use of distance education type technologies and if they enhance interaction.

Specific scale items include:

- The use of *online chats* could be used to enhance my interactions with

other learners.

- The use of *threaded discussions* could be used to enhance my interactions with *other learners*.
- The use of *email* could be used to enhance my interactions with *other learners*.
- The use of *audio or phone calls* could be used to enhance my interactions with *other learners*.
- The use of *interactive video* could be used to enhance my interactions with *other learners*.
- The use of *instant messaging* could be used to enhance my interactions with *other learners*.
- The use of *blogging* could be used to enhance my interactions with *other learners*.
- The use of *collaborative documents* could be used to enhance my interactions with *other learners*.

The items in Section II are designed to measure the level of interaction between the learner and instructor through the use of distance education type technologies and if they enhance interaction.

Specific scale items include:

- The use of *lecture* could be used to enhance my interactions with *instructor*.
- The use of *streaming video* could be used to enhance my interactions with

instructor.

- The use of *email* could be used to enhance my interactions with *instructor*.
- The use of *voice over PowerPoint* could be used to enhance my interactions with *instructor*.
- The use of *online editing and feedback* could be used to enhance my interactions with *instructor*.
- The use of *picture in picture video* could be used to enhance my interactions with *instructor*.
- The use of *evaluation* could be used to enhance my interactions with *instructor*.

The items in Section III are designed to measure the level of interaction between the learner and course content through the use of distance education type technologies and if they enhance interaction.

Specific scale items include:

- The use of *texts* could be used to enhance my interactions with *course content*.
- The use of *online instructional material* could be used to enhance my interactions with *course content*.
- The use of *support material* could be used to enhance my interactions with *course content*.
- The use of *worksheets* could be used to enhance my interactions with

course content.

- The use of *case studies* could be used to enhance my interactions with *course content*.
- The use of *picture in picture video* could be used to enhance my interactions with *course content*.
- The use of *interactive video* could be used to enhance my interactions with *course content*.
- The use of *online exercises* could be used to enhance my interactions with *course content*.
- The use of *podcasting* could be used to enhance my interactions with *course content*.
- The use of *collaborative documents* could be used to enhance my interactions with *course content*.

The items in Section IV are designed to measure the level of interaction between the learner and technology through the use of distance education type technologies and if they enhance interaction.

Specific scale items include:

- The use of *online tutorials* could be used to enhance my interactions with *course technology*.
- The use of *getting help online* could be used to enhance my interactions with *course technology*.
- The use of *online instructions for downloading plugins* could be used to

enhance my interactions with *course technology*.

- The use of *electronic libraries* could be used to enhance my interactions with *course technology*.
- The use of *software applications* could be used to enhance my interactions with *course technology*.
- The use of *file management system* could be used to enhance my interactions with *course technology*.

The items in Section V are designed to measure the level of perceived satisfaction, quality, and learning experienced through interaction.

Specific scale items include:

Satisfaction:

- I am generally more satisfied with a learning experience when opportunities for interaction with other students are provided.
- I am generally more satisfied with a learning experience when opportunities for interaction with the instructor are provided.
- I am generally more satisfied with a learning experience when opportunities for interaction with the technology are provided.
- I am generally more satisfied with a learning experience when opportunities for interaction with the course content are provided.

Quality:

- The quality of a learning experience increases when opportunities for

interaction with other students are provided.

- The quality of a learning experience increases when opportunities for interaction with the instructor are provided.
- The quality of a learning experience increases when opportunities for interaction with the technology are provided.
- The quality of a learning experience increases when opportunities for interaction with the course content are provided.

Learning:

- Learning increases when opportunities for interaction with other students are provided.
- Learning increases when opportunities for interaction with the instructor are provided.
- Learning increases when opportunities for interaction with the technology are provided.
- Learning increases when opportunities for interaction with the course content are provided.

The items in Section VI are designed to measure the level of agreement with the question. Is the use of the following technology an *effective means for enhancing interactions* with other learners, the instructor, the technology, or the content? The respondents were able to choose multiple responses for each given technology. The technologies listed were:

- Online chat

- Threaded discussions
- Email
- Audio/phone call
- Interactive video conference
- Lecture
- Streaming video
- Voice over PowerPoint
- Online editing and feedback
- Text
- Support materials
- Online instructional materials
- Worksheets
- Case studies
- Online tutorials
- Getting help online
- Instructions for downloading plugins
- Electronic libraries
- Software applications
- Internet links
- Podcasts
- Collaborative documents/wikis

- Blogging
- Instant messaging
- Online quizzes
- RSS feeds
- Who's online feature
- Student homepages
- Journaling
- Online café
- Online calendar
- Instructor announcements
- Guest lectures
- Virtual office hours
- Online self-tests
- Role play/simulations
- Online glossaries
- PowerPoint
- Student response systems (CPS)
- Text messaging
- Twitter
- YouTube
- iTunes U

- Social sites (second life, facebook, etc.)

Validity and Reliability

Reliability was established by calculating Cronbach's Alpha. Table 1 represents the reliability summary of the scales used to measure enhancement of interactions. Any scale can be considered reliable with a Cronbach's Alpha of .83. The reliability of the four independent variables learner to learner interaction, learner to instructor interaction, learner to content interaction, and learner to technology interaction were good despite the lower scale of learner to learner interactions and learner to instructor interactions. When considering the size of the population, these estimates indicate the strength of the scale when used for analyzing these variables. This indicates the confident use of this instrument with larger populations. The specific questions for each scale can be found in Appendix A.

Table 1

Reliability Summary of the Scales Used to Measure Enhancement

Scales	Number of items	Cronbach Alpha
Learner to Learner Interactions	8	.813
Learner to Instructor Interactions	7	.810
Learner to Content Interactions	10	.853
Learner to Technology Interactions	6	.874

Collection of Data

Data was collected using a web-formatted survey (see Appendix A) delivered to the students using the Internet. An analysis of the data was then conducted as described below using SPSS 18.0. Potential participants were given the web address and no identification information was entered to allow for the data to be reported anonymously. Non-response was handled by sending reminders electronically at random intervals.

Quantitative Analysis of Data

Descriptive statistics were calculated for each variable. SPSS was used to generate Crosstabs. Cell frequencies and percentages were used to summarize agreement or disagreement with statements related to interaction with other learners, the instructor, the content, and the technology. Spearman's rank order correlation coefficient was used to determine if the responses were statistically different between variables. Respondents who indicated "agree" and "strongly agree" or those indicating "disagree" or "strongly disagree" were reported.

Relationships between interaction and learning, quality, and satisfaction were described by calculating Pearson's product moment correlation coefficient using Davis' (1971) convention. Magnitude of the relationship is noted by Davis as $.01 \geq r \leq .09$ = negligible correlation, $.10 \geq r \leq .29$ = Low, $.30 \geq r \leq .49$ = moderate correlation, $.50 \geq r \leq .69$ = substantial correlation, $r \geq .70$ = very strong correlation.

Limitations

This was a convenient and small sample so caution is warranted as the findings, conclusions, recommendations, and implications may not be generalized to larger populations.

CHAPTER IV

MAJOR FINDINGS

Purpose of Study

The purpose of this study was to describe students' level of self-directedness, engagement, and interaction in a course delivered using multiple delivery strategies. The purpose was deduced from and tests Moore's (1989) theory of transactional distance variables with the addition of the learner-to-technology variable by Hillman, Willis, and Gunawardena (1994). We will also ascertain the students' perception of satisfaction, quality, and overall learning.

Research Objectives

The objectives of the study were to:

1. Describe and explore learner to learner interactions
2. Describe and explore learner to instructor interactions
3. Describe and explore learner to content interactions
4. Describe and explore learner to technology interactions
5. Describe and explore student perceptions of satisfaction in a course, quality of the learner experience, and increases in learning as a result of increased interactions
6. Describe how different elearning technologies can be used to enhance learner to learner interactions, learner to instructor interactions, learner to content interactions, and learner to technology interactions
7. Explore the relationships between learner to learner interactions, learner

to instructor interactions, learner to content interactions, learner to technology interactions and satisfaction, quality, and learning

8. Explore the relationships between elearning technologies and satisfaction, quality, and learning

Objective One: Learner to Learner Interaction

The participants were asked about specific technologies and whether these technologies enhanced their interactions with other learners. The specific technologies were online chats, threaded discussions, email, audio or phone calls, interactive video conferencing, instant messaging, blogging, and collaborative documents.

Table 2 shows that out of all the technologies, participants described the use of interactive video conferencing as the most effective at enhancing interactions with other learners with 87% answering “agree” or “strongly agree” and 12% answering “disagree.” Email and online chats were also favored with 80% of participants answering “agree” or “strongly agree” and 20% answering “disagree.” Audio or phone calls were also found as useful technology for learner to learner interactions with 78% agreeing or strongly agreeing and 21% disagreeing. The next most useful technology was threaded discussions with which 76% chose “agree” or “strongly agree” and 21% answered “disagree” or “strongly disagree.” For collaborative documents 76% of participants answered “agree” or “strongly agree” while 20% answered “disagree” or “strongly disagree.” The choice of instant messaging had 70% answering “agree” or “strongly agree” and 29% answering “disagree” or “strongly disagree.” Blogging was found to be

the least useful with 49% of participants respectively answering “agree” or “strongly agree” and 50% answering “disagree” or “strongly disagree.”

Table 2

Learner to Learner Descriptive

	Strongly Disagree		Disagree		Agree		Strongly Agree	
Item	*f*	%	*f*	%	*f*	%	*f*	%
Online Chats	0.0	0.0	11	20	33	60	11	20
Threaded discussion	2	3.6	10	18.2	31	56.4	11	20
Email	0.0	0.0	11	20	33	60	11	20
Audio/Phone	0.0	0.0	12	21.8	34	61.8	9	16.4
Video Conferencing	0.0	0.0	7	12.7	30	54.5	18	32.7
Instant Message	0.0	0.0	16	29.1	27	49.1	12	21.8
Blogging	4	7.3	24	43.6	20	36.4	7	12.7
Collaborative Documents	0.0	0.0	11	20	32	58.2	10	18.2

Note: Scale Strongly Disagree =1; Disagree =2; Agree =3; Strongly Agree =4;
An overall construct score was computed *M*=2.94; *SD*=.44

Table 3 shows that participants tended to agree (*M*=2.94 *SD*=.44) that the use of online chats, threaded discussion, email, audio/phone call, video conferencing, instant messaging, blogging, and collaborative documents could be used to enhance their interaction with other learners.

Table 3

Learner to Learner Interaction

	N	Mean	Std. Deviation
Learner to learner	55	2.94	.44

Note: Scale Strongly Disagree =1; Disagree =2; Agree =3; Strongly Agree =4

Objective Two: Learner to Instructor Interaction

The participants also responded to questions regarding the use of technology to enhance the interactions between the learner and instructor. These technologies were lecture, streaming video, email, voice over PowerPoint, online editing and feedback, picture-in-picture video, and evaluations.

Table 4 shows that the technologies chosen as most effective at enhancing interactions with the instructor were lecture and email with 87% choosing "strongly agree" or "agree" and 12% choosing "strongly disagree" or "disagree." The next most useful technology was online editing/feedback and voice over PowerPoint with 83% choosing "agree" or "strongly agree" while 14% and 16% chose "disagree" or "strongly disagree" respectively. Picture-in-picture video showed similar numbers with 80% agreeing or strongly agreeing and 16% disagreeing. The majority of respondents (80%) agreed or strongly agreed that streaming video was useful and 20% disagreed or strongly disagreed. The respondents found evaluation to be least useful to enhance interactions with the instructor with 78% agreeing or strongly agreeing and 20% disagreeing or strongly disagreeing.

Table 4

Learner to Instructor Descriptive

	Strongly Disagree		Disagree		Agree		Strongly Agree	
Item	*f*	%	*f*	%	*f*	%	*f*	%
Lecture	1	1.8	6	10.9	27	49.1	21	38.2
Streaming video	1	1.8	10	18.2	27	49.1	17	30.9
Email	1	1.8	6	10.9	30	54.5	18	32.7
Voice over PowerPoint	1	1.8	8	14.5	30	54.5	16	29.1
Online editing/feedback	1	1.8	7	12.7	31	56.4	15	27.3
PIP video	0.0	0.0	9	16.4	32	58.2	12	21.8
Evaluation	1	1.8	10	18.2	30	54.4	13	23.6

Note: Scale Strongly Disagree =1; Disagree =2; Agree =3; Strongly Agree =4;
An overall construct score was computed M=3.11; SD=.48

Table 5 shows that when participants tended to agree (M=3.12 SD=.48) that the use lecture, streaming video, email, voice over PowerPoint, online editing/feedback, PIP video, and evaluation could be used to enhance their interaction with the instructor.

Table 5

Learner to Instructor Interaction

	N	Mean	Std. Deviation
Learner to instructor	55	3.12	.48

Note: Scale Strongly Disagree =1; Disagree =2; Agree =3; Strongly Agree =4

Objective Three: Learner to Content Interaction

The technologies for enhancing learner to content interaction were also investigated. The technologies included were texts, online instructional materials, support materials, worksheets, case studies, picture-in-picture video, interactive video,

online exercises, podcasting, and collaborative documents.

Table 6 shows that of these technologies online exercises were found to be most effective at enhancing interactions with the content with 91% of the participants agreeing or strongly agreeing and 9% disagreeing or strongly disagreeing. Online instructional materials and support materials were also found to be useful with 87% agreeing or strongly agreeing and 13% disagreeing or strongly disagreeing. Eighty three percent of respondents agreed or strongly agreed that interactive video and case studies could be used to enhance interactions with course content while 14% and 16% disagreed or strongly disagreed respectively. Only 78% of participants agreed or strongly agreed that worksheets would enhance interaction with content and 22% disagreed or strongly disagreed. A majority of participants (71%) agreed or strongly agreed that collaborative documents would enhance interaction while 29% disagreed or strongly disagreed. Picture in picture video and texts received low scores with 67% agreeing or strongly agreeing while 29% and 33% disagreed or strongly disagreed respectively. The lowest scores were found when asked if texts enhance interaction with content with 67% agreeing or strongly agreeing and 33% disagreeing or strongly disagreeing.

Table 6

Learner to Content Descriptive

	Strongly Disagree		Disagree		Agree		Strongly Agree	
Item	*f*	%	*f*	%	*f*	%	*f*	%
Texts	3	5.4	15	26.8	27	48.2	10	17.9
Online material	1	1.8	6	10.7	33	58.9	15	26.8
Support material	1	1.8	6	10.7	31	55.4	17	30.4
Worksheets	1	1.8	11	19.6	34	60.7	9	16.1
Case studies	1	1.8	7	14.	24	42.9	22	39.3
PIP video	1	1.8	15	26.8	25	44.6	12	21.4
Interactive video	0.0	0.0	8	14.3	34	60.7	12	21.4
Online exercises	1	1.8	4	7.1	37	66.1	13	23.2
Podcasting	4	7.1	16	28.6	26	46.4	8	14.3
Collaborative documents	2	3.6	14	25	30	53.6	9	16.1

Note: Scale Strongly Disagree =1; Disagree =2; Agree =3; Strongly Agree =4;
An overall construct score was computed *M*=2.96; *SD*=.45

Table 7 shows that participants tended to agree (*M*=2.96 *SD*=.45) that the use texts, online material, support material, worksheets, case studies, PIP video, interactive video, online exercises, podcasting, and collaborative documents could be used to enhance their interaction with the content.

Table 7

Learner to Content Interaction

	N	Mean	Std. Deviation
Learner to Content	55	2.96	.45

Note: Scale Strongly Disagree =1; Disagree =2; Agree =3; Strongly Agree =4

Objective Four: Learner to Technology Interaction

To ascertain the enhancement of interaction with course technology the participants were asked about online tutorials, online help, online instructions for plugins, electronic libraries, software applications, and a file management system.

Table 8 shows that when responding to the statements 93% (agreed or strongly agreed) of the participants thought that getting online help would be most effective at enhancing interactions with course technology while 7% disagreed or strongly disagreed. The second highest score of 89% agreed or strongly agreed that electronic libraries would also enhance the interaction with 11% disagreeing or strongly disagreeing. Online tutorials were found to enhance interaction with 87% agreeing or strongly agreeing and 16% choosing “disagree” or “strongly disagree.” The participants discerned that software applications would enhance interactions with 85% agreeing/strongly agreeing and 14% disagreeing or strongly disagreeing. The participants perceived that a file management system and instructions for downloading plugins would be least useful with 78% and 75% agreeing or strongly agreeing while 20% and 25% disagreed or strongly disagreed respectively.

Table 8

Learner to Technology Descriptive

	Strongly Disagree		Disagree		Agree		Strongly Agree	
Item	*f*	%	*f*	%	*f*	%	*f*	%
Online tutorials	1	1.8	8	14.5	37	67.3	9	16.4
Online help	1	1.8	3	5.5	41	74.5	10	18.2
Online instruction	1	1.8	13	23.6	32	58.2	9	16.4
Electronic libraries	2	3.6	4	7.3	34	61.8	15	27.3
Software applications	1	1.8	7	12.7	37	67.3	10	18.2
File management system	1	1.8	10	18.2	31	56.4	12	21.8

Note: Scale Strongly Disagree =1; Disagree =2; Agree =3; Strongly Agree =4;
An overall construct score was computed *M*=3.01; *SD*=.51

According to Table 9 participants tended to agree (*M*=3.01 *SD*=.51) that the use online tutorials, online help, online instruction, electronic libraries, software applications, and file management systems could be used to enhance their interaction with technology.

Table 9

Learner to Technology Interaction

	N	Mean	Std. Deviation
Learner to Technology	55	3.02	.51

Note: Scale Strongly Disagree =1; Disagree =2; Agree =3; Strongly Agree =4

Objective Five: Satisfaction, Quality, Learning

The participants were asked about opportunities for interaction and how they perceived it would affect satisfaction, quality, and learning.

Table 10 shows that the participants perceived the greatest amount of

satisfaction if opportunities for interaction with the instructor (100% agreeing) and with the content (98% agreeing) were provided. They perceived a lesser amount of satisfaction from interaction opportunities with the other students (87% agreeing) and technology (76% agreeing).

Table 10 shows that when considering quality 100 % of the participants professed increased quality when opportunities for interaction with both the instructor and content were provided. While 82% (agreeing) of the participants perceived increased quality with increased opportunities for interaction with technology and 80% thought the same for opportunities for interaction with other students.

According to Table 10 participants (98% agreeing) perceived increased learning when opportunities for interaction with both the instructor and content were available. Increased learning from opportunities for interaction with students and technology were found to score lower with 80% and 78% agreeing respectively.

Table 10

Satisfaction, Quality, and Learning

	Disagree		Agree	
Satisfaction	*f*	%	*f*	%
Opportunities for interaction with other students provided	7	12.7	48	87.3
Opportunities for interaction with the instructor provided	0.0	0.0	55	100
Opportunities for interaction with the technology provided	13	23.6	42	76.4
Opportunities for interaction with the content provided	1	1.8	54	98.2
Quality				
Opportunities for interaction with other students provided	11	20	44	80
Opportunities for interaction with the instructor provided	0.0	0.0	55	100
Opportunities for interaction with the technology provided	10	18.2	45	81.8
Opportunities for interaction with the content provided	0.0	0.0	55	100
Learning				
Opportunities for interaction with other students provided	11	20	44	80
Opportunities for interaction with the instructor provided	1	1.8	54	98.2
Opportunities for interaction with the technology provided	12	21.8	43	78.2
Opportunities for interaction with the content provided	1	1.8	54	98.2

According to Table 11 participants tended to agree (M=1.90 SD=.15) that when they are provided with opportunities for interaction with other students, opportunities for interaction with the instructor, opportunities for interaction with the technology, and opportunities for interaction with the content they will be more satisfied with the learning experience.

Table 11

Satisfaction

	N	Mean	Std. Deviation
Satisfaction	55	1.90	.15

Note: Scale Disagree =1; Agree =2

According to Table 12 participants tended to agree (*M*=1.90 *SD*=.16 that when they are provided with opportunities for interaction with other students, opportunities for interaction with the instructor, opportunities for interaction with the technology, and opportunities for interaction with the content the quality of the learning experience will increase.

Table 12

Quality

	N	Mean	Std. Deviation
Quality	55	1.90	.16

Note: Scale Disagree =1; Agree =2

According to Table 13 participants tended to agree (*M*=1.89 *SD*=.18) that when they are provided with opportunities for interaction with other students, opportunities for interaction with the instructor, opportunities for interaction with the technology, and opportunities for interaction with the content the overall learning will increase.

Table 13

Learning

	N	Mean	Std. Deviation
Learning	55	1.89	.18

Note: Scale Disagree =1; Agree =2

Objective Six: Describe the Data Using Pearson Coefficient

Relationships between learning mean, satisfaction mean, quality mean, learner to learner mean, learner to instructor mean, learner to content mean, and learner to technology mean are described below in Table 14 by calculating Pearson's product–moment correlation coefficient using Davis' (1971) convention. Magnitude of the relationship is noted by Davis as $.01 \geq r \leq .09$ = Negligible, $.10 \geq r \leq .29$ = Low, $.30 \geq r \leq .49$ = Moderate, $.50 \geq r \leq .69$ = Substantial, $r \geq .70$ = Very Strong.

The overall satisfaction mean score had a substantial correlation ($r = .54$) with the learning mean (see Table 14). The overall quality mean score had a very strong correlation ($r = .73$) with the learning mean and a substantial correlation ($r = .55$) with the satisfaction mean (see Table 14). The overall learner to learner mean score had a low correlation ($r = .27$) with the learning mean and a moderate correlation ($r = .33$) with the satisfaction mean (see Table 14).

The overall learner to instructor mean score had a substantial correlation (r = .55) with the learner to learner mean (see Table 14). The overall learner to content mean score had a moderate correlation (r = .32) with the learning mean, a moderate correlation (r = .33) with the satisfaction mean, a low correlation (r = .28) with the quality mean, a substantial correlation (r = .58) with the learner to learner mean, and a substantial correlation (r = .67) with the learner to instructor mean (see Table 14).

The overall learner to technology mean score had a moderate correlation (r = .40) with the learner to learner mean, a substantial correlation (r = .57) with the learner to instructor mean, and a very strong correlation (r = .73) with the learner to content mean (see Table 14). The overall enhanced interaction mean score had a moderate correlation (r = .30) with the satisfaction mean, a moderate correlation (r = .30) with the quality mean, a very strong correlation (r = .75) with the learner to learner mean, a very strong correlation (r = .84) with the learner to instructor mean, a very strong correlation (r = .90) with the learner to content mean, and a very strong correlation (r = .83) with the learner to technology mean (see Table 14). We see significant single order correlation between interaction and learner to learner, learner to instructor, learner to content, and learner to technology.

Table 14

Pearson Correlation Coefficients of means

	Learning Mean	Satisfaction Mean	Quality Mean	Learner to Learner Mean	Learner to Instructor Mean	Learner to Content Mean	Learner to Technology Mean	Enhanced Interaction Mean
Learning Mean	1	-	-	-	-	-	-	-
Satisfaction Mean	.54**	1	-	-	-	-	-	-
Quality Mean	.73**	.55**	1	-	-	-	-	-
Learner to Learner Mean	.27*	.26	.33*	1	-	-	-	-
Learner to Instructor Mean	.06	.17	.21	.55**	1	-	-	-
Learner to Content Mean	.32*	.33*	.28*	.58**	.67**	1	-	-
Learner to Technology Mean	.20	.24	.18	.40**	.57**	.73**	1	-
Enhanced Interaction Mean	.25	.30*	.30*	.75**	.84**	.90**	.83**	1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Objective Seven: Student Perception of Enhancing Interaction

The participants were asked to determine which of the following technologies is an effective means for enhancing interactions with the other learners, the instructor, the technology, or the content.

From Table 15 we see that the most effective means for enhancing interactions with other learners are through the use of online chat (*f*=38, 69.1%), threaded discussion (*f*=34, 61.8%), and audio/phone calls (*f*=30, 54.5%). The least effective means for enhancing interactions with the other learners are instructions for downloading plugins (*f*=3, 5.5%), online glossaries (*f*=3, 5.5%), and software applications (*f*=2, 3.6%).

Table 15

Enhancement with Other Learners

Technology	With other Learners	
	f	%
Online chat	38	69.1
Threaded discussions	34	61.8
Audio/phone call	30	54.5
Email	29	52.7
Instant messaging	28	50.9
Interactive video conference	25	45.5
Student homepages	24	43.6
Blogging	23	41.8
Who's online feature	22	40.0
Online editing and feedback	21	38.2
Getting help online	21	38.2
Collaborative documents/wikis	20	36.4
Role play/simulations	19	34.5
Text messaging	19	34.5
Text	18	32.7
Social sites (second life, facebook, etc.)	18	32.7
Lecture	16	29.1
Voice over PowerPoint	16	29.1

Table 15 Continued

Technology	With other Learners	
	f	%
Case studies	16	29.1
Online instructional materials	15	27.3
Journaling	15	27.3
Online café	15	27.3
Worksheets	14	25.5
Online tutorials	14	25.5
YouTube	14	25.5
Support materials	13	23.6
Twitter	13	23.6
Online quizzes	12	21.8
PowerPoint	12	21.8
Streaming video	11	20.0
iTunes U	11	20.0
Online calendar	10	18.2
Instructor announcements	9	16.4
Guest lectures	9	16.4
Student response systems (CPS)	9	16.4
Podcasts	8	14.5
Online self-tests	8	14.5
Internet links	7	12.7
Electronic libraries	6	10.9
RSS feeds	4	7.3
Virtual office hours	4	7.3
Instructions for downloading plugins	3	5.5
Online glossaries	3	5.5
Software applications	2	3.6

From Table 16 we see that the most effective means for enhancing interactions with the instructor are through the use of email (*f*=51, 92.7%), lecture (*f*=48, 87.3%), and instructor announcements (*f*=45, 81.8%). The least effective means for enhancing interactions with the technology are software applications (*f*=8, 14.5%), online glossaries (*f*=8, 14.5%), twitter (*f*=8, 14.5%), and student homepages (*f*=4, 7.3%).

Table 16

Enhancement with the Instructor

Technology	With the Instructor	
	f	%
Email	51	92.7
Lecture	48	87.3
Instructor announcements	45	81.8
Interactive video conference	43	78.2
Online editing and feedback	42	76.4
Audio/phone call	39	70.9
Voice over PowerPoint	38	69.1
Online chat	36	65.5
Virtual office hours	34	61.8
Streaming video	32	58.2
Getting help online	29	52.7
Threaded discussions	27	49.1
Online calendar	27	49.1
Online quizzes	24	43.6
PowerPoint	24	43.6
Support materials	23	41.8
Online tutorials	23	41.8
Blogging	22	40.0
Text	21	38.2
Collaborative documents/wikis	21	38.2
Instant messaging	21	38.2
Worksheets	20	36.4
Role play/simulations	20	36.4
Case studies	19	34.5
Guest lectures	19	34.5
Online instructional materials	18	32.7
Podcasts	18	32.7
Journaling	17	30.9
Who's online feature	15	27.3
Online self-tests	13	23.6
Electronic libraries	12	21.8
Text messaging	12	21.8
Social sites (second life, facebook, etc.)	12	21.8
Internet links	11	20.0
Instructions for downloading plugins	9	16.4
RSS feeds	9	16.4
Online café	9	16.4

Table 16 Continued

Technology	With the Instructor	
	f	%
Student response systems (CPS)	9	16.4
YouTube	9	16.4
iTunes U	9	16.4
Software applications	8	14.5
Online glossaries	8	14.5
Twitter	8	14.5
Student homepages	4	7.3

From Table 17 we see that the most effective means for enhancing interactions with the technology are through the use of instructions for downloading plugins (*f*=40, 72.7%), software applications (*f*=39, 70.9%), and electronic libraries (*f*=35, 63.6%). The least effective means for enhancing interactions with the technology are social sites (*f*=8, 14.5%), guest lectures (*f*=6, 10.9%), and role play/simulations (*f*=5, 9.1%).

Table 17

Enhancement with the Technology

Technology	With the Technology	
	f	%
Instructions for downloading plugins	40	72.7
Software applications	39	70.9
Electronic libraries	35	63.6
Online instructional materials	32	58.2
Internet links	32	58.2
Getting help online	31	56.4
Online tutorials	29	52.7
Podcasts	28	50.9
Streaming video	27	49.1
Interactive video conference	23	41.8
Support materials	23	41.8
Collaborative documents/wikis	23	41.8
Blogging	20	36.4
PowerPoint	18	32.7

Table 17 Continued

Technology	With the Technology	
	f	%
Online quizzes	17	30.9
Online calendar	17	30.9
Instructor announcements	16	29.1
Online café	15	27.3
Voice over PowerPoint	14	25.5
Online editing and feedback	14	25.5
Online self-tests	14	25.5
Worksheets	13	23.6
Case studies	13	23.6
Instant messaging	13	23.6
YouTube	13	23.6
iTunes U	13	23.6
Threaded discussions	12	21.8
Text	12	21.8
RSS feeds	12	21.8
Journaling	12	21.8
Virtual office hours	12	21.8
Student response systems (CPS)	12	21.8
Online chat	11	20.0
Email	11	20.0
Audio/phone call	11	20.0
Lecture	11	20.0
Student homepages	11	20.0
Online glossaries	11	20.0
Twitter	10	18.2
Who's online feature	9	16.4
Text messaging	9	16.4
Social sites (second life, facebook, etc.)	8	14.5
Guest lectures	6	10.9
Role play/simulations	5	9.1

From Table 18 we see that the most effective means for enhancing interactions with the content are through the use of case studies (*f*=40, 72.7%), support materials (*f*=39, 70.9%), online instructional materials (*f*=36, 65.5%), and online glossaries (*f*=36, 65.5%). The least effective means for enhancing interactions with the content are a who

is online feature (*f*=5, 9.1%), text messaging (*f*=5, 9.1%), twitter (*f*=5, 9.1%), and student homepages (*f*=1, 1.8%).

Table 18

Enhancement with the Content

Technology	With the Content	
	f	%
Case studies	40	72.7
Support materials	39	70.9
Online instructional materials	36	65.5
Online glossaries	36	65.5
Online tutorials	34	61.8
Online quizzes	33	60.0
Worksheets	32	58.2
Electronic libraries	32	58.2
PowerPoint	31	56.4
Online self-tests	30	54.5
Internet links	29	52.7
Online calendar	29	52.7
Guest lectures	29	52.7
Text	27	49.1
Lecture	25	45.5
Voice over PowerPoint	24	43.6
Streaming video	23	41.8
Podcasts	23	41.8
Collaborative documents/wikis	23	41.8
Online editing and feedback	22	40.0
Threaded discussions	21	38.2
Getting help online	21	38.2
Instructor announcements	21	38.2
Interactive video conference	20	36.4
Role play/simulations	18	32.7
Blogging	17	30.9
Journaling	15	27.3
Software applications	12	21.8
RSS feeds	12	21.8
Audio/phone call	11	20.0
Social sites (second life, facebook, etc.)	11	20.0

Table 18 Continued

Technology	With the Content	
	f	%
Email	10	18.2
Instructions for downloading plugins	10	18.2
YouTube	10	18.2
iTunes U	10	18.2
Virtual office hours	8	14.5
Student response systems (CPS)	8	14.5
Online chat	7	12.7
Instant messaging	6	10.9
Online café	6	10.9
Who's online feature	5	9.1
Text messaging	5	9.1
Twitter	5	9.1
Student homepages	1	1.8

Table 19 describes each technology, the frequency of selection for each interaction, the percentage of those participants selecting the interaction, and the mean across all interactions. Table 19 shows that the overall most effective means for enhancing interactions are interactive video conference (M=2.02), getting help online (M=1.85), email (M=1.84), online instructional materials (M=1.84), lecture (M=1.82), online tutorials (M=1.82), and online editing and feedback (M=1.80). The least effective means for enhancing interactions were student response systems (M=0.69), RSS feeds (M=0.67), and Twitter (M=0.65).

Table 19

Overall Enhancement

Technology	With other Students		With the Instructor		With the Technology		With the Content		Mean Selection Across Variables
	f	%	*f*	%	*f*	%	*f*	%	*M*
Interactive video conference	25	45.5	43	78.2	23	41.8	20	36.4	2.02
Getting help online	21	38.2	29	52.7	31	56.4	21	38.2	1.85
Email	29	52.7	51	92.7	11	20.0	10	18.2	1.84
Online instructional materials	15	27.3	18	32.7	32	58.2	36	65.5	1.84
Lecture	16	29.1	48	87.3	11	20.0	25	45.5	1.82
Online tutorials	14	25.5	23	41.8	29	52.7	34	61.8	1.82
Online editing and feedback	21	38.2	42	76.4	14	25.5	22	40.0	1.80
Support materials	13	23.6	23	41.8	23	41.8	39	70.9	1.78
Threaded discussions	34	61.8	27	49.1	12	21.8	21	38.2	1.71
Streaming video	11	20.0	32	58.2	27	49.1	23	41.8	1.69
Online chat	38	69.1	36	65.5	11	20.0	7	12.7	1.67
Voice over PowerPoint	16	29.1	38	69.1	14	25.5	24	43.6	1.67
Audio/phone call	30	54.5	39	70.9	11	20.0	11	20.0	1.65
Instructor announcements	9	16.4	45	81.8	16	29.1	21	38.2	1.65
Case studies	16	29.1	19	34.5	13	23.6	40	72.7	1.60
Collaborative documents/wikis	20	36.4	21	38.2	23	41.8	23	41.8	1.58
Online quizzes	12	21.8	24	43.6	17	30.9	33	60.0	1.56
Electronic libraries	6	10.9	12	21.8	35	63.6	32	58.2	1.55
PowerPoint	12	21.8	24	43.6	18	32.7	31	56.4	1.55
Online calendar	10	18.2	27	49.1	17	30.9	29	52.7	1.51
Blogging	23	41.8	22	40.0	20	36.4	17	30.9	1.49
Worksheets	14	25.5	20	36.4	13	23.6	32	58.2	1.44
Internet links	7	12.7	11	20.0	32	58.2	29	52.7	1.44
Text	18	32.7	21	38.2	12	21.8	27	49.1	1.42
Podcasts	8	14.5	18	32.7	28	50.9	23	41.8	1.40
Instant messaging	28	50.9	21	38.2	13	23.6	6	10.9	1.24
Online self-tests	8	14.5	13	23.6	14	25.5	30	54.5	1.18
Guest lectures	9	16.4	19	34.5	6	10.9	29	52.7	1.15
Instructions for downloading plugins	3	5.5	9	16.4	40	72.7	10	18.2	1.13
Role play/simulations	19	34.5	20	36.4	5	9.1	18	32.7	1.13
Software applications	2	3.6	8	14.5	39	70.9	12	21.8	1.11

Table 19 Continued

Technology	With other Students		With the Instructor		With the Technology		With the Content		Mean Selection Across Variables
	f	%	*f*	%	*f*	%	*f*	%	*M*
Journaling	15	27.3	17	30.9	12	21.8	15	27.3	1.07
Virtual office hours	4	7.3	34	61.8	12	21.8	8	14.5	1.05
Online glossaries	3	5.5	8	14.5	11	20.0	36	65.5	1.05
Who's online feature	22	40.0	15	27.3	9	16.4	5	9.1	0.93
Social sites (second life, facebook, etc.)	18	32.7	12	21.8	8	14.5	11	20.0	0.89
YouTube	14	25.5	9	16.4	13	23.6	10	18.2	0.84
Online café	15	27.3	9	16.4	15	27.3	6	10.9	0.82
Text messaging	19	34.5	12	21.8	9	16.4	5	9.1	0.82
iTunes U	11	20.0	9	16.4	13	23.6	10	18.2	0.78
Student homepages	24	43.6	4	7.3	11	20.0	1	1.8	0.73
Student response systems (CPS)	9	16.4	9	16.4	12	21.8	8	14.5	0.69
RSS feeds	4	7.3	9	16.4	12	21.8	12	21.8	0.67
Twitter	13	23.6	8	14.5	10	18.2	5	9.1	0.65

Objective Eight: Predict Learning, Quality, and Satisfaction

Stepwise linear regression was used to predict learning from the constructs of student to student interaction, student to instructor, student to technology interaction, and student to content interaction. Table 20 displays the regression model that depicts the construct student to content interaction was found to be a significant predictor of learning.

Table 20

Stepwise Regression of Predictors of Learning from Interactions (n= 55)

Construct	R	R^2	B	Beta	t-value	Sig.
Learning	.32[a]	.10	.13	.32	2.48	.02
(Constant)			1.51		9.82	.00

Note: a. Predictors: (Constant), scsum

Stepwise linear regression was used to predict quality from the constructs of student to student interaction, student to instructor, student to technology interaction, and student to content interaction. Table 21 displays the regression model that depicts the construct student to student interaction was found to be a significant predictor of quality.

Table 21

Stepwise Regression of Predictors of Quality from Interactions (n= 55)

Construct	R	R^2	B	Beta	t-value	Sig.
Quality	.33[a]	.11	.11	.33	2.51	.02
(Constant)			1.57		11.55	.00

Note: a. Predictors: (Constant), sssum

Stepwise linear regression was used to predict satisfaction from the constructs of student to student interaction, student to instructor, student to technology interaction, and student to content interaction. Table 22 displays the regression model that depicts the construct student to content interaction was found to be a significant predictor of satisfaction.

Table 22

Stepwise Regression of Predictors of Satisfaction from Interactions (n= 55)

Construct	R	R^2	B	Beta	t-value	Sig.
Satisfaction	.33[a]	.11	.11	.33	2.52	.02
(Constant)			1.59		12.48	.00

Note: a. Predictors: (Constant), scsum

CHAPTER V

CONCLUSIONS, IMPLICATIONS, RECOMMENDATIONS

Purpose of Study

The purpose of this study was to describe students' level of self-directedness, engagement, and interaction in a course delivered using multiple delivery strategies. The purpose was deduced from and tests Moore's (1989) theory of transactional distance variables with the addition of the learner-to-technology variable by Hillman, Willis, and Gunawardena (1994). We will also ascertain the students' perception of satisfaction, quality, and overall learning.

Research Objectives

The objectives of the study were to:

1. Describe and explore learner to learner interactions
2. Describe and explore learner to instructor interactions
3. Describe and explore learner to content interactions
4. Describe and explore learner to technology interactions
5. Describe and explore student perceptions of satisfaction in a course, quality of the learner experience, and increases in learning as a result of increased interactions
6. Describe how different elearning technologies can be used to enhance learner to learner interactions, learner to instructor interactions, learner to content interactions, and learner to technology interactions
7. Explore the relationships between learner to learner interactions, learner

to instructor interactions, learner to content interactions, learner to technology interactions and satisfaction, quality, and learning

8. Explore the relationships between elearning technologies and satisfaction, quality, and learning

Summary of Review of Literature

Transactional Distance

The transactional distance theory (Moore, 1989) included three types of interaction: learner-to-learner; learner-to-content; and learner-to-instructor. This was expanded by Hillman, Willis, and Gunawardena (1994) to include learner-to-technology interaction. Examples of these interactions are listed below (Dooley, Lindner, & Dooley, 2005):

Learner-to-learner – online chats, threaded discussion, email, point-to-point video conference, audio calls, etc.

Learner-to-content – online books, online instructional materials, support materials, worksheets, case studies, etc.

Learner-to-instructor – lecture, email, online editing and feedback, evaluation of learning, interactive television, streaming video, voice-over PowerPoint, etc.

Learner-to-technology – online tutorials on the use of technology, online help, downloading plug-ins, installation of software, file management (including downloading and uploading of files), electronic libraries, search engines, etc.

Dooley, Lindner, and Dooley (2005) further theorize that maximum learning occurs when all four of these interactions are ongoing, overlap, and successful and term this as “vicarious interaction”

Quality

Nelson & Thompson (2005) found quality to be

> the perceived lack of personal contact between students and instructor is also often associated with lower course quality. Increasing and maintaining high course quality, increasing and maintaining instructor responsiveness, and increasing opportunities for students to interact among themselves, with the instructor and with outside expertise are objectives that would begin removing the personal contact barriers. (p. 44)

Spallak (2009) developed and evaluated criteria for quality assurance in online instruction. These course criteria are:

- be scientifically based
- be regularly updated (current)
- be easy to navigate through
- have defined educational objectives
- stimulate learning
- be created by appropriately qualified academics
- be at an appropriate level for the intended participants
- be peer reviewed
- be structured so that the participant can determine the pace
- give prompt feedback to any answered question

- contain context sensitive help
- have a consistent look and feel; aesthetics
- include self assessments
- adapt to the performance of the participant

Of these criteria regular updating, defined objective, stimulate learning, and scientific basis were perceived as the best criteria for quality while the criteria of consistent look, adapting to the participants' performance, self assessments, and context sensitive help were seen as less important.

Satisfaction

Gunawardena, Linder-VanBerschot, LaPoint, and Rao (2010) used the dependent variable of learner satisfaction and the independent variables self online self efficacy, course design, learner to learner interaction, and learner to instructor interaction to predict the dependent variable learner satisfaction and found that online self efficacy to the best predictor of satisfaction.

Learning

Cronbach (1963) described learning as behavior changes that result from experience. Boyd & Apps. (1980) describe learning as the act or process by which behavioral change, knowledge, skills, and attitudes are acquired. Kolb (1984) defines learning as the process by whereby knowledge is created through transformation of experience. For the purpose of this paper we will use Cronbach's (1963) definition due to its simplicity. Many of the definitions given by other theorists state the same main idea as Cronbach but tend to make them overly complex especially when using catch

words or phrases of the day.

Statement of Problem

Some researchers have called into question the reliability of studies confirming Moore's (1989) theory. Gorsky and Caspi (2005) state that "either data only partially supported the theory (Chen 2001a, 2001b: Chen & Willis, 1998) or, that if they apparently did so (Bischoff et al., 1996; Bunker et al., 1996; Saba & Shearer, 1994) the studies lacked reliability and/or construct validity"(p.3). This research seeks to confirm Moore's theory by testing for learner-to-learner; learner-to-content; and learner-to-instructor interaction using various technologies as well as the students' perception of satisfaction, quality, and overall learning.

Summary of Methodology

This was a convenient and small sample so caution is warranted as the findings, conclusions, recommendations, and implications may not be generalized to larger populations. The instrument is a six-section questionnaire (see Appendix A) with six sections. A four-point Likert-type response scale was employed for Sections II to V.

The items in Section I are designed to measure the level of interaction between the learner and other learners. The items in Section II are designed to measure the level of interaction between the learner and instructor. The items in Section III are designed to measure the level of interaction between the learner and course content. The items in Section IV are designed to measure the level of interaction between the learner and technology. The items in Section V are designed to measure the level of perceived satisfaction, quality, and learning experienced through interaction.

The items in Section VI are designed to measure the level of agreement with the question "Is the use of the following technology an *effective means for enhancing interactions* with other learners, the instructor, the technology, or the content?". The respondents were able to choose multiple responses for each given technology.

Data was collected using a web-formatted survey (see Appendix A) delivered to the students using the Internet and reliability was estimated by calculating Cronbach's Alpha. Descriptive statistics were calculated for each variable. Spearman's rank order correlation coefficient was used to determine if the responses were statistically different between variables. Relationships between interaction and learning, quality, and satisfaction were described by calculating Pearson's product moment correlation coefficient using Davis' (1971) convention.

Summary of Key Findings for each Objective

Objective One: Learner to Learner Interaction

Dooley, Lindner, & Dooley (2005) state that online chats, threaded discussion, email, point-to-point video conference, and audio calls are examples of learner to learner interaction. Out of all the technologies listed in the instrument, participants described the use of interactive video conferencing as the most effective at enhancing interactions with other learners with 87% answering "agree" or "strongly agree" and 12% answering "disagree." Email and online chats were also favored with 80% of participants answering "agree" or "strongly agree" and 20% answering "disagree." Audio or phone calls were also found as useful technology for learner to learner interactions with 78% agreeing or strongly agreeing and 21% disagreeing. Blogging was found to be the least useful with

49% of participants respectively answering “agree” or “strongly agree” and 50% answering “disagree” or “strongly disagree.” An implication exists that interactive video, email, online chats, and audio/phone calls are the most effective technologies for enhancing interaction between learners while blogging is not effective for enhancing interaction between learners.

The conclusion is that interactive video, email, online chats, and audio/phone calls could be made available and these interactions encouraged within the education setting to enhance interaction between the learners. The researcher may also conclude that making blogging available is not an efficient use of time and/or capital as a means of enhancing interaction between the learners.

The researcher recommends that instructors consider the following technologies as a means of enhancing interactions with other learners: interactive video, email, online chats, and audio/phone calls. The researcher also recommend that blogging is removed as a priority in the educational setting. Instructors should consider evaluating these and other technologies to insure purposeful use of technologies and appropriateness.

Participants tended to agree (M=2.94 SD=.44) that the use of online chats, threaded discussion, email, audio/phone call, video conferencing, instant messaging, blogging, and collaborative documents could be used to enhance their interaction with other learners. An implication exists that learner to learner interaction is important to learners. The researcher may conclude that learner to learner interaction technologies could be made available to learners to enhance interaction between the learners.

Again, the researcher recommends that interactive video, email, online chats, and

audio/phone calls are made available to the learners as a means of enhancing interactions with other learners. Evaluations should be conducted of these and other technologies to insure purposeful use of technologies and appropriateness.

Objective Two: Learner to Instructor Interaction

Dooley, Lindner, & Dooley (2005) state that lecture, email, online editing and feedback, evaluation of learning, interactive television, streaming video, and voice-over PowerPoint are examples of learner to instructor interaction. The technologies chosen as most effective at enhancing interactions with the instructor were lecture and email with 87% choosing "strongly agree" or "agree" and 12% choosing "strongly disagree" or "disagree." The next most useful technology was online editing/feedback and voice over PowerPoint with 83% choosing "agree" or "strongly agree" while 14% and 16% chose "disagree" or "strongly disagree" respectively. The respondents found evaluation to be least useful to enhance interactions with the instructor with 78% agreeing or strongly agreeing and 20% disagreeing or strongly disagreeing.

An implication exists that lecture, email, online editing/feedback, and voice over PowerPoint are the most effective technologies for enhancing interaction between learners and the instructor while evaluation is not effective for enhancing interaction between learners and the instructor.

The conclusion is that lecture, email, online editing/feedback, and voice over PowerPoint could be utilized by the instructor to insure interaction between the instructor and learner. The researcher may also conclude that evaluation is not an efficient use of time and/or capital for the instructor as a means of enhancing interaction

between the learner and the instructor.

The researcher recommends that instructors consider the following technologies as a means of enhancing interactions between the learner and instructor: email, online editing/feedback, and voice over PowerPoint. The researcher also recommends that evaluation is removed as a priority as a means of interaction between the learner and instructor. However, it may have value when considering the instructor for tenure and promotion. This was not included in the scope of this study. Instructors should consider evaluating these and other technologies to insure purposeful use of technologies and appropriateness.

Participants tended to agree (M=3.12 SD=.48) that the use of lecture, streaming video, email, voice over PowerPoint, online editing/feedback, PIP video, and evaluation could be used to enhance their interaction with the instructor. An implication exists that learner to instructor interaction is important to learners. This was also our highest overall mean score for interaction. The researcher may conclude that learner to instructor interaction is the most important overall to the learner and that these technologies could be utilized by the instructor to enhance interactions.

Again, the researcher recommends that lecture, email, online editing/feedback, and voice over PowerPoint are made available to the learners as a means of enhancing interactions between the learner and instructor. Evaluations should be conducted of these and other technologies to insure purposeful use of technologies and appropriateness.

Objective Three: Learner to Content Interaction

Dooley, Lindner, & Dooley (2005) state that online books, online instructional materials, support materials, worksheets, and case studies are examples of learner to content interaction. Out of all the technologies listed in the instrument participants described the use of online exercises as the most effective at enhancing interactions with the content with 91% of the participants agreeing or strongly agreeing and 9% disagreeing or strongly disagreeing. Online instructional materials and support materials were also found to be useful with 87% agreeing or strongly agreeing and 13% disagreeing or strongly disagreeing. Eighty three percent of respondents agreed or strongly agreed that interactive video and case studies could be used to enhance interactions with course content while 14% and 16% disagreed or strongly disagreed respectively. The lowest scores were found when asked if texts enhance interaction with content with 67% agreeing or strongly agreeing and 33% disagreeing or strongly disagreeing. An implication exists that online exercises, online instructional materials, online support materials, and interactive video are the most effective technologies for enhancing interaction between learners and the content while texts are not effective for enhancing interaction between learners and the content.

The conclusion is that online exercises, online instructional materials, online support materials, and interactive video, more specifically the online means of delivery, could be utilized by the instructor to insure interaction between the learner and content. The researcher may also conclude that texts are not an efficient use of time and/or capital for the instructor as a means of enhancing interaction between the learner and the

content.

The researcher recommends that instructors consider the following technologies as a means of enhancing interactions between the learner and content: online exercises, online instructional materials, online support materials, and interactive video. The researcher also recommends that texts, at least in the traditional sense, be reconsidered as a means of delivering content to the learner. The data seems to show that online materials including, possibly, an electronic version of the text would be more effective at enhancing the interaction between the learner and the content. Instructors should consider evaluating these and other technologies to insure purposeful use of technologies and appropriateness.

Participants tended to agree (M=2.96 SD=.45) that the use of texts, online material, support material, worksheets, case studies, PIP video, interactive video, online exercises, podcasting, and collaborative documents could be used to enhance their interaction with the content. An implication exists that learner to content interaction is important to learners. The researcher may conclude that online exercises, online instructional materials, online support materials, and interactive video technologies could be made available to the learner by the instructor to enhance learner to content interaction.

Again, the researcher recommends that online exercises, online instructional materials, online support materials, and interactive video are made available to the learners as a means of enhancing interactions between the learner and the content. Evaluations should be conducted of these and other technologies to insure purposeful

use of technologies and appropriateness.

Objective Four: Learner to Technology Interaction

Dooley, Lindner, & Dooley (2005) state that online tutorials on the use of technology, online help, downloading plug-ins, installation of software, file management (including downloading and uploading of files), electronic libraries, and search engines, are examples of learner to technology interaction. According to the data 93% (agreed or strongly agreed) of the participants thought that getting online help would be most effective at enhancing interactions with course technology while 7% disagreed or strongly disagreed. The second highest score of 89% agreed or strongly agreed that electronic libraries would also enhance the interaction with 11% disagreeing or strongly disagreeing. Online tutorials were found to enhance interaction with 87% agreeing or strongly agreeing and 16% choosing "disagree" or "strongly disagree." The participants perceived that a file management system and instructions for downloading plugins would be least useful with 78% and 75% agreeing or strongly agreeing while 20% and 25% disagreed or strongly disagreed respectively. An implication exists that getting help online, electronic libraries, and online tutorials are the most effective technologies for enhancing interaction between learners and the technology while a file management system and instructions for downloading plugins are not effective for enhancing interaction between learners and the technology.

The conclusion is that these technologies must be made available within the education setting to insure interaction between the learners and technology. The researcher may also conclude that making a file management system and instructions for

downloading plugins are not an efficient use of time and/or capital as a means of enhancing interaction between the learners and the technology.

The researcher recommends that instructors consider the following technologies as a means of enhancing interactions between the learner and technology: getting help online, electronic libraries, and online tutorials. The researcher also recommends that a file management system and instructions for downloading plugins be reconsidered as a means of enhancing interactions between the technology and the learner. Instructors should consider evaluating these and other technologies to insure purposeful use of technologies and appropriateness.

Participants tended to agree (M=3.02 SD=.51) that the use online tutorials, online help, online instruction, electronic libraries, software applications, and file management systems could be used to enhance their interaction with other learners. An implication exists that learner to technology interaction is important to learners. The researcher may conclude that learner to content interaction technologies could be made available to learners to enhance the interaction between the learner and the technology.

Again, The researcher recommends that getting help online, electronic libraries, and online tutorials are made available to the learners as a means of enhancing interactions between the learner and the technology. Evaluations should be conducted of these and other technologies to insure purposeful use of technologies and appropriateness.

Objective Five: Satisfaction, Quality, Learning

Gunawardena, Linder-VanBerschot, LaPoint, and Rao (2010) hypothesized that learners have increased levels of satisfaction when there is increased participation and learning gains which leads to continued enrollment and that increased satisfaction leads to success. Participants perceived the greatest amount of satisfaction if opportunities for interaction with the instructor (100% agreeing) and with the content (98% agreeing) were provided. Participants tended to agree (M=1.90 SD=.15) that when they are provided with opportunities for interaction with other students, opportunities for interaction with the instructor, opportunities for interaction with the technology, and opportunities for interaction with the content they will be more satisfied with the learning experience. This seems to agree with Gunawardena's (2010) hypothesis that online self efficacy is the best predictor of satisfaction.

Nelson & Thompson (2005) state that the perception of distance between instructors and learners can be associated with lower quality. These findings disagree with Nelson & Thompson. Participants perceived the greatest amount of quality (100 % agreeing) when opportunities for interaction with both the instructor and content were provided. A majority (82% agreeing) of the participants also perceived increased quality with increased opportunities for interaction with technology. Participants tended to agree (M=1.90 SD=.16) that when they are provided with opportunities for interaction with other students, opportunities for interaction with the instructor, opportunities for interaction with the technology, and opportunities for interaction with the content the quality of the learning experience will increase.

Cronbach (1963) described learning as behavior changes that result from experience. Participants (98% agreeing) perceived increased learning when opportunities for interaction with both the instructor and content were available. Participants tended to agree (M=1.89 SD=.18) that when they are provided with opportunities for interaction with other students, opportunities for interaction with the instructor, opportunities for interaction with the technology, and opportunities for interaction with the content the overall learning will increase.

An implication exists that learners perceive greater satisfaction, quality, and learning when opportunities for interaction with the content and the instructor are made available. This leads to the conclusion that the technologies that scored highest in enhancing interactions with the content and instructor could be utilized in the educational setting. It may also be concluded that technologies utilized for enhancing interactions with the technology and other learners are not as important in the educational setting.

The researcher recommends that using lecture, email, online editing/feedback, voice over PowerPoint, online exercises, online instructional materials, online support materials, and interactive video be considered as part of the course planning by the instructor and at least some of them be implement to enhance the interactions between the learners, the content and the instructor thereby increasing satisfaction, quality, and learning. Instructors should consider evaluating these and other technologies to insure purposeful use of technologies and appropriateness.

Objective Six: Describe the Data using Pearson Correlation Coefficient

Gall, Borg, and Gall (1996) define correlation as a mathematical expression of the relationship between two variables. It is the proportion of variance and can be useful in predicting the dependent variable from independent variables.

The overall satisfaction mean score had a substantial correlation (r= .54) with the learning mean. The overall quality mean score had a very strong correlation (r = .73) with the learning mean and a substantial correlation (r = .55) with the satisfaction mean (see Table 15).

The overall learner to learner mean score had a low correlation (r = .27) with the learning mean and a moderate correlation (r = .33) with the satisfaction mean (see Table 15). The overall learner to instructor mean score had a substantial correlation (r = .55) with the learner to learner mean (see Table 15). The overall learner to content mean score had a moderate correlation (r = .32) with the learning mean, a moderate correlation (r = .33) with the satisfaction mean, a low correlation (r = .28) with the quality mean, a substantial correlation (r = .58) with the learner to learner mean, and a substantial correlation (r = .67) with the learner to instructor mean (see Table 15). The overall learner to technology mean score had a moderate correlation (r = .40) with the learner to learner mean, a substantial correlation (r = .57) with the learner to instructor mean, and a very strong correlation (r = .73) with the learner to content mean.

The overall enhanced interaction mean score had a moderate correlation (r = .30) with the satisfaction mean, a moderate correlation (r = .30) with the quality mean, a very strong correlation (r = .75) with the learner to learner mean, a very strong correlation (r

= .84) with the learner to instructor mean, a very strong correlation (r = .90) with the learner to content mean, and a very strong correlation (r = .83) with the learner to technology mean.

Out of learning, satisfaction, and quality a very strong correlation was found between quality and learning (.73). This implies that quality and learning are interrelated. The conclusion is that the learner will perceive an increased level of quality if there is an increased level of learning and vice versa.

Out of the learner to learner, learner to instructor, learner to content, and learner to technology mean scores the strongest correlation (.73) was between learner to technology and learner to content. This implies a very strong correlation and that learner to technology and learner to content interactions are interrelated. The conclusion is that learner to technology and learner to content interactions are equally important.

The relationship between the enhanced interaction mean score and all other means was found to be strongest (.90) between learner to content and enhanced interaction. This was the strongest correlation among the variables. This implies that enhanced interaction and learner to content interaction are interrelated. The conclusion is that the learner to content interaction is most important for enhancing interactions.

The researcher recommends that instructors consider that when attempting to enhance interactions in the classroom that the majority of the effort be spent evaluating learner to content interactions. These efforts should be targeted on online exercises, online instructional materials, online support materials, and interactive video as the most effective technologies for enhancing interaction between learners and the content.

Objective Seven: Describe the Learners' Perception of the Effectiveness of Different Technologies at Enhancing Interaction

Kinshuk and Young (2003) identified five limitations to asynchronous learning: lack of match between course material and its explanation; lack of contextual discussion; lack of human teacher expression and explanation; lack of human interaction, and lack of contextual understandings. Technology can bridge all these gaps when used correctly.

Participants perceived the most effective means for enhancing interactions with other learners were through the use of online chat (*f*=38, 69.1%), threaded discussion (*f*=34, 61.8%), and audio/phone calls (*f*=30, 54.5%). The least effective means for enhancing interactions with the other learners are instructions for downloading plugins (*f*=3, 5.5%), online glossaries (*f*=3, 5.5%), and software applications (*f*=2, 3.6%).

An implication exists that online chats, threaded discussions, and audio/phone calls are the most effective technologies for enhancing interactions between learners. The conclusion is that online chats, threaded discussions, and audio/phone calls could be made available if interactions between learners are the goal.

The researcher recommends to instructors that the majority of effort is spent evaluating online chats, threaded discussions, and audio/phone calls as possible technologies when attempting to enhance interactions between learners. The researcher also recommends that instructions for downloading plugins, online glossaries, and software applications not be considered as a means of enhancing interactions between learners.

Participants perceived the most effective means for enhancing interactions with the instructor are through the use of email (*f*=51, 92.7%), lecture (*f*=48, 87.3%), and instructor announcements (*f*=45, 81.8%). The least effective means for enhancing interactions with the technology are software applications (*f*=8, 14.5%), online glossaries (*f*=8, 14.5%), twitter (*f*=8, 14.5%), and student homepages (*f*=4, 7.3%).

An implication exists that email, lecture, and instructor announcements are the most effective technologies for enhancing interactions between learners and the instructor. The conclusion is that email, lecture, and instructor announcements could be made available if interactions between learners and the instructor are the goal.

The researcher recommends to instructors that the majority of effort is spent evaluating email, lecture, and instructor announcements as possible technologies when attempting to enhance interactions between learners and the instructor. The researcher also recommend that software applications, online glossaries, twitter, and student homepages not be considered as a means of enhancing interactions between learners and the instructor.

Participants perceived the most effective means for enhancing interactions with the technology are through the use of instructions for downloading plugins (*f*=40, 72.7%), software applications (*f*=39, 70.9%), and electronic libraries (*f*=35, 63.6%). The least effective means for enhancing interactions with the technology are social sites (*f*=8, 14.5%), guest lectures (*f*=6, 10.9%), and role play/simulations (*f*=5, 9.1%).

An implication exists that instructions for downloading plugins, software, and electronic libraries are the most effective technologies for enhancing interactions

between learners and the technology. The conclusion is that instructions for downloading plugins, software, and electronic libraries could be made available if interactions between learners and the technology are the goal.

The researcher recommends to instructors that the majority of effort be spent evaluating instructions for downloading plugins, software, and electronic libraries when attempting to enhance interactions between learners and the technology. The researcher also recommend that social sites, guest lectures, and role play/simulations not be considered as a means of enhancing interactions between learners and the technology.

Participants perceived the most effective means for enhancing interactions with the content are through the use of case studies (*f*=40, 72.7%), support materials (*f*=39, 70.9%), online instructional materials (*f*=36, 65.5%), and online glossaries (*f*=36, 65.5%). The least effective means for enhancing interactions with the content are a who is online feature (*f*=5, 9.1%), text messaging (*f*=5, 9.1%), twitter (*f*=5, 9.1%), and student homepages (*f*=1, 1.8%).

An implication exists that case studies, support materials, online instructional materials and online glossaries are the most effective technologies for enhancing interactions between learners and the content.

The conclusion is that case studies, support materials, online instructional materials and online glossaries could be made available if interactions between learners and the content is the goal.

The researcher recommends that when attempting to enhance interactions between learners and the content that the majority of the effort is spent evaluating case

studies, support materials, online instructional materials and online glossaries as possible technologies to enhance the interaction. The researcher also recommends that a who is online feature, text messaging, twitter, and student homepages not be considered as a means of enhancing interactions between learners and the content.

Participants perceive the overall most effective means for enhancing interactions are interactive video conference (M=2.02), getting help online (M=1.85), email (M=1.84), online instructional materials (M=1.84), lecture (M=1.82), online tutorials (M=1.82), and online editing and feedback (M=1.80). The least effective means for enhancing interactions were student response systems (M=0.69), RSS feeds (M=0.67), and Twitter (M=0.65).

An implication exists that interactive video conference, getting help online, email, online instructional materials, lecture, online tutorials, and online editing and feedback are the most effective technologies for enhancing interactions.

The conclusion is that interactive video conference, getting help online, email, online instructional materials, lecture, online tutorials, and online editing and feedback could be made available if increased interactions are the goal.

The researcher recommends that when attempting to enhance overall interactions that the majority of the effort is spent evaluating interactive video conference, getting help online, email, online instructional materials, lecture, online tutorials, and online editing and feedback as possible technologies to enhance the interaction. The researcher also recommends that student response systems, RSS feeds, and Twitter not be considered as a means of enhancing interactions between learners and the content.

Objective Eight: Predict Learning, Quality, and Satisfaction from Interaction

The regression models found that the construct student to content interaction was found to be a significant predictor of learning, the construct student to student interaction was found to be a significant predictor of quality, and the construct student to content interaction was found to be a significant predictor of satisfaction. Dooley, Lindner, & Dooley (2005) suggested that the greatest amount of learning occurs when all the interactions; learner to learner, learner to instructor, learner to content, and learner to technology; overlap and that to maximize learning and satisfaction the instructor must include all the interactions. The research reported in this dissertation does not support their hypothesis.

Nelson & Thompson (2005) state that the perception of distance between instructors and learners can be associated with lower quality. The regression models found that the construct student to student interaction was found to be a significant predictor of quality. This finding disagrees with Nelson & Thompson.

An implication exists that the constructs student to content interaction and student to student interaction are the best predictors of learning, quality, and satisfaction. The conclusion is that opportunities for student to content interaction and student to student interaction could be made available to increase the perception of learning, quality, and satisfaction.

The researcher recommends to the instructor that when attempting to enhance learning, quality, and satisfaction the majority of the effort is targeted on interactive video, email, online chats, audio/phone calls, online exercises, online instructional

materials, online support materials, and interactive video as the most effective technologies for student to student and student to content interaction. Instructors should consider evaluating these and other technologies to insure purposeful use of technologies and appropriateness.

Overall Conclusions and Recommendations

It may be concluded from the data that the most import interactions are between the learner and the content and between the learners themselves. Despite significant single order correlation between enhancing interaction and learner to learner, learner to instructor, learner to content, and leaner to technology our regression modeling shows the most effective way to predict learning and satisfaction is through student to content interaction. The researcher see the most effective way to predict quality is through student to student interactions. The researcher found no interaction effect between student to instructor interaction and increased learning, quality, or satisfaction. The researcher found no interaction effect between student to technology interaction and increased learning, quality, and satisfaction.

It is our recommendation that in order to achieve increased perceptions of satisfaction, quality, and learning, opportunities for interactions between the learner and the content should be provided. Utilizing and evaluating the technologies of online exercises, online instructional materials, online support materials, and interactive video is a great place to start. Instructors should consider evaluating these and other technologies to insure purposeful use of technologies and appropriateness.

Recommendations for Further Study

While our conclusions are supported by our findings, our population for this study was small. The researcher would recommend the application of the instrument to a larger population for increased validation of the findings. The addition of new technology to the instrument would also increase validity.

The researcher also recommends a study to further investigate the implications of interactions between learner and content. It is these interactions that seem to be the most promising for increasing satisfaction, quality and learning and the most straightforward for the instructor to implement especially for the distance learner.

Recommendations for Practice

Dooley, Lindner, & Dooley (2005) discuss the possibility that some technologies can contribute to, are neutral to, and detract from interaction. The single order findings of this research seem to support that theory. The researcher found that out of the technologies listed online chat, threaded discussions, audio/phone calls, email, instant messaging, and interactive video would tend to contribute to the learner to learner interaction while the remainder of the listed technologies would be neutral to or detract from the interaction.

The researcher found that email, lecture, instructor announcements, interactive video conference, online editing and feedback, audio/phone calls, voice over PowerPoint, online chat, virtual office hours, and streaming video would tend to contribute to the learner to instructor interaction while the remainder of the listed technologies would be neutral to or detract from the interaction.

The researcher found that instructions for downloading plugins, software applications, electronic libraries, online instructional materials, internet links, getting help online, online tutorials, podcasts, and streaming video would tend to contribute to the interaction between the learner and the technology while the remainder of the listed technologies would be neutral to or detract from the interaction.

The researcher found that case studies, support materials, online instructional materials, online glossaries, online tutorials, online quizzes, worksheets, electronic libraries, PowerPoint, online self-tests, internet links, online calendar, guest lectures, and text would tend to contribute to the learner to content interaction while the remainder of the listed technologies would be neutral to or detract from the interaction.

In order to quickly and most increase interaction the researcher recommends utilizing those technologies that contribute and cross over at least two of the types of interaction. For learner to learner and leaner to instructor these technologies would be online chat, audio/phone calls, email, and interactive video conference. For learner to technology and learner to content interactions these technologies would be electronic library, online instructional materials, internet links, and online tutorials. For learner to instructor and learner to technology interactions streaming video is the only common contributing technology.

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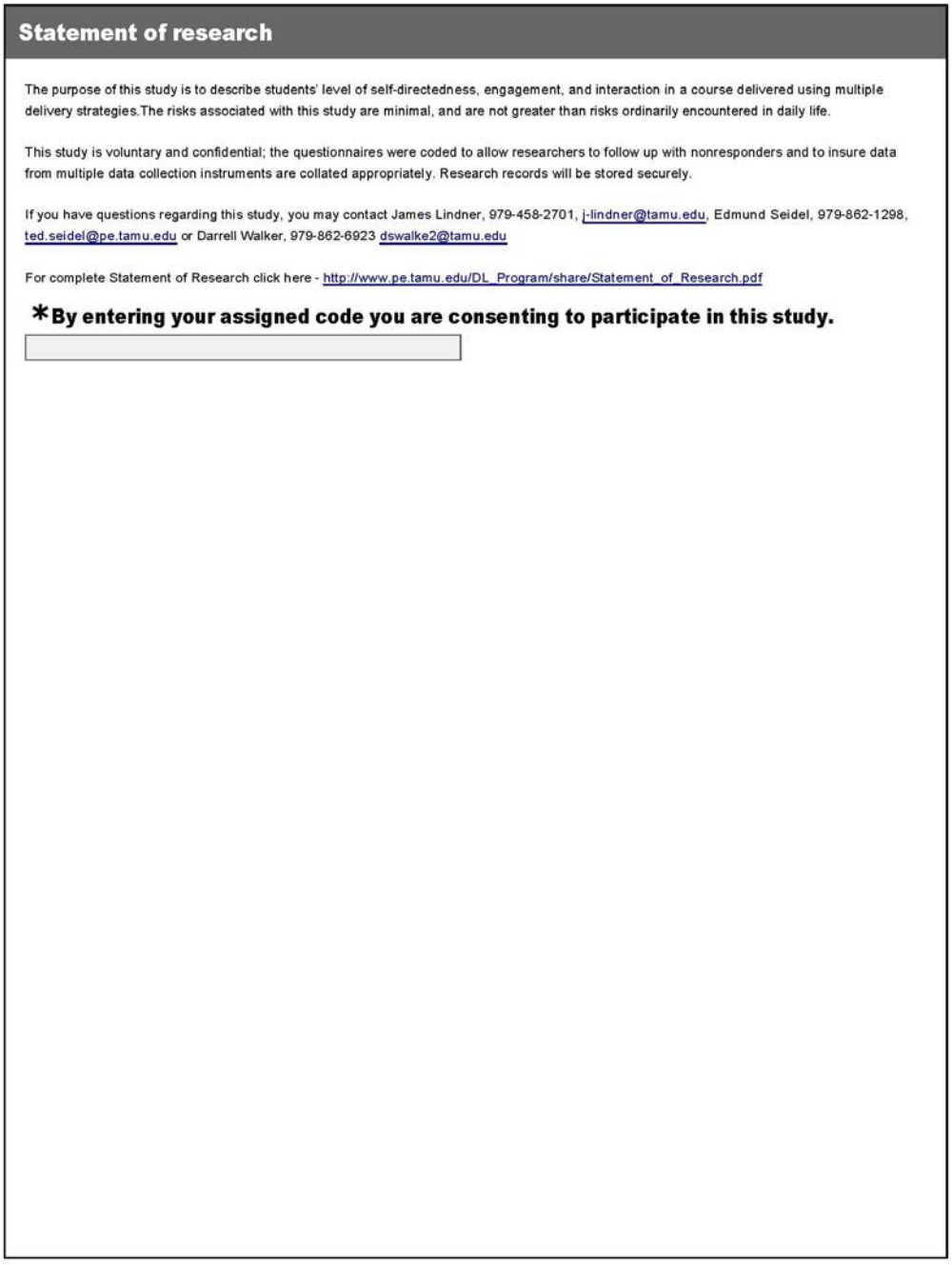
APPENDIX A

SURVEY INSTRUMENT



Statement of research

The purpose of this study is to describe students' level of self-directedness, engagement, and interaction in a course delivered using multiple delivery strategies.The risks associated with this study are minimal, and are not greater than risks ordinarily encountered in daily life.

This study is voluntary and confidential; the questionnaires were coded to allow researchers to follow up with nonresponders and to insure data from multiple data collection instruments are collated appropriately. Research records will be stored securely.

If you have questions regarding this study, you may contact James Lindner, 979-458-2701, j-lindner@tamu.edu, Edmund Seidel, 979-862-1298, ted.seidel@pe.tamu.edu or Darrell Walker, 979-862-6923 dswalke2@tamu.edu

For complete Statement of Research click here - http://www.pe.tamu.edu/DL_Program/share/Statement_of_Research.pdf

***By entering your assigned code you are consenting to participate in this study.**

Section I: Learner to Learner Interactions

Read each statement below and indicate whether you agree or disagree by marking the appropriate response.

	Strongly Disagree	Disagree	Agree	Strongly Agree
The use of online chats could be used to enhance my interactions with other learners.	◯	◯	◯	◯
The use of threaded discussions could be used to enhance my interactions with other learners.	◯	◯	◯	◯
The use of email could be used to enhance my interactions with other learners.	◯	◯	◯	◯
The use of audio or phone calls could be used to enhance my interactions with other learners.	◯	◯	◯	◯
The use of interactive video conferencing could be used to enhance my interactions with other learners.	◯	◯	◯	◯
The use of instant messaging could be used to enhance my interactions with other learners.	◯	◯	◯	◯
The use of blogging could be used to enhance my interactions with other learners.	◯	◯	◯	◯
The use of collaborative documents could be used to enhance my interactions with other learners.	◯	◯	◯	◯

Section II: Learner to Instructor Interactions

Read each statement below and indicate whether you agree or disagree by marking the appropriate response.

	Strongly Disagree	Disagree	Agree	Strongly Agree
The use of lecture could be used to enhance my interactions with the instructor.	◯	◯	◯	◯
The use of streaming video could be used to enhance my interactions with the instructor.	◯	◯	◯	◯
The use of email could be used to enhance my interactions with the instructor.	◯	◯	◯	◯
The use of voice over PowerPoints could be used to enhance my interactions with the instructor.	◯	◯	◯	◯
The use of online editing and feedback could be used to enhance my interactions with the instructor.	◯	◯	◯	◯
The use of picture in picture video could be used to enhance my interactions with the instructor.	◯	◯	◯	◯
The use of evaluation could be used to enhance my interactions with the instructor.	◯	◯	◯	◯

Section III: Learner to Content Interactions

Read each statement below and indicate whether you agree or disagree by marking the appropriate response.

	Strongly Disagree	Disagree	Agree	Strongly Agree
The use of texts could be used to enhance my interactions with course content.	◯	◯	◯	◯
The use of online instructional materials could be used to enhance my interactions with course content.	◯	◯	◯	◯
The use of support materials could be used to enhance my interactions with course content.	◯	◯	◯	◯
The use of worksheets could be used to enhance my interactions with course content.	◯	◯	◯	◯
The use of case studies could be used to enhance my interactions with course content.	◯	◯	◯	◯
The use of picture in picture video could be used to enhance my interactions with course content.	◯	◯	◯	◯
The use of interactive video could be used to enhance my interactions with course content.	◯	◯	◯	◯
The use of online exercises could be used to enhance my interactions with course content.	◯	◯	◯	◯
The use of podcasting could be used to enhance my interactions with course content.	◯	◯	◯	◯
The use of collaborative documents could be used to enhance my interactions with course content.	◯	◯	◯	◯

Section IV: Learner to Technology Interactions

Read each statement below and indicate whether you agree or disagree by marking the appropriate response.

	Strongly Disagree	Disagree	Agree	Strongly Agree
The use of online tutorials could be used to enhance my interactions with course technology.	◯	◯	◯	◯
The use of getting help online could be used to enhance my interactions with course technology.	◯	◯	◯	◯
The use of online instructions for downloading plugins could be used to enhance my interactions with course technology.	◯	◯	◯	◯
The use of electronic libraries could be used to enhance my interactions with course technology.	◯	◯	◯	◯
The use of software applications could be used to enhance my interactions with course technology.	◯	◯	◯	◯
The use of a file management system could be used to enhance my interactions with course technology.	◯	◯	◯	◯

Section V: Satisfaction, Quality, and Learning

Read each statement below and indicate whether you agree or disagree by choosing the appropriate response.

	Disagree	Agree
I am generally more satisfied with a learning experience when opportunities for interaction with other students are provided.	◯	◯
I am generally more satisfied with a learning experience when opportunities for interaction with the instructor are provided.	◯	◯
I am generally more satisfied with a learning experience when opportunities for interaction with the technology are provided.	◯	◯
I am generally more satisfied with a learning experience when opportunities for interaction with the course content are provided.	◯	◯
The quality of a learning experience increases when opportunities for interaction with other students are provided.	◯	◯
The quality of a learning experience increases when opportunities for interaction with the instructor are provided.	◯	◯
The quality of a learning experience increases when opportunities for interaction with the technology are provided.	◯	◯
The quality of a learning experience increases when opportunities for interaction with the course content are provided.	◯	◯
Learning increases when opportunities for interaction with other students are provided.	◯	◯
Learning increases when opportunities for interaction with the instructor are provided.	◯	◯
Learning increases when opportunities for interaction with the technology are provided.	◯	◯
Learning increases when opportunities for interaction with the course content are provided.	◯	◯

Section VI: Enhancing interactions

Is the use of the following technology an effective means for enhancing interactions with other learners, the instructor, the technology, or the content? Choose whether you Agree. No response indicates disagreement.

	With other Learners	With the Instructor	With the Technology	With the Content
online chat	☐	☐	☐	☐
threaded discussions	☐	☐	☐	☐
email	☐	☐	☐	☐
audio / phone calls	☐	☐	☐	☐
interactive video conference	☐	☐	☐	☐
lecture	☐	☐	☐	☐
streaming video	☐	☐	☐	☐
voice over PowerPoint	☐	☐	☐	☐
online editing and feedback	☐	☐	☐	☐
text	☐	☐	☐	☐
support materials	☐	☐	☐	☐
online instructional materials	☐	☐	☐	☐
worksheets	☐	☐	☐	☐
case studies	☐	☐	☐	☐
online tutorials	☐	☐	☐	☐

Enhancing Interactions II

Is the use of the following technology an <u>effective means for enhancing interactions</u> with other learners, the instructor, the technology, or the content? Choose whether you Agree. No response indicates disagreement.

	With other Learners	With the Instructor	With the Technology	With the Content
getting help online	☐	☐	☐	☐
instructions for downloading plugins	☐	☐	☐	☐
electronic libraries	☐	☐	☐	☐
software applications	☐	☐	☐	☐
internet links	☐	☐	☐	☐
podcasts	☐	☐	☐	☐
collaborative documents / wikis	☐	☐	☐	☐
blogging	☐	☐	☐	☐
instant messaging	☐	☐	☐	☐
online quizzes	☐	☐	☐	☐
RSS feeds	☐	☐	☐	☐
who's online feature	☐	☐	☐	☐
student homepages	☐	☐	☐	☐
journaling	☐	☐	☐	☐
online café	☐	☐	☐	☐

Enhancing interactions III

Is the use of the following technology an effective means for enhancing interactions with other learners, the instructor, the technology, or the content? Choose whether you Agree. No response indicates disagreement.

	With other Learners	With the Instructor	With the Technology	With the Content
online calendar	☐	☐	☐	☐
instructor announcements	☐	☐	☐	☐
guest lectures	☐	☐	☐	☐
virtual office hours	☐	☐	☐	☐
online self-tests	☐	☐	☐	☐
role play / simulations	☐	☐	☐	☐
online glossaries	☐	☐	☐	☐
Power Point	☐	☐	☐	☐
Student Response Systems (CPS)	☐	☐	☐	☐
Text Messaging	☐	☐	☐	☐
Twitter	☐	☐	☐	☐
YouTube	☐	☐	☐	☐
iTunes U	☐	☐	☐	☐
Social Site Examples:Second Life, FaceBook, MySpace	☐	☐	☐	☐

APPENDIX B

IRB APPROVAL

TEXAS A&M UNIVERSITY
DIVISION OF RESEARCH AND GRADUATE STUDIES - OFFICE OF RESEARCH COMPLIANCE

1186 TAMU, General Services Complex
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979.458.1467
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Human Subjects Protection Program — Institutional Review Board

DATE: 09-Oct-2009

MEMORANDUM

TO: LINDNER, JAMES R

FROM: Office of Research Compliance
Institutional Review Board

SUBJECT: Initial Review

Protocol Number:	2009-0611
Title:	Vicarious Interactions and Self-Directed Learning of Students by Course Delivery Strategy
Review Category:	Expedited
Approval Period:	09-Oct-2009 **To** 08-Oct-2010

Approval determination was based on the following Code of Federal Regulations:

45 CFR 46.110(b)(1) - Some or all of the research appearing on the list and found by the reviewer(s) to involve no more than minimal risk.

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(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation or quality assurance methodologies.

(Note: Some research in this category may be exempt from the HHS regulations for the protection of human subjects. 45 CFR 46.101(b)(2) and (b) (3). This listing refers only to research that is not exempt.)

Provisions:

This research project has been approved for one (1) year. As principal investigator, you assume the following responsibilities

1. **Continuing Review:** The protocol must be renewed each year in order to continue with the research project. A Continuing Review along with required documents must be submitted 30 days before the end of the approval period. Failure to do so may result in processing delays and/or non-renewal.
2. **Completion Report:** Upon completion of the research project (including data analysis and final written papers), a Completion Report must be submitted to the IRB Office.
3. **Adverse Events:** Adverse events must be reported to the IRB Office immediately.
4. **Amendments:** Changes to the protocol must be requested by submitting an Amendment to the IRB Office for review. The Amendment must be approved by the IRB before being implemented.
5. **Informed Consent:** Information must be presented to enable persons to voluntarily decide whether or not to participate in the research project.

This electronic document provides notification of the review results by the Institutional Review Board.

VITA

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