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LEARNING ECONOMICS IN AN ONLINE ENVIRONMENT: EVALUATING THE IMPACT OF COLLABORATIVE LEARNING AND INSTRUCTIONAL AUDIO/VIDEO ON LEARNER ACHIEVEMENT, GOAL ORIENTATION, SELF-EFFICACY, SENSE OF LEARNING COMMUNITY, AND ATTRITION

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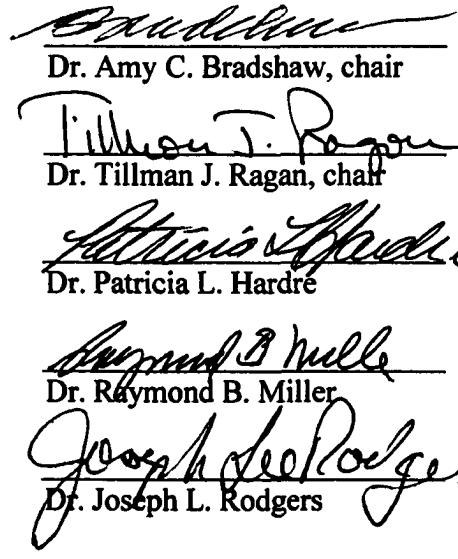

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ABSTRACT

Teaching learners at a distance has long been problematic for educational institutions. A significant body of research has espoused the advantages of recorded audio and/or video as it relates to student learning. Additionally, much research has been conducted indicating that collaborative learning strategies can result in positive learner outcomes.

This study measured the impact of the use of recorded instructional lectures via audio and video along with collaborative learning strategies had on learner achievement, goal orientation, self-efficacy, sense of learning community, and attrition when utilized in an online economics course.

The results suggest that student learning was enhanced by exposure to the audio/video and exposure to collaborative learning strategies. Some gains in learner self-efficacy were indicated. Further, student attrition rates were significantly lower for those students assigned to a collaborative learning group.

CHAPTER I

Introduction

Background of the Study

Distance learning, collaborative learning, and the use of instructional media are three topics that have received a great deal of attention in educational research over the past several years. However, given the advances in computer technology and its impact on the distance-learning environment, it appears that a new set of relationships may be materializing among these research areas.

Distance education has come to generate numerous images. Technically, distance education is a method of teaching learners who are physically separated from the instructor and the institution sponsoring the instruction (Mielke,1999). Numerous terms have been developed to describe the types of instruction and communication modes available in a distance learning setting. Synchronous communication has come to mean communication between the learner and instructor or among learners that is in real time (Palloff & Pratt, 1999). The communication among the parties occurs in a manner that allows the parties to ask questions, respond, and elaborate immediately. Asynchronous communication does not allow for such immediate interactions. This mode of communication requires the parties to respond to questions that may have been asked several hours or days earlier. While this communication mode allows the parties to respond at their own leisure, it removes many of the advantages that go along with synchronous communication. The advantages of synchronous communication include

immediate feedback and a greater feeling of personal interaction. However, there are a number of advantages that exist with asynchronous communication modes. This mode of communication allows the sender more time to reflect and develop a complete and accurate response.

Numerous discussions have been held debating the impact of and utilization of distance education methodologies. How effective is it when compared to traditional instruction? How do instructors encourage interaction and what types of interactions appear to be most effective? Do traditional instructional design models apply to distance learning settings? Given today's technological capacities, can digitized instructional audio and video improve learning and remove the feelings of isolation and lack of support expressed by a large percentage of distant learners? How can instructors instill a greater feeling of socialization and support for these learners?

The "transactional distance," as addressed by Moore (1990), is a barrier to learning for online distance learners. This "distance" is affected by two variables. First, the amount of dialogue that occurs between the learner and instructor influences the learner's perception of distance. Secondly, the amount of structure is a measure of the technology's responsiveness to the learner's needs. Moore argues that increases in dialogue and structure reduce the transactional distance. This removal of a feeling of "distance" has been shown to aid in the development of "learning communities" and increases the "social presence" a student perceives to have in a course (McIsaac & Gunawardena, 1996; Moller, 1998). These learning communities provide various forms of beneficial support to learners. This support can, if applied properly, increase learner achievement and result in improvements in various other learner attributes.

"Collaborative learning" is a term that refers to a set of instructional methods requiring or encouraging students to work together to achieve specific tasks (Slavin, 1987). While this explanation of collaborative learning appears simplistic, in actuality, the implementation and utilization of collaborative group learning as an instructional tool is quite complex. Educators must concern themselves with numerous issues relevant to student interaction, responsibility, accountability, and group monitoring. As will be illustrated in this investigation, the advantages of collaborative learning are numerous if certain instructional strategies are used. The question arises whether these tested strategies are equally beneficial to online distant learners.

Audio and video have been used to support instruction for several decades, and the research on the impact such media has on achievement has shown mixed results. Considerable research has shown that students can learn as well from audio and video as they do from traditional in-class instruction (Gibson, 1960; Greenhill, 1967; Menne, Klingenschmidt, & Nord, 1996). Additional research has shown that when learners are exposed to multiple media, the amount of effort the students exhibited tends to differ with the media used (Salomon, 1983, 1984; Tripp, 1994).

In some subject areas distance education has been plagued with below average rates of completion and achievement. Further, it has been purported that the use of the Internet, with its communicative capabilities, can improve student learning and attrition rates (Brown & Liedholm, 2002). These benefits, among others, have contributed to the tremendous growth rates of online courses taught at colleges and universities worldwide.

The study of economics is tremendously challenging for the majority of students. Given the degree of abstract thinking required, introduction to new terminology, and development of relational quantitative models, students enrolled in traditional economics classes are faced with several challenges. Students who enroll in economics courses taught at a distance are faced with even greater challenges as depicted by the observed completion rates that sometimes fall below 50%, and the class grades that are usually 7-10% below those of students enrolled in a traditional class (personal observation).

This study investigated the impact collaborative learning and recorded instructional audio and a video lecture had on goal orientation, self-efficacy, and achievement of students enrolled in either an online collegiate principles of microeconomics or principles of macroeconomics class. The investigation developed a rationale for how collaborative group learning and the use of audio/video may increase the learners' feeling of social presence and development of learning communities and how this development may impact achievement. Secondly, the cognitive advantages of a learning goal orientation and high self-efficacy were addressed. Lastly, it examined whether it may be possible to affect a learner's goal orientation and self-efficacy using collaborative learning and audio/video. The use of collaborative learning and instructional audio/video should increase the development of learning communities and feeling of social presence, resulting in an increase in self-efficacy, learning goal orientation, achievement, and reduce attrition rates.

Variables to be Investigated

The dependent variables that were investigated included learner goal orientation, self-efficacy, achievement, and attrition rates. The independent variables, or treatments, that were part of this study include the use of audio/video recordings containing instructor presentations of content, and exposure to collaborative group learning strategies.

Numerous researchers have shown that the use of collaborative group learning results in increases in achievement and improvements in attitudes (Boling & Robinson, 1999; Rocklin et al., 1985; Dalton, 1990; Jehng, 1998; Hooper, Ward, Hannifan, & Clark, 1989; Hooper & Hannifan, 1991; Johnson & Johnson, 1989; Slavin, 1987). The use and potential impact of collaborative learning were addressed.

The use of audio and video to aid in instructional settings were evaluated. Research has indicated that learning via audio and/or video tapes has either increased student learning, or was found to be similar to learning in a traditional setting (Gibson, 1960; Greenhill, 1967; Loder, 1937;Mosenthal, 1977; Nasser & McEwen, 1976; Nugent, 1982). The impact such use may have on achievement and attitudes in learning economics in an online course were appraised.

Bandura (1986) has proposed that goals enhance motivation through self-reactive influences following self-evaluations. Dweck (1986) has categorized two types of goals. Learning goals are those goals for which a person seeks to increase his or her competence or to understand new material. With this type of goal, individuals place importance on developing new skills, value learning, and view achievement as a function of effort. Performance goals, on the other hand, are those goals in which a

person seeks to look good or gain favorable judgments of his or her competence or avoid negative judgments. With these goals, individuals tend to avoid tasks that appear to provide a challenge. This allows them to avoid failure and the negative image they feel this failure will broadcast about them.

Bandura (1986) states that efficacy expectations are those personal probabilistic judgments or confidence that individuals can execute a particular behavior. If a person lacks self-efficacy, a decrease in effort and motivation will ensue. The impact collaborative learning and instructional audio/video may have on goal orientation, self-efficacy, and achievement was investigated.

Significance of the Study

This study attempted to provide information regarding several theoretical relationships that exist between collaborative group instruction and a variety of motivational variables as it applies to the online learning environment. It tested whether collaborative learning and audio/video, when used together, resulted in the highest gains in achievement for online distant learners studying economics.

This investigation provides distance educators, in all content domains, with information about a methodology that is hypothesized to have positive instructional outcomes. It is hoped that this evidence will provide a foundation for future research into the support structures that are most beneficial and the degree of support that most enhances achievement for online distant learners. This study investigated the relationships that may exist among collaborative group learning, audio/video, learning communities, achievement, and attrition rates in an online instructional setting.

Purpose of the Study

The purpose of this study was to explore the effect that collaborative group learning and the use of digitized audio and video lecture had on the development of learning communities and the learners' social presence in an online collegiate economics class. Further, the impact that collaborative learning and audio/video had on achievement was investigated. Differences in learning goal orientation and self-efficacy were explored to determine what relationships existed among method of instruction and support and the enhancement of these learner characteristics.

Stated succinctly, this study explored the effect collaborative group learning and recorded audio and video lectures had on learner achievement, goal orientation, self-efficacy, feeling of community, and attrition rates when utilized in an online collegiate economics course. It is hoped that these findings will aid online educators, in all fields, in designing adequate support systems for learners in such settings.

CHAPTER II

Current Literature

Recently, the separation of learners and educational institutions in both time and distance has been growing. Given the sociological changes and technological developments that are occurring, the need for improved instructional design in a distance education setting has become more pronounced. Online instruction is the fastest growing form of domestic and international education. The reasons given most often for the growth of distance education are: (a) to battle illiteracy in developing countries, (b) to provide training and development, and (c) to provide curriculum enrichment in various nontraditional settings (McIsaac & Gunawardena, 1996).

Historically, distance education has been either an individual enterprise (e.g. correspondence study, individual computer-based tutorials) or simulations of traditional classes provided at a distance (e.g. educational television, interactive two-way television). In both cases, little collaboration among students occurred. Such an omission may weaken the potential impact of distance education.

The potential benefits of collaborative group learning are numerous and have been shown in numerous studies conducted in a variety of contexts. These studies have indicated that students working in collaborative groups have shown an increase in social interactions and are more motivated than those who work alone (Klein & Pridemore, 1992). Other studies have focused on the increases in performance, attitudes,

productivity, time on task, and transfer in classroom settings that result from such a class structure (Johnson & Johnson, 1989; Sharan, 1980; Slavin, 1990).

In addition to the research on collaborative learning, another potentially important consideration for distance educators would be aspects of the media used to deliver instruction. Much research has been conducted espousing the cognitive and motivational benefits of various forms of instructional media. Computer-aided instruction (CAI), with its use of audio and video, has shown that such instruction can improve students' preferences for an instructional unit (Kinzie & Sullivan, 1989), can be intrinsically motivating (Kinzie, 1990), and can lead to increases in student learning and retention (Acker & Klein, 1986; Fletcher, Hawley, and Piele, 1990). Much of the current research has focused on the attributes of media and how these impact the learner. Kozma (1994) attempted to show that various media can be shown to differ on their ability to "present certain representations and perform certain operations in interactions with learners who are similarly engaged in internally constructing representations and operating on these" (p. 11).

In today's distance learning environment, instructors are attempting to develop new approaches to using the capabilities of technology and existing instructional methods in a way that best supports learning. The balance between too much and too little support is not easily determined. The literature relevant to distance education, collaborative learning, and the use of audio/video in instructional settings will be reviewed.

Distance Education

The University of Chicago established the first correspondence program in the United States in the late 1800s where the teacher and learner were in two separate locations (Johnson & Johnson, 1996). The efforts of William Rainey Harper to develop alternative methods of instruction were laughed at by those who thought that (a) education should be reserved for males in the higher levels of society, and (b) students should be taught in one location by masters of the subject. However, given the democratic ideals of Harper and many others, equal access to the opportunities provided by education provided the impetus for the development of various other correspondence (distance education) programs.

The communication capabilities of the radio and television brought about a new methodology for providing such instruction. In the 1920s, Wisconsin's School of the Air was developed and began to provide instruction via radio. Given the campus turmoil of the 1960s, "nontraditional" came to describe nationwide teach-ins and "days of concern" that focused on the coverage of the Vietnam War (Rossman & Rossman, 1995). Later, with the development of the Open University in Britain in 1970 and the innovative use of media by Charles Wedemeyer at the University of Wisconsin, technologies began to be used much more effectively in correspondence study and helped shape today's distance education.

Specifically, distance education is most commonly defined as an organizational and technological framework for providing instruction at a distance...when the teacher and student(s) are separated by geography, technology is used to bridge the gap

(Ham, 1995). Palloff and Pratt (1999, p. 5) proposed that there are five defining elements in distance education. These include:

1. The separation of teacher and learner during at least a majority of each instructional process;
2. The use of educational media to unite teacher and learner and carry course content;
3. The provision of two-way communication between teacher, tutor or educational agency, and learner;
4. Separation of teacher and learner in space and time; and
5. Volitional control of learning by students rather than by the distance instructor.

It is important to note that even this expanded definition of distance learning omits the elements that distinguish distance learning from the traditional classroom. It has been said that the keys to the learning process are the interactions among students themselves, the interactions between faculty and students, and the collaboration in learning that results from these interactions" (Palloff & Pratt, p. 5). This development of learning communities is vital to the imparting of knowledge for the co-creation of meaning and the attainment of learning outcomes. Furthermore, the unwritten contract that exists between instructors and learners requires that learners be taught, assessed, provided guidance, and prepared for examinations that may or may not be given at the same location. Learning must be accompanied by two-way communication and can occur either individually or in groups (Mielke, 1999). Mielke argued that a strong commitment to interactions among learners, and between a learner and the instructor, is one of the five critical elements to successful teaching at a distance.

Billings (as cited in Rossman & Rossman, 1995) presented four generations of distance education that are expressed in terms of mode of delivery. Generation One includes basic correspondence study, such as mailable print materials and audio/videocassettes. Generation Two involves the use of audio and video teleconferencing. Generation Three involves the use of the computer technology, and Generation Four involves the use of technologies that are not widely used (such as virtual reality and video desktops).

An important distinction is made between Billings' Generation Three and Four and what is commonly referred to as computer-assisted instruction (CAI) and computer-based training (CBT) (Palloff & Pratt, 1999). The latter refers to an instructional setting where learners interact with software via a computer and there is no planned interaction between learners and possibly none between learners and instructors. Generation Three and Four refer to a setting in which students are able to post questions to a discussion area on a website or send email to other students or the instructor. Such interaction is commonly referred to as asynchronous (not at the same time) communication. Another method of computer communication allows students to communicate with one another in real time. These "chats," as they are commonly labeled, allow for synchronous (at the same time) communication. Furthermore, students can now communicate using two-way streaming audio and video to communicate in real time. The instructional content may be transmitted via print or electronically in both Generation Three and Four. The literature reviewed here will focus on work that contributes to our understanding of how Billings' generations can be used to achieve various desirable learning outcomes and enhance beneficial learner characteristics.

Dede (1990) argued that there are five forces driving the current evolution of distance education. First, technological advances will continue to synthesize computers and telecommunications, plus make sophisticated equipment more affordable for all modes of delivery of instruction. These advancements have resulted in a tremendous increase in the number of students enrolled in online courses being offered by colleges and universities around the world. In this environment the Internet is the primary mode of communication and can be used to transmit content. The communication and motivational challenges facing online students today are not tremendously different from those faced by distance learners of the past. However, the opportunities provided by the instructional technologies and their prevalence in society appear to require that the instructional strategies used to support such learning be reevaluated.

Demographic forces are bringing about changes in distance education. The needs of specific groups of learners are often inadequately met with local resources. Given the diversity that exists in our country and the move away from assimilating the diversity into the mainstream, a need for unique course offerings has developed. Students who speak only a foreign language or those who wish to learn atypical subjects can be grouped and taught by a specialized teacher. Furthermore, learners with unique visual or auditory learning styles can benefit from multimedia formats used with distance learning technology. Lastly, students with unusual emotional problems can associate with various support groups without the risks that direct personal contact may create.

Economic forces are the third factor driving the current evolution of distance learning. As companies continue to attempt to compete in the global marketplace, the

development of partnerships and teams will become increasingly important. The need for bringing together these individuals to work together in solving problems creates unique learning situations.

Various political forces are mandating that school systems around the world adopt and develop distance learning as an option to traditional learning. As legislators continue to expect higher levels of learning outcomes and more diverse exposure to advanced courses, some small and poorly funded school systems will begin to use distance learning as a cost-effective alternative to traditional instruction.

Lastly, pedagogical forces are providing an impetus to the evolution of distance learning. As instructors become more familiar with the use of technology in distance learning settings, the Second and Third Generation projects will begin to use emerging technologies more effectively and utilize some innovative pedagogical methods. The opportunities provided by this distance education will stimulate new demands on distance learning technologies and methodology.

Undoubtedly, given the technological advances that are occurring in digital audio and video, processing speeds of computers, memory capacity, and the proliferation of the Internet, the current focus in distance education has turned to various technological considerations. McIsaac and Gunawardena (1996, p. 427) developed a list of characteristics, or questions, that should be considered when adopting technologies for use with distance education. These include:

1. Delivery and access: How and where is the learning material distributed to the learner and what degree of access to technologies does the learner have?

2. Control: To what extent does the learner have control over the medium and how flexible is the time and space?

3. Interaction: To what degree does the technology allow interaction (two-way communication) between the teacher and the learners, and among learners?

4. Audiovisual characteristics of the medium: Does the technology allow for pictorial representations and/or written notation?

5. The social presence created by the medium: To what degree is the instructor perceived as a "real person"?

As has been shown, the degree of social interaction and social presence that exists appears to be a relevant consideration in developing a successful online learning setting. It appears appropriate that a natural progression of the review of the literature proceed to a description of the methods that may be used to enhance the degree of social interaction and development of learning communities and research that may show that such interaction may prove worthwhile. Later, the literature that describes how audio/video may impact the perception of social presence and stimulation of various forms of interaction will be reviewed.

Interaction and Learning Communities

In traditional classroom instruction, social interaction and the development of learning support relationships are less of a problem than what is posed in distance learning settings. In traditional distance learning settings, and more specifically, online instruction, learning communities play a pivotal role in the support of learning (Palloff & Pratt, 1999). Historically, distance education has fallen short in its utilization and development of methods used to enhance learner interaction. Without such interaction

and access to information, distance learners will continue to be at a disadvantage when compared to students taking classes in traditional settings (Rossman & Rossman, 1995).

Moore (1989) identified three types of interactions that are prevalent in all learning environments. Learner/instructor, learner/learner, and learner/content interactions each provide the learner with forms of support and contribute to the achievement of the learning objective. Hillman, Willis, and Gunawardena (1994) added a fourth form of interaction – learner/interface. This is the interaction between the learner and the technology used to deliver the instruction.

McIsaac and Gunawardena (1996) stated that the degree of interaction that the technology permits between the teacher and students and among students is vital to the success of distance learners. Furthermore, the ability of the medium to transmit a feeling of social presence appears to be extremely important. This refers to the ability of the medium to make the person appear "real."

When evaluating the outcomes of such interactions, Wagner (1998) stated it is important to focus on the objectives and view these interactions as a method of achieving the learning and performance objectives. She argues that these interactions have two primary purposes. They must change learners, and they must move learners toward an action state of goal attainment.

Wagner further categorized these interactions by what the learner is trying to achieve from them. First, interaction for participation provides the learner with a means of engagement and allows for relationships to develop. Next, interaction for communication allows the learners the opportunity to share information and opinions or to attempt to influence the opinions of others. Third, interaction for feedback allows the

learner to assess the quality of his or her performance. This can be used as a source of reinforcement or to evaluate the correctness of responses to allow for long-term retention. Next, interaction for elaboration allows the learners to come up with examples and explanations for ideas and relationships that make the information more meaningful. It can be seen that from the learners' perspective these interactions should aid in their achievement of the learning goal. Enhancing the learners' ability to interact and providing modes for such interaction can contribute to higher achievement.

Moore (1990) stated that varying degrees of "transactional distance" exist in all instructional settings and are determined, not by the geographical distance, but by the amount of dialogue that occurs between the learner and instructor and the amount of structure in a course. Moore claimed that greater transactional distance exists in those technologies that are more structured and have less student/instructor interaction. Saba and Shearer (1994) showed that as this dialogue and responsiveness to learner needs (structure) increases, transactional distance decreases.

While most researchers advocate the development of learning settings that promote interaction, others voice some concerns. Some distance education research (Keegan, 1988) has questioned the need for extensive student/student and student/instructor interaction.

Hara and Kling (1998) conducted a qualitative study in which they observed learners while they were interacting with the course materials and technology in Web-based instruction. They found that there were two levels of frustration that decreased the students' satisfaction with the course. First, the technological problems and the inability to resolve them led to tremendous dissatisfaction. Secondly, they found that many of the

students were dissatisfied with the course content. They failed to receive communication from the instructor as promised, or the instructions they did receive seemed to conflict with the syllabus, email, or web postings. Such failures contribute to frustration and feelings of hopelessness. These feelings can contribute to the learners' decrease in motivation and inability to achieve instructional objectives. Providing learners with methods for and an incentive to interact with other students and the instructor should alleviate many of these frustrations.

Many online distance learners lack the orientation, mental models, and strategies necessary for the achievement of the learning objectives (Hill ,1999). Moller (1998) cautioned against thinking of learners simply as receivers of information. Doing so tends to encourage passive learning. This limits the learners and causes them to simply mirror the knowledge, and can prevent them from enhancing their own expertise.

Research has shown that viewing learners as receivers of information encourages inactivity rather than thought (Ahern, Peck & Laycock, 1992; Grabinger, 1996). Efforts should be made when designing instruction to develop tasks that engage learners and create real, meaningful thinking. Learning communities provide an avenue for students to reflect and collaborate in developing responses and solutions to problems. In traditional asynchronous distance education, the primary interactions exist only between the learner and the content. However, given the advent of online learning and the communication technologies used in such settings, this limitation of traditional distance learning has been removed. Learners can communicate with one another and with the instructor easily and regularly. As stated earlier, such instructional settings can include synchronous forms of communication where such interaction can be immediate.

Moller (1998) contended that such environments necessitate the development of learner support communities. The purpose of the learning community is to provide a mode for (a) social reinforcement, and (b) information exchange.

Social reinforcement allows for a learner's need for self-esteem to be satisfied by creating feelings of recognition, attention, importance, and appreciation. This has been shown to increase feelings of self-confidence, capability, and adequacy. These gains then result in improvements in student motivation. Lack of these feelings tends to lead to feelings of inferiority, weakness, and helplessness. Findings by McIsaac and Gunawardena (1996) indicated that social presence, the degree the person feels or is seen by others as real, has a significant impact on satisfaction and achievement.

Information exchange, the second function of learning communities, refers to the collaboration and knowledge building that results from such interactions and communication. Collaborative learning allows those students who are physically separated to create and share knowledge. Learners can actively analyze and share their thoughts with others in the group. Neilson, (1997) found evidence that groups outperformed individuals in complex problem solving. Further analysis found that sharing knowledge was a critical element in success. This exchange allows learners individually, and as groups, to analyze, assess, and organize their thoughts. While in a traditional classroom such communities develop, to some extent automatically, this development is far less likely to occur naturally in distance learning environments. The sense of belonging may not occur in these settings and may need to be specifically designed, developed, and implemented.

The development of these learning communities must be encouraged. It has been shown that, even though space and time may separate distance learners, they still need to feel a sense of belonging in order to promote learning and success. This sense of belonging results from being part of a community and sharing the benefits that result from collaborating with the other students enrolled in the class.

Moller (1998) maintained that learning communities provide the learner with three types of support: (a) academic, (b) intellectual, and (c) interpersonal. The academic support community provides a method for learners to transfer prior knowledge to new situations by allowing for interactions among learners and the instructor. This interaction converts the instructor from an individual who espouses information and knowledge to a person who aids in the facilitation of such knowledge by providing and creating situations that promote dialogue.

The intellectual support community can result in increases in achievement and improvements in attitudes toward the content by making the learner a more active participant in the creation of knowledge. Meaningful learning is that learning which relates new information to information that is stored in long-term memory. This requires that the learner be engaged in cognitive manipulation of the content or information. Some learning occurs within the teacher-learner dialogues. However, as Moore and Kearsley (1996) pointed out, learner-learner exchanges often occur for their educational advantages. These exchanges are invaluable in the application and evaluation of learning. A study by Scardamalia and Bereiter (1994) indicated that intellectual support communities result in greater "depth of learning and reflection, awareness of what they have learned or need to learn, and understanding of learning

itself" (p. 4). This community can increase peer interaction and learning effectiveness by engaging the learner in a manner that is more active than is likely found in the traditional classroom. Moller asserted that asynchronous communication helps stimulate interactions by promoting an opportunity for meaningful learning, increasing cognitive development through argument construction and their defense, expanding the range of ideas, and providing support for risk-taking behaviors.

Lastly, the interpersonal support community provides the learner with the encouragement and assistance that they tend to expect. The solving of problems, both content specific and technological, can be challenging to distance learners. Kember, et al. (1991) and Moller and Russell (1994) showed that those learners who are unable to overcome these difficulties have been shown to be less persistent in their efforts, less likely to achieve the learning objectives, and show a decrease in motivation and effort.

Research by Lally and Barrett (1999) appears to support the argument that the reduction of "transactional distance" will increase social and evaluative interactions. This research was derived from a project, conducted within the Division of Education at the University of Sheffield, in which computer-mediated communication (CMC) was used to support postgraduate students in distance-education contexts. The research focused on identifying and exploring ways in which CMC reduced this transactional distance by mediating the academic and social dialogue among students and instructors. The research further investigated the extent to which on-line learning communities could be developed in distance learning settings and the socio-academic nature of such a community.

The sixteen subjects in this study were students enrolled in a course in English language teaching. These students used their own personal computers to access an Internet email account where asynchronous computer-discussions could be held. One of the measures included in the study was derived from categorizing the types of discussions that were being held during the time frame the course was held. This was used to measure the amount and types of dialogue that occurred and determine whether this could lessen the social isolation felt by distance learners. Approximately one-half of the interactions that occurred were more social or simply interactive in nature, and the other half consisted of metacognitive and cognitive skill development. The authors concluded from this that the use of CMC in the distance learning setting had removed much of the feeling of social isolation and had resulted in the development of a learning community that was supporting both the academic and interpersonal needs addressed by Moller (1998) and discussed earlier.

Following additional qualitative analysis on the types and quantity of interactions, Lally and Barrett concluded that CMC could provide adequate social and academic support to students. However, they contended that the development of learning communities is dependent upon the provision for "adequate opportunities for socio-emotional discourse and the establishment of cooperative frameworks for learning" (p. 147).

Given the development of synchronous online communication tools, a new generation of technology used in distance education is developing (Chou & Chuen-Tsai, 1996). These tools allow for online communication to occur in real time between students, students and the instructor, and between students and the learning materials. It

would be reasonable to conclude that this would facilitate the types of interactions (learner/learner, learner/instructor, learner/content) identified by Moore (1989).

Thus, it can be seen that the ability to interact is vital to the development of learning communities, and that such learning communities can stimulate further interaction by providing much of the support learners require. It would appear that collaborative group learning would stimulate the development of learning communities and an increase in interaction between students and the instructor. The next section will focus on how collaborative learning can help increase student achievement, promote a learning goal orientation, and increase self-efficacy.

Collaborative Group Learning

Introduction

As stated earlier, the "transactional distance" that exists in distance learning settings can contribute to students' lack of academic success. According to Moore (1990), this "distance" refers to more than the geographic separation that exists between the learners and the instructor. This distance can also refer to the "distance of understandings and perceptions...that has to be overcome by teachers, learners and educational organizations if effective, deliberate, planned learning is to occur." The establishment of collaborative learning groups can help to reduce this transactional distance. Hiltz (1995, March) defined collaborative learning as:

> ...a learning process that emphasized group or cooperative efforts among faculty and students. It stresses active participation and interaction on the part of both students and instructors. Knowledge is viewed as a social construct, and therefore the educational process is facilitated by social interaction in an environment that facilitates peer interaction, evaluation, and cooperation. (pp. 6-7).

Damon and Phelps (1989) recognized three approaches to learner interactions and identifies these on the basis of mutuality and equality between team members. Tutoring is said to occur when more capable learners guide less capable learners through the completion of the learning task. Cooperation is said to exist when learners work on different parts of the task and combine their efforts to derive a solution. Collaboration involves a greater amount of social interaction because it requires the learners to work jointly on all or most of the stages of the task. Research has indicated that collaborative learning results in more meaningful and productive interactions. This research is not clear regarding how effective such efforts would be in an online learning setting (Jehng, 1998).

To avoid confusion that may result from terminology usage, all future references to work done in groups will be referred to as collaborative rather than cooperative learning. Collis and Smith (1997) stated that the terms cooperative, collaborative, team, and group learning are used somewhat interchangeably. Since the application of the terms "in practice often involves a blurring of distinctions," the utilization of one term will help reduce unnecessary misunderstandings.

Johnson and Johnson (1975) developed three goal structures that can be applied to distance learning settings and increases in interaction among students, the development of learning communities, and collaborative group learning. Most distance

learning occurs within an "individualistic" goal structure where the achievement of one student is unrelated to the achievement of the others. In such an environment, there is little motivation for interaction since each student seeks to maximize his/her outcome, and these students have little concern for the success of other students in achieving their goals. Furthermore, these students usually see little value in interacting and helping others with their efforts. In a competitive goal structure, the success of some students in achieving their goals or desired outcomes is dependent upon other students' failure to do so. This environment, like the individualistic goal structure, provides little incentive to interact and support other students' learning. Lastly, the collaborative goal structure exists when students can only achieve their goals if the students to whom they are tied, or linked, can obtain this goal. In such a setting, student interaction plays a pivotal role in the success of the group, and thus, the individual.

Individualized instruction has numerous appealing features resulting from learner differences: learner ability, background, readiness, motivation, interest, and learning style, for example (Hooper, 1992). Quite often, simply placing students in groups to work on a task is referred to as collaborative learning. However, placing these learners in groups without guidance has been shown to provide few cognitive and affective benefits. Hooper contended collaborative learning requires careful attention to student interaction and is affected by task structure, rewards, group dynamics, and interpersonal skills. Further recommendations for collaborative learning group development will be detailed later.

Collaborative learning requires the learners working together to achieve a shared understanding of the stages taken to complete a task. Jehng (1998) identifies

three collaboration processes that contribute to the outcome. During the communication stage the members of the group attempt to establish a shared understanding of the goals by "searching, requesting, exchanging, and transmitting activity-related information" (p. 21). Secondly, during the negotiation stage, the learners design a plan for possible solutions and share ideas. Lastly, during the consolidation stage, the team members collaborate more closely to construct and maintain their shared conceptions by examining, evaluating, refining, and justifying their proposals. This stage requires the highest degree of coordination.

Collaborative group learning can be categorized further. Informal collaborative learning consists of having students work together to achieve a learning goal in a temporary group that is only in existence for a few minutes to one class period (Johnson & Johnson, 1996). Contrarily, formal collaborative learning involves students working together from one class period to several weeks to achieve a common learning goal and jointly complete assigned tasks.

Impact on Learner

The cognitive and motivational benefits of collaborative learning groups have been a focus of educational research for several years. Numerous authors have advocated its use for a variety of different reasons and have supported their contention with extensive research. In this section, a review of the literature detailing the use of collaborative learning strategies and its impact on learners will be detailed. The research attempting to measure the effects of these strategies will also be addressed.

The utilization of collaborative group learning has been minimally used in traditional educational settings for a variety of reasons (Dede, 1990, p. 254). The reasons include: (a) the difficulties of organizing and managing students in groups; (b) the maturity and motivation of students in a peer teaching/learning situation; and (c) our society's competitive paradigm stressing individual, rather than group, achievement. These attitudes toward collaborative learning can and should be overcome, but this will only occur if educators come to understand the potential benefits of such instruction and are guided in its proper use.

Much of the recent research into the effect of collaborative learning strategies began when Vygotsky (1987) explained that meaning mediates thought in its path to verbal expression. Simply stated, as is now widely accepted, learners are better able to consolidate their knowledge and may discover solutions when they are required to discuss topics with other learners. This environment has been shown to increase self-confidence, which in turn, increases active participation and brings about a greater likelihood independent learning will occur (Bennett & Dunne, 1992). Vygotsky went on to explain that through this communication, students learn more than the subject of the communication. The student gains an insight into human, social, and cultural aspects of the communication. As stated by Jaques (1984), cooperation doesn't just happen. He argues that we learn to cooperate through practice. This requires a clear and coordinated strategy for learning about working together and becoming better at cooperation.

This position can be seen in Watabe's (1995) listing of the benefits of collaborative distance learning settings:

1) The students benefit from different viewpoints or perspectives on the material they are learning. This can lead to refinement and deeper understanding of the materials.

2) Collaboration supports and encourages the sharing of individual expertise and experience. The group collectively brings with it a broader range of experience than does any individual member.

3) In the process of collaborative learning, students are required to present, explain, and sometimes defend their contributions to peers. By communicating what they have learned to other students, their learning will become more integrated into their general understanding and can lead to broader applications and generalization of the knowledge.

4) Collaborative learning can lead to a sense of involvement and identification within groups and their products. This supports the human need to interact with others, which is usually unsatisfied by distance learning.

Johnson and Johnson (1989) compiled a list explaining how collaborative learning group members will promote each other's success. This occurs by:

1) Giving and receiving help. Hooper (as cited in Johnson & Johnson) found a positive and significant correlation between achievement and helping behaviors.

2) Exchanging resources and information. Listening and exchanging explanations allows learners to think critically and engages the learner's higher-level reasoning skills.

3) Giving and receiving feedback.

4) Challenging each other's reasoning. Intellectual controversy promotes curiosity, motivation to learn, reconceptualization of what one knows, higher-quality decision making, greater insight into the problem being considered, higher-level reasoning, and cognitive development (Johnson & Johnson, 1992).

Finally, Watabe, Halalainen, and Whinston (1995, p. 142) assembled a list of benefits of using collaborative learning systems in distance education. These benefits include:

1) The students benefit from different perspectives of the material they are learning. Given the variety of experiences individuals bring to the learning setting, learners can handle larger and more complex tasks than they could if they were working individually.

2) Discussion with peers can be more relaxed than with a teacher. This communication will result in the material being more integrated into their understanding.

3) Working with groups is highly motivating. Support and pacing builds confidence and reduces the fear of failure.

Watabe, Halalainen, and Whinston's research into the impact collaborative learning and video support suggested that collaborative learning could be effective when supported with the use of technology. However, they note that the learning tasks must be designed in a manner that requires interaction. Furthermore, they found evidence that there is a need to use communication tools that go beyond those that are text based. In this regard, forms of synchronous communication tools provide a richer learning experience. The advantages of these forms of communication will be addressed in a later section.

A significant amount of research has shown that collaborative learning can lead to favorable attitudes toward learning in a variety of contexts. Rocklin et al. (1985) and Dalton (1990) found evaluations from students involved in computer-based collaborative learning were significantly more positive toward the learning task when utilizing collaborative learning than those who worked individually. Other researchers, Hooper and Hannifan (1991), Hooper, Ward, Hannifan, and Clark (1989) found that collaborative learning resulted in more favorable attitudes toward learning, in general, and the learning task, more specifically. Johnson, Johnson and Maruyama's (1983) research led them to conclude that collaborative efforts, on the part of learners,

contributed to larger improvement in the attitudes of group members toward each other than do competitive and individualistic models. Similarly, Sharan (1980) found that this approach to learning enhances learners' self-perception and that learners are more concerned for each other and enjoy their work more. These findings appear to clearly show that collaborative learning can, when properly designed and implemented, contribute to improvements in student achievement by impacting attitudes.

An abundance of research exists addressing the impact collaborative learning groups have on achievement. The large majority of this research has shown that students who learn in collaborative groups in a traditional classroom are better able to master teacher-presented information than those students who work individually (Slavin, 1987). Furthermore, these learners have been shown to perform better than those who work individually at all levels of education: elementary (Stevens & Slavin, 1995), secondary (Nichols & Miller, 1994), and college levels (Franklin, Griffin, & Perry, 1994).

Boling and Robinson's (1999) research attempted to discover how lecture-based distance education could best be supplemented with different learning activities. The research compared individual study, collaborative learning, and computer based interactive multimedia. In this study, the lecture was broadcast from a remote site to those in each treatment group. Those working in the collaborative learning condition were expected to use an informal collaborative learning procedure to complete the task. The learners in the interactive multimedia treatment group were allowed to work with a module program that provided them with information necessary to complete the assigned problems. This information was provided to the other two groups in print

form. It was found that those students working in the collaborative learning group scored significantly better that those in either of the two other groups. No other significant difference in achievement between groups was found.

Jehng (1998) was able to conclude that, in some settings, computer-based collaborative learning environments lead to an improvement in complex problem solving abilities over individualistic approaches. In his study, he had two relevant treatment groups and one control group. The treatment groups were exposed to collaborative distributed learning (to simulate distance learning) or face-to-face collaborative learning. The control group studied individually. The research found that those involved in face-to-face collaborative environments, while their achievement was similar, did interact more than those in a distributed treatment. This gives credence to one premise of this review – collaborative environments can improve learning. Furthermore, it indicates that computer-based interactions reduce these interpersonal communications. While this may appear problematic, it may not be in actuality. It would only impact learning if the quality of the interaction was similar. As shown earlier, much of the interaction that occurs in a distance-learning environment is meaningful. Such may not be the case in face-to-face interaction. These interactions may contain less pertinent information and be more socializing in nature. This was verified in the study. The researchers found those in the distributed learning treatment tended to interact more reflectively and less socially.

A study by Keeler and Anson (1995) indicated that college students learning basic computer skills increased their achievement when working in collaborative learning environments. Furthermore, they found that those students who exhibited a

high degree of computer anxiety performed significantly better in a collaborative learning environment than those with high anxiety in an individualistic learning setting. This research provides distance online educators with tremendous insights. If learners enroll in an online course and exhibit high anxiety, either toward the topic or the technology, it can be assumed that they may experience comparable achievement gains. Such benefits may be tremendously valuable as schools begin to offer online classes for the first time and students enroll in their initial online distance learning courses.

In two meta-analyses of collaborative learning studies, it appears likely that collaborative learning clearly can contribute to increases in learner achievement. Johnson and Johnson (1989) conducted an analysis on 226 collaborative-learning studies and found that collaborative learning increased students' achievement by .63 standard deviation over individualistic learning methods.

Slavin (1987) found forty-six studies that were fairly consistent in showing greater gains for learners exposed to collaborative learning strategies than those with individualistic goal structures. Twenty-nine (63%) of the studies found such effects, and only two found individual goal structures to result in greater achievement. However, Slavin pointed out that two structures result in significantly greater gains. Collaborative learning's effectiveness is highly dependent upon the utilization of group rewards and individual accountability. These structures will be addressed in the next section.

Since colleges and universities are offering the vast majority of online distance education, adult learners may not experience achievement and attitude gains comparable to some of the studies addressed earlier. Therefore, one should be cautious

when making the claim that collaborative learning will result in gains in all desirable learner attributes in all contexts.

Some research appears to indicate that these achievement gains may not apply to all settings. Crooks et al. (1998) investigated how the collaborative and individual instructional methods might interact with learner control (low vs. high) in its impact on achievement, attitudes, and learner interactions when adult students are working in a computer based instruction (CBI) setting. The researchers assigned the subjects to one of four treatment groups and used a 2 x 2 factorial design. They included a group reward with individual accountability. There was no significant main or interaction effects found on achievement. Similarly, little difference in attitudes toward the learning and instructional setting was found. The only significant finding dealt with the attitudes the students had regarding working with others. As would be expected, those who were in the collaborative learning treatment group preferred to work with others when completing tasks more vehemently than those that had worked individually. The authors concluded that the gains others attribute to collaborative learning may not apply to adult learners in all contexts. It should be noted that the size of the collaborative learning groups in this study was limited to two students. Clearly, the benefits of collaboration would be reduced in this setting since the number of interactions and perspectives would be dramatically reduced. The differences between individualistic learning and collaborative learning when only two individuals are working together would appear to be minimal.

Other studies found that collaborative learning did not result in significant achievement differences when using media other than CBI (Klein, Erchul, &

Pridemore, 1994; Klein & Pridemore, 1994). However, while these studies investigated how collaborative learning may impact learner outcomes when using various other media, they failed to allow for group rewards requiring the individual learner accountability Slavin (1987) claimed is vital to the success of collaborative learning strategies.

Susman (1998) contended that this lack of effectiveness in collaborative computer-based instruction (C-CBI) may result from the reduction in the amount and quality of elaboration that occurs in such environments. As earlier noted, elaboration has been shown to be a key to the effectiveness of collaborative learning. Students elaborate more on the learning material and tasks when interacting with one another than they do when interacting with a computer. While not all online distance learning courses may include a CBI component, many have begun to include this as the primary instructional component.

Susman's research suggested that the lack of differences between individual and collaborative computer-based instruction is primarily due to the poor design of collaborative and computer designed instruction. This review will now focus on the design of collaborative learning environments.

Designing Collaborative Learning Environments

Chou and Chuen-Tsai (1996) stated that successful collaborative learning will not occur simply by putting students into groups and telling them to get on with the learning. Learning in such settings will not occur unless collaboration is highly motivated and an essential part of the distance learning collaborative efforts.

Collaborative learning methods should be evaluated primarily on the degree of equality and mutuality they create (Damon & Phelps, 1989). Equality refers to the degree and types of differences between group members. These authors argued that when the group members are equal, the number of interactions will tend to increase. Mutuality refers to the degree of engagement between group members. High mutuality results in lively and meaningful interactions. Therefore, Damon and Phelps argued that collaborative learning groups should be set up to minimize differences and instructors should make efforts to create a high degree of mutuality. In order to stimulate mutuality, the number of learner/learner and learner/instructor interactions should be equivalent. This form of modeling makes the instructor appear as a group member who is contributing to the learning process and contributes to group mutuality.

As mentioned earlier, Slavin (1987) asserted that collaborative learning must include group rewards used in combination with individual accountability. Group rewards provide an incentive for group members to encourage and help the members to succeed. In contrast, individualistic rewards provide learners with rewards based on their own performance (Klein, Erchul, & Pridemore, 1994). With group rewards, individual success contributes to group success. In these contingencies, the group is rewarded if it collectively meets a standard. This may cause the members to place various pressures on one another to help ensure group success.

Secondly, individual accountability is vital to collaborative group success. This can be achieved by calculating the group score based on the score of the group's individual members. This will motivate members of the group to work with one another to raise one another's understanding. This improvement then will benefit all members,

including the members who provide help to others. It should be noted that these contingencies have been found to result in significant improvement in learner behaviors (Cavanagh, 1984: Hamblin, Hathaway, & Wodarski, 1971; Van Houten, 1980). Slavin notes than in twenty-eight studies of collaborative learning using group rewards and individual accountability, twenty-five (89%) found significantly greater achievement in the collaborative learning treatment groups than in the control groups. Another study found that simply providing students with the opportunity to study together did not result in higher achievement. However, adding group rewards and individual accountability did increase learning significantly (Slavin, 1987).

A belief in the effectiveness of this instructional strategy by the learners is highly important. In order to instill this confidence in a methodology, learners should be told of the strategy's benefits and be provided with learning strategies that may aid them in their efforts. This is better accomplished in a face-to-face meeting of the instructor and learners. If this is not possible, initial online contact should be primarily devoted to group development. This should occur prior to exposing the learners to the course content. Minimum levels of student participation and interaction should be established. Hooper, Temiyakarn, and Williams (1993) gave an example of how learners can be motivated to increase their interaction. Their training of students included (a) showing students how effective groups can be, (b) practicing of summarizing and paraphrasing, and (c) providing feedback. Susman's (1998) research found that those collaborative group learners who were provided with group training did result in gains in achievement. While the results were not statistically significant, it does provide an insight into the potential of the effectiveness of such training.

Johnson and Johnson (1996, 1991, 1989) have outlined the critical components that should be included in collaborative learning groups. The suggestions were compiled from lists of recommendations for formal collaborative learning, collaborative circles of learning (learning together), and utilizing software.

Generally, Johnson and Johnson advised instructors utilizing collaborative learning to:

1. Specify clearly the objectives of the lesson.
2. Make a number of pre-instructional decisions. These include group size, individual roles, and method for assigning members to groups.
3. Explain the task and the individual accountability and positive interdependence. To promote individual accountability, rewards should be based on the performance of all group members and members should be required to master lesson content. Positive interdependence can be promoted by giving the group members a grade based on their collaborative assignment.
4. Monitor the students' learning and intervene within groups to provide assistance or to increase group interaction.
5. Evaluate students' learning and provide feedback to groups regarding their performance as a unit.

To promote interaction, Johnson and Johnson recommended the groups be heterogonous in skill, gender, and ethnicity. To further promote interaction, the instructor should inform the group members that their success is dependent upon their efforts and can be improved upon with increases in effort and that any failures are a natural part of learning. Students should be trained to interact effectively before being assigned tasks. It is further recommended that prompts be provided to groups to interact and that they be engaged in group processing while working on exercises.

Hooper (1992) developed a set of issues that instructors utilizing group learning should consider. Social loafing is said to occur when group size increases. Because an individual student's effort is less noticed in large groups, less motivation and willingness to work often occur. The free-rider effect is said to occur when group members perceive their work as unnecessary and other members do the majority of the work. A result of the free-rider effect is the sucker effect. The sucker effect comes about when members observe the free-riding of some members and tend to become less motivated as a result. Four to six students per group, in most settings, will help reduce these effects. Efforts should be made by instructors using collaborative group learning to ensure that group members are doing their share of the work.

The potential effectiveness of collaborative learning has been established. Now, the focus of the review of the literature will turn to the impact one-way recorded audio and/or video may have on these learner characteristics and outcomes.

Audio/Video

Introduction

The delivery of instructional audio and video can occur in one of six methods: one-way audio, one-way video, two-way audio, two way video, one-way audio/video, and two-way audio/video (Penaranda, 1995). In a one-way communication system, the sound and/or video can be sent from one site to another, whereas two-way systems allow for the sound and/or video to be sent and received by both sites. Often the terms audio-conferencing and video-conferencing are used to describe these two-way communication systems. These systems would be a form of synchronous interactive

communication. Asynchronous communication would involve the use of recorded audio and/or video that would allow individual learners to watch and/or listen to the presentation when convenient for them.

These asynchronous communication modes, or independent systems (Smith & Dillon, 1999), allow learners to control better the pace of their study and where that study occurs. Furthermore, they allow learners more time to prepare thoughtful and detailed responses to questions or problems (Moore & Kearsley, 1996). However, these two systems place different demands upon the learners and the instructor in terms of design considerations and support requirements. In an online setting, it is possible for the learner to be exposed to both synchronous and asynchronous interactive methods. Digitized audio and video would allow learners the opportunity to review recorded information asynchronously, along with print media that may be supplied and electronic communications. However, online chats and telephone communication do allow the learner the opportunity to converse with other students and the instructor in real-time. The interplay between the communication modes may provide interesting effects on learners and achievement.

As stated by Hiemstra, Hummel, and Sint (1996), student success in distance learning depends greatly upon the design and quality of the instructional materials. Therefore, the media and instructional strategies should be developed in order to allow for studying by learners to be as independent of time, pace, and location as possible. As detailed earlier, McIsaac and Gunawardena (1996) listed delivery and access, control of the medium, the degree of interaction, audiovisual characteristics, and the extent to which the person is perceived as real, or social presence, as factors online educators

should consider when designing instruction for online distant learners. It has been shown that social presence is inherent in the medium of choice, and different media provide varying degrees of social presence (Short, Williams & Christie, 1976). This depends upon the ability of the medium to transmit facial expressions, direction of looking, posture, dress, and nonverbal vocal cues. They stated that the concept of "intimacy" is important in determining the degree of social presence. This is affected by the physical distance that exists between the learner and instructor, amount of eye contact, smiling, and personal conversations included in the presentation. As discussed earlier, this social presence can contribute to the development of learning communities and increase the amount and depth of interactions.

Importance of Media Selection

A review of the more current literature appears to complicate the analysis extensively. Researchers do not agree entirely regarding whether or how media impacts learning. Kozma (1994) and Clark (1994) vigorously debated the impact media have on learning in a series of articles, which was followed with another set of writings (Jonassen, Campbell, & Davidson, 1994; Morrison, 1994; Reiser, 1994; Shrock, 1994) advocating and challenging the writings of both.

The first school of thought contends that media are "mere vehicles that deliver instruction but do not influence student achievement any more that the truck that delivers our groceries causes changes in our nutrition" (Clark, 1983, p. 445). While there are varying degrees of agreement among educational researchers on this issue,

this school contends that it is the method of instruction or instructional design strategies that influences learning and not the media.

Clark (1994) argued that no given media must be present in order for learning to occur. Media, according to Clark, only make the learning more efficient for many learners, learning goals, and tasks. He argued that learning can occur regardless of what media is used -- print, video, or the computer. The only differences that occur relate to the amount of time and effort that must be exerted in order for the learning to occur. He made note that researchers continually confuse method with media when studying the impact of media. Salomon (1979) defined an instructional method as "any way to shape information that activates, supplants, or compensates for the cognitive processes necessary for achievement or motivation". More specifically, methods are the procedures of instruction that are selected to help learners achieve the objectives or to internalize the content or message. Media, on the other hand, are the carriers of the message from the sender to the receiver.

The second school argues that media is relevant and can enhance student depth and breadth of learning. This school of thought contends that knowledge and learning result from the interaction between the learner's cognitive resources and aspects of the external environment. They further argue that this interaction is strongly influenced by the extent to which internal and external resources fit together (Snow, 1992).

Kozma attempted to provide evidence and a basis for the importance of media in instruction. He states that media should be analyzed in terms of their relevant cognitive attributes. The capabilities or attributes that should be used to distinguish media are the medium's technology, symbol systems, and processing capabilities. Using these to

profile a medium will allow it to be described in terms of its capability to "present certain representations and perform certain operations in interaction with learners who are similarly engaged in internally constructing representations and operating on these" (p. 11). Kozma (1994) referenced two separate studies that he feels helps to substantiate this claim. Jonassen, Campbell, and Davidson defended this stance by arguing that the use of media has different things to offer to different learners who are working with different learning tasks. They felt that to categorize media as "mere vehicles," as Clark did, seemed to tremendously downplay its importance.

Reiser (1994) provided an insight that will be used to guide much of the rest of this review. He contends that the focus of research should be less on what methods cause learning to occur, but more on the attributes of media that make certain methods possible. This review will investigate to what extent the use of audio and video enhances and increases the quality of the instructional methods and what impact this improvement has on the outcome measures.

Research on Instructional Audio and Video

A vast array of research has been completed addressing the impact that the use of audio and/or video has on a variety of learning outcomes and learner behaviors. In this section, a review of the literature that provides an insight into what potential impact the use of one-way audio and video may have on the study of economics by online distance learners and, more specifically, what impact such technology use may have on achievement.

Audio and video have been used to aid in instruction since very early in their development. Loder (1937) did some of the earliest research on audio instruction without the instructor present. His research used a speaker who instructed two groups. One group heard and was able to see the instructor, while the other was only able to hear the instructor via a loudspeaker. The research discovered no significant difference in achievement.

The significant early research on video began in the 1950s. This research focused on evaluating the degree of learning that occurred from instructional television and films. In a review of the research on these early studies, Greenhill (1967) reported that the vast majority of these studies found no significant differences between learning from film or instructional television and conventional instruction. As stated by Greenhill, this finding, in and of itself, was a partial endorsement of the use of media in instructional settings. It indicated that student learning from these media was on par with one another and those learning from the media were not hindered. There were few studies that found television to be either beneficial or detrimental to learning.

Similar findings applied to the early research investigating the effectiveness of auditory presentations. Much of the early research focused on phonographic and tape recordings. Gibson (1960) conducted a three-year experimental comparison studying the impact the use of tape recordings to teach conversational Spanish had on achievement and attitudes. In another study, Menne, Klingenschmidt, and Nord (as cited in Tripp & Roby, 1996) investigated whether instruction using solely taped lectures, taped recordings, and printed notes resulted in differences in learning from those students enrolled in a traditional class. These researchers found no significant

differences but did discover that those in the lowest quartile in the taped treatment performed better than those in the lowest quartile of those enrolled in the traditional class.

Recent writings into the benefits of audiotapes have focused on several advantages (Lappia, A., & Kirkland, J., 1989). Among these are:

1) Flexibility; tapes can complement other media;
2) User control; listeners can choose when to listen;
3) Humanizing; instructor-student relationships become more personal, and;
4) Stimulating and motivating learners; variations in phase, amplitude, and frequency can highlight aspects of content.

Another focal point of research relevant to this investigation deals with the differences in learning from audio and print, both separately and together. Considerable research found no differences in learning from print and audio, both for children and adults (Mosenthal, 1977; Nasser & McEwen, 1976; Nugent, 1982). However, Furnham, Gunter, and Green (1988) found that recall of information from print exceeded the recall of information from audio. In another study, Tripp and Roby (1996) attempted to hold the possible confounds constant to evaluate the differences in recall between subjects who read the material and those who heard the reading of the text. The students who read the text remembered significantly more information than those who just heard the reading. Tripp attributed this difference to the expectations of the students. Prior to the treatment, those students who read the text indicated that they expected the learning to be more difficult than those who were going to listen to the readings. This expectation, Tripp contended, led to these students expending more

effort, leading to the increase in recall rates. It is important to note that in most instructional settings all confounding variables are not equal, thus making some media advantageous over others for some learners in various contexts.

This finding has been repeated in a series of studies conducted by Salomon. In these studies, it was concluded that learners perceive learning from television easier than print, report investing less mental effort in learning from television than print, and learn less from television than from print (Salomon, 1983; Salomon, 1984). In these settings, learners assess a task in terms of the characteristics of both the medium and the task then make a decision on the difficulty of the lesson based on passed experiences. Following this assessment, they decide to assert a certain amount of effort (Cennamo, 1992). As shown by Tripp (1994) and verified by Salomon (1983), students perceive learning from television or video to be less demanding than from print. Salomon (1983, 1984) found that students reported putting more effort into processing information presented in text-based lessons than in those presented orally or through television. These increases in effort may result from the increases in the conscious generation of elaborations that occur during the reading of text. However, the expending of effort does not always guarantee an increase in achievement if learners are unable to make a coherent mental model of the content.

Cennamo (1993) further detailed the assessment processes that learners undergo in relation to the learner and task. The conceptions of media and tasks will vary among learners, will vary with experience, and may be influenced by various cultural differences. The characteristics of the task also influence the preconceptions learners have regarding the amount of effort necessary to complete the learning task. Cennamo

(1992) has shown that college students perceive it easier to learn some skills from television than others. Psychomotor skills and attitudes were perceived to be more easily learned from television than print or computers. However, print and computers were perceived as easier in the learning of verbal information and intellectual skills. Again, these perceptions will result in varying degrees of effort on the task and ultimate success. In a similar study, Cennamo, Savenye, and Smith (1991) found college students perceived interactive video, instructional television, and television to be different in the demands placed on them during learning. They found that perceived mental effort was significantly correlated ($r = .27$, $p = .012$) with an inference score.

It is generally agreed that gaining the attention of the learner is an important determinant of achievement and comprehension. The attention of the learner not only describes the attention to the general content but also attention to the key concepts that are included in the instruction. The attention of the learner can be drawn to specific visual or aural stimuli by manipulating the "features" of the instruction (Hannifan, 1985). This can be done by varying pace, sound, motion, activity, uniqueness, and planned repetition. Stated succinctly, "attention can be affected both by the expectancies of the learner and by the capacity of the instruction to direct and maintain attention for effective comprehension" (p. 240). This "attention to detail" can be achieved by various media, but in different ways. The utilization of audio and video would allow for instructors to direct attention to those concepts that, based upon experience of the instructor, provide the greatest challenges to learners.

Much of the recent audio/video research focuses on interactive audio/video. A review of these does provide some information that applies to this investigation. Dalton

(1986) discovered that students who learn from video alone do not perform as well as those who learn from computer-aided instruction (CAI) or interactive video. This appears to further illustrate that media may impact learning and achievement. Furthermore, he discovered that the learners utilizing only video scored significantly lower than those using interactive video. It might be concluded from this that the interaction between the learner and the technology contributed to the increases in achievement and attitudes. It would seem feasible that video instruction may be more effective if coupled with methods of support that provide for immediate responses to questions that may arise. In an online learning setting, this is possible given the various synchronous and asynchronous methods of communication.

In a study conducted by Supinski (1999) it was hypothesized that those learners who were exposed to interactive video instruction followed by a collaborative learning exercise would perform better than those who worked collaboratively on the interactive video and worked on the exercise simultaneously. The rationale for the hypothesis is derived from the "noise" that is created when learners are completing more than one task at a time. It was thought that focusing on one task at a time would allow for greater interaction and result in better comprehension. The achievement scores of the two groups were not significantly different, while the group working simultaneously with the interactive video did show an improvement in attitudes toward collaborative learning. This provides an insight into the design for this investigation. Furthermore, it does not support the argument that providing multiple modes of instruction, simultaneously or sequentially, will result in deterioration in achievement. However, it does seem to show that groups who work on tasks as a group at the same time they are

interacting with the media develop a better attitude toward collaborative learning. As shown by this study and others, collaborative learning, when combined with various forms of media, has not always positively affected performance (Klein & Pridemore, 1992).

In a study of the impact the addition of video to hypermedia instruction, Swan (1996-97) found that audio/video enhanced the learning from hypermedia. She reasoned, "Video adds an affective dimension to hypermedia materials, making them more meaningful, hence more memorable, and that video is represented differently from text in memory, and that such representations are more complex and so provide more links to elaborated knowledge therein" (p. 187).

Research has shown that in some settings audio, when combined with print, is superior to just audio by itself, but equal to print alone as a method for presenting information (Nasser & McEwen, 1976). Furthermore, print or audio, when combined with pictures, generally increases learning over the use of any one of these media individually. Furthermore, dual media combinations of pictures and audio instruction result in greater gains than those combinations of print and audio (Levin & Lesgold, 1978). This may prove to be a tremendous benefit for those subjects to be included in this investigation. The study of economics deals with a tremendous amount of models and graphs that are presented pictorially. It may be that the audio presentation of concepts, when coupled with the graphs, enhances learning and comprehension. The addition of text may increase comprehension even further. While these combinations will not work the same for all learners, it would be expected some combination of audio/video/text might increase learning over limited exposure to media.

A more recent study by Barron and Kysilka's (1993) does not provide support for this assertion. In this study three treatment groups consisting of a total of sixty students were analyzed. One treatment group completed an identical CBT program using (a) text only delivery, (b) full-text and totally redundant audio delivery, or (c) bulleted text with full-audio delivery. They found that there was no difference in achievement and acceptance of the CBT program in the three treatment groups. The researchers did discover the text-only treatment group completed the task in significantly less time. Barron and Kysilka attributed the achievement uniformity to the ability of text-based CBT programs to teach the basic knowledge sufficiently. They also noted that the reduction in the amount of text in the full-audio version did not adversely affect achievement gains. This appeared to provide support to studies addressed earlier that showed redundant multiple inputs seem not to affect communication and achievement negatively (Mosenthal, 1977; Nasser & McEwen, 1976; Nugent, 1982).

These studies provide data that are valuable to this investigation. It appears, when using multiple media, it may be most effective to present information that is non-redundant. In the current investigation, it may be most effective to allow students to read text and augment this with relevant discussion and additional information via audio and video. It is yet to be seen whether these media enhance the socialization of the class and what impact this socialization has on achievement, goal orientation, and self-efficacy. The next section will address the significance of these outcomes and how they may be related.

As addressed by Park and Gittelman (1992), media presentations contribute to learning only when their "attributes are applied in congruence with the specific learning requirements of the given task" (p. 28). Given the sequential development of models within economics, video presentations would be expected to contribute significantly to learner comprehension. The ability to animate serves a variety of instructional functions. First, attracting attention to important points and maintaining motivation often result from animation. Secondly, the ability to represent domain knowledge involving explicit or implicit movement can be advantageous. Lastly, animation can be used as an aid for explaining complex knowledge or phenomena.

A physical presence can emanate from the use of audio and video presentations. Body language and facial expressions can provide useful information to learners (Smith & Dillon, 1999). This ability will contribute to social processing. In audio recordings one could assume that voice inflections and delays in presentation will contribute to this processing and contribute to the "humanizing" and "personalization" of the instructor (Lappia & Kirkland, 1989). This may contribute to the learners' sense of community.

Lappia and Kirkland found that learners took extensive notes when listening to recorded lectures. This provides further evidence that such use of media may result in behaviors that resemble that of a traditional class. This association may further contribute to the students' sense of learning community.

Goal Orientation

Achievement goal orientation and self-efficacy manipulation can be instrumental in improving the effectiveness of online instruction. Dweck (1986) has

shown that there are two different ways of categorizing goals. Learning goals are those goals in which a person seeks to increase his/her competence or to understand new material. Students with a learning goal orientation place importance on developing new skills, they value learning, and what they achieve is seen as dependent on effort. Performance goals, on the other hand, are those goals in which a person seeks to look good or gain favorable judgments of his/her competence or to avoid negative judgments. People who are predominantly learning goal oriented are said to be intrinsically motivated, while those who are performance goal oriented are said to be extrinsically motivated.

One of the advantages of a learning goal orientation has to do with persistence. Those who are learning goal oriented have been shown to be more persistent in their efforts, both in those tasks that they perceive as difficult or simple. In contrast, persons who have a performance goal orientation will not put forth much effort if they perceive their chances of success as being low. In order to avoid looking bad in front of fellow students, they exhibit little effort to complete their work. This allows them to attribute their failure to their lack of effort, deflecting it from their apparent, or perceived, lack of ability.

The significance of this relationship is that since it can be assumed that effort and persistence by learners is directly related to their achievement, development of a learning goal orientation may contribute to increases in achievement. This is indicated by the several studies that have indicated that those learners who exhibit a learning goal orientation are likely to exhibit an increase in achievement and a self-reporting of using deep learning strategies, preferred tasks that offered more challenges, are more

persistent, and identify effort to be related to success (Ames & Archer, 1988; Greene & Miller, 1996; Meece & Holt, 1993; Miller et al., 1996).

This investigation attempted to provide evidence suggesting that goal orientation can be influenced by a variety of instructional strategies. While these strategies were be used in this study, the evidence gathered indicating the malleability of learner goal orientation was valuable. It is expected that the treatments in this study would positively impact learner goal orientation.

Dweck and Leggett (1988) have shown that students' perceptions of intelligence can influence their goal orientation. Those who believe that intelligence is a fixed factor and cannot be changed often blame failure on inadequate ability and favor a performance goal orientation. Learners who believe intelligence and abilities can be improved through hard work and effort are likely to increase their efforts when faced with failures. These learners tend to exhibit a learning goal orientation. It is inarguably more desirable for a learner to view intelligence as a malleable characteristic versus a fixed trait.

In an unpublished study of late grade-school-age children, Bandura and Dweck (1985) compared the goal orientation and theory of intelligence of the students. The researchers used the term "incremental theory" of intelligence to represent the belief that intelligence is a variable, controllable quality. The "entity theory" of intelligence is the belief that intelligence is uncontrollable and fixed. Sixty-three students took part in the study. The researchers measured three levels of goal orientation. These included (a) performance goal orientation and avoid challenges, (b) performance goal orientation and seek challenges, and (c) learning goal orientation and seek challenges. Fifty-percent

(50%) of those who had an entity theory of intelligence were identified as having a performance goal orientation and avoiding challenges, and 31.8% were performance goal oriented and seek challenges. Only 18.2% were identified as having a learning goal orientation and seek challenges. In contrast, of those students who were categorized as having an incremental theory of intelligence, 60.9% had a learning goal orientation and sought challenges and only 39.1% were categorized as having a performance goal orientation. These statistically significant differences lead the investigators to conclude that those individuals with a learning goal orientation tended to view intelligence as malleable and something that can be enhanced. In contrast, those with a performance goal orientation tend to view intelligence as something that is fixed and cannot be enhanced through effort.

If goal orientation is not a fixed characteristic, then these findings are invaluable to instructional designers and to online distant education instructors. Dweck and Leggett (1988) indicated that students' perceptions of intelligence can be modified using feedback that suggests ability is modifiable, increases in effort will increase achievement, and errors do not signify failure but are part of the learning process. While the present research did not attempt to evaluate the impact various forms of feedback have on goal orientation, the information contained within Dweck and Leggett's study further indicates that instructional strategies may impact learner goal orientation.

In a study by Elliott and Dweck (1988) it was shown that learner goal orientation could be manipulated by instruction, and the impact of such an orientation has on learner behaviors coincides with those predicted by Dweck (1986). In this study 101 fifth-graders were randomly assigned to one of four treatment groups. The

researchers manipulated the learners' goal orientation by providing a different set of instructions prior to attempting a task.

Half the students were given instructions that highlighted either a learning or performance goal. Those that were given the instructions highlighting a performance goal were told that the tasks they were going to be asked to complete were of varying difficulty levels. Some were hard and some were easier. They were told that they would not learn anything new, but their performance would provide an indication of what students can do. The other group was told that they were going to learn many new things, the task would be challenging, and they would make several mistakes. However, in the end they would learn many useful things.

The researchers found that those students that were exposed to the learning goal treatment continuously attempted to increase their competence, opted for challenging problems, and attempted to learn new skills even though their errors would be public. However, those students that were exposed to the performance goal treatment declined the opportunity to attempt challenging tasks and showed less motivation to learn new skills.

Interestingly, in a study presented in an unpublished manuscript, Hoska and Hooper (1992) showed that that advisement feedback may have little effect on students in an individualistic setting, but may have a significantly different impact on students working collaboratively. In the collaborative groups, those who received effort-related feedback displayed an increase in learning goal orientation and attempted more complex questions than those who received success-related feedback. Apparently, effort-related feedback and communication stimulated group learning. This may be due

to increases in socialization that may have resulted from the effort incentive. In this investigation, effort related feedback would be limited. This will better allow for any changes in goal orientation and achievement to be attributed to the treatments under investigation.

It appears as though Nichols and Miller's (1994) study may provide further evidence that learners' goal orientation may be malleable and that collaborative learning may contribute to the development of a learning goal orientation. The subjects in their study included 31 female and 31 male eleventh and twelfth grade students enrolled in an Algebra II class. Students were enrolled either in the control group or the treatment group. Each group, consisting of 30 and 32 students respectfully, was equally represented by males and females.

Each student completed a 27-item questionnaire used to assess various motivational aspects. Among the factors evaluated were goal orientation and self-efficacy. Achievement was an observed outcome measure. The items used to evaluate the factors were Likert-type and used a 5-point scale using "strongly agree" and "strongly disagree" as the anchors. Mathematical achievement was measured prior to the treatment. The collaborative learning treatment utilized the Team-Assisted Individualization method of instruction. Each group consisted of four to five students who were heterogeneously arranged by gender and previous math achievement scores. Students worked individually on assignments, but team members checked on one another's progress and provided tutoring as needed. These students were allowed to proceed at their own pace on the assignments and received individual grades following assessment. However, the individual performances were combined at the end of each

week for a team score. Learners in the control group received a traditional introductory lecture that was longer and more detailed. These students worked on their assignments independently and were required to move at an established pace. Using a pretest as a covariate, the researchers discovered that the learners in the treatment group had significantly higher learning goal orientation $F(1,59) = 20.18$ than those in the traditional instruction control group. It should be noted that learners in the treatment group scored significantly ($p<.05$) higher on the achievement test $F(1,59) = 5.60$ than those in the traditional instruction control group.

As stated earlier, Johnson, Johnson, and Maruyama (1983) have concluded that this perception of support from group members will increase self-esteem and improve attitudes of students toward one another. These students will feel more liked, supported, and accepted, and care more about how much is learned. They have found a significant correlation between low self-esteem and low grades in school.

Self-Efficacy

Bandura (1986) stated that efficacy expectations are those personal probabilistic judgments, or confidence, that individuals can execute a particular behavior. Outcome expectations, on the other hand, are those judgments that a behavior will lead to a particular outcome. If one loses or lacks confidence in his/her ability to achieve a goal, a decrease in motivation and effort will ensue. Likewise, if one believes that no matter what he/she does, he/she cannot achieve the objective, his/her effort will wane. If distant learners are continually faced with obstacles, either technical or cognitive, and

their efforts to overcome these have not been successful, they will become frustrated over time and motivational levels will begin to decline.

Self-efficacy research has focused primarily on two areas. One area addresses the relationships between learner self-efficacy and career choices. The other research area has investigated the relationships among efficacy beliefs and learner motivation or achievement (Pajares, 1996). The findings of various researches have shown that efficacy beliefs are significant predictors of achievement through their influencing of effort, persistence, and perseverance (Bandura & Schunk, 1981; Bouffard-Bouchard, 1990; Pajares & Miller, 1995; Schunk & Hanson, 1985).

In their study, Pajares and Miller evaluated the relationships between students' confidence to solve mathematics problems and their actual ability to solve assigned problems. Furthermore, they investigated the predictive power students' confidence of success in a course has regarding their choice of major. The researchers studied 391 undergraduates and discovered that the self-efficacy of the learner was a significant predictor of their ability to correctly solve various mathematical problems and exceeded the predictive power of the learners' self-efficacy to succeed in the course. However, their course self-efficacy was a significant, and the best, predictor of their choice of major. From this we can see that learner self-efficacy is closely related to a learners' behavior and decisions. Pentrich and De Groot (1990) have provided evidence that learners who believe they are more capable at performing academic tasks use more cognitive and metacognitive strategies and persist longer than those lacking self-efficacy. Furthermore, learner self-efficacy was found to be positively correlated with end of semester class grades, in-class seatwork scores, exam grades, and essay/report

scores. It may be reasonable to assume that the use of the cognitive/metacognitive strategies and learner persistence resulting from elevated learner self-efficacy improve overall student achievement.

Alloy and Seligman (1979) have found that low self-efficacy can lead to motivational, cognitive, and affective deficits. The motivational deficits they refer to are illustrated by a person's unwillingness to respond to various situations. The cognitive deficits result in the person becoming pessimistic about the causes of the outcomes he/she observes. He/she tends to attribute the outcomes to some other action and believe they are independent of their actions. Lastly, the affective deficit that results is fear. The net effect of fear is apathy, listlessness, and depression. Clearly, these are emotions one would not want learners to exhibit. This is especially true of distant learners. Not being able to see the learners personally would prohibit the instructor from gaining visual cues that may illustrate frustration levels. Instructor and student support, which may be stimulated in a collaborative learning setting, can provide the learner with a feeling of security and a confidence that problems that may arise can be overcome.

A learner's past success and failure with related tasks will have a dramatic impact on his/her self-efficacy (Bandura, 1986). If a student has experienced success in the past with a task, it is more likely that the learner will exhibit higher self-efficacy in the future if faced with a similar task. However, a student who has had a negative experience with a task and feels he/she failed in past efforts will exhibit lower self-efficacy if faced with a similar task in the future. These learners may feel apprehensive and feel their incompetence gives a negative image of themselves and may avoid similar situations in the future. However, if it can be assumed that collaborative learning

and/or audio/video support may increase the chances for success such conditions may raise learner future self-efficacy.

Research has shown that a variety of instructional strategies can be used to possibly increase student self-efficacy. Feedback research conducted by Keller (1987) recommends that teachers should maintain intrinsic satisfaction by using praise and informative feedback and should avoid threats and external surveillance methods. Teachers should maintain the quantity of performance by using motivational feedback. Lastly, teachers should attempt to improve the quality of performance by providing corrective (formative) feedback. This should be done before the next opportunity to work with the instructional materials. The ability to provide immediate and meaningful feedback, both from the instructor and/or other students, in an online instructional setting utilizing collaborative learning strategies may prove to be a tremendous advantage of this mode of distance learning.

Elliott and Dweck's (1988) study provides further evidence that self-efficacy can be manipulated and further indicates how self-efficacy may interact with learner goal orientation to increase desired learner behaviors. In this study the students' beliefs about their current skill levels were manipulated via feedback following the completion of a task. Half the students were told that the task had revealed that they had high ability, and half were told they had low ability for the task to be used in the experiment. This factor was crossed with the manipulation of the students' learning goal orientation as detailed earlier. The researchers discovered that when the performance goal was highlighted and the learners had low self-efficacy they responded to mistakes they made completing tasks during the experiment in a "helpless" manner. The characteristics of

this response include an attribution that mistakes reflect a lack of ability, and an expression of negative affect. Furthermore, learners exhibiting this behavior tended to reduce the number of attempts they made to find solutions to problems. However, when the performance goal was highlighted and students' self-efficacy was high, the learners responded in a "mastery-oriented" manner. They persisted in their attempts to find solutions to problems, did not make attributions for failure, or express negative affect. Yet, they did not attempt to increase their skills on tasks that involved public mistakes.

Johnson and Johnson (1989) professed that collaborative learning can contribute to the development of self-efficacy. Learners who work together to find meaning in their experiences and to develop new meanings can experience increases in self-efficacy. Self-efficacy is more prevalent in collaborative than competitive or individualistic situations. Collaborative efforts enhance learners' chances of success that may cause the learner to emphasize the internal, stable causes of the success. This attribution would be expected to increase the self-efficacy of the learner.

This contention has been supported by the findings of Nichols and Miller (1994) detailed earlier. The researchers discovered that the students in the collaborative learning treatment exhibited significantly ($p<.01$) higher self-efficacy $F(1,59) = 13.61$ and achievement ($p<.05$) scores $F(1,59) = 5.60$ than those in the traditional instruction control group.

Another study (Miller et al., 1996) provides partial support to the contentions made regarding the relationships among goal orientation, self-efficacy and persistence. Their study appears to substantiate Dweck and Leggett's (1988) assertion that learning goal orientation is positively correlated to cognitive engagement and achievement.

However, they discovered that while perceptions of ability should not impact effort and persistence for those learners exhibiting a learning goal orientation according to goal orientation theorists, it might, in fact, do so. They discovered that the students who exhibited a learning goal orientation exhibited a higher degree of persistence when they had a high perception of ability versus a low perception of ability.

It can be concluded that increases in self-efficacy will possibly increase learner persistence and achievement more for those learners who exhibit a learning goal orientation than a performance goal orientation. Resultantly, it may be most desirable to foster a learning goal orientation while simultaneously making efforts to increase learner self-efficacy.

Motivational Issues

Learning support structures should be established in such a manner that they increase a student's interest and persistence in achieving the objective. Ormrod (1995) defined motivation as an "internal state that arouses us to action, pushes us in particular directions, and keeps us engaged in certain activities" (p. 412).

According to Maehr (1984), motivation is revealed by five basic indicators. First, direction, or choice among a set of action possibilities, indicates motivation. Secondly, persistence, or the concentration of attention on a task for a greater period of time, indicates greater motivation. Next, continuing motivation, or the willingness to return to a previously encountered task, demonstrates motivation. Fourth, the effort, or physical involvement can indicate motivation. Lastly, performance can be used to indicate varying degrees of motivation.

Intrinsic motivation can be defined as behavior that is done solely for the interest and enjoyment inherent in performing a given activity (Reeve, 1992). In those activities where an individual finds pleasure, avoids pain and frustration, succeeds and receives rewards, a person may exhibit a high degree of intrinsic motivation. As stated by Csikszentmihalyi and Nakamura (1989) people are motivated by curiosity and novelty; and people need to feel in charge of their own actions.

Reeve (1992) pointed out that there are two steps involved in intrinsically motivating events. First, the individual must determine whether or not an activity is novel, interesting, and peaks, his/her curiosity. Secondly, the activity must be challenging and provide the person with competence feedback. He states that as long as learners are challenged and receive competence feedback, they will re-engage the activity.

A study by Miller et al. (1996) provides evidence that goal orientation and various motivational characteristics may be closely related. The study included 297 high school students who completed an 83-item instrument used to measure learning goals, self-efficacy, self-regulation, persistence, and effort. Using regression analysis, the researchers found that learning goal orientation was a significant factor in predicting self-regulation, deep processing, effort, and persistence. Furthermore, they found that effort, persistence, and self-regulation were significant factors in the prediction of achievement. Resultantly, this provides support for the argument that goal orientation has a significant influence on several key motivational factors, which in turn, are significant predictors of achievement. It can be concluded from this that the development of a learning goal orientation tends to improve learner achievement.

The potential benefits of the development of learning communities and increases in socialization, or "social presence," are numerous in this regard. Through social reinforcement, learning communities help to provide the learner with self-esteem. Gains in self-esteem can lead to feelings of self-confidence, self-efficacy, capability, and adequacy (Reeve, 1992). These gains can result in improvements in student motivation. Lack of these feelings tends to lead to feelings of inferiority, weakness, helplessness, and dramatic reductions in motivational behaviors.

Toward a Methodology

This review has attempted to illustrate the potential benefits of collaborative learning and the use of multiple media to support online distant learners in their efforts. The potential increases in interactions, socialization, and development of learning communities and their benefits were detailed. The potential impact of collaborative learning on the development of these learning communities was addressed. A review of the use of audio and video and their potential impact on learning and perceptions followed. Studies addressing the use of multiple media to present information were presented. Next, the investigation attempted to illustrate the effects a learning goal orientation and self-efficacy have on motivation and achievement.

A summary of the findings shows that Miller et al (1996), Greene and Miller (1996), and Nichols and Miller's (1994) studies indicated that a learning goal orientation correlates positively to higher achievement. Also, evidence shows that high learner self-efficacy is similarly related to achievement (Pajares & Miller, 1995; Pentrich & De Groot, 1990). Keller (1987) showed that informative corrective

feedback could increase learner self-efficacy. Further, Nichols and Miller's (1994) study indicated that collaborative learning might perpetuate a learning goal orientation and increase learner self-efficacy. Dweck and Leggett (1988) showed that instructors who remind learners that their success is dependent upon effort, thus making intelligence malleable, are more likely to develop a learning goal orientation. Hoska and Hooper (1992) showed that this effect might be even more pronounced in a collaborative group setting. Numerous studies (Slavin, 1987; Nichols & Miller, 1994) have shown how collaborative learning may increase learner achievement and various other learner attributes. Still further, studies by Salomon (1983) and Tripp (1994, August 5) indicated how recorded audio and/or video may affect effort, while Greenhill's (1967) meta-analysis indicated that recorded lectures result in no reduction in achievement.

Given these findings and purported relationships the proposed investigation would be worthwhile. Simply, if audio/video and/or collaborative learning did promote a learning goal orientation and increase learner self-efficacy, it would be expected to increase achievement, as other researchers have shown it does.

Succinctly stated, it was hypothesized that collaborative learning strategies and recorded audio/video lectures positively would positively impact student achievement, student learning goal orientation, self-efficacy, and sense of community. Additionally, it was hypothesized that the groups exposed to either the collaborative learning treatment or the media treatment would report higher learning goal orientation, higher self-efficacy, and higher sense of community over time. Furthermore, those receiving both would report the highest of each of these dependent measures. Resultantly, it was

hypothesized that student attrition rates would be significantly lower for those learners utilizing collaborative learning versus individual learning. Likewise, it was hypothesized that learners utilizing the recorded audio and video lectures would have a significantly lower attrition rate than the students who do not have such access.

The focus of this paper will now turn to presenting the specific methods used in this study. While no investigation is capable of answering all the questions that apply to all contexts, the methodology utilized should allow the findings to be generalizable to several distance learning settings in which a variety of subjects are taught. Additionally, the design should allow for the information garnered to be applied to many traditional instructional settings.

CHAPTER III

Methodology

Purpose of the Study

The purpose of this study was to investigate the impact the use of recorded audio and video lectures and collaborative learning strategies have on various learner outcomes. It was believed that these treatments would significantly increase student learning, goal orientation development, self-efficacy, and sense of community. Further, it was contended that the treatments would result in a lower attrition rate. The information garnered will provide an insight into some effective instructional strategies that could be beneficial to instructors teaching in a wide variety of contexts.

Subjects

The subjects included in this study were enrolled in one of three sections of a micro- or one of three sections of a macroeconomics online distance education class. These courses were offered at a community college in the Midwest during a four-week summer semester, a sixteen-week fall semester, or a sixteen-week spring semester. Principles of microeconomics was offered during the first four-weeks of a summer semester followed by a principles of macroeconomics section offered during the second four-week summer semester. Two additional sections of both courses were included in the study. These were offered during a sixteen-week fall and spring semester. The courses offered during the fall and spring were offered concurrently. Students were

allowed to enroll in one or both of the classes and were not required to take one prior to taking the other.

These two courses are required for all students seeking the transferable Associate in Science degree. These students plan to transfer to a four-year university. Students may take the course as an elective for any of the terminal Associate in Applied Science degrees offered in the Business and Information Technology Division. It is estimated that 80-90% of the students enrolled in each of the two courses are seeking to transfer the course to a four-year comprehensive university.

The school is comprised of 70% Caucasian, 16% African American, 6% Native American, 4% Hispanic, and 3% Asian. Women comprise 59% of the current population. The average age is approximately 27, while the median age is 23. Approximately 47% of the students are planning to transfer to a university and 35% are seeking a terminal two-year degree.

The subjects included in the study were comprised of 84 females and 42 males with an average age of 26 and a median of 24. Most students (93) indicated the present course was their first distance-learning course, some (16) had taken one distance-learning course previously, 11 had taken two courses before, and five students indicated they had taken four or more distance learning courses. The course was the first online course for 98 students while 27 students had taken one or more online courses prior to the present course. Lastly, 91 students indicated the course was their first economics course, 30 had taken one course previously, and four students had taken two economics courses.

Instruments

Four dependent variables were measured at various points during the semester. During a student orientation that occurred prior to the beginning of the class, learner goal orientation, self-efficacy, and sense of learning community were evaluated. Other demographic information was gathered at this time along with questions detailing students' expectations of the course. This will be referred to as the entry assessment. At three separate points during the semester, goal-orientation, self-efficacy, and sense of learning community were measured for comparison to one another and to the entry assessment. Student learning was assessed with the use of an assessment examination at the end of each quarter of the semester.

A 26-item questionnaire (see Appendix B & C) partially derived from the Attitude Toward Statistics questionnaire was used to assess the dependent variables in the study relating to student motivation (Miller et al., 1996; Miller, Behrens, and Greene, 1993). Several studies have used a form of the instrument to evaluate goal orientation, self-efficacy, intrinsic valuing, self-regulation, learning strategy use, and persistence. The items included in the instrument were Likert-type questions utilizing four questions to measure learning goal orientation, eight items to measure performance goal orientation, eight items to measure self-efficacy, and six items to evaluate sense of learning community. The items were randomly ordered utilizing a five-point scale. The two anchors for the scale were "strongly agree" and "strongly disagree."

Principal component analysis was performed using SPSS on the 26 items used to measure the dependent variables. This analysis was done for the ninety-one students that completed the online survey at the conclusion of the semester (Q3). The

communalities of the items within the instrument were well within acceptable parameters ranging from .504 to .817.

Component analysis resulted in four factors being extracted. The Eigenvalues for the four factors were 7.033, 5.362, 3.767, and 1.955. Given that the next component resulted in an Eigenvalue of .98 and the break in values was close to 1, it was concluded that the items on the research instrument clearly describe four unique factors. These factors explained 27%, 21%, 14%, and 8% of the variance, or 70% of the total variance in the responses.

The component matrix indicated that the items on the survey were accurate measures of the four dependent variables and should be included in making up the scale. The four items intended to measure learning goal orientation had factor loadings of .505 to .654. The eight items used to evaluate learner performance goal orientation had factor loadings of .742 to .895. The self-efficacy scale included eight items whose factor loadings ranged from .506 to .821. Lastly, the sense of community scale was comprised of six items whose factor loadings ranged from .599 to .743.

The research instruments appeared to be a very good measure of the four dependent variables they were designed to measure. Next, the reliability of the instruments will be considered.

The reliability analysis of the instruments used to assess learning goal orientation, performance goal orientation, learner self-efficacy, and sense of community was evaluated at four separate points during the semester. These reliabilities were calculated at the beginning of the semester (entry), at the end of the first quarter (Q1), at

the end of the second quarter (Q2), and at the end of the fourth quarter (Q4). The results of these analyses are detailed below.

The entry reliability coefficients for each of the dependent variables were well within the .70 preferred alpha for the first three dependent variables. The alpha coefficient related to the sense of community measure was .67. This value likely is lower than the other values at this point of the semester due to the structure of the questions. The questions measured the learner's sense of community in the class and at the beginning of the semester, students had very little idea of how the class would be conducted. For this reason, their responses were more varied than they were later in the semester. This assertion appears to be validated as the reliability scores increased at the other points during the semester.

The reliability coefficients for each scale used to measure the dependent variables are shown in the Table 1. Given the calculated coefficients shown, the reliability of the instruments was confirmed. Again, these values are well above the .70 preferred alpha.

Table 1

Instrument reliability measures

	LG	PG	SE	COMM	N
ENTRY	.78	.89	.84	.67	124
Q1	.81	.90	.88	.80	108
Q2	.85	.93	.91	.89	101
Q4	.86	.92	.92	.90	91

Table 2

Reliability Measures of Achievement Scores

	Q1	Q2	Q3	Q4
Micro	.84	.84	.80	.68
Macro	.90	.95	.62	.71

A fifty-question multiple-choice test was used to assess achievement at the conclusion of the first quarter (Q1), second quarter (Q2), third quarter (Q3), and fourth quarter (Q4). Each question contained four alternatives. The concepts taught in both courses used in this study were similar in complexity and content. Three professors of economics reviewed the instruments and compared the items to the objectives to confirm the validity of the instrument. They agreed that the items on the tests did assess the achievement of the objectives that were detailed in the study guide and on the content page.

Given that these assessments involved two separate courses, reliabilities of these two achievement tests at the various points during the semester are reported. Due to complexities involved in extracting the required information for this analysis, the spring 2002 semester was used to derive the reliability measure for the achievement scores. The split-half reliability coefficients are shown in Table 2.

As indicated by these measures, the vast majority of the reliability coefficients for each achievement assessment are within acceptable parameters. As can be seen in Q3, the macroeconomics achievement measure is not within the .70 desired range. However, since the overall achievement is a combination of the micro- and

macroeconomics scores the coefficient becomes more acceptable. While the overall Q3 reliability measure is not a simple arithmetic average of the two, it does provide some rationale for maintaining the assessment score as a measure of achievement. The split-half reliability coefficients for the Q4 assessments are both reasonably close to the desired level. For these reasons, it is further asserted that the eight separate assessments are each reliable measures and should be included in the analysis to determine the impact the treatments had on learner achievement.

Treatments

The first treatment (grouping condition) consisted of a collaborative learning and an individual learning condition. The second treatment (media condition) consisted of an audio/video support and a no audio/video support condition. In order to help control for a potential "instructor effect," the same instructor was used for all of the classes that were included in this study.

The resulting four treatment groups consisted of (a) collaborative learning and audio/video support (G1), (b) collaborative learning and no audio/video support (G2), (c) individual learning and audio/video support (G3), and (d) individual learning and no audio/video support (G4). Students within each treatment group were assigned to their group prior to the beginning of the semester. Those within each group had access to a unique online section that contained those resources unique to that group. Within each online learning section, students were only able to communicate with others assigned to the same group.

Prior to the on-campus orientation, the subjects were randomly assigned to one of these four treatment groups. It was originally intended that those assigned to the collaborative learning condition would be placed in collaborative learning group containing between four and seven students. At no point during the study did the collaborative treatment groups exceed seven students. Resultantly, this within treatment group assignment was unnecessary. All collaborative groups consisted of 5-7 students.

The students enrolled in both micro- and macroeconomics offered during the same semester were assigned to the same treatment group in both classes. This helped ensure that students did not begin to question the differences in the treatments used in the two classes. The data gathered from these students was counted only in one course. This assignment was done by attempting to equate the number of students enrolled in both courses. Students enrolling in a course in a following semester were randomly assigned to one of the four treatment groups. These students' responses were not included in the analysis. However, they completed all instruments and measures administered during the semester. As recommended by Johnson and Johnson (1996), attention to gender heterogeneity was considered. Following the random assignment of students the ratio of men to women in the groups was compared. At no time was it deemed necessary to reassign subjects.

To reduce confounding, the orientation for the subjects assigned to each treatment group was held separately. As addressed by Slavin (1987) and Johnson and Johnson (1989), the group members assigned to the collaborative learning treatment received training in the dynamics of collaborative learning and its likely benefits. The members were strongly encouraged to develop a working relationship among

themselves and with the instructor. Learners received an explanation of the expectations of their group efforts.

As recommended by Slavin (1987) and Johnson and Johnson (1996), a group reward requiring individual accountability was utilized. In order to achieve this, students in the collaborative learning groups were awarded bonus points added to their examination scores if their group's average grade met or exceeded a minimum score. The score was based on the percentage of test questions answered correctly. If the group average score met or exceeded 70%, each group member received five (5) extra-credit points that were added to their individual grade. If the group average met or exceeded 75%, each group member received ten (10) extra-credit points. It was expected that this method would maximize individual accountability while not penalizing those who perform well due to low scores of others. Johnson and Johnson (1989) argue that all members of a collaborative learning group should receive the same score. However, it was felt that the addition of identical bonus points would add a sufficient group reward incentive and would instill ample individual accountability within the group's members. These bonus points were not included in the analysis of achievement.

Students in the audio/video treatment had access to approximately six audio recordings per chapter consisting of the instructor elaborating on concepts that were particularly challenging. These files were one to four minutes in length and contained information printed in the "instructor's notes" to which students had access. These audio files were accessible from the contents page located within the WebCT course homepage. The information contained within the audios was detailed in the "instructor

notes." This was done to help ensure that all students had equal access to identical information.

The "instructor notes" were a typewritten explanation of the complex concepts and relationships presented in each chapter. Some included examples and detailed problems that expounded upon information presented elsewhere. The "instructor notes" could be accessed from the "Course Content Page" via WebCT.

During the first two semesters of this investigation, students were required to download the file from the website or play it without saving the file. The students were required to have the RealPlayer plug-in installed on their computers. They received instruction during the orientation on how to access the downloadable file and how to install and use the program. It was anticipated that students would be able to access these files any time and could listen to them repeatedly. Due to some technological problems faced by students and the reluctance of some to take the time to download the files, the procedure was changed prior to the last semester of the study. Students enrolled in the courses during the spring semester (final semester of study) were given a CD containing the audio/video files. This CD was professional in appearance and was placed in a plastic case. It was hoped that students would be more likely to access and utilize the resource if the time and degree of technological expertise required to access the information was reduced. Again, students were provided with a link on the "Contents Page" that launched RealPlayer and played the appropriate file. Students were given instruction on how to use the CD during the orientation.

The audio/video treatment group had access to a video file that contained the instructor's presentation of an economic model. There was no more than one video per

chapter. This video presentation was a simple recording of the instructor's step-by-step explanation of the concepts relevant to the development of the model and how the interrelationships between the concepts could be interpreted graphically. The presentation contained some lighthearted statements and gestures. As recommended by Hiltz (1995), creating a less structured video presentation in a virtual classroom can help enliven and improve student attitudes and impressions. The information contained within the videos was redundant; all information was alternatively provided in the textbook, study guide, website, and/or the publisher supplied CD. Therefore, this information was not duplicated in the "instructor notes." This file was accessible (either as a downloadable file or a link to a file on the CD) from the "Chapter Content" page in WebCT. Like the audio files, students had twenty-four hour access to these files and could listen to them repetitively.

Design

To evaluate differences in achievement, goal orientation, self-efficacy, and sense of learning community a 2 (media condition) x 2 (grouping condition) between-subjects factorial ANOVA was calculated comparing the exam scores and responses to the survey instrument for subjects who were given access to the audios/videos or not and who were exposed to collaborative learning strategies or not. One factor consisted of the grouping treatment with collaborative learning and individual learning serving as the two treatment groups. The other factor was media treatment with audio/video support and no audio/video support serving as the two treatment groups. The resulting four treatment groups consisted of: Group 1 (G1) – A/V support with collaborative

learning; Group 2 (G2) – A/V support with individual learning; Group 3 (G3) – no A/V support with collaborative learning; and Group 4 (G4) – no A/V support with individual learning.

Three-way 2 (between-subjects) x 2 (between-subjects) x 4 (within-subjects) repeated measures ANOVAs were calculated to examine the effects of the media condition (with and without audio/video support), grouping condition (with and without collaborative learning), and time (entry, Q1, Q2, Q4). This was utilized to evaluate the main effects and interactions the treatments and time had on individual participant's goal orientation, self-efficacy, and sense of learning community.

ANOVA was selected as the primary analysis tool due to the limitations MANOVA placed upon the analysis. Given the reduction in sample sizes resulting from the listwise deletion, the MANOVA reduced the sample sizes for the first three exams to include only those students taking the last assessment test. This greatly reduced the power of the analysis. Further, following each exam it would be expected that those students doing poorly would likely become reluctant to take later exams, making the results of those exams more similar. For these reasons it was felt the gain in power of the analysis outweighed the impact the multiple tests had upon alpha error.

To assess differences in attrition rates, a χ^2 test for differences in proportions was used to determine whether the learners' exposure to media and collaborative learning strategies resulted in a different proportion of students completing the course. The percentage of students that enrolled, came to the on-campus orientation, and remained enrolled following the first week was compared to the percentage of students that took the final exam.

Procedure

During the orientation, the students were informed that they were taking part in a study and were asked to complete and sign the required permission forms. All students enrolled in the courses were willing participants and signed an informed consent form. The entry assessment was completed by all students using the instrument used to measure goal orientation, self-efficacy, and sense of community. Other questions on the instrument were included to provide background and demographic information.

Learners in the four experimental groups were expected to attend an on-campus personal orientation where they received additional course information. To avoid possible confounding, the groups' orientations were held at different times. During this orientation the students received information on how to access the course information on the Internet. The online information was hosted on the school's network server and utilized WebCT as the instructional interface. Prior to beginning their online course studies, the students also were required to complete an online course orientation that was developed by the school's instructional technology center.

Upon enrollment in the course the subjects were given the Web address of the website containing the link to the online orientation and how to access the course information. Login and password information was presented during this online orientation.

Further assistance in logging on and accessing the online course information was provided during the campus orientation. Students who had difficulty accessing the information were encouraged to seek assistance immediately. The students were shown

how to login and were shown the online course interface. Each of the tools that were used in the course to disperse information and communicate was demonstrated. These included email, bulletin board, chat room, whiteboard, and course calendar utilities. Students were shown how to use each function and informed of the benefits of using each. Particular attention was paid to the utilization of email and the bulletin board to send and/or post questions that students had regarding course content, expectations, or other relevant issues. The importance of using this mode of communication to solve problems was emphasized. A parallel between asking questions in class and posting questions was developed.

Students were shown the content pages and course syllabus information accessible from the homepage. The use of information that could be garnered from each chapter's content page was detailed. Students were advised to refer to each chapter's content page prior to beginning that chapter's review. Content pages contained information on study sequence suggestions, a listing of important concepts to consider, and audio/video links (for the audio/video treatment groups).

During this orientation, all groups were presented with information regarding the utilization of the course instructional materials. All groups had access to an economics textbook and study guide sold in the school bookstore. The instructor provided guidance regarding how to move through the various sections of the text and how to best utilize the study guide to enhance learning. Effective learning strategies applicable to individual and collaborative online learning were presented. Furthermore, learners were coached on how much time they should dedicate to the study of each chapter. The instructor demonstrated the use of the publisher-developed Website that

contained additional instructional materials and practice quizzes (with feedback) that could be used to assess learning. Additionally, the students were shown how to use the publisher-supplied instructional CD. This CD contained additional information, assessment quizzes, and animated models that could be used to demonstrate and aid in the understanding of numerous concepts taught in the class.

A review of the course syllabus addressed homework, testing, and grade determination. Each experimental group member was expected to take the three unit examinations (100 points per exam) covering four chapters each and was expected to take a comprehensive final examination (150 points). The score on the final exam could be used to take the place of one exam grade if the student did better on the final than his/her lowest exam grade. All unit exams were administered online and contained identical items that were randomly ordered. These tests were administered during a sixty-minute timeframe beginning at 6:00 p.m. on a Friday and ending at noon Saturday. Students were allowed to begin the exam any time during this eighteen-hour window. However, once they began, they were allowed sixty minutes to complete the test. It was emphasized that the test was intended to be a closed book and closed note exam and any attempt to use these resources would likely cause the student to run out of time long before completing the fifty questions. Questions appeared one at a time, and once the question was answered they were not allowed to go back and make changes. This was designed to help ensure that students who had time remaining in the testing hour did not go back to the questions on the test and look up answers. An online sample test was made available to the learners prior to each assessment. The sample test allowed the students to preview the testing interface and procedure, and assess their

knowledge using questions similar in complexity and content to those questions that appeared on the unit examination.

Students were required to take the final on campus in the campus testing center and were given the choice of one of two days in which to complete the exam. They were allotted 110 minutes to complete the final exam. This on-campus final exam served two purposes. First, this approach helped ensure test security on the comprehensive final and provided greater validity to the scores. Secondly, given students were allowed to take the earlier exams unproctered, the on-campus cumulative final dissuaded students from cheating and/or allowing someone else to take the earlier exams for them.

Online participation and communication of students were evaluated to determine part of the student's course grade. Students assigned to the individual treatment group could receive up to 25 points dependent upon the quantity and quality of their responses to bulletin board postings by other students, their participation in online chats, and response to email inquiries by the instructor. The chats used as part of the evaluation were held at various times during the semester and reviewed the concepts presented in specific chapters. This was designed to resemble a classroom lecture.

Students assigned to the collaborative treatment groups were given the same opportunity to earn 25 participation points. However, the instructor assigned ten of these points based on similar criteria used for the individual treatment groups. Students could earn up to fifteen points based upon a participation evaluation completed by the other members of the group. At midterm and the conclusion of the semester the group members were asked to assess the assistance and participation of the other group

members. These evaluations were used to assign up to 15 points to the group members. Students were informed of the pending evaluations during the on-campus orientation.

During the semester, students were expected to complete seven chapter assignments that were turned in via email, fax, or physical mail to the instructor. These assignments were worth a possible 65 points. Students were given a written copy of these problems and were notified electronically via email and a calendar posting of each assignment. All students were expected to complete the assignments individually. However, learners in all treatment groups were encouraged to interact with one another using the electronic messaging tools to seek assistance and solutions to problems they faced. Students in the collaborative learning treatment were required to produce a group response to three of the seven assignments. This required collaboration was designed to encourage communication (especially during the initial stages of the semester). It was hoped that the collaboration on these assignments would encourage future interactions and communication among students. Members of the group who assisted in the completion of the assignment received identical grades. Other members received no credit for these collaborative assignments. Students were expected to meet specific deadlines pertaining to assignments. Late homework was penalized.

Students were informed that they were going to be asked to complete three surveys during the semester. Upon completion of each of these instruments they received five points that were included in their assignment/survey grade. This included five points of extra credit if all surveys were completed (65 homework points + 15 survey points).

The 550 total points possible for the semester included:

Three unit exams:	300 points
Final examination	150
Assignments/surveys	75
Online Participation	25

Following the completion of one-quarter (Q1) of the semester (one week for summer sections and four weeks for fall and spring sections) and immediately prior to taking the first assessment examination, all learners were given online access to the instrument to measure goal orientation, self-efficacy, and sense of learning community. This instrument was administered, completed, and stored using the online course management software (WebCT). All learners were then given a 50-item multiple-choice teacher-made examination derived from the objectives listed in the textbook, study guide, and online chapter content pages. Since the first two introductory chapters were the same in both micro- and macroeconomics, questions on the assessment instrument relevant to the first two chapters were similar, but not identical. All other chapter questions were unrelated. At the conclusion of the second quarter of the semester (Q2) students were again given online access to the instrument used to measure the dependent variables. After completing this instrument, students were granted access to the examination. This was two weeks into the four-week summer semester, and eight weeks into the sixteen-week fall and spring semesters. This was repeated prior to the administration of the final exam (Q4).

Attention now will turn to a description of the research questions and the method utilized to analyze the data. The questions and statistical analysis utilized to evaluate the research questions are detailed in the following paragraphs.

Data Analysis

Primary

The research questions and method used to answer each question are as follows:

1. Was there a statistically significant difference between grouping conditions (cooperative versus individual) on the following variables?
    a. course achievement
    b. students' achievement goals (learning and performance)
    c. students' self-efficacy
    d. students' sense of learning community

2. Was there a statistically significant difference between media conditions (audio/video versus none) on the following variables?
    a. course achievement
    b. students' achievement goals (learning and performance)
    c. students' self-efficacy
    d. students' sense of learning community

3. Was there a statistically significant interaction between grouping and media conditions (grouping x media) on the following variables?
    a. course achievement
    b. students' achievement goals (learning and performance)
    c. students' self-efficacy
    d. students' sense of learning community

4. Was there a statistically significant main effect for time on the following variables?
    a. students' achievement goals (learning and performance)
    b. students' self-efficacy
    c. students' sense of learning community

5. Was there a statistically significant time by group interaction (time x group) on the following variables?
    a. students' achievement goals (learning and performance)
    b. students' self-efficacy
    c. students' sense of learning community

6. Was there a statistically significant time by media interaction (time x media) on the following variables?
    a. students' achievement goals (learning and performance)
    b. students' self-efficacy
    c. students' sense of learning community

7. Was there a statistically significant time by group by media interaction (time x group x media) on the following variables?
    a. students' achievement goals (learning and performance)
    b. students' self-efficacy
    c. students' sense of learning community

8. Was there a statistically significant difference in the attrition rates among those students assigned to the collaborative learning-A/V, individual learning-A/V, collaborative learning-no A/V, and individual learning-no A/V treatment groups?

Research questions 1 – 3 were analyzed using a 2 x 2 between-subjects factorial ANOVA. Learner achievement was measured from the students' scores from the four assessment exams given at the conclusion of each quarter of the semester. The analysis of learner achievement goals, self-efficacy, and sense of community were derived from the entry, Q1 (pre-test 1), Q2 (pre-test 2) and Q4 (pre-final exam) assessments.

Research questions 4 – 7 were analyzed using a 2 (between subjects) x 2 (between subjects) x 4 (within subjects) repeated measures ANOVA. The analysis consisted of the scores derived from the entry, Q1 (pre-test 1), Q2 (pre-test 2) and Q4 (pre-final exam) assessments.

Research question 8 was analyzed using a χ^2 proportions test (test for independence). Analysis of the differences in the proportion of students who completed the class was conducted.

Exploratory

Following the analysis of the data intended to answer the primary research questions, an exploratory data analysis process was undertaken. During this phase of the analysis, relationships among the dependent variables and specific demographic and

subject characteristics were investigated. The effects of pace of instruction (4 weeks vs. 16 weeks), gender, age, prior online course experience, and prior economics exposure on the dependent variables were evaluated. Additionally, the impact that the CD-supplied A/V files versus the downloadable versions had on the various dependent variables was evaluated. Additional noteworthy relationships were analyzed and reported.

The theoretical relationships purported to exist were analyzed to provide support for the validity of the measures and treatments. Among these:

1. Was achievement positively correlated with the following variables: sense of learning community, learning goal orientation, and self-efficacy?
2. Was there a positive correlation among sense of learning community, learning goal orientation, and self-efficacy?

The focus of this paper now will turn to the presentation of the data gathered during the course of the study. Figures and tables, along with relevant statistics, will be presented for those comparisons that resulted in noteworthy and/or significant differences.

CHAPTER IV

Results

Introduction

The sequencing of the findings is grouped by the dependent variable under investigation. Initially, analyses were conducted to evaluate the separate achievement scores in each course to ensure their similarity. This will be followed by a presentation of the analyses of the between-subjects and interaction effects of the treatments as they related to achievement, goal orientation, self-efficacy, and sense of learning community. Next, the within-subjects and interaction effects of the treatments as they related to goal orientation, self-efficacy, and sense of learning community over time will be presented. An exploratory analysis section will follow the separate analyses at the conclusion of the chapter.

Differences In Courses

Prior to completing the data analysis to answer the various research questions, comparisons were made to determine whether there were significant differences in the grades of students enrolled in the two different courses included in the study. This was done to ensure that the achievement scores of the students enrolled in micro- and macroeconomics were similar on each exam. This helped assure one course did not disproportionately impact the achievement scores for the different groups if there was a difference in the proportion of micro- and macroeconomics students. The potential

impact was minimized by the equality of assignment of students from the courses. The scores on exam one were comprised of 53 micro- and 55 macroeconomics students; exam two scores consisted of 49 micro- and 49 macroeconomics students; exam three scores consisted of 45 micro- and 46 macroeconomics students; and the final exam scores consisted of 45 micro- and 47 macroeconomics students.

An independent-samples *t* test was calculated comparing the mean scores on each exam for the two courses. No significant difference was found for exam one ($t(106) = .439, p > .05$). The mean of the microeconomic students ($m = 76.68$, sd = 13.82) was not significantly different from the mean of the macroeconomics students ($m = 75.56, sd = 12.57$).

A significant difference was found for exam two ($t(96) = 4.050, p < .01$). The mean exam score of the microeconomic students ($m = 74.18, sd = 13.42$) was significantly higher than the mean exam score of the macroeconomics students ($m = 63.55, sd = 12.56$). The significant difference between the two course's assessment scores required special attention be paid to how the analysis was conducted for those research questions comparing achievement differences. In most cases, a separate analysis was completed for the microeconomics and macroeconomics students.

No significant difference was found for exam three ($t(89) = -.038, p > .05$). The mean exam score of the microeconomic students ($m = 69.80, sd = 15.03$) was not significantly different from the mean exam score of the macroeconomics students ($m = 69.91, sd = 13.70$).

Lastly, no significant difference was found for exam four ($t(90) = .277, p > .05$). The mean exam score of the microeconomic students ($m = 60.24, sd = 11.91$) was not

significantly different from the mean exam score of the macroeconomics students (m = 59.55, sd = 12.05).

Achievement

A 2 x 2 between-subjects factorial ANOVA was utilized to evaluate the effects the treatments had on student learning. These analyses provided an insight into the impact the media and the grouping treatment had on learner achievement. Additionally, it evaluated any interaction effects that may have existed.

The differences in achievement were evaluated at four points during the semester. Given the differences in the complexity of the subject matter covered on each examination, comparisons were made using the four quarterly exams given during the semester (Q1, Q2, Q3, Q4). Historically, the concepts and models detailed in each section get progressively more complex. The first test covered mainly verbal information, while the second and third exams begin to develop multiple conceptual relationships. The models developed included more variables as the courses progressed. Additional comparisons were made using the students' total test points, homework points, and total course points as dependent variables.

A 2 (media condition) x 2 (grouping condition) between-subjects factorial ANOVA was calculated comparing the exam scores for subjects who were given access to the audios/videos and those who were not and who were exposed to collaborative learning strategies and those who were not. Table 3 summarizes the results from an analysis of exam one scores.

Table 3

Analysis of Variance for Exam 1 Achievement

Source	*df*	*F*	*p*
	Between Subjects		
Media (M)	1	0.782	.19
Grouping (G)	1	3.579*	.031
M x G	1	3.973*	.025
Error	104	(164.822)	

Note. Value enclosed in parentheses represent mean square error.

*$p < .05$, one-tailed.

The main effect for the grouping condition was significant. Students who were exposed to the collaborative learning treatment had higher exam scores ($m = 78.507$, $sd = 9.721$) than those who were not exposed to such strategies ($m = 73.822$, $sd = 15.698$). As indicated by the significant Media x Grouping interaction, the effect of the collaborative learning treatment was reduced for those students not exposed to the audio/video treatment (see Table 4).

A follow-up Tukey's LSD test indicated that the group not receiving either treatment scored significantly lower than each of the three other treatment groups. ($p < .05$) The exposure to collaborative learning strategies resulted in gains in student learning when compared to those students who had neither audio/videos nor utilized collaborative learning strategies. Utilizing either audios/videos and/or collaboration

Table 4

Exam 1 Descriptive Measures for Media and Grouping Treatments

Group	Mean Test Score	Standard Deviation
Media & Grouping (G1)	77.133	9.933
Media (G2)	77.385	13.252
Grouping (G3)	79.880	9.440
Neither (G4)	70.259	17.266

resulted in comparable scores. Those students who had neither audios/videos nor collaboration did worse than the students exposed to one or both of the treatments. When comparing across all semesters, the utilization of audios/video did not have a significant impact on student learning.

A similar analysis was completed on the second examination (Q2). Due to the differences in course averages, a separate analysis was completed for each course. No main effects or interactions were indicated in either course. In the microeconomics course, the main effect for the media condition was not significant ($F(1,45) = 0.292$, $p > .05$). The main effect for the grouping condition was not significant ($F(1,45) = 0.900, p > .05$). The interaction was not significant ($F(1,45) = 2.081, p > .05$). In macroeconomics, the main effect for the media condition was not significant ($F(1,45) = 1.206, p > .05$). The main effect for the grouping condition was not significant ($F(1,45) = 1.429, p > .05$). The interaction was not significant ($F(1,45) = 0.785, p > .05$).

Next, the scores from the third examination (Q3) were analyzed. The results can be seen in Table 5.

Table 5

Analysis of Variance for Exam 3 Achievement

Source	*df*	*F*	*p*
	Between Subjects		
Media (M)	1	6.058*	.008
Grouping (G)	1	1.413	.119
M x G	1	1.564	.107
Error	87	(191.830)	

Note. Value enclosed in parentheses represent mean square error.

*$p < .05$, one-tailed.

Students exposed to the audio/video files did significantly better ($m = 73.400$, $sd = 11.026$) than those who did not have the use of the audio/videos ($m = 66.391$, $sd = 16.276$). Given the complexity of the information contained within this unit, it is not surprising that the exposure to audio/videos resulted in significant gains in the learning of the students. However, the gains seen on the first exam from the utilization of collaborative learning strategies were not realized on this assessment exam.

The final analysis was completed on exam four (Q4). This exam was a comprehensive final that included questions over the previous three units and a section on a new unit. The results from the analysis can be seen in Table 6. When comparing across all semesters, it is apparent that the complexity and amount of information included on the final exam may have contributed to the decrease in the impact of the

Table 6

Analysis of Variance for Exam 4 Achievement

Source	*df*	*F*	*p*
	Between Subjects		
Media (M)	1	.212	.324
Grouping (G)	1	.112	.369
M x G	1	.164	.343
Error	88	(146.156)	

Note. Value enclosed in parentheses represent mean square error.

treatments on student achievement. Further, analysis of the differences in the achievement scores on the new material presented for the final exam provided no additional insights.

The evidence appears to partially support the hypothesized relationships. The achievement scores for the grouping treatment were significantly higher on the first exam. Additionally, an interaction effect was found to exist on exam one. Furthermore, on the third of the four exams, the utilization of audios/videos did significantly raise student achievement scores over those that had no access to the audios/videos. While these results do not provide full support for the hypothesized effects, further analysis may partly explain these results.

Exploratory Analysis - Achievement

Exploratory analysis of the achievement scores provided strong evidence that the treatments did have a positive impact on achievement. This support is derived from several different analyses.

First, students' exposure to the audio/video treatment resulted in higher test scores on each of the assessment exams. While only the differences on the third examination were statistically significant, this additional information provides evidence of the effectiveness of the audio/videos in aiding student learning. This can be seen in the Table 7. The data for exam two is a combination of both courses since the number of subjects taking the exam from each class was approximately equal (25 micro- and 24 macro- for the A/V group and 24 micro- and 25 macro- for the No A/V group).

The data show that on each exam, student achievement was higher for those students exposed to the audio/video treatment. Furthermore, the standard deviation for each exam was smaller for the learners exposed to the treatment. This indicates the scores are more homogenous, as well as higher.

Identical results were found for the grouping treatment. As seen in Table 8, students exposed to the grouping treatment performed better on every achievement test than those not exposed to the grouping treatment. Different results were shown for micro- and macro due to the unequal number of scores reported for micro- and macroeconomics (31 micro- and 21 macro-)

The results indicate that the students exposed to the collaborative learning treatment scored higher than those not exposed to the treatment. The data provides some compelling evidence that the grouping treatment did provide some achievement

Table 7

Exam Means and Standard Deviations for Media Treatment

	A/V		No A/V	
	M	*SD*	*M*	*SD*
Exam 1	77.26	11.48	75.07	14.75
Exam 2	70.76	12.93	67.19	14.99
Exam 3	73.41	11.03	66.39	16.28
Exam 4	60.43	10.78	59.33	13.10

Table 8

Exam Means and Standard Deviations for Grouping Treatment

	Grouping		No Grouping	
	M	*SD*	*M*	*SD*
Exam 1	78.51	9.72	73.82	15.70
Exam 2 (mic)	75.55	13.37	71.83	13.56
Exam 2 (mac)	66.00	9.47	61.71	14.35
Exam 3	71.56	12.22	68.09	16.30
Exam 4	60.28	11.64	59.43	12.37

benefit. As with the media treatment, the standard deviations on each exam for the treatment group is lower than that of the students not receiving the treatment. Again, this provides an indication that the scores are more homogenous and higher for the

students exposed to the collaborative learning treatment than those not exposed to such instructional strategies.

The lack of significant findings in all cases can be explained by the unexpectedly large standard deviations. Raising the power of the test by increasing the sample size could result in a greater number of significant differences.

Additional evidence of the impact of the treatment on student achievement can be seen when comparing the four treatment groups. Table 9 details the achievement scores for the different treatment groups.

These data further indicate that the treatments did positively impact student learning. When comparing the four groups using a one-way ANOVA, the group receiving neither treatment scored significantly lower than at least one of the other treatment groups on the first and third examinations. Table 10 summarizes these

Table 9

Exam Means and Standard Deviations for Each Treatment Group

	Treatment Group							
	G1		G2		G3		G4	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Exam 1	77.13	9.93	70.96	13.25	79.88	9.44	70.26	17.27
Exam 2-mic	73.81	13.07	75.78	13.98	77.40	13.89	67.89	12.65
Exam 2-mac	66.40	6.65	65.29	13.94	65.64	11.79	58.14	14.35
Exam 3	73.32	9.49	73.50	12.95	69.79	14.53	62.68	17.58
Exam 4	60.35	11.05	60.52	10.71	60.21	12.49	58.33	14.02

Table 10

Analysis of Variance for Differences in Exam Scores for Four Treatment Groups

Source	*df*	*MSE*	*F*	*p*
		Exam 1		
Between Groups	3	451.074	2.737*	.024
Within Groups	104	164.822		
		Exam 2-mic		
Between Groups	3	178.955	0.994	.202
Within Groups	45	180.100		
		Exam 2-mac		
Between Groups	3	193.535	1.246	.152
Within Groups	45	155.323		
		Exam 3		
Between Groups	3	565.991	2.950*	.019
Within Groups	87	191.830		
		Exam 4		
Between Groups	3	22.388	0.153	.464
Within Groups	88	146.156		

*$p < .05$, one-tailed.

findings. While exposure to both treatments did not necessarily result in the highest achievement scores, lack of either treatment resulted in the lowest exam scores of the four groups on each of the four tests.

The similarity in the final exam scores can be attributed to two factors. Given the amount of information students were required to know for the comprehensive final exam, a floor effect may have occurred. Student grades became more similar because the test was equally challenging for the majority of students. Further, those students who had performed better on earlier exams had less need to perform exceptionally well on the final. They had "made their grade."

Additional exploratory analysis done on achievement scores compared the test averages, points from homework, and total points for the four groups. Student achievement could be viewed as a compilation of all exam scores and/or scores on homework. Only students who took all four exams were included in the analysis. Homework scores could be interpreted as a measure of effort, since some students failed to even attempt some of the assignments. Course total achievement is a combination of the two scores.

A 2 (media condition) x 2 (grouping condition) between-subjects factorial ANOVA was calculated comparing the exam averages for subjects who were given access to the audios/videos or not and who were exposed to collaborative learning strategies or not. Table 11 summarizes these findings.

As seen in Table 11, when comparing across all examinations, the grouping treatment resulted in significantly higher achievement scores. Students exposed to the collaborative learning treatment had a significantly higher exam average ($m = 72.0667$, $sd = 8.588$) than those not utilizing collaborative learning ($m = 68.154$, $sd = 11.902$). Being part of a collaborative learning group positively impacted students' test average while exposure to various media did not.

Table 11

Analysis of Variance for Achievement Exam Averages

Source	*df*	*F*	*p*
	Between Subjects		
Media (M)	1	1.257	.133
Grouping (G)	1	3.209*	.039
M x G	1	2.078	.153
Error	80	(103.802)	

Note. Value enclosed in parentheses represent mean square error.

*$p < .05$, one-tailed.

Similar analysis was done for the total homework points earned by students. Sixty-five points were possible on homework. Table 12 summarizes the analysis completed measuring differences in homework points.

Again, it can be seen that the grouping treatment resulted in significant gains in the students' homework score. Students exposed to the collaborative learning treatment had significantly higher scores on homework ($m = 39.635$, $sd = 18.318$) than those not utilizing collaborative learning ($m = 32.590$, $sd = 20.955$).

No significant differences were found when comparing the total points of the students. Total points were calculated only for those students who took all four exams and consisted of a combination of exam and homework scores. The main effect for the

Table 12

Analysis of Variance for Homework Points

Source	*df*	*F*	*p*
	Between Subjects		
Media (M)	1	.068	.398
Grouping (G)	1	3.861*	.026
M x G	1	.164	.225
Error	88	(146.156)	

Note. Value enclosed in parentheses represent mean square error.

*$p < .05$, one-tailed.

media treatment was not significant ($F(1,80) = 1.142, p > .05$). The main effect for the grouping treatment was not significant ($F(1,80) = 2.295, p > .05$). Finally, the interaction was not significant ($F(1,80) = 2.151, p > .05$). Of those students who took all four exams, the treatments had no impact on their total points scored.

Exploratory Analysis – CD Effect

Additional analysis on student learning was conducted on the students enrolled in the spring semester alone. These students were able to access the audios/videos from a CD instead of downloading them from the course WebCT homepage. As detailed previously, it became apparent that students were not utilizing the audios/videos to the desired extent because of the difficulties they faced in doing so. The method of

accessing the files was revised to reduce the complexity and time required to utilize the resource. It was felt that this would increase the students' use of the audios/videos and result in greater differences in student achievement. Exploratory analysis confirmed this assertion.

Four independent-samples *t* tests were calculated comparing the mean scores on each of the exams for those students exposed to the audio/video treatment utilizing the CD and those not exposed to the treatment. Based on the original hypothesis, one-tailed tests were utilized to evaluate the differences. The reason for utilizing this statistic was to maintain the number of subjects. Analysis using MANOVA with SPSS utilizes listwise deletion causing the power of the analysis to decline as the number of subjects decrease. While a MANOVA produced very similar results, the findings differed on the final exam.

As a result of the inequality of variances, the *p* values for the first three exams are reported assuming unequal variances. On exam one, a significant difference was found between the means of the two groups ($t(17.779) = 2.160, p < .05$) with the mean of the experimental group being significantly higher ($m = 78.609$, $sd = 8.789$) than the group not receiving the treatment ($m = 67.067$, $sd = 19.444$).

Separate analysis was not done for the micro- and macroeconomics courses for students utilizing the CD due to the equality of scores. The average grades for the micro- course ($m = 67.53$, $sd = 9.57$) was not significantly different ($t(31) = 0.731$, $p > .05$) from the grades for the macro- course ($m = 64.33$, $sd = 14.51$). Those students exposed to the media treatment via the CD ($m = 69.362$, $sd = 8.295$) scored

significantly higher ($t(18.606) = 2.008, p < .05$) than those students that had no access to the media ($m = 60.571$, $sd = 15.306$).

Exam three's experimental group again scored significantly higher ($t(15.563) = 2.739, p < .05$) with the mean of the students exposed to the audios/videos ($m = 73.765$, $sd = 8.899$) being significantly higher than those not exposed to the files ($m = 57.308$, $sd = 20.217$).

Lastly, the final exam produced comparable results ($t(26) = 1.778, p < .05$) with the treatment group's scores ($m = 62.882$, $sd = 7.865$) being significantly higher than the group not receiving the treatment ($m = 55.455$, $sd = 14.285$). This provides compelling evidence that the use of the audios/videos do provide gains in student learning when the files are more easily accessible.

A 2 (media condition) x 2 (grouping condition) between-subjects factorial ANOVA was calculated comparing the exam averages for subjects who were given access to the audios/videos and those who were not and who were exposed to collaborative learning strategies or and those who were not (see Table 13). Only those students enrolled in the spring semester who took all four exams were included.

Students exposed to the media treatment had a significantly higher exam average ($m = 72.097$, $sd = 4.966$) than those not utilizing the audios/videos ($m = 62.896$, $sd = 14.382$). When students utilized a CD to access the audios/videos, the media treatment resulted in a higher exam average. The collaborative learning treatment did not result in significant exam average differences. This provides additional evidence that creating a format that is easy for students to use can enhance the impact of various media and increase student learning.

Table 13

Analysis of Variance for Test Averages for Students Using the CD

Source	*df*	*F*	*p*
	Between Subjects		
Media (M)	1	4.567*	.022
Grouping (G)	1	.103	.351
M x G	1	.200	.330
Error	23	(104.109)	

Note. Value enclosed in parentheses represent mean square error.

*$p < .05$, one-tailed.

Analysis of the homework points for those students enrolled in the spring resulted in a non-significant main effect for the media treatment ($F(1,37) = 1.907$, $p > .05$). The main effect for the grouping treatment was not significant ($F(1,37) = 0.011, p > .05$). Finally, the interaction was not significant ($F(1, 37) = 1.322, p > .05$). The homework points of the students enrolled during the spring semester utilizing the CD were not significantly impacted by either of the treatments.

Lastly, differences in the number of the total points (515 possible) earned by students enrolled in the spring semester were measured. Only students enrolled in the spring semester who took all four exams were included (see Table 14)

Table 14

Analysis of Variance for Total Points for Students Using the CD

Source	*df*	*F*	*p*
	Between Subjects		
Media (M)	1	6.246*	.010
Grouping (G)	1	.240	.315
M x G	1	.083	.388
Error	23	(2100.344)	

Note. Value enclosed in parentheses represent mean square error.

*$p < .05$, one-tailed.

Students exposed to the media treatment earned significantly more points ($m = 340.627$, $sd = 22.715$) than those not utilizing the audios/videos ($m = 292.292$, $sd = 64.414$). Utilizing audios/videos on a CD resulted in students earning significantly more points in the course while the collaborative learning treatment did not. This would be expected since total points were a compilation of exam scores and homework scores.

A final comparison was made among the three levels of exposure to the audios/videos for all students. The averages for those students taking the four exams were compared for students using the Web, CD, or those who had no exposure. Summer and fall students utilized the Web to download the files, while the spring

Table 15

Exam Means and Standard Deviations for Three Levels of Exposure to Audios/Videos

	Treatment Group					
	Web		CD		Neither	
	M	*SD*	*M*	*SD*	*M*	*SD*
Exam 1	76.30	13.09	78.61	8.79	74.88	14.75
Exam 2	70.60	15.28	69.36	8.29	67.51	14.99
Exam 3	73.18	12.29	73.76	8.90	66.39	16.28
Exam 4	59.03	12.03	62.88	7.87	59.33	13.49

semester students had access to the audios/videos via the CD. No significant differences were found for exam one ($F(2,105) = .640, p > .05$), exam two ($F(2,95) = .484, p > .05$, exam three ($F(2,88) = 2.857, p > .05$) and exam four ($F(2,89) = .657, p > .05$). As seen in Table 15, students utilizing the CD maintained the highest average on three of the four examinations, while the groups receiving no audios/videos scored the lowest on three of the four exams. The group receiving no audios/videos had the highest standard deviation on three of the four exams, while the group accessing the audios/videos via the CD had the lowest standard deviation on all four examinations.

Learning Goals

The impact the treatments had upon learner goal orientation was evaluated using a 2 (media condition) x 2 (grouping condition) between-subjects factorial

ANOVA. This analysis was completed first to evaluate the resulting differences in the students' learning goal orientation. Second, the impact the treatments had upon the students' performance goal orientation was compared.

Goal orientation was measured at four points during the semester. Prior to the course beginning (entry), following the completion of the first quarter of the semester and immediately prior to the first exam (Q1), at the completion of the second quarter and prior to the second exam (Q2), and at the completion of the last quarter of the semester, and immediately prior to the final examination (Q4).

Prior to the class beginning there were no significant differences found among the group's learning goal orientation. The two levels of the media condition were not significantly different ($F(1,120) = 1.218, p > .05$). The two levels of the grouping condition were not significantly different ($F(1,120) = 2.562, p > .05$). At the beginning of the semester, the students in the four groups were similar in their degree of learning goal orientation.

Prior to exam one (Q1), the main effect for the media condition was not significant ($F(1,104) = 2.361, p > .05$). The main effect for the grouping condition was not significant ($F(1,104) = 2.792, p > .05$). Finally, the interaction was not significant ($F(1,104) = 0.281, p > .05$). When comparing across all semesters, neither the collaborative learning nor the audio/video treatment resulted in significant differences in the student's learning goal orientation.

Similar results were found for Q2. The main effect for the media condition was not significant ($F(1,97) = 0.068, p > .05$). The main effect for the grouping condition

was not significant ($F(1,97) = 1.931, p > .05$). Finally, the interaction was not significant ($F(1,97) = 1.484, p > .05$).

These results were duplicated on the final measure (Q4). The main effect for the media condition was not significant ($F(1,87) = 0.671, p > .05$). The main effect for the grouping condition was not significant ($F(1,87) = 1.954, p > .05$). Lastly, the interaction was not significant ($F(1,87) = 0.162, p > .05$). The treatments had no impact on student learning goal orientation at any point during the semester.

Performance Goals

A 2 x 2 factorial ANOVA was calculated comparing learner performance goal orientation for students exposed to the two media conditions and the two grouping conditions. Prior to the class beginning there were no significant differences found among the group's performance goal orientation. Student performance goal orientation for the two levels of the media condition were not significantly different ($F(1,120) = 1.287, p > .05$). The two levels of the grouping condition were not significantly different ($F(1,120) = 0.491, p > .05$).

Prior to exam one (Q1), the main effect for the media condition was not significant ($F(1,104) = 0.169, p > .05$). The main effect for the grouping condition was not significant ($F(1,104) = 0.147, p > .05$). Finally, the interaction was not significant ($F(1,104) = 0.037, p > .05$). Learner performance goal orientation was not influenced by exposure to instructional audios/videos or collaborative learning strategies.

Similar results were found for Q2. The main effect for the media condition was not significant ($F(1,97) = 1.812, p > .05$). The main effect for the grouping condition

was not significant ($F(1,97) = 0.012, p > .05$). Finally, the interaction was not significant ($F(1,97) = 0.500, p > .05$).

These results were duplicated on the final measure (Q4). The main effect for the media condition was not significant ($F(1,87) = 0.517, p > .05$). The main effect for the grouping condition was not significant ($F(1,87) = 0.816, p > .05$). The interaction was not significant ($F(1,87) = 0.652, p > .05$). As expected, neither exposure to the media treatment nor the grouping treatment resulted in significant differences in learner performance goal orientation.

Self-Efficacy

The impact the treatments had upon learner self-efficacy was evaluated using a 2 (media condition) x 2 (grouping condition) between-subjects factorial ANOVA. The initial analysis was used to determine whether differences existed prior to the class beginning.

Prior to the class beginning there were no significant differences found among the groups' self-efficacy. The two levels of the media condition were not significantly different ($F(1,120) = 0.904, p > .05$). The two levels of the grouping condition were not significantly different ($F(1,120) = 1.547, p > .05$).

Prior to exam one (Q1), the main effect for the media condition was not significant ($F(1,104) = 0.841, p > .05$). The main effect for the grouping condition was not significant ($F(1,104) = 1.570, p > .05$). Finally, the interaction was not significant ($F(1,104) = 1.098, p > .05$). When comparing across all semesters, learner self-efficacy

was not influenced by exposure to instructional audios/videos or collaborative learning strategies at the conclusion of the first quarter of the semester.

As seen in Table 16, slightly different results were found for Q2. The interaction effect was found to be significant. Further, as shown in Table 17, the groups receiving both treatments and neither treatment reported the lowest self-efficacy. Those groups receiving either treatment demonstrated higher self-efficacy. When adding the grouping treatment to those receiving neither treatment, self-efficacy increased. However, when combining the grouping treatment with the media treatment, self-efficacy was lower.

Table 16

Analysis of Variance for Pre-Test 2 (Q2) Self-Efficacy

Source	*df*	*F*	*p*
	Between Subjects		
Media (M)	1	0.021	.443
Grouping (G)	1	0.095	.379
M x G	1	3.914*	.026
Error	97	(0.551)	

Note. Value enclosed in parentheses represent mean square error.

*$p < .05$, one-tailed.

Table 17

Descriptive Self-Efficacy Measures for Media and Grouping Treatments Prior to Exam 2 (Q 2)

Group	Mean S/E Score	Standard Deviation
Media & Grouping (G1)	3.313	0.832
Media (G2)	3.652	0.715
Grouping (G3)	3.585	0.667
Neither (G4)	3.337	0.720

Results similar to those prior to the first test were reproduced on the final measure (Q4). The main effect for the media condition was not significant ($F(1,87) = 0.034, p > .05$). The main effect for the grouping condition was not significant ($F(1,87) = 0.380, p > .05$). The interaction was not significant ($F(1,87) = 1.657, p > .05$). The treatments had no impact on the self-efficacy when comparing across all semesters.

Exploratory Analysis – CD Effect

The impact the utilization of the CD had on the differences in the students' learning goal orientation, performance goal orientation, self-efficacy, and sense of community was analyzed using a 2 x 2 MANOVA. The significant findings are shown in Table 18.

At the conclusion of the first quarter of the semester, and prior to the first assessment exam, learner self-efficacy was significantly higher for those exposed to the CD supplied audios/videos ($m = 3.717, sd = .669$) than those who did not have access to

Table 18

2 x 2 MANOVA Evaluating the Impact of Treatments on Dependent Variables for Students Using the CD

Source	*DV*	*df*	*MSE*	*F*	*p*
	Between-Subjects				
Media	SE(Q1)	1	1.563	3.823*	.031
Error		27	.409		
Media	SE(Q2)	1	1.454	3.036*	.047
Error		27	.479		

*$p < ..05$, one-tailed.

the audios/videos ($m = 3.275$, $sd = .686$). Similar findings were found prior to the second examination (Q2)`. Students using the audios/videos had higher self-efficacy ($m = 3.661$, $sd = .778$) than those that did not ($m = 3.144$, $sd = .631$). The earlier findings indicated no difference when all students were included in the analysis. When focusing only on the students utilizing the CD, significant differences in learner self-efficacy were found at two of the three treatment points during the semester.

Sense of Learning Community

The impact the treatments had upon the students' sense of learning community was evaluated using a 2 (media condition) x 2 (grouping condition) between-subjects factorial ANOVA. The initial analysis was used to determine whether differences existed prior to the class beginning.

Prior to the class beginning there were no significant differences found among the group's sense of learning community. The two levels of the media condition were not significantly different ($F(1,120) = 1.197, p > .05$). The two levels of the grouping condition were not significantly different ($F(1,120) = 0.005, p > .05$). At the beginning of the semester, the students in the four groups were similar in their sense of learning community.

At the conclusion of the first quarter of the semester (Q1), the main effect for media condition was not significant ($F(1,104) = 2.766, p > .05$). The main effect for grouping condition was not significant ($F(1,104) = 0.082, p > .05$). Finally, the interaction was not significant ($F(1,104) = 0.057, p > .05$). When comparing across all semesters, at the conclusion of the first quarter of the semester, the students' sense of learning community was not influenced by exposure to instructional audios/videos or collaborative learning strategies

Prior to the second examination (Q2), the main effect for media condition was not significant ($F(1,97) = 0.582, p > .05$). The main effect for grouping condition was not significant ($F(1,97) = 0.162, p > .05$). The interaction was not significant ($F(1,97) = 0.365, p > .05$).

Identical results were found prior to the final examination (Q4). The main effect for media condition was not significant ($F(1,87) = 1.348, p > .05$). The main effect for grouping condition was not significant ($F(1,87) = 0.603, p > .05$). Finally, the interaction was not significant ($F(1,87) = 0.294, p > .05$). The treatments had no significant impact on student's sense of learning community.

Effects of Time

A three-way 2 (between subjects) x 2 (between subjects) x 4 (within subjects) repeated measures ANOVA was calculated to examine the effects of the media condition (with and without audio/video support), grouping condition (with and without collaborative learning), and time (entry, Q1, Q2, Q4). This approach was utilized to evaluate the main and interaction effects for learning goal orientation, performance goal orientation, self-efficacy, and sense of learning community.

Time and Learning Goal Orientation

The ANOVA calculated to examine the impacts the media condition, grouping condition, and time had on student learning goal orientation was calculated first. No significant main effects or interactions were found. The main effects for Time ($F(3,258) = 1.967, p > .05$) and interactions for Time x Media Condition ($F(3,258) = 0.843, p > .05$), Time x Grouping Condition ($F(3,258) = 0.481, p > .05$), and Time x Media Condition x Grouping Condition ($F(3,258) = 0.440, p > .05$) were all not significant. When comparing across all semesters, learning goal orientation was not influenced by either time, media condition, or grouping condition.

Time and Performance Goal Orientation

A similar ANOVA was calculated to evaluate the impact of the treatments upon learner performance goal orientation. A significant main effect for time was found ($F(3,258) = 7.876, p < .05$). The performance goal orientation score (higher values denote greater performance goal orientation) at the beginning of the semester (m =

2.589, $sd = 0.90$), Q1 ($m = 2.442$, $sd = 0.914$), Q2 ($m = 2.365$, $sd = 0.914$), and Q4 ($m = 2.235$, $sd = 0.90$) was found to be significantly different ($t(1,89) = 4.171$, $p < .05$) from Q4. The interactions for Time x Media Condition ($F(3, 258) = 0.808$, $p > .05$), Time x Grouping Condition ($F(3, 258) = 1.456$, $p > .05$), and Time x Media Condition x Grouping Condition ($F(3, 258) = 1.361$, $p > .05$) were not significant. When comparing across all semesters, since no interactions were found, this reduction cannot be attributed to any one factor. However, over time, student performance goal orientation did decrease.

Time and Self-Efficacy

Differences in self-efficacy were evaluated next. A significant main effect for time was found (see Table 19). As seen in Table 20, the self-efficacy scores (higher values denote greater self-efficacy) declined over time. Figure 1 illustrates the changes in learner self-efficacy over time and how the treatments interacted with self-efficacy.

Learner self-efficacy decreased over time. However, given the Time x Grouping Condition interaction, the collaboration treatment did impact the rate of or direction of changes in learner self-efficacy. From the chart, it can be seen that those learners working in collaborative groups experienced a dramatic decrease in self-efficacy at the beginning, and then noted a considerable increase. The self-efficacy of those not exposed to the grouping treatment experienced a consistent decrease. A follow-up MANOVA indicated that at Q1, and prior to the first exam a significant difference in learner self-efficacy did exist ($F(1,88) = 3.958$, $< .05$). Learners exposed to the grouping treatment exhibited lower self-efficacy ($m = 3.417$, $sd = 0.685$) than

Table 19

Repeated Measures for Self-Efficacy and Treatments

Source	*df*	*MSE*	*F*	*p*
	Within Subjects			
Time (T)	3	2.247	10.752*	.000
T x Media (M)	3	.173	.828	.240
T x Grouping (G)	3	.799	3.822*	.005
T x M x G	3	.135	.645	.293
Error	258	(0.209)		

Note. Value enclosed in parentheses represent mean square error.

*$p < .05$, one-tailed.

Table 20

Changes in Learner Self-Efficacy Over Time

Time	Mean Self-Efficacy	Standard Deviation
Entry	3.823	0.550
Q1	3.557	0.683
Q2	3.537	0.740
Q4	3.455	0.816

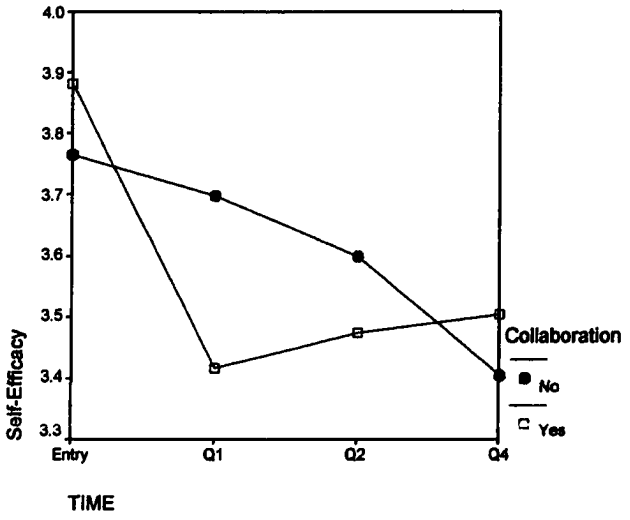

Figure 1. Effect of grouping treatment on self-efficacy over time

those not exposed to the grouping treatment ($m = 3.702$, $sd = 0.659$). No other differences in learner self-efficacy were found.

Time and Sense of Learning Community

Analysis of the effects of the treatments on the students' sense of learning community followed. No significant main effects or interactions were found. The main effects for Time ($F(3, 258) = 1.854$, $p > .05$) and interactions for Time x Media Condition ($F(3, 258) = 1.023$, $p > .05$), Time x Grouping Condition ($F(3, 258) = 1.439$, $p > .05$), and Time x Media Condition x Grouping Condition ($F(3, 258) = 0.394$, $p > .05$) were all not significant. Sense of learning community was not influenced by time, media condition, or grouping condition.

Attrition Rates

A chi-square test of independence was calculated to determine whether the proportion of students who completed the course (took the final) was significantly different for those students exposed to the treatments versus those not exposed to the treatments. Students who were listed on the final role sheet and attended an orientation were counted as students in the class. The final role sheet was printed following the first week of the four-week summer classes, and at the conclusion of the second week of the sixteen-week fall and spring semesters. Students often find they are enrolled in the wrong course, determine they cannot meet the deadlines or technological requirements for the course, or never attend an orientation and may withdraw later for unknown reasons. Additionally, students were added to the class after the semester actually began. Therefore, students were considered a student in the class if they were on the final role sheet and attended an orientation.

Students who took the final were considered to have completed the course. Students who failed to take the final exam were considered to have not completed the course.

First, a chi-square test was calculated comparing groups to course completion. The four levels of the groups included those exposed to both the media and the grouping treatment (G1), just the media treatment (G2), just the grouping treatment (G3), and the last group received neither (G4). Table 21 shows the observed and expected frequencies.

Table 21

Observed and Expected Frequencies of Student Completion and Non-Completion

	Treatment Group							
	G1		G2		G3		G4	
	O	E	O	E	O	E	O	E
Finished	26	(22.6)	21	(24.1)	24	(20.4)	21	(24.8)
Not Finish	5	(8.4)	12	(8.9)	4	(7.6)	13	(9.2)
Totals	31	(31)	33	(33)	28	(28)	34	(34)

Note. Values in parenthesis denote expected values.

O = observed; E = expected.

A significant interaction was found (chi-square(3) = 7.804, $p < .05$) indicating that the attrition rates were significantly different among the groups. The attrition rate for G1 was 16.1%, compared to 36.4% for G2, 14.3% for G3, and 38.2% for G4. Groups 1 and 3 were both exposed to collaborative learning strategies

A chi-square was calculated comparing the frequency of attrition for student exposed to the grouping treatment and those not exposed to the treatment. The observed and expected frequencies are shown in Table 22.

A significant interaction was found (chi-square(1) = 7.748, $p < .01$). The attrition rates were significantly different for those exposed to the grouping treatment and those not exposed to the treatment. Of those exposed to the collaborative learning

Table 22

Observed and Expected Frequencies of Student Completion and Non-Completion (Grouping)

	Collaboration				
	Yes		No		Totals
	O	E	O	E	
Finished	50	(43.1)	42	(48.9)	92
Not Finish	9	(15.9)	25	(18.1)	34
Totals	59	(59)	67	(67)	126

Note. Values in parenthesis denote expected values.

O = observed; E = expected.

treatment, 15.3% did not complete the course. However, of the students not exposed to the collaborative learning treatment, 37.3% failed to complete the course. Those exposed to the collaborative learning treatment were more likely to stay in the class and take the final exam.

A chi-square test of independence was calculated comparing the frequency of attrition for student exposed to the media treatment and those not exposed to the treatment. No significant relationship was found (chi-square(1) = .537, $p > .05$). Exposure to audio/video files did not alter the student attrition rate.

Exploratory Analysis – Media Access

Provided the evidence that the utilization of the CD appeared to enhance the achievement effects, and possibly self-efficacy, further analysis of the impact of the CD was warranted. Students in the sample were exposed to the audios/videos using either a CD or the Internet to download the files. Other students had no access to the audios/videos. An analysis of the effect of these three independent variables (media access) on learning goal orientation, performance goal orientation, self-efficacy, and sense of community over time was warranted. The three independent variables include CD access, Internet access, and no access.

A 3 x 4 repeated measures ANOVA was calculated to examine the effects of the media access and time (entry, Q1, Q2, Q4) on the student's learning goal orientation. No significant main effects or interactions were found for learning goal orientation. The main effect for Time ($F(3,261) = 1.238, p > .05$) and the Time x Media Access interaction ($F(6,261) = 0.420, p > .05$) were not significant. Learning goal orientation was not impacted by either time or media access.

Similar analysis was conducted for performance goal orientation. The main effect for time was significant ($F(3,261) = 6.568, p < .05$). The Time x Media Access interaction was not significant ($F(6,261 = 1.645, p > .05$). The performance goal orientation for students in the three groups declined over time. This decline was not altered by the type of access students had to the media or lack thereof.

The effects of media access on learner self-efficacy produced similar results. The main effect for time was significant ($F(3,261) = 9.044, p < .05$). The Time x Media Access interaction was not significant ($F(6,261) = 0.822, p > .05$). Learner self-efficacy

Table 23

Repeated Measures for Sense of Community and Media Access

Source	*df*	*MSE*	*F*	*p*
	Within-Subjects			
Time	2.399	0.508	1.956	.121
Time x Access	4.798	.734	2.261*	.049
Error	67.769	208.728		

*$p < .05$.

for the three groups declined over time and the type of media access available to students did not affect the rate of decline.

The analysis of the effects of media access and time on learner sense of community did result in significant differences (see Table 23). As a result of the unequal sample sizes ($n = 18$ for CD access; $n = 29$ for Web access; $n = 43$ for neither), the sphericity assumption could not be met. However, the Greenhouse-Geisser F was reported to correct for this violation.

The change in student sense of community was impacted by their media access. As shown in Figure 2, students utilizing the CD experienced a considerable increase in sense of community at Q1, while students accessing the audios/videos via the Web experienced a decrease. A one-way ANOVA was calculated for Q1 (Time = 2). The difference in student sense of learning community was significant ($F(2,105) = 5.789$, $p < .05$) one quarter of the way through the semester. The differences at the other

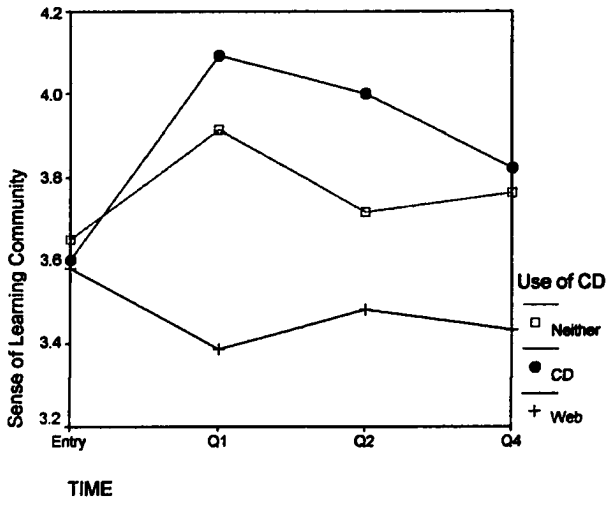

Figure 2. Changes in sense of learning community over time for various sources of exposure to audios/videos.

points during the semester were not significant. This provides at least partial evidence that the utilization of the audios/videos, when easily accessible to students, do influence student sense of learning community. This can further explain the gains in achievement.

Exploratory Analysis – Correlations

The correlations among the various dependent variables were calculated to help ensure the validity of the instruments used to measure the outcomes. Additional correlation analysis among the dependent variables and other demographic information gathered was conducted. Lastly, correlations among these variables and other questions pertaining to the students' attitudes and feelings toward the class were evaluated.

Table 24

Correlations Between Achievement Scores and Homework Points

	Test 1	Test 2	Test 3	Test 4	HW Points
Test 1	----	.564	.690	.635	.432
Test 2		----	.680	.566	.344
Test 3			----	.604	.455
Test 4				----	.410
HW Points					----

Table 24 indicates the correlations among the assessment tests and the homework points earned by students. All correlations were significant at the .01 level.

These data indicate that the achievement scores on the four exams and homework points of the students are related to each other. This provides evidence that the exams and homework scores are measuring the same outcome.

Additional correlation analysis was conducted to determine whether the dependent measures were related to one another as expected. Initially, a correlation matrix was prepared for the four learning goal orientation measures taken during the semester. Further analysis was conducted for both self-efficacy and sense of learning community. The information gathered here will provide evidence that the four measures were measuring the same learner characteristic.

As seen in Table 25, the correlations for the learning goal orientation measures taken at entry, Q1, Q2, and Q4 were quite high. All correlations were significant at the .01 level. As indicated in the matrix, the correlations among the learning goal

Table 25

Correlations Between Students' Learning Goal Orientations at Different Times

	LGENTRY	LGQ1	LGQ2	LGQ4
LGENTRY	----	.627	.609	.620
LGQ1		----	.706	.670
LGQ2			----	738
LGQ4				----

Table 26

Correlations Between Students' Performance Goal Orientations at Different Times

	PGENTRY	PGQ1	PGQ2	PGQ4
PGENTRY	----	.616	.623	.638
PGQ1		----	.737	.752
PGQ2			----	737
PGQ4				----

orientation scores are significant. The values are consistent over time and significantly correlated.

Table 26 illustrates the correlation among the performance goal orientation measures at different points during the semester. All correlations were significant at the .01 level.

Table 27

Correlations Between Student's Self-Efficacy at Different Times

	SEENTRY	SEQ1	SEQ2	SEQ4
SEENTRY	----	.426	.508	.521
SEQ1		----	.747	.558
SEQ2			----	.671
SEQ4				----

Table 28

Correlations Between Student's Sense of Community at Different Times

	COMENTRY	COMQ1	COMQ2	COMQ4
COMENTRY	----	.420	.328	.340
COMQ1		----	.754	.674
COMQ2			----	.738
COMQ4				----

A similar correlation matrix was prepared to determine the degree of relationship among the learner self-efficacy measures taken at the four points during the semester (see Table 27). All correlations were significant at the .05 level. Again, the self-efficacy scores appeared to be strongly related and consistent for each student over time.

Table 28 reports the correlations for the students' sense of learning community. All correlations were significant at the .01 level.

Table 29

Correlations Between Student's Learning Goal Orientation and Self-Efficacy at Different Times

	LGENTRY	LGQ1	LGQ2	LGQ4
SEENTRY	.373**	.306**	.226*	.322**
SEQ1	.316**	.461**	.424**	.246*
SEQ2	.259**	.378**	.512**	.368**
SEQ4	.192	.292**	.386**	.493**

*$p < .05$. **$p < .01$.

Students' sense of learning community scores are consistent and related. The low correlation between the entry community score and the others may be attributed to the students' lack of experience with the course. At the beginning of the semester the students met with the instructor to discuss the course. Prior to this orientation, the instrument used to measure community feelings was administered. The student's sense of community was based upon minimal course exposure.

Next, the correlations among the students' learning goal orientation and self-efficacy scores were evaluated. Table 29 describes the correlations between student's learning goal orientation and self-efficacy measures at different times during the semester.

The expected correlations were observed. As seen in the matrix, each period's learning goal orientation was most highly correlated with that period's self-efficacy

Table 30

Correlations Between Student's Learning Goal Orientation and Sense of Learning Community at Different Times

	LGENTRY	LGQ1	LGQ2	LGQ4
COMENTRY	.108	.228*	.191	.087
COMQ1	.093	.302**	.312**	.184*
COMQ2	.135	.174	.301**	.202**
COMQ4	-.011	.063	.112	.155

*$p < .05$. **$p < .01$.

score. As expected, there is a positive correlation between self-efficacy and learning goal orientation.

Next, the correlations among the learning goal orientation scores and sense of learning community scores were calculated. Table 30 describes these correlations.

The data illustrate that student learning goal orientation is somewhat closely tied to the corresponding period's sense of community measure. As mentioned earlier, at entry students had very little sense of the community structure of the course other that what they gathered during their initial face-to-face meeting with the instructor. If the entry values are discounted, then two of the three remaining similar time periods' measures indicate significant relationships. As expected, Q1's learning goal orientation and sense of learning community are significantly positively related. Similar results are shown for Q2.

Looking at only the spring semester's score's results in even greater correlations (see Table 31). The spring semester students in the audio/video treatment were given access to a CD containing the audio/video files.

Table 31

Correlations Between Spring Semester's Student's Learning Goal Orientation and Sense of Learning Community at Different Times

	LGENTRY	LGQ1	LGQ2	LGQ4
COMENTRY	.301*	.356*	.324*	.193
COMQ1	.192	.412*	.343*	.252
COMQ2	.221	.366**	.368**	.323**
COMQ4	.029	.283	.145	.189

*$p < .05$. **$p < .01$.

Table 32

Correlations Between Student's Self-Efficacy and Sense of Learning Community at Different Times

	SEENTRY	SEQ1	SEQ2	SEQ4
COMENTRY	.089	-.002	.030	.023
COMQ1	-.015	.239*	.267**	.110
COMQ2	.027	.237	.393**	.183
COMQ4	-.099	-.013	.096	.236**

*$p < .05$. **$p < .01$.

One period's learning goal orientation is correlated with surrounding period's sense of learning community. As expected, the use of the CD created a stronger relationship between the two variables.

The correlations between student's self-efficacy scores and sense of community were evaluated. Table 32 details these relationships.

As expected, students' self-efficacy and sense of learning community were significantly positively related at the conclusion of the first quarter of the semester (Q1). Similar results are shown for Q2 and Q4.

The correlations between achievement and self-efficacy, learning goal orientation, performance goal orientation, and sense of learning community were calculated next. The correlation matrix for self-efficacy and achievement can be seen in Table 33.

Table 33

Correlations Between Student's Self-Efficacy and Achievement Scores

	SEENTRY	SEQ1	SEQ2	SEQ4
Test 1	.185	.222*	.405**	.382**
Test 2	.237*	.027	.261*	.374**
Test 3	.198	.241*	.166	.355**
Test 4	-.178	.176	.199	.334**

* $p < .05$. ** $p < .01$.

Table 34

Correlations Between Student's

Performance Goal Orientation and Achievement Scores

	PGENTRY	PGQ1	PGQ2	PGQ4
Test 1	.088	-.014	.039	-.014
Test 2	.036	-.261*	-.206*	-.051
Test 3	.077	-.114	-.082	-.012
Test 4	.064	-.070	-.098	-.084

* $p < .05$.

The correlations were significant for all measures taken during the same time frame. Test 1 is given following the Q1 self-efficacy measure. The Q2 measure occurs immediately prior to the second exam, and the Q4 measure occurred immediately prior to the final exam. There was no Q3 measure of self-efficacy.

Some of the expected correlations between learners' performance goal orientation and achievement materialized. Table 34 summarizes these relationships.

It would be expected that as a students' goal orientation shifted more toward a performance goal, their achievement scores would decline. This can be seen only during Q2, when the second examination was administered. Also, Q1 learner performance goal orientation was significantly correlated with achievement scores on the second examination

Lastly, the correlations for achievement and sense of learning community along with the correlations for achievement and learning goal orientation were calculated.

Surprisingly, there were no significant correlations found between student learning goal orientation and achievement. Likewise, there were no significant correlations found for sense of learning community and achievement. Regression analysis and model selection did not result in a set of questions that created a significant relationship for either the goal orientation or community measure and achievement.

Exploratory Analysis – Student Attrition

The correlations were calculated for student attrition and all demographic and entry student perception measures. No significant relationships were found.

Additionally, student attrition and the exit perceptions were compared. Student responses to the question, "Intelligence is a fixed characteristic that cannot be altered," were negatively correlated with student attrition ($r(91) = -.285, p < .01$). Students who felt their intelligence was malleable were more likely to complete the course.

Student responses to the question, "I learned _____ in this class than I would have had I taken the course taught in a traditional format", were negatively correlated to attrition rates ($r(91) = .223, p < .05$). Possible responses to the question ranged from "Much Less" to "Much More" on a five point Likert scale. As expected, the higher the student's perception of their learning in the online course, the more likely they were complete the course.

Exploratory Analysis – Demographics, Attitudes, & Perceptions

Several questions were asked of the subjects prior to the beginning of class pertaining to the characteristics of the students and their attitudes toward various topics

(see Appendix A). These included questions on gender, age, the number of distance education courses and the number of online course taken previously, the student's perception of their computer knowledge, and the number of economics courses taken previously. Additional questions addressed their expectations regarding the difficulty of the class and the amount of learning they expect in the class versus the amount they would expect if they had taken the course in a traditional format. The correlations among these factors and the other dependent variables were calculated.

Another set of questions was given to the students at the conclusion of the semester (see Appendix B). These questions measured their perceptions of the importance of making good grades versus learning the information presented in a course. Other questions evaluated their impressions of the difficulty of the course and the degree of learning they felt had occurred. Lastly, a set of questions addressed their perceptions of the usefulness of the instructional materials. The correlations among these questions and the ones given prior to the course were calculated.

Using correlation analysis, learner gender was significantly related to their responses on two separate questions. While student achievement was not related to gender, the learners' gender had an impact on student responses to the question, "Making a good grade is more important to me than learning the information." An independent sample *t* test comparing the mean scores on student responses to the question for males and females was calculated. The difference between the means of the two groups was significant ($t(89) = 2.224, p < .05$). The mean response for men was significantly higher ($m = 3.107, sd = 1.166$) than that of women ($m = 2.571, sd = 1.011$). Males tended to feel making a grade in economics is more important than learning the

information in the course to a greater extent than did females. Women tended to value learning the information more than the men.

The second question that appeared to be related to gender was, "I will take another online course again in the future." Student response to this question was based on a five-point Likert scale, similar to the previous question. An independent sample *t* test comparing the mean scores for men and women found a significant difference for the two groups ($t(89) = -2.087, p < .05$). The mean response rate for women was significantly higher ($m = 4.444$, $sd = .996$) than the mean for men ($m = 3.929$, $sd = 1.275$). The women enrolled in the course were more likely to enroll in an online course again in the future. This is further indicated by the make-up of the subjects that originally enrolled in the course (42 males, 84 females). A chi-square goodness of fit was calculated comparing the frequency of men and women enrolled. It was hypothesized that each value would occur an equal number of times. A significant deviation from the hypothesized values was found (chi-square(1) = 14.000, $p < .01$).

A Pearson correlation coefficient was calculated for gender and achievement, goal orientation, self-efficacy, and sense of learning community. A significant correlation was found for gender and self-efficacy at entry ($r(124) = -.256, p < .01$), Q1($r(108) = -.281, p < .01$), and Q2 ($r(101) = -.257, p < .01$). Women tended to have lower self-efficacy in the course than did men. No significant correlation was found for Q4. A one-way MANOVA was calculated examining the effect gender had on learner self-efficacy. A significant effect was found ($F(3,96) = 3.362, p < .05$). Follow-up univariate ANOVAS indicated that self-efficacy was significantly influenced by gender. A significant difference was found at entry ($F(1,98) = 7.226, p < .01$), Q1 ($F(1,98) =$

6.032, $p < .01$), and Q2 ($F(1,98) = 7.393, p < .01$). The entry self-efficacy for men (m = 4.021, sd = .475) was significantly higher than women (3.713, sd = .546). Likewise, the self-efficacy was significantly higher at Q1 for men (m = 3.742, sd = .510) than women (m = 3.380, sd = .732). Lastly, men's Q2 self-efficacy was significantly higher (m = 3.767, sd = .588) than women's (m = 3.336, sd = .777). Men exhibited significantly higher self-efficacy at the beginning and during the process of completing an economics course.

The number of online courses that a student had taken prior to taking the present course was negatively correlated to their perception of the value of the audios ($r(47)$ = -.341, $p < .05$) or videos ($r(47) = -.296, p < .05$). The more online courses a student had taken prior to the class, the lower the student's perception of the value of the audios and videos.

Prior to the class beginning, students were asked to assess their own computer knowledge. The responses were on a five point Likert scale ranging from "Novice" to "Expert." The learner's perception of their computer knowledge was positively correlated to their entry learning goal orientation ($r(123) = .181, p < .05$) and entry self-efficacy ($r(123) = .284, p < .01$). Students with greater entry computer knowledge (whether real or perceived) had greater learning goal orientation and self-efficacy.

Learner computer knowledge was negatively correlated to their valuing of making a grade in a course. The question addressed earlier, "Making a good grade is more important to me than learning the information" ($r(90) = -.250, p < .05$) and another, "I feel learning the information presented in a course is more important than the grade I receive" ($r(90) = .277, p < .01$) were correlated to their computer

knowledge. As a student's perception of their computer knowledge increased, their valuing of learning tended to increase.

Additional analysis seemed to explain these results. Computer knowledge was positively correlated to achievement on all exams. Student perception of their computer knowledge was positively correlated to their achievement scores on test 1 ($r(107) = .321, p < .01$), test 2 ($r(96) = .271, p < .01$), test 3 ($r(90) = .276, p < .01$), and test 4 ($r(91) = .323, p < .01$). Students with greater computer knowledge tended to learn more, and perform better on achievement tests, than those with lower levels of computer knowledge.

The question, "How do you expect your learning in this class to compare to the learning that would occur in an economics course taught in a traditional setting? You expect to learn _____?" was asked at the beginning of the semester. At the conclusion of the semester students were asked, "I learned ____ in this class than I would have had I taken the course taught in a traditional format." Responses ranged from "Much Less" to "Much More" on a five point Likert scale. Entry learning expectations were positively correlated ($r(71) = .273, p < .05$) to the student's perception of the amount of learning that occurred in the course. Students who expected to learn more felt they learned more than they would have in a traditional course. Likewise, those who felt they would learn less at the beginning perceived they had learned less at the conclusion of the semester.

The number of economics courses students had taken prior to the class beginning was measured at the beginning of the course. The number of courses taken previously was not related to achievement or self-efficacy as anticipated. However, it

was negatively correlated ($r(90) = -.215, p < .05$) to the exit learning perception addressed above. The more economics courses a student had taken previously, the lower their perception of their learning in the course compared to a traditional course. Those students who had taken economics courses prior to this class were better able to answer this question. Since they had taken a course, they had a basis for comparison. Students who had taken a course, felt they learned less than they would have had they taken the course in a traditional format.

Student valuing of learning was significantly related to their achievement scores. The question asked at the end of the semester, "Making a good grade is more important to me than learning the information" was correlated to the achievement scores on each exam. The responses varied from "Strongly Disagree" to "Strongly Agree" on a five point Likert scale. A Pearson correlation coefficient was calculated for the relationship between the student's achievement score and their degree of agreement with this question. A negative correlation was found with test 1 ($r(89) = -.231, p < .05$), test 2 ($r(88) = -.290, p < .01$), test 3 ($r(87) = -.277, p < .01$), and test 4 ($r(90) = -.241, p < .05$). The more students valued their grades over learning, the lower their scores on the achievement tests. Those who valued learning more did better. This mirrors the hypothesized relationship. While the earlier results showed no correlation between student learning goal orientation and student learning, this question appears to indicate that there was in actuality a relationship between the valuing of learning and achievement scores. Evidently, this question and the set of questions used to assess learning goal orientation were interpreted by students in a different manner.

Many findings addressed in this chapter mirror the hypothesized relationships and differences. However, there are numerous disparities between the expected findings and the observed. The next chapter will address these differences and provide a view of the implications of the results.

CHAPTER V

Conclusion

Introduction

Given the difficulties students face when attempting to learn the complex concepts taught in an introductory economics course, it is clear that developing methods to improve attitudes toward the content and improving the classroom atmosphere should provide numerous instructional and motivational benefits. Additionally, instructional strategies that improve student comprehension and transfer would be expected to increase learner achievement scores. With the added complexity of learning these concepts in an online environment, developing the optimal mix of strategies and tools to aid these students in their learning becomes even more imperative. This study investigated the impact of the use of instructional audios/videos and collaborative learning strategies on numerous learner outcomes.

While the analysis did not provide conclusive evidence that the use of audios/videos and collaborative learning strategies affected all the dependent variables as anticipated, it did provide an indication that the use of such strategies does provide beneficial outcomes to students enrolled in online economics courses. Primarily, these benefits were directed toward student learning. The evidence gained in this study indicates that the use of media and grouping strategies positively impacts student learning and reduces student attrition rates.

There were many unexpected results. The treatments did not impact several dependent variables as anticipated,and many expected relationships did not materialize. This chapter will attempt to summarize these findings, develop a rationale for the results, and provide recommendations for further study.

Treatment Group Effects

Goal Orientation, Self-Efficacy, and Sense of Learning Community

The expected treatment effects on learner goal orientation, self-efficacy, and sense of learning community were not observed. The original assertion was that the exposure to the media treatment and/or the grouping treatment would result in differences in the students' learning goal orientation, performance goal orientation, self-efficacy, and sense of learning community.

The anticipated gains in the learning goal orientation of those students exposed to the treatments were not observed in this study. The findings of Nichols and Miller (1994) and Johnson, Johnson, and Maruyame (1983) indicating that collaborative learning strategies may positively impact the learning goal orientation were not duplicated in this setting. At no point during the course of this study did the collaborative treatment result in significant treatment group differences in student learning goal orientation. Likewise, neither the media treatment nor grouping treatment resulted in significant differences in the learners' performance goal orientation.

Researchers have found that collaborative learning can contribute to improvements in learner self-efficacy (Johnson & Johnson, 1989; Nichols & Miller,

1994; Miller et al., 1996). The results of these researchers study are not duplicated in the present analysis and does not confirm that the earlier findings are relevant to the context of this analysis. The online learners exposed to collaborative strategies and/or the use of audios/videos did not exhibit significantly different levels of self-efficacy at any point during the course of the study. However, it was discovered during the exploratory analysis that the use of a CD to access the audios/videos enhanced the treatment effect of the media treatment on learner self-efficacy. The CD led to significant differences in learner self-efficacy prior to two of the four examinations.

Further, Johnson, Johnson, and Maruyame (1983) concluded that collaborative learning would result in the improvement of attitudes of the group members toward one another. Research by Sharan (1980) indicated that group learning would enhance the concern for the learner's fellow group members. Additional research indicated that the use of recorded audio and/or video would increase the "intimacy" and the degree of social presence in a course (Short, Williams & Christie, 1976). These improvements in attitudes toward one another and feelings of "intimacy" were expected to increase the sense of learning community of those students exposed to the treatments. This expected gain in learner sense of community was not observed.

Achievement Effects

A great deal of research espouses the similarities between learning from audios and/or videos and from learning in a traditional classroom setting (Gibson, 1960; Greenhill, 1967; Loder, 1937; Mosenthal, 1977; Nasser & McEwen, 1976; Nugent, 1982). The present study confirms these findings. As indicated on one of the

achievement tests, students exposed to the audios/videos learned more than those who received no exposure. This effect was enhanced when students utilized the CD to access the audios/videos. As argued by Hannifan (1985), the audio/videos allowed the instructor to provide the attention to detail that may not be provided by text alone. Similarly, the analysis seems to affirm the findings by Nasser and McEwen (1976), which indicated that student learning would be enhanced when printed text was combined with audio and pictures.

The expected gains in student learning from the grouping treatment did materialize. The findings confirmed those of many researchers (Boling & Robinson, 1999; Franklin, Griffin, & Perry, 1994; Jehng, 1998; Keeler & Anson, 1995; Johnson & Johnson, 1989; Nichols & Miller, 1994; Slavin, 1987; Stevens & Slavin, 1995). Learners exposed to the collaborative learning groups performed better on one of the achievement tests than those working individually. While the differences between groups were not statistically significant on each examination, the evidence provided from other analyses is compelling and indicates that the use of collaborative learning strategies in an online environment can result in increases in student learning.

On exam one, the grouping treatment resulted in a difference that was significant (4.7 point improvement), and the interaction effect was significant. The media treatment resulted in a significant improvement (7 point improvement) on exam three. It was discovered that the groups exposed to at least one of the treatments did better than the group not exposed to either treatment on every examination. Those exposed to the media treatment performed better on every exam than those who did not have such access. Furthermore, the students exposed to the grouping treatment did

better on every exam than the students who had no collaborative treatment. It was noted that the standard deviations for those students exposed to the treatments was lower than those who had no access.

These conclusions were confirmed in the exploratory analysis section. Significant differences were found among the four treatment groups. Additionally, the analysis of the student exam averages indicated a significant difference in the group members' exam averages and homework points for those exposed to the grouping treatment. At a minimum, this provides very compelling evidence that the grouping treatment resulted in significant gains in student learning.

Lastly, exploratory analysis of the scores of students exposed to the media via the CD indicated that the utilization of the audios/videos when accessed from a CD resulted in higher achievement scores. This was confirmed when comparing differences in exam scores and total points. The total points and exam averages of the students exposed to the media treatment were significantly higher than those students who had no access to the audios/videos. Furthermore, students exposed to the media treatment via the CD scored significantly higher on each examination than those who had no access.

Initially, the findings were not perfectly in line with what was expected. This resulted from the unexpectedly high standard deviations that existed in some groups. However, upon further review it is clear that the treatments resulted in an improvement in the achievement scores of those students exposed to the treatments. It is yet to be determined what the optimal mix of exposure to these particular treatments may actually be.

Attrition Rates

It was anticipated that gains in learning and learner self-efficacy and the development of a sense of learning community would result in lower attrition rates for those students exposed to the treatments. A significant difference in the proportion of students who completed the course did occur. However, only one difference was found to be significant. Those students assigned to the grouping treatment were significantly more likely to complete the course than those in the individual learning groups. Surprisingly, the subjects assigned to the media treatment were not more likely to complete the course. This finding was surprising since both treatments resulted in gains in student achievement. However, only those in the collaborative learning groups were significantly more likely to complete the course.

Students exposed to the grouping treatment were far more likely to complete the class than those working in an individualistic setting (85% vs. 63%). This finding can be attributed to several desirable factors. First, while the students' sense of community was not impacted, their sense of commitment and responsibility may have been. Being part of a group that depended upon each student for input on assignments, and whose members were going to evaluate the contribution of each member, may have created a feeling of obligation to remain in the class and extend greater effort.

Learners exposed to the grouping treatment performed better on the achievement tests. This would be expected to increase the students' valuing of their group efforts and make it more likely students would achieve their grade or achievement goals. The bonus points some groups earned on various examinations further raised this likelihood. While the grades of the groups not exposed to the grouping treatments were adjusted

upward to ensure greater similarity to the grades of these students, perfect equality did not exist. Therefore, a portion of the differences in attrition rates may be attributed to the differences in total points awarded on the exams (following the bonus and curve).

Students in the collaborative groups were expected to turn in numerous group assignments and bonus opportunities. The group efforts increased the grades for these students, raised their bonus points, and raised the likelihood that they actually received a grade on homework. Therefore, their homework points would be increased because they belonged to a group. It should be noted that students working in the individualistic groups had the same assignments and bonus assignment opportunities. They were not given an opportunity to earn a bonus based upon their performance on exams.

While it cannot be asserted that the attrition rates were lower for the collaborative learning groups because of a greater sense of community, it can be assumed that the increases may be attributable to the increases in learning and the attainment of their achievement goals. However, since the media treatment did not impact attrition rates, even though their achievement scores were higher, it must be assumed that the differences in attrition for the grouping treatments are attributable, at least in part, to another factor. This decrease in attrition may be explained by the sense of responsibility and obligation students developed in these groups. Further research will be needed to explore this possibility.

*Time * Treatment Interactions*

Analysis of the data was conducted to assess the effects of the treatments on individual learners over time. The data indicates that the media treatment and/or the

grouping treatment had minimal impact on the rate of change or the direction of change in their learning or performance goal orientation, or sense of learning community.

Some significant differences were discovered. Learner performance goal orientation declined over time. Students were less likely to exhibit a performance goal orientation at the conclusion of the semester that at the beginning. This would be desirable if it were replaced by the development of a learning goal orientation. However, the learning goal orientation of the students remained stable or increased only slightly, depending upon assignment. It was hypothesized that the treatments would increase student learning goal orientation and decrease their performance goal orientation.

It was expected that the treatments would lead to increases in self-efficacy, or at least lead to a smaller rate of decline. In this analysis, learner self-efficacy declined over time. The rate of change was impacted by the grouping treatment. The data indicates that exposure to the collaborative learning strategies resulted in a difference in the direction and rate of change in self-efficacy. Those subjects not utilizing collaborative learning strategies exhibited a consistent decrease in self-efficacy, while those who were exposed to the strategies exhibited a large decline, then a consistent increase over time. This may be due to the timing of the administration of the measurement instrument. Since it was given prior to the administration of each examination, learner self-efficacy may have been impacted by their performance on previous examinations. Therefore, those exposed to the grouping became more self-efficacious as a result of their superior assessment exam performance.

The grouping treatment may have resulted in some gains in learner sense of community. As indicated in the analysis, subjects exposed to the grouping treatment exhibited a consistent increase in sense of community, while those not exposed to such treatment experienced an increase followed by a dramatic decrease. While the differences and interactions were not statistically significant, it appears to provide some evidence that collaborative strategies may have fostered the desirable sense of learning community. If the direction of change was extended, or the strategies designed to instill a sense of community were refined, a significant difference might result. It was originally asserted that the treatments would lead to increases in learner sense of community or lead to differences in the rate and/or direction of change.

Explanations for Lack of Effects

The results of this study replicate the positive impact of the collaborative treatment on student learning. However, the expected gains in learning-goal orientation, self-efficacy, and sense of community failed to materialize to the extent anticipated.

Neilson's (1997) research indicated that significant effort on the part of the instructor is necessary to ensure the development of a learning community. The academic, intellectual, and interpersonal support communities referenced by Moller (1998) require students to have easy access to the instructor and other students. Given the delays in communication inherent in online settings, it is possible that these limitations restricted the development of the necessary interpersonal links required to impact the goal orientation of the learners, their self-efficacy, and their sense of learning community.

In actuality, the degree of student-instructor interaction that occurred in the course was not to the level anticipated. It was not possible to measure the number of emails sent between students; however, the number and quality of bulletin board questions and answers were below what was expected. As noted by Watabe, Halalainen, and Whinston (1995), the learning tasks must require interaction in order to promote positive learner outcomes. The collaborative projects in this study were limited to approximately one-half the assignments and all bonus opportunities. The degree of collaboration required was not sufficient. At the beginning of the semester students were enthusiastic and were very responsive to prompts and each other's questions. As the semester progressed, these interactions and communications dropped off dramatically. These findings contradicted the research by Lally and Barrett (1999) where they found that computer-mediated communication seemed to reduce the feeling of social isolation and increase interaction.

Susman's (1998) research indicated that the amount of elaboration that occurs in many collaborative computer-based courses was not adequate. The research indicated the failings of these tasks to develop the hoped for learner outcomes were due to poor instructional design. A change in the design of instructional tasks used in this investigation to increase the degree of elaboration would prove to be beneficial.

Slavin (1987) recommended that collaborative learning strategies must include elements of group rewards and individual accountability. The strategy used in this study to promote these elements was to assign the learners to groups and reward the group members with bonus points contingent upon the group achieving a base group average on the assessment exams. If the group averaged 70% on the exam, they earned

five points. If they averaged 75% they each earned ten points. It was felt that this would encourage interaction by providing a reward to each member of the group, while creating a responsibility of each group to provide input into the success of the group.

The incentive provided to the students was not adequate to promote the necessary interaction. The base averages may have been too low, or the bonus points were too high to encourage interaction during the semester. Many students may have felt that the effort required to earn the points was minimal and failed to see the necessity in supporting one another. Virtually all groups received the bonus points on the first assessment exam, approximately one-half on the second, and one-third on the third exam. No group achieved the bonus opportunities on the final exam. While this is partially attributable to the complexity of the subject matter, it may be a result of the decrease in the quantity and quality of interactions. Given the early success, the students' view of the necessity of group interaction likely declined. Further, given the success rates on the early exams, and the resulting bonus points, the subjects need for future support waned.

It is most likely that the strategies developed to stimulate group learning and foster the development of a learning goal orientation were inadequate. As addressed earlier in the paper, extensive effort is necessary to create an environment where collaborative strategies develop a sense of community, foster a learning goal orientation, and increase learner self-efficacy. It was originally thought that the strategies developed would be adequate. Evidently, they were not.

Far more attention should have been paid to the strategies recommended by Ames (1992) to instill a learning goal orientation in students. Linking the students'

success on the assignments to their success on their achievement exam may have proven to be beneficial. Furthermore, trying to make the material personally relevant was extremely difficult. The concepts taught in economics are, in most cases, abstract. Given this and the apparent lack of interaction among students, it is evident that the strategies developed were terribly inadequate or misguided altogether.

Additionally, the extrinsic reward (bonus points) provided the learners with a performance incentive that increased their performance goal orientation. As explained by Dweck (1986), students who are learning goal oriented are said to be intrinsically motivated, while those who are performance goal oriented are said to be extrinsically motivated. Given the extrinsic reward that was built into the group bonus, learners may have been encouraged to behave with more of a performance goal focus. This may have reduced the effects of the treatments on their learning goal orientation and likely reduced their incentive to communicate with one another. Many may have feared being embarrassed and identified as one of the students preventing the group from achieving the bonus points. This further lowered their self-efficacy and sense of learning community.

It is possible that the anxieties related to the technological problems some students had, the lack of familiarity with taking an online course, and the complexity of the information presented may have lowered learner self-efficacy. These anxieties may have reduced the expected gains from collaboration. Additional anxiety may have been come about as a result of the communications students received from others when they expressed their frustrations with the course, technology, or other demands of the course.

This, in turn, may have reduced the expected effect of the treatments on learner goal orientation and sense of community.

The gains in achievement that resulted from both the media treatment and the grouping treatment could have occurred for unexpected reasons. The subjects exposed to the media treatment experienced gains in learning due to the gains in cognitive efficiency. They found the information to be more direct and summative of the information they were required to know. These gains were more than adequate to negate the failure of the media treatment to generate a learning goal orientation and sense of learning community. Likewise, the grouping treatment created a sense of group responsibility, but did not provide adequate incentive to interact with one another. The responsibility the students felt to "carry their weight" provided a source of motivation to do well on the examinations. However, it did not stimulate the interaction and elaboration necessary for the expected benefits to develop. Resultantly, the grouping treatment failed to stimulate gains in learning goal orientation or sense of learning community, and the grouping treatment had very little impact on learner self-efficacy.

Thus, students' gains in learning were attributable to the cognitive advantages of the media treatment and the sense of responsibility the students developed. This overcame the reduction in learning goal orientation that resulted from the extrinsic reward, the minimal gains in self-efficacy, and lack of development of a sense of learning community.

It was discovered very early on during the collection of data that many students were resistant to working with others in a group setting. One reason for this was the

inability to develop a one-to-one relationship with the other members of their group. Given the physical separation of the students and the difficulties in developing a consistent dialogue, the students struggled in completing their group assignments. Likewise, their responses to one another's queries went unanswered even though they were going to be evaluated by their peers and awarded a grade based upon their support of one another.

Even more prevalent was the resistance of some students to be forced to work in groups. Several students voiced their disapproval of being required to work with other students at various points during the semesters. One student stated he had enrolled in an online course to avoid working with or around other students. He preferred to be evaluated entirely on his individual performance. This resistance to working in groups could have greatly reduced the impact of the developed strategies to foster desirable goal orientation, self-efficacy, and sense of learning community.

The inability of the audios/videos to affect these dependent variables may be attributable to the technical problems student faced during the first two semesters of the study. As noted by Hiemstra, Hummel, and Sint (1996), the media must be developed in order to allow for studying by learners to be independent of time, pace, and location. As addressed earlier, many students were unable and/or unwilling to download the files from the Internet. This required them to access the files from computers other than the one that may be most convenient. Additionally, the frustrations and time required to download the files created a barrier that dissuaded the media's use. Therefore, an uncounted number of students did not utilize these files at all. As seen in the spring semester, when the complexity of accessing the files was reduced, student achievement

was increased. Similarly, the media treatment resulted in significant increases in self-efficacy when the files were accessed from the CD.

As indicated in the exploratory section of Chapter 4, the degree of access learners had to the audios/videos impacted their sense of learning community. Students were similar at the beginning of the semester, but those students accessing the files via the CD exhibited a considerable increase in sense of community, while those accessing the files via the Web recorded a decrease. This could be attributed to the frustration they experienced trying to access the files. These frustrations and lack of resolution of their problems apparently alienated these students from one another and the instructor.

It is possible that the instrument developed to assess the subjects' sense of community was not measuring what was intended. While the factor analysis clearly indicated that the items measured the same construct, it is possible that the identified construct was not the one intended. The sense of belonging and of being part of a group trying to achieve a goal with easy access to others to receive assistance failed to materialize.

Correlation Analysis

The relationship among the achievement scores of the students and some of the other dependent measures did not appear in this analysis. It would be expected that achievement scores would be positively correlated to the subjects' learning goal orientation, self-efficacy, and sense of learning community. Performance goal orientation would be expected to have a negative correlation with achievement. While learner self-efficacy and performance goal orientation marginally followed the expected

pattern of correlation, neither student learning goal orientation nor sense of learning community was significantly correlated to learner achievement scores. This finding raises doubts regarding the accuracy of one or all of the measures, or leads one to believe that students may have been motivated by other factors than those addressed in this study.

Several factors could explain the lack of correlation among these dependent variables. First, given the measures for goal orientation, self-efficacy, and sense of community were reported on-line, subjects may have answered the questions without reviewing or thinking about their responses. There was some indication of this response pattern. Students were administered randomly generated surveys via the Website three times during the semester. Students became familiar with the questions and may have responded arbitrarily. This pattern may have been encouraged since students were not answering the questions in the presence of an instructor.

While there was no conclusive evidence that student cheating occurred, it undoubtedly did happen. Students were allotted an 18-hour window to take their online exams. The questions appeared one at a time to minimize the opportunity and discourage the printing out of the exams. Savvy students could have printed each question individually and shared it with others. This behavior may have been encouraged more in the collaborative groups due to the bonus point rule that was established. This would reduce the correlation between achievement and the other dependent variables.

All students were provided a sample test prior to actually taking the assessment exams. When the students completed their tests, they were provided the correct

answers with feedback and encouraged to seek assistance. Very early in this study students were provided access to their assessment exams with the correct answers noted. Test security concerns brought this practice to a stop. In order to ensure test security, students were encouraged to come to the instructor's office if they desired to review their exams. Surprisingly, very few students actually did so. The inability to review these test with the students as a group to provide reinforcement decreased the possible transfer of the information and lessened the potential learning of the students. This may have reduced student grades as the semester progressed and reduced the relationship among the dependent variables.

Given the resistance of some learners to work in groups, the strategies and treatments designed to foster a learning goal orientation and sense of community were ineffective. Therefore, while the treatments increased student achievement, the learning goal orientation and sense of community remained stable, or may have declined. Thus, the expected relationship among the dependent variables failed to materialize.

During the course of the semester students in all groups received numerous bulletin board postings and emails from the instructor providing them with additional instructional materials and explanations, words of encouragement, and prompts to stimulate their learning. This may have brought about a more uniform goal orientation, feeling of self-efficacy, and sense of learning community than desired. Students in the treatment groups received additional instructional support through media and collaboration. However, if the instructional support received by all resulted in uniform

measures for the students, it would be more difficult to calculate the correlations between the differences in these variables and learner achievement.

The items used to measure the dependent variables may not have measured the intended factor. While the items designed to measure goal orientation and self-efficacy were validated prior to their inclusion in this study, their interpretation may have been different given the context of this study. Further, the community measure may not have evaluated the intended construct.

It is possible that the exam scores of the students were not a true indicator of their learning. Given the complexity of the information and lack of familiarity with the terminology, student scores may not have been a true reflection of their knowledge. The questions were designed to measure the conceptual understanding of the students and focused very little upon their recall of declarative knowledge. Given the context, this degree of learning may have been too difficult for many to achieve.

While the correlation between achievement and learning goal orientation was not significant, student responses to the question measuring their valuing of grades over learning was significant. At the conclusion of the semester, the correlation between students valuing of grades was negatively correlated with their achievement exam scores. The range of correlations varied from -.231 to -.290. This indicated that as the valuing of grades over learning increased for students, their achievement decreased. Thus, students who valued learning more over grade achievement tended to do better. This confirms the expected relationship.

Implications

The analysis presented confirms the previously cited research purporting that instructional support in the form of recorded lectures of instructors using audios/videos and/or the utilization of collaborative learning strategies does result in increases in student achievement/learning and decreases in attrition rates. Therefore, this information would prove valuable to instructors who teach any course at a distance and to those instructors who wish to provide their traditional students with additional instructional support.

Given the various forms that distance education takes, these findings provide evidence that learners taking courses administered via the television, through correspondence, and possibly traditional courses could benefit from recorded audios/video lectures of the instructor providing an explanation of the complex concepts. These forms of support allow students to better assimilate the information and provide them another form of media from which to draw information. It should be noted that these audios/videos are not a substitute for reading a textual presentation of the information. They should be a supplement to the information students derive from a textbook.

The evidence indicates that collaborative learning strategies can result in gains in achievement and a reduction in student attrition in an online course. Given this information, and the large amount of research supporting this assertion, instructors teaching courses both at a distance and in a traditional setting should consider implementing a form of collaborative learning to aid students in their acquisition of knowledge. However, the degree of support these groups require is extensive. Online

students, due to their physical separation, must be prompted and/or required to regularly communicate with one another. While this requirement may result in resentment from some students, the establishment of a well-organized group structure will provide students with the necessary instructional support. Further, the group members should be provided adequate incentive to encourage member support. As recommended by Slavin (1987), these groups should be provided a group reward that includes individual accountability.

The group rewards utilized in this study seemed to be an effective incentive to stimulate group interaction. Given the lack of development of student sense of community, learning was stimulated either from the support students received from others or from the sense of obligation these students felt to aid in the attainment of the group's achievement goal. Therefore, it is apparent that collaborative groups learning in an online setting must be provided with adequate incentive to work with one another. The bonus incentive may prove to be adequate. However, the determination of the cutoff score and amount of points to award for the achievement of the goal must be closely reviewed. As stated by Csikszentmihalyi and Nakamura (1989), the goal must appear to be attainable to the student, and it must prove to be challenging. The failure of students to view an achievement goal as attainable or challenging will prevent the group members from seeking assistance from or providing assistance to their fellow group members. Additionally, the bonus points must be high enough to be viewed as worthwhile, but not so high as to reduce efforts on subsequent assessment exams.

The importance of a personal orientation was recognized. Instructors teaching at a distance should, if possible, meet with their students personally, and preferably as a

group, to explain the intricacies of the course. This appears to be especially true for those courses involving the utilization of technology. Learner frustrations with technology will, in very short order, dissuade them from utilizing the technology. Additionally, instructors attempting to establish collaborative groups should require the group members to meet together at the beginning of a course to aid in improving group cohesiveness. Observation of the interactions of students in this study indicated that learners assigned to collaborative groups attempted to establish study groups and meet to work on assignments. Some of these attempts were successful, but several failed due to the perceived lack of productivity. These meetings should be encouraged and even supported by the attendance of an instructor.

Limitations of the Study

As with any data analysis, this study is faced with several factors that limit its generalizability. Students enrolled in the course did so voluntarily even though the course is a requirement for the majority of the students. Students could have enrolled in a traditional course taught in a variety of different time frames. Their enrollment may have been driven by their desire to experiment with a new avenue of learning, or they may have been misguided into thinking the course would be less demanding than it turned out to be.

The age of the students enrolled in the course, while reflective of the average age of the students enrolled in the college used in this investigation, is not reflective of the average age of students enrolled at all institutions. Therefore, younger students enrolled in secondary education and older students attending school may not react the same as the subjects included in this study to the various treatments.

Recommendations for Further Study

The findings of this study have created several questions relevant to instructors who teach both courses at a distance and in a traditional setting. The most compelling question relates directly to the assertions made regarding the effects of the treatments on student learning.

The evidence shows that students exposed to audio/video lectures and/or collaborative learning strategies tend to learn more than those who are not exposed to such instructional strategies. The data do not indicate that learners exposed to both strategies do better than those exposed to just one. While it does indicate that those learners exposed to both do better than those exposed to neither, it does not lead to a conclusion as to what the best mix of learner support may be. An analysis of the amount of collaborative requirements and type and depth of recorded lectures has on student learning may prove insightful. It may very well be that either strategy is equally beneficial and that those learners exposed to both are subject to information overload. However, combining the benefits of the recorded lectures and collaborative strategies seems practical. Requiring the learning groups to listen to and/or watch the videos, then review this content in a discussion with one another to complete a related assignment may bring to the forefront the instructional benefits of both strategies.

One can question the type and amount of guided learning strategies that most benefits online learners. Should an instructor provide students with daily prompts, questions, and explanations via a bulletin board posting or email, or should learners be allowed to discover relationships on their own? During the course of this study, it became apparent that an increase in the number and amount of information provided by

the instructor seemed to stimulate discussion. However, some students may have become over saturated with the quantity of communications and became less likely to access the course information presented on the website. All students were provided with the objectives for each chapter and a recommended sequence of study. A question arose as to whether the guidance should have been even more detailed. One could surmise that utilizing a management strategy that provides students with a calendar detailing the daily activities they should complete may increase student performance. This, coupled with more detailed advance organizers, may enhance the effects of the treatments included in this study.

The degree of attention to group characteristics and maintenance of group work with learner interactions that most benefits student learning in an online setting remains an unanswered question. In this study students were randomly assigned to groups to ensure diversity and generalizability. However, greater attention to group homogeneity or heterogeneity may have proven the better assignment technique. As indicated in the exploratory section, men were less likely to value learning and had higher degrees of self-efficacy than women. However, women were far more likely to take online courses in the future. Given these gender differences, it may prove worthwhile to research how these disparities relate to group assignment and whether such assignment impacts the development of a sense of community, increases learner self-efficacy, and improves student learning.

Given the constraints placed upon student-teacher interaction and feedback, a new set of strategies for developing a learning goal orientation, increasing self-efficacy, and instilling a sense of learning community may be necessary. This study indicated

that the strategies implemented did not positively impact these variables, in most cases. Research into effective strategies that do result in favorable effects on these factors in this context would prove to be valuable.

The pacing of instruction is a topic that did not receive any attention in this research. However, the interaction of pacing with some of the dependent variables addressed in this study may prove to be enlightening. Instructor led pacing was the approach utilized in this study. Allowing learners to control their own pace of instruction may enhance the effects of the treatments included in this study. Furthermore, research into the optimal length of time for a course to be conducted would be beneficial. Students in this study were allowed four weeks during the summer semester and sixteen weeks during the fall and spring semesters to complete the course. It was discovered that the summer students did better on each of the four exams. While no differences were significant, the p values indicated closer scrutiny might indicate significant differences.

Gaining an insight into the amount of time the subjects in different groups spent on class-related tasks would prove valuable. Requiring subjects to keep a time log to record the amount of time spent working individually and with their classmates could provide information about group interactions. Additionally, at the conclusion of the study this time log could be discussed with the researcher in a group interview.

It would be beneficial to interview the subjects at the conclusion of the study to gain a feel for their impressions and to delve into the specific events that occurred during the semester. This could include an investigation into the various learning

strategies utilized by the various groups, the degree of personal contact made within each group, and the amount of time spent in class related activities.

Lastly, research into the forms of media and types of access available to students enrolled in an online course should be scrutinized. Potentially, effectiveness comparisons could be made among exposure to audios, videos, both, and neither. These comparisons could be coupled with access comparison including CDs, Web, VHS tapes, and possibly live online video feeds. Such comparisons would better allow instructors to develop a mix of instructional strategies and media that most improves learning.

Summary

The information to be garnered from this research indicates that there are potential gains to be recognized from the utilization of lecture audios/videos and collaborative learning strategies in an online course. Given the findings regarding student achievement and attrition, the evidence is strong that the potential for the improvement in student learning exists. Further, the findings indicate that a refinement of the approach and amount of exposure is warranted. The non-conclusive findings regarding the impact the treatments had upon learner self-efficacy indicate that exposure to these strategies may result in beneficial learner outcomes.

With the number of hurdles placed before online learners, it is clear that the utilization of strategies that may improve student learning is worthwhile. The analysis conducted here suggests that providing these learners with recorded lectures via a CD coupled with the utilization of collaborative learning strategies will result in positive outcomes. While the time required in planning, developing, and implementing such

strategies and tools is extensive, the benefits far outweigh the costs. It is hoped that this research will lead to an increase in the number of innovative techniques used by instructors teaching online, or Web-based, courses. Students deserve such efforts.

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APPENDIX A

Entry Survey

Entry Survey

1. Name _____ email _____
   phone_____

   WebCT ID _____

2. Gender M F

3. Age _____

4. How many distant learning courses have you taken previously (other than online)? _____

5. How many online courses have you taken previously? _____

6. How would you rate your computer knowledge? (circle the corresponding number)

Novice				Expert
1	2	3	4	5

7. How do you expect your study of economics in an online setting to compare to the study of economics in an "average" college economics course taught in a traditional setting?

Much easier		Same		Much Harder
1	2	3	4	5

8. How do you expect your learning in this class to compare to the learning that would occur in an economics course taught in a traditional setting? You expect to learn _____.

Much Less		Same		Much More
1	2	3	4	5

9. List the economics courses you have taken previously

_____

APPENDIX B

Online Learner Survey

Online Learner Survey

Instructions: Circle the number that best reflects how strongly you agree with the following statements. **Do not write in any numbers.**

1. I typically do the work assigned in class because I like learning interesting things.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

2. I typically do the work assigned in class because I like to do better than other students.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

3. I feel as if I am isolated from the other students in this class.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

4. I am confident about my ability to interpret the economic models presented in this class.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

5. I am confident I can perform as well or better than others in this class.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

6. I typically do the work assigned in class because I like to score higher than other students.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

7. I typically do the work assigned in class because I don't want to be embarrassed about not being able to do the work.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

8. I typically do the work assigned in class because I don't want to be the only one who cannot do the work well.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

9. I feel as if I am detached from my classmates enrolled in this class.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

10. I typically do the work assigned in class because I like to work hard to solve challenging problems.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

11. I am confident I have the ability to understand the ideas taught in this class.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

12. Compared with others students in this class my skills are weak.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

13. In this class I feel I can receive help with problems from my classmates.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

14. I typically do the work assigned in class because I like to understand the material I study.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

15. I will have a good understanding of the economic concepts I will be taught.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

16. I typically do the work assigned in class because I don't want others to think I'm not smart.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

17. Relative to others in this class, I think I am good at economics.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

18. In this class I feel as if I am part of a community of students.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

19. I typically do the work assigned in class because I can show people that I am smart.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

20. I typically do the work assigned in class because I don't want to look foolish or stupid to my friends, family, or teachers.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

21. I am certain I can understand the economic principles presented in this class.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

22. I typically do the work assigned in class because I like to understand really complicated ideas.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

23. I think I will do better than other students in this class.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

24. I typically do the work assigned in class because I want to look smart to my friends.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

25. I feel as if I am disconnected from the instructor in this class.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

26. In this class I feel as if I am part of a classroom of learning.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

APPENDIX C

Online Learner Survey -- Post

Online Learner Survey -- Post

Instructions: Circle the number that best reflects how strongly you agree with the following statements. **Do not write in any numbers.**

1. I do the work assigned in this class because I like learning interesting things.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

2. I do the work assigned in this class because I like to do better than other students.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

3. I feel as if I am isolated from the other students in this class.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

4. I am confident about my ability to interpret the economic models presented in this class.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

5. I am confident I can perform as well or better than others in this class.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

6. I do the work assigned in this class because I like to score higher than other students.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

7. I do the work assigned in this class because I don't want to be embarrassed about not being able to do the work.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

8. I do the work assigned in this class because I don't want to be the only one who cannot do the work well.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

9. I feel as if I am detached from my classmates enrolled in this class.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

10. I do the work assigned in this class because I like to work hard to solve challenging problems.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

11. I am confident I have the ability to understand the ideas taught in this class.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

12. Compared with others students in this class my skills are weak.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

13. I feel I can receive help with problems from my classmates any time I need it.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

14. I do the work assigned in this class because I like to understand the material I study.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

15. I have a good understanding of the economic concepts I have been taught.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

16. I do the work assigned in this class because I don't want others to think I'm not smart.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

17. Relative to others in this class, I think I am good at economics.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

18. In this class I feel as if I am part of a community of students.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

19. I do the work assigned in this class because I can show people that I am smart.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

20. I do the work assigned in this class because I don't want to look foolish or stupid to my friends, family, or teachers.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

21. I am certain I understand the economic principles presented in this class.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

22. I do the work assigned in this class because I like to understand really complicated ideas.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

23. I think I am doing better than other students in this class.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

24. I do the work assigned in this class because I want to look smart to my friends.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

25. I feel as if I am disconnected from the instructor in this class.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

26. In this class I feel as if I am part of a classroom of learning.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

27. I will take another online course again in the future.

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

28. This class was _____ difficult that I expected.

Much More				**Much Less**
1	2	3	4	5

29. I learned _____ in this class than I would have had I taken the course taught in a traditional format.

Much More				**Much Less**
1	2	3	4	5

30. The use of the textbook helped me _____ in the study of the material.

Not at All				**Greatly**
1	2	3	4	5

31. The use of the studyguide helped me _____ in the study of the material.

Not at All				**Greatly**
1	2	3	4	5

32. The use of the textbook supplied CD helped me _____ in the study of the material.

Not at All				**Greatly**
1	2	3	4	5

33. The use of the audios helped me _____ in the study of the material.

Not at All				**Greatly**
1	2	3	4	5

34. The use of the videos helped me _____ in the study of the material.

Not at All				**Greatly**
1	2	3	4	5

35. The use of the instructor notes helped me _____ in the study of the material.

Not at All				**Greatly**
1	2	3	4	5