THE EFFECTS OF COOPERATIVE LEARNING TECHNIQUES ON PERCEIVED CLASSROOM ENVIRONMENT AND CRITICAL THINKING SKILLS OF PRESERVICE TEACHERS

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The Effects of Cooperative Learning Techniques on Perceived Classroom Environment and Critical Thinking Skills of Preservice Teachers

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Abstract

Antone Michael Goyak. THE EFFECTS OF COOPERATIVE LEARNING TECHNIQUES ON PERCEIVED CLASSROOM ENVIRONMENT AND CRITICAL THINKING SKILLS OF PRESERVICE TEACHERS. (Under the direction of Dr. Scott Watson) School of Education, May 2009.

This study analyzed the effects of cooperative learning techniques versus lecture techniques on the following aspects of a higher education classroom: (a) the perception of a student's learning environment and (b) a student's critical thinking skills. Preservice teachers at a small Midwest college completed the College and University Classroom Environment Inventory (CUCEI) and the Watson-Glaser Critical Thinking Appraisal, Form-S (WGCTA-FS). Results revealed significantly higher means in the cooperative learning group in four of the eight constructs within the CUCEI. Results within the WGCTA-FS disclosed no significant differences between the means of the two groups. The outcomes of this study suggest that cooperative learning techniques have merit and profit in the undergraduate classroom. Suggestions for further research were also included.

Acknowledgments

Many along the path of this journey have faithfully assisted me in getting to this destination. My initial thanks must be to Dr. Scott Watson, my committee chair, who has been very encouraging and patient. He has also provided guidance and navigation along each step of the way. In addition, I would also to express my sincere appreciation to Dr. Ellen Black and Dr. Jim Bennett for their expertise, direction, and assistance in this process. I also express gratitude to my sponsoring college, who permitted me to perform my research in the classroom and greatly supported me in my dissertation process.

My love and affection goes to my faithful bride and best friend, Stefanie Goyak, who constantly applauded, inspired, and cheered for me, never allowing me to stumble for too long. In addition, I would like to thank my dear children for their prayers, understanding, and patience in enduring many weekends without dad around the house. I would also like to thank my mother for consistently lifting me up in prayer and my dad for keeping me focused on God's truth. My gratitude also goes to my in-laws, who have been so prayerfully supportive of my efforts. Finally, I would like to express my appreciation to my Sunday school class, who faithfully prayed for me and received many lessons in class as a result of what God taught me through this journey.

In conclusion, I offer praise and thanksgiving to my Lord and Savior, Jesus Christ, who taught me dependence and a greater love for Him in the midst of challenging circumstances. In my weakness, He is made strong.

Dedication

This study is dedicated with admiration and thanksgiving to Dr. Rebecca Carwile, who provided me with the passion and desire to engage, encourage, and inspire others in the classroom; to value what it means to be a Christian educator; and to use every moment of instruction to love students in shaping lives for Jesus Christ.

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CHAPTER ONE: INTRODUCTION

This study sought to quantitatively analyze the effects of cooperative learning strategies integrated into a traditional lecture within a higher education institution. The author of this study specifically limited his sample to preservice teachers within two educational courses. The author interpreted the impact of the cooperative learning approaches through the use of two educational instruments: the College and University Classroom Environment Inventory (CUCEI) and the Watson-Glaser Critical Thinking Appraisal, Form-S (WGCTA-FS). The purpose of the CUCEI was to evaluate the learning environments for classes taught with traditional lecture versus cooperative learning strategies. The intention of the WGCTA-FS was to quantify the presence of critical thinking skills of students in classes taught with traditional lecture versus cooperative learning strategies. The intended outcome of this investigation was to evaluate the effectiveness of cooperative learning in an undergraduate setting for the training of future teachers in the classroom.

The contents of this chapter include the theoretical background of the topic of cooperative learning as well as key empirical studies that parallel this author's work. In addition, the author will present the problem statement and accompanying hypotheses so as to state the intended outcomes of this graduate student's research. In conclusion, the author will discuss the professional significance of this study as it adds to the current body of knowledge. In closing, the definitions of key terms unique to this investigation will be listed.

Background of the Study

Societal Background

In the arena of higher education are documented reports of an increasing shortfall of qualified math teachers in the United States. The Business-Higher Education Forum (p. 22) projected a shortage of 283,000 secondary math and science teachers by the year 2015. This concern has been not only a legitimate fear but has also been an apprehension of past educators. Kerr and Lester (1982) stated, “The growing shortage of qualified secondary school mathematics teachers in the United States is exacerbated by a glaring deficiency in the professional training provided for persons who choose to become teachers” (p. 431). These authors listed four reasons the preparation of secondary school teachers was inadequate (p. 432):

1. Many prospective teachers felt that mathematics courses lacked relevance.
2. The mathematics content and methods components of teacher preparation were not in step with the changing nature of society nor were they in tune with the changing nature of secondary school curriculum.
3. Educators gave little attention to developing a solid understanding of certain mathematics content, which is particularly important for secondary school teachers.
4. Preservice teacher programs provided insufficient emphasis on making prospective teachers aware of certain big ideas that pervade all of mathematics.

Though this example is in reference to a specific discipline, it goads this educator's thoughts and compels him to ask whether teacher-training programs in general are supplying preservice teachers with exemplary classroom models of learning. Panitz (1999b) stated that preservice teachers will model what others modeled for them in the classroom; therefore, it is essential that faculty teach using the instructional techniques they desire their students to use as future teachers.

The preparation of all preservice teachers must successfully begin in the undergraduate classroom. Attitudes and thinking skills are being formed within each student that are either enhancing or stifling their views of their subject matter and education. Much research has been accomplished in the latter part of the twentieth century relating to how students learn best (Johnson, Johnson, & Stanne, 2000). The foundational elements of cognitive learning theory state that students learn best when they actively engage within the learning process. Research has confirmed that students are involved with true learning when they actively make connections and organize information into meaningful concepts (Barkley, Cross, & Major, 2005). Research has also shown that the prime learning environment of undergraduate students is connected not with a passive learning environment but rather with one of interaction and discovery (Guskin, 1994). Guskin (1994) has noted the following:

> The primary learning environment for undergraduate students, the fairly passive lecture-discussion format where faculty talk and most students listen, is contrary to almost every principle of optimal settings for student learning. While the lecture and lecture-discussion formats are, overwhelmingly, the common practice at most universities where large

> classes, multiple-choice exams, and teaching assistants are the norm, this situation is also true for too much of the education that occurs in most smaller colleges. Intimate faculty/student contact that encourages feedback, that motivates students, and that allows students to perform is the exception, not the norm. Direct faculty-student engagement outside of class and other formal settings is not common, and students are only occasionally provided vehicles for real peer, collaborative learning with and without faculty. (p. 19)

This statement suggests that classroom pedagogy deserves to be scrutinized for its efficacy with students and especially preservice teachers. Does the end result of classroom strategies produce school teachers who are prepared for the classroom? Thomas Friedman (2006) made a thought-provoking statement when he said, “In the future, *how* we educate our children may prove to be more important than *how much* we educate them” (p. 302).

Theoretical Background

One classroom interaction structure that has stirred interest in the elementary and secondary teaching realms is cooperative learning. Cooperative learning (Johnson, Johnson, & Smith, 1991) is “the instructional use of small groups so that students work together to maximize their own and each other’s learning” (p. 1:14). A true cooperative learning environment offers the following five essential elements (Johnson, 2003) that are foundational to its activities:

1. Positive interdependence—As a group, the team strives together to reach a common goal. Everyone in the group has a role that must be fulfilled. If not,

the rest of the group suffers consequences.

2. Individual accountability—All group members are accountable for the successful completion of their own task. The group's responsibility is mastery of the material.
3. Face-to-face promotive interaction—Group members are expected to offer feedback, challenge ideas, and encourage each other.
4. Appropriate use of collaborative skills—Students are encouraged to practice team-building skills including trust, communication, leadership, and conflict resolution in a positive manner.
5. Group processing—Team members assess their progress and identify areas that could use improvement.

According to Slavin (1999), cooperative learning techniques have led to some of the greatest success stories the educational world has witnessed. Research has documented many benefits in using cooperative learning techniques in the classroom. George (n.d.), Felder and Brent (1994) affirmed in their investigations that cooperative learning techniques fostered a positive attitude toward the subject matter in the classroom. Springer, Stanne, and Donovan (1999) noted in their meta-analysis that the use of small-group learning within university science, mathematics, engineering, and technology courses had significant effects on the achievement, persistence, and attitudes of learners. Learning models have suggested that cooperative learning is more congruent with the skills that students need in real-world experiences. In addition, cooperative learning models are parallel with learning research results (Johnson, Johnson, Holubec, & Roy, 1984).

This author has chosen to focus on two specific outcomes of cooperative learning: cooperative learning as it affects perceived classroom environment and cooperative learning as it influences critical thinking. Johnson and Johnson (2007) strongly believe in their research in the cooperative learning field. They contend that "cooperative groups are perhaps the most effective tool colleges have in inculcating desired attitudes in students" (p. 21). While this statement may be true, they also document the need for more research in this area. Furthermore, cooperative learning has been shown to stimulate critical thinking in students through the development of higher-level discussion within groups (Panitz & Panitz, 1998). Panitz (1999a) believed that "in a typical college classroom emphasizing lecturing, there is little time for reflection and discussion of students' errors or misconceptions. With the cooperative learning paradigm students are continuously discussing, debating and clarifying their understanding of the concepts" (p. 1). Though many studies have been investigated in regard to the correlation between teaching methodologies and the cognitive side of instruction, researchers have noted that increased attention to the non-cognitive side of collegiate instruction, such as the classroom learning environment, would be beneficial (Khine & Chiew, 2001).

Significant Empirical Studies

In order to properly support the outcomes of this author's research, he will discuss three empirical studies within the main theme of cooperative learning: (a) a meta-analysis of the benefits of cooperative learning, (b) the effects of cooperative learning upon a learning environment, and (c) the effects of cooperative learning upon critical thinking.

The primary study this author would like to include is a meta-analysis on cooperative learning completed by David W. Johnson and Robert T. Johnson. The studies

included in this meta-analysis were selected from both published and unpublished studies that were relevant in the field of cooperative learning. In order for the research to be selected, the criteria were that the study had to review the effects of a specific cooperative learning technique on the achievement of students. A total of 164 studies were included in the analysis. With some reports containing multiple studies, a total of 194 separate comparisons were made through the meta-analysis. The meta-analysis had two independent variables and one dependent variable. The first independent variable was the specific cooperative methodology used in the research. Moreover, in the included study, some form of positive interdependence had to be exhibited, such as positive goal interdependence, positive reward interdependence, resource interdependence, or role interdependence (Johnson et al., 2000).

The second independent variable to be declared in this systematic review was the classification of the cooperative learning strategy as being either direct or conceptual. Direct cooperative learning methods were defined in this study as having procedures and step-by-step instructions for a teacher to follow in an exact manner. Comparatively, conceptual cooperative learning methods were defined as a structured framework a teacher could apply to general classroom methods and operations within a classroom setting. In addition, the dependent variable for this study was defined to be student achievement. Achievement included both standardized and teacher-made assessments and grades (Johnson et al., 2000).

In total, the meta-analysis was comprised of 158 research studies on specific cooperative learning strategies. The analysis categorized studies by decade, by randomly assigned individuals or groups, by grade, by publisher medium, by number of weeks that

the cooperative learning technique was employed, and by gender. In addition, the analyses were categorized by types of cooperative learning strategies: (a) Learning Together, (b) Teams-Games-Tournament (TGT), (c) Group Investigation, (d) Academic Controversy, (e) Jigsaw, (f) Student-Teams-Achievement-Divisions (STAD), (g) Team-Assisted Individualization (TAI), and (h) Cooperative Integrated Reading and Composition. The meta-analysis made comparisons for each of the learning methodologies to both competitive and individualistic learning environments. The size of the relationship between the two variables was quantified by calculating effect size of each treatment as well as calculating the average effect size and the mean weighted effect size (Johnson et al., 2000).

The conclusion of this meta-analysis yielded positive results in favor of cooperative learning. For each of the cooperative learning strategies previously listed, each revealed that cooperation promoted higher achievement than either competitive or individualistic efforts in the classroom. In addition, each cooperative learning exercise was evaluated according to five dimensions: (a) ease of learning the method, (b) ease of initially using the strategy in the classroom, (c) ease of using the strategy long term, (d) the applicability of the technique to multiple classes and disciplines, and (e) ease of modifying the technique to accommodate changes in classroom conditions. For this experiment, each score was correlated with the effect-size of each method. The conclusion was that the cooperative learning strategies that were more conceptual in nature were more effective in achievement than the direct cooperative learning methods. The study showed that cooperative learning methods that were effectively constructed and implemented according to plan were more likely to produce positive results within

the classroom (Johnson et al., 2000).

> The results of this meta-analysis provide evidence that considerable research has been conducted on cooperative learning methods, that eight diverse methods have been researched, all methods have produced higher achievement than competitive and individualistic learning, and the more conceptual approaches to cooperative learning may produce higher achievement than the direct methods. These conclusions are all the stronger due to the diversity of the research on which they are based, ranging from controlled field experimental studies to evaluational field studies. (p. 14)

As a secondary study to the meta-analysis completed by the Johnson brothers, this author would like to expound the results of an early study by Walberg and Anderson (1968). The premise of this study focused on the critical relationship between a student's individual satisfaction with a class's climate and his or her learning. The purpose of the research was structured to find a quantifiable relationship between a classroom's climate, as structured by a teacher, and its effects on achievement and interest in the subject. For this study, the structural aspects of classroom climate referred to how students related to each other organizationally within the classroom as defined by the group behavior. The affective aspect of the classroom climate referenced how satisfied the students were with the class as well as the intimacy or tension they experienced in the classroom. The results of these two dimensions culminated in student learning as defined by cognitive, affective, and behavioral constructs (Walberg & Anderson, 1968).

The results of the research revealed that distinct perceptions of classroom climate

were instrumental in how students perceived their growth during a course. The results of the research gave 32 statistically significant correlations ($p < .05$). In conclusion, students reported closer peer relationships and the ability to make more decisions when they were engaged in additional classroom activities.

Finally, in a 2005 published investigation, Khosravani, Manoochehri, and Memarian conducted a quasi-experimental study to view the effects of group-dynamic learning on the critical thinking skills of nursing students. In the sample population of this inquiry, 60 nursing students were attending their final year of clinical training at an Iranian university. The population was randomly divided into two equal groups representing a control group and an experimental group. The experiment's hypothesis (Khosravani, Manoochehri, & Memarian, 2005) was that "the critical thinking skills of nursing students passing their community health training by participating in group-dynamic sessions would increase compared with those of the control group" (p. 6). For those involved in the treatment group, subgroups met twice per week. The two treatment days integrated 8-10 group-dynamic sessions that involved the presentation of a topic with follow-up discussion (Khosravani et al., 2005).

To ascertain the progress in critical thinking skills, a questionnaire assimilated the nursing-specific critical thinking skills of assessment, diagnosis, planning, and evaluation. Both groups were assessed on subgroup topics of seeking information, diagnosis, clinical reasoning, clinical judgment, prediction, and creativity. The content validity and internal reliability of the survey were calculated and shown to have internal consistency scores of 99.95. For both the treatment group and the control group, mean scores were compared for each subgroup rating using *t*-tests. The experimental group

demonstrated higher mean scores in all six categories; but only the scores for diagnosis, clinical reasoning, clinical judgment, prediction, and creativity were significant ($p < 0.01$) (Khosravani et al., 2005). Study results concluded that "the more educators provide scenes for better and deeper thinking, the better learners can understand and analyze phenomena in the surrounding world to be better thinkers for better life" (Khosravani et al., 2005, pp. 9-10).

The Problem Statement

Purpose of the Study

This study sought to examine two questions related to the effects of cooperative learning: (a) What effects do cooperative learning techniques have on students' perception of their classroom environment, and (b) what effects do cooperative learning techniques have on the development of students' critical thinking skills in a classroom environment? Though the concept of classroom environment may seem abstract and difficult to make tangible, research has shown that the idea of classroom environment can be both conceptualized and measured (Logan, Crump, & Rennie, 2006). In their study, Khine and Chiew (2001) established the correlation between preservice teachers' perception of their learning environment and their attitudes toward a course.

While an effective learning environment should be relevant to an educator, critical thinking skills should be of paramount importance to believers in Christ. First Peter 3:15 (English Standard Version) states, "But in your hearts honor Christ the Lord as holy, always being prepared to make a defense to anyone who asks you for a reason for the hope that is in you; yet do it with gentleness and respect." Also, Christian educators have a greater purpose and higher calling to be effective critical thinkers. It is imperative that

preservice teachers be trained in how to think critically and didactically in this world. Lost in a sea of relativism, many educators do not know how to exchange arguments and counterarguments through rational discussion. Richard Paul (1984), in referring to students, succinctly expressed,

> They do not know how to conduct a serious discussion of their own most fundamental beliefs. Indeed, they do not know in most cases what those beliefs are. They are unable to empathize with the reasoning of those who seriously disagree with them. (p. 12)

Statement of the Problem

Research question one. What are the effects of cooperative learning techniques on the perceived learning environment of preservice teachers as measured by the College and University Classroom Environment Inventory (CUCEI)?

Research question two. What are the effects of cooperative learning techniques on the critical thinking skills of preservice teachers as measured by the Watson-Glaser Critical Thinking Appraisal, Form-S (WGCTA-FS)?

Statement of the Hypotheses

The following null hypotheses for each of the research questions were tested. Hypotheses were rejected at the .05 alpha level.

> H_{0a}: There will be no difference in the perception of the learning environment of preservice teachers who have been taught using cooperative learning techniques compared to preservice teachers who have been taught using conventional lecture methods, as measured by the College and University Classroom Environment Inventory (CUCEI).

H_{0b}: There will be no difference in the critical thinking skill scores of preservice teachers taught using cooperative learning techniques compared to preservice teachers taught using conventional lecture methods, as measured by the Watson-Glaser Critical Thinking Appraisal, Form-S (WGCTA-FS).

Professional Significance of the Problem

Implications

The implications of this author's study are beneficial for the future instruction of preservice teachers in the higher education classroom. Cooperative learning has been tested in a variety of settings, but further research would be advantageous in aiding an educator to know best how to teach those who will one day be teaching others.

The significance of this study lies in comparing the effectiveness of two documented teaching methodologies as utilized in a college classroom with similar population groups. This author currently teaches at a Christian college and therefore is placed in a favorable position to answer the problem in question.

Applications

The application of this research gets to the very heart of effective teaching. Though this research is narrow in its scope, this fixed approach could assist other programs of study in how professors choose to educate those training to be teachers. Preservice teachers are consequential to the success of education and their training should be viewed differently than the training of those not involved in a preservice arena. Felder and Brent's (1994) research parallels the purpose of this study: "The goal should rather be to optimize the learning experience for the greatest possible number of students, and extensive research has demonstrated that when properly implemented, cooperative

learning does that" (p. 18). Optimal learning techniques and conditions for student teachers have great possibilities for the students they will one day teach.

Definitions of Key Terms

General Definitions of Cooperative Learning

The following are samples of the various concepts of what cooperative learning is as well as specific components that make it distinct as found in the literature. These authors have articulated the concept of cooperative learning in the following manner:

1. For the purpose of this study, Johnson et al. (1991) defined *cooperative learning* as "the instructional use of small groups so that students work together to maximize their own and each other's learning" (p. 1:14).
2. Slavin (1987) defined cooperative learning as "a set of instructional methods in which students work in small, mixed-ability learning groups" (p. 8).
3. "Cooperative learning is an instructional method in which students work in small, heterogeneous groups to help one another learn" (Strother, 1990, p. 158).
4. "Cooperation is a structure of interaction designed to facilitate the accomplishment of a specific end product or goal through people working together in groups" (Panitz, 1997, p. 1).

General Definitions of Critical Thinking

The following are samples of the various concepts of what critical thinking is as well as specific components that make it distinct according to the literature. These authors have articulated the concept of critical thinking in the following manner:

1. *Critical thinking* is "purposeful, self-regulatory judgment which results in

interpretation, analysis, evaluation, and interference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based" (Facione, 1990b, p. 6).

2. *Critical thinking* is "reflective and reasonable thinking that is focused on deciding what to believe or do" (Ennis, 1985, p. 45).
3. "Critical thinking is the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generalized by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action" (The Critical Thinking Community, 1987, p. 1).

Other Significant Definitions

1. *Classroom environment* is "the tone, ambience [*sic*], culture or atmosphere of a classroom or school. It evolves from the relationships between students, and between teacher and students, and the types of activities, actions and interactions that are rewarded, encouraged and emphasized in the classroom" (Logan et al., 2006, p. 67).
2. *Learning environment* "is a place where people can draw upon resources to make sense out of things and construct meaningful solutions to problems" (B. G. Wilson, 1996, p. 3).
3. A *constructivist learning environment* is "a place where learners may work together and support each other as they use a variety of tools and information resources in their guided pursuit of learning goals and problem-solving activities" (B. G. Wilson, 1996, p. 5).

4. “A lecture is a well-prepared oral presentation on a topic by a qualified person” (Morgan, Whorton, & Gunsalus, 2000, p. 1).
5. For purposes of this study, *preservice teacher* refers to an undergraduate student enrolled in an education course at Midwest Bible College (MBC). (“Midwest Bible College” is a fictitious name used to preserve confidentiality.)

Introduction Summary

The training of preservice teachers is of great importance to the future success of our educational system and its students. The instruction preservice teachers receive is of little consequence unless they are taught to teach their curriculum effectively. Cooperative learning is effective in motivating and engaging preservice teachers in their preparation for the classroom (Hillkirk, 1991). Unless teachers are properly trained to use cooperative learning, expecting its penetration into the classroom is difficult. Research has shown that many preservice teachers enter their education programs without a clear concept of their own discipline (Yalvac & Crawford, 2002). The author’s hope is that this study will add to the current body of knowledge in assessing how to develop preservice teachers into classroom managers who are engaging, motivating, inspiring, and able to instill a love for being a lifelong learner.

CHAPTER TWO: REVIEW OF THE LITERATURE

The purpose of the literature review is to provide a theoretical, empirical foundation for the use of cooperative learning in this author's study. The use of cooperative learning techniques has been shown to be both relevant and germane to effective classroom atmosphere and instruction (Springer et al., 1999). The myth of the individual learner and individual achievement has been deeply embedded into the fabric of our educational society (Johnson, Johnson, & Smith, 1998). Cooperative learning, however, emphasizes that the achievement of learning outcomes should be responsibilities of both the faculty and the students (Barr & Tagg, 1995). This research document examines the historical and conceptual frameworks of cooperative learning and how its structure provided the impetus for this graduate student to investigate two key aspects of a successful classroom: (a) perception of the learning environment, and (b) the building of critical thinking skills. As part of this review, the author presents a summary of past research on cooperative learning to provide an understanding of the studies that have influenced and validated this group-based instructional method. He examined details of notable classroom inventories for both the perceived classroom environment and critical thinking components of this dissertation.

Historical Perspectives

Ideological Shifts in American Education

As the emphases and methodologies of a pragmatic society have changed over past decades, so have the emphases and methodologies of a college and university education. This transition over time is important for this educator to note, for it

accentuates the importance of the teacher to have insights into the learning models that best prepare the student teacher for the classroom. Sapon-Shevin (1992) commented that education is a microcosm of the way society operates in the real world. As society has experienced the rise and fall of many worldviews, so has education. In response to the needs and demands of a changing society, higher education has modified its emphases through three distinct and overlapping frames of reference.

To understand the ideological shifts that have taken place within American higher education, it is fitting to begin this summary with the birth of the American college during the Colonial time period. The colonial college existed primarily for the development of moral and spiritual character within the lives of students and not primarily for the emphasis of scholarly achievement. As Boyer (1990) commented in his study of scholarship in America, “Teaching was viewed as a vocation—a sacred calling—an act of dedication honored as fully as the ministry” (p. 4). This sacred calling manifested itself in students who were primarily prepared for civic and religious callings. Teachers were expected to mentor their young students and assist in the development of their spiritual disposition for the moral uplifting of their society (Boyer, 1990).

As America grew and prospered, the direction of college teaching shifted away from the shaping of young minds and the mentoring of character to an emphasis on democracy, agriculture, and manufacturing. As a new country hungry for growth and prosperity, America added service to its mission statement in higher education by promoting the desire to serve a democratic community. Instead of training for religious and civic service, higher education schools began to train students to strive to achieve a better world. The service-oriented patriot was considered the model product of collegiate

training. Harvard's renowned president Charles Eliot affirmed this philosophy in stating, "At bottom, most of the American institutions of higher education are filled with the modern democratic spirit of serviceableness. Teachers and students alike are profoundly moved by the desire to serve the democratic society" (Boyer, 1990, p. 5). The momentum of agriculture and manufacturing created an interest in utilitarian research designed to further perpetuate the growth of the nation. The professor took on a new role of disseminating knowledge in order to contribute to the progress of agriculture and manufacturing. The results of this accentuation led the professor into what is now known as *applied research*, a shaping of the nation through the efforts of experimentation within education (Boyer, 1990).

As the winds of philosophical change began to swell, an ensuing conflict appeared as church dogma and educational thought began to be at odds with each other. Marsden (1994), in noting this conflict, asked the question, "How could educators fully serve the church with its particular theological commitments while at the same time serving the whole of society?" (p. 44). This struggle of philosophies manifested itself as schools of higher education sought to be true to their Protestant roots yet showcase themselves as being current with mainstream educational thought, whether modern or ancient. There was a subtle shift in emphases, as noted in the example of Charles W. Eliot, who served as Harvard's president from 1869-1909. He believed in the idea of self-development and perpetuated this thought by allowing students to select their own course of study. It was not long before freedom within academics resulted in freedom from religious restraints as well. Ultimately, the ideas of Christian thought slowly gave way to the adherence of scientific truth and reasoning (Marsden, 1994).

The third shift in education occurred in the early 1900s when many schools of higher education saw research and science as their legitimacy of purpose and existence. The function of the college professor once again shifted focus from the teacher as applied researcher to an authority of scientific efforts. Eastern seaboard colleges began to emphasize scientific research, and a few colleges transformed themselves into research and graduate institutions. The values of the colonial college, which stressed the student's morality and character, began to lose ground to this new way of thinking. Research often replaced class and lecture; the idea of service as taught within higher education began to be viewed as unimportant (Boyer, 1990).

In the 1960s, educators busied themselves with investigating the achievement effects of a competitive learning environment in the classroom. In the 1970s, the emphasis changed as experimenters viewed individualistic learning as the key to higher achievement. In today's educational realm, the theory of group learning has taken a more prominent role than in past years within undergraduate education (Johnson et al., 2007). Some have the opinion that the teacher's role has once again swung back to guiding students and away from purely being a dispenser of knowledge (Korthagen, 2004). Though these shifts in educational thought have affected the course of American higher education, this author notes that a common thread within each of these periods has been the extent to which the teacher has been engaged with the students in a classroom setting.

Dispositions Toward Preservice Teacher Training

This graduate student has chosen to centralize his research on the classroom environment and critical thinking aspects of cooperative learning because both have been part of an end-goal for this educator in ascertaining what a preservice teacher should look

like upon graduation. The learning environment is a critical element in the attitudinal development of preservice teachers. In a 2001 study performed at the National Institute of Education in Singapore, Khine (2001) concluded that preservice teachers who experienced a positive learning environment were more likely to enhance their own students' learning by creating a positive learning environment. Deng (2004) underscored the need for teacher training that is broader based than current programs. He has suggested teacher preparation that embodies both training and education, with a higher emphasis on learning theory in the classroom. As Deng (2004) stated in respect to training and education, "Training is concerned with the development of skills and procedures, with a focus on 'knowing how.' Education, on the other hand, is the acquisition of knowledge and understanding, with an emphasis on 'knowing that'" (p. 162). As expressed by Korthagen (2004), two essential aspects that one should consider as part of any comprehensive teacher training program are determining the necessary attributes of an effective teacher and assessing how to assist teachers in acquiring these necessary attributes.

The focus of teacher-training programs at the undergraduate level is a deliberate inclusion within this research document. If cooperative learning has been deemed to assist in multiple areas of education for both students and teachers (Panitz & Panitz, 1998), then the discussion of preservice teacher training should also be addressed. One issue that Kerr and Lester (1982) revealed in their research was that the preservice teacher may not fully recognize or perceive the relevance of the curriculum he or she is studying. The student teacher has manifested this lack of relevance in a display of apathy or a negative attitude toward his or her subject. Yalvac and Crawford (2002) echoed this

sentiment by stating that many teachers do not have a clear perception of the nature of their own discipline. Moreover, as reflected in a recent study of graduate students in a secondary social studies student teaching preparation program, Doppen (2007) commented, “Only when they have a clear understanding of their own philosophy of social studies education will preservice teachers be able to make a meaningful connection with the methods they use to teach their subject” (p. 61). This same study identified active, engaging, and student-centered approaches as those methods used in class that were deemed essential ideas in social studies methods courses. In conclusion, this author wishes to emphasize the importance of a teacher preparation program in the lives of the students who sit under the scope of its influence. Teacher training programs have been extremely valuable in influencing the beliefs that preservice teachers hold about teaching and learning. Doppen’s (2007) research presented strong evidence that student teaching training programs have favorably influenced preservice teachers to integrate student-centered pedagogies into their collection of teaching methodologies.

Undergraduate institutions must continue to emphasize teacher training programs to advance pedagogical success in secondary and middle-school classrooms. Cooperative learning has had a rich history of theoretical and empirical results. Johnson and Johnson (2002) fortified this statement with documenting that over 249 separate studies have compared the effectiveness of cooperative, competitive, and individualistic learning in the college classroom. The results of their meta-analysis revealed that cooperative learning led to greater achievement, critical thinking, problem solving, and transfer of learning than either competitive or individualistic learning. One concern one must address in the training of student teachers is the dichotomy that often appears between

methodologies in the preservice and real-world classrooms. Teacher programs must help their students grow into the world where their learners will teach. College instructors must model what they desire their students to imitate (Coke, 2005). Dubisch (1970) made an interesting observation in stating the following:

> Somehow we must come to grips with the fact that a "C"-level understanding of a topic by a teacher may be worse than no understanding at all. For example, a somewhat muddled presentation of a proof by induction in a college mathematics class may, by usual grading standards, be entitled to a "C" grade. A prospective teacher, however, who passes the course with such a performance is all too likely to provide us with a second generation of students whose initial understanding of proof by induction is badly muddled. (p. 435)

In order for preservice teachers to move in a different direction from what has been previously stated and make significant connections in methodologies, students must have a clear understanding of the philosophy, relevance, and instructional techniques of their own subject and its curriculum.

A Critique of the Lecture

Despite the focus on instructional strategies used in the classroom, the primary test of success lies in the learner learning, not in the teacher teaching. It is the teacher's responsibility to cause the student to learn because the teacher has great influence. In Plato's *The Seventh Letter* (Georgetown University, n.d.), the philosopher Dion was so determined that Plato educate the young Dionysios, that Plato stated that

> he also wrote himself entreating me to come by all manner of means

> and with the utmost possible speed, before certain other persons coming in contact with Dionysios should turn him aside into some way of life other than the best. (p. 3)

This sentiment of the teacher's significance has been modeled by Gregory (1995), who in his seven laws of teaching, employed the use of a questions to mold students into independent lifelong learners. Wilkinson (1992) made the thought-provoking statement that for the teacher to teach is for the student to learn; in other words, he perceived teaching and learning to be parallel thoughts. He backed up this premise with a study of the book of Deuteronomy. Deuteronomy 4:1 says, "And now, O Israel, listen to the statutes and the rules that I am teaching you." Deuteronomy 5:1 states, "Hear, O Israel, the statutes and the rules that I speak in your hearing today, and you shall learn them and be careful to do them." The word *teaching* in Deuteronomy 4:1 and the word *learn* in Deuteronomy 5:1 have the same root Hebrew word. To teach, therefore, is to be eagerly busy with another's learning (Wilkinson, 1992).

This author would add, though, that while he would embrace many of the end goals and applications of this notion, this teaching needs further consideration. For example, the Lord Jesus Christ was the master teacher with flawless technique, yet Judas never embraced the cause of Christ and ultimately betrayed the one he claimed to follow. Nevertheless, someone must model for preservice teachers the instructional strategies that are considered best practice in the teaching world (Ruhl, Hughes, & Schloss, 1987). One such technique, the lecture, has been the primary mode of communication in the college classroom since the time of the Middle Ages (Frederick, 1986) and continues to be a strategy that is primary used in the classroom (Tileston, 2000).

Despite its prevalent use, some have criticized the lecture as an instructional strategy, and some educators have called for more active discussion and innovative teaching methods (Frederick, 1986). According to early historical research estimates, over 85 percent of the time in a classroom is spent in a lecture-based environment where students are isolated from each other in their learning experience and work against each other instead of with each other (Johnson et al., 1984). This educator is not purporting that cooperative learning should entirely replace the instructional technique of lecture in the classroom but rather supplement what is already occurring in the classroom. On the contrary, a well-developed lecture can accomplish the following objectives: (a) explain, clarify, and organize data; (b) analyze and show results of ideas that are compared and contrasted; (c) challenge beliefs and suppositions; and (d) motivate students to learn (Frederick, 1986). The imperative is that educators move away from those techniques that inspire a passive-learning mentality in the classroom. In his study, Maiorana (1992) concluded the following:

> Students are not able to assess their own learning achievements because the traditional classroom has taught them to be passive learners. They find it hard to engage in life-long learning because they have been taught *what* to learn, not *how* to learn. (p. 18)

This thought is echoed in Dorothy Sayers' (1947) assertion that though the educational institution is performing adequately in teaching subjects, it is lacking in teaching students how to think. Learning taking place, yet the art of learning is deficient.

Nair (2003) completed a study in which different modes of teaching were investigated to determine their effects on students' perception of classroom environment.

In this study, 504 students from Canadian and Australian universities participated in a study in which they were given the College and University Classroom Environment Inventory (CUCEI). This inventory has seven scales that measure distinct facets of a classroom environment such as personalization, student cohesiveness, task orientation, cooperation, individualization, equity, and innovation. One of the study's objectives was to quantify if a specific mode of teaching was more advantageous in producing measureable differences in the perception of a learning environment. In this specific study, the author compared three lecturers. Lecturers one and two followed a guided approach to learning that included methodologies and strategies adopted from both a secondary and tertiary setting. This guided approach to learning was designed to develop the skills and abilities of the students for success in a higher education setting. The third lecturer used a typical, standard lecture format as defined earlier in this document. In all but two of the scales of the CUCEI, the classes incorporating a guided form of lecture had higher mean scores than the course adopting a pure lecture strategy. In other words, lecturers who employed the standard framework of a lecture were perceived less favorably than those who employed more dynamic and engaging forms of teaching (Nair, 2003).

After many years of research in the undergraduate classroom, Chickering and Gamson (1987) summarized sound practices for college teaching in their article, "Seven Principles for Good Practice in Undergraduate Education." Their article included several recommendations: (a) encourage relationships between faculty and students, (b) develop a mutual exchange of cooperation among students, (c) use active learning techniques in the classroom, (d) give punctual feedback to students, (e) emphasize time on task, (f)

communicate high expectations for students, and (g) respect a wide array of talents and modes of learning.

Within the aforementioned listing, this author would like to highlight the emphases on active learning and cooperative relationships among students. These classroom elements move a learning atmosphere away from a passive climate to an engaging one. If these descriptions are foundational components of college teaching, then the fairly passive, lecture-driven undergraduate educational experience should be reconsidered as an optimal setting for learning (Guskin, 1994). In viewing the learning climate, "any attempts to structure classroom learning environments in ways that will facilitate deep approaches to learning must ensure that students have the requisite learning strategies to take full advantage of such teaching and learning experiences" (Dart et al., 2000, p. 269). Guskin (1994) made the suggestion that learning in the full sense of its meaning includes bridging the gap between experiential learning and real-world exposure, coupled with reflection on the integration of the learning and doing.

One documented concern with a primarily lecture-based classroom is that a lecture can be a precursor to a loss of attention span because the students are not engaged in their learning environment. In an early study on classroom attention, Johnstone and Percival (1976) studied the effects of lecture and the decline in attention span among students. The authors reported observing 90 first-year lectures in chemistry among 12 lecturers. A general pattern was a period of inattention at the beginning of the lecture as students settled down for the class hour. The next break in attention occurred between 10 and 18 minutes into the class. Johnstone and Percival noted that attention breaks became more frequent as the lecture progressed. This pattern repeated during lectures that

occurred without breaks.

Initially, students may experience excitement and enthusiasm at the beginning of a class. Unless another instructional methodology intervenes, however, students' passive-engagement may overtake the dynamics of the lecture-based classroom (Frederick, 1986). In a separate study reported by Middendorf and Kalish (1996), the researcher asked students to write summaries of presentations they had observed in the classroom. The students retrieved the greatest amount of information during the first five minutes of the presentation. After that time, the students' ability to recall information declined, with the lowest level reported during the 15-20 minute portion of the presentation. In a more recent study, Tileston (2000) has also noted in her lecture research that student attention spans decrease after listening to a lecture for 15-20 minutes. She attributes this phenomenon to the fact that "today's students are a part of a multimedia world from birth. They don't just listen; they participate. They don't just sit; they move" (Tileston, 2000).

Among researchers are those who would disagree with the premise that students' attention spans in a lecture-based format decline during the first 10-15 minutes, especially in a college atmosphere. Thompson and Pledger (1998), in comparing lecture to cooperative learning, stated, "The environment in the college classroom is sufficiently different from the precollege class to warrant separate investigation about using cooperative learning methods in this environment" (p. 5). Within a research study by these authors, a professor taught two groups of students in basic speech communication. One group was instructed in a traditional lecture-based classroom, and the other group was instructed using a cooperative learning technique. The comparison of the means of

the pre-test and post-test results failed to show a significant difference between the two groups' achievement scores (Thompson & Pledger, 1998).

In a secondary study performed by Morgan, Whorton, and Gunsalus (2000), researchers assessed the performance of college students in a special education course using lecture combined with discussion versus cooperative learning. When evaluating short-term retention, results showed that lecture combined with discussion produced higher scores than cooperative learning techniques did. For long-term retention, results for both methodologies were similar. Though several studies support the claim that students' attention spans declined in a lecture setting, a more recent study by Wilson and Korn (2007) questioned if the research on which this premise was based actually provided sound support. In their review of the literature, these authors argued that students' notes reflected the lecture's key points, showing that student attention spans did not actually decline. Research relied on subjective behavioral observations and did not give reliability estimates among the observers. The conclusion was that teachers should consistently strive for a classroom that motivates and engages learners, seeking to understand the students' thought-processes during class. The research emphasis significantly focused on noting individual differences in how students were attentive during a class. The teacher was responsible for motivating the learner; if a teacher was creating a classroom environment that stirred thought and demanded attention, students were sufficiently stirred and provoked to prolonged concentration (K. Wilson & Korn, 2007).

This graduate student would like to state that though attention lapses during a lecture may be hard to define and may be in dispute among researchers, classroom

achievement is not the only basis for evaluating teaching methodology. An instructor must look at the entirety of what creates a complete student, not only in the context of achievement but also within the framework of behavior and social development. Deep approaches to learning involve the creation of learning environments students see as safe, supportive, investigative, and flourishing in relationships, both between teacher and student and among peers (Dart et al., 2000). For a teacher to be true to his or her calling as an educator, proper pedagogy must include providing experiences and activities that pull a student out of passivity into an engaging learning atmosphere.

Conceptual Framework of Cooperative Learning

Introduction

The concept of cooperative learning is a learning strategy that boasts a rich and lengthy heritage. Cooperative learning has existed in several forms throughout history. One of the earliest evidences of cooperation appears in Ecclesiastes 4:9-10, 12:

> Two are better than one, because they have a good reward for their toil.
> For if they fall, one will lift up his fellow. But woe to him who is alone
> when he falls and has not another to lift him up! And though a man might
> prevail against one who is alone, two will withstand him—a threefold cord
> is not quickly broken.

The ability to work cooperatively with others has been an important factor in the successful survival of cultures. The Talmud suggests that learning partners read together, arguing with each other to maximize their learning (Alexenberg, 2004). In ancient Greek society, Socrates taught those under his tutelage in small groups the art of discourse (Johnson et al., 1998). Quintilian, the first-century Roman rhetorician, stated that students

could benefit by teaching one another. In the early 1600s, Johann Amos Comenius, a prolific pedagogical reformer, believed that students could benefit in their own learning by teaching each other as peers (Johnson et al., 1998).

Those who peruse the history of the Middle Ages discover that cooperative learning appeared within the structures of apprenticeships and guilds. The master craftsman would often teach the most skilled students in small groups. Those students, in turn, would teach those who were less experienced. During the late 1700s, Joseph Lancaster and Andrew Bell made extensive use of cooperative learning in England. Their pedagogical model was replicated in the United States in 1806 when a Lancastrian school was opened in New York City (Johnson et al., 1998). In the last decades of the nineteenth century, Colonel Francis Parker highly influenced classroom pedagogy in America. Colonel Parker brought into the classroom a concept of cooperative learning that was filled with enthusiasm, practicality, and democracy (Johnson et al., 1991). He believed in a work environment structured to stimulate students to ask questions, many of which led to experimentation. He sought to develop all aspects of a child; and the classroom was to be one of interest, freedom, and satisfaction (Cooke, 1912). Colonel Francis Parker took the inspiration for his classroom pedagogy from the master teacher, Jesus Christ. Cooke (1912) stated, “The ideal which inspired him . . . reaches far back of Colonel Parker’s personal life, and far beyond it. It finds itself personified in the love and in the life of the greatest Teacher in the world” (p. 420).

In the 1960s, David and Roger Johnson began their quest for research on cooperative learning; their research resulted in the Cooperative Learning Center at the University of Minnesota. Their work focused primarily on the following five coordinated

activities: (a) synthesizing research concerning cooperative, competitive, and individualistic learning; (b) formulating theoretical models regarding cooperative learning; (c) testing their theories using systematic research; (d) extracting validated strategies from the research; and (e) assisting colleges and universities in successfully implementing cooperative learning in the classroom (1991).

Sapon-Shevin and Schniedewind (1992) promoted the concept and purpose of cooperative learning in the following statement:

> Cooperative learning: more than a teaching strategy, more than an instructional technique. Cooperative learning is an entirely different way of viewing the educational process of schools, reshaping them into communities of caring in which individual students take responsibility for the learning of their classmates and respect and encourage each other's diversity. Cooperative learning has the potential to completely transform all aspects of your classroom and of your school so as to promote the sharing of power, responsibility, and decision-making throughout. (p. 16)

Concepts and Context of Cooperative Learning: Robert Slavin

One considerable argument for the success of cooperative learning in the classroom is the effective integration among the theory, research, and practice of cooperative learning (Johnson et al., 2007). Cooperative learning argues that it is not enough merely to work with others or just to work in groups within the class. Cooperative learning demands that all students within a class actively and meaningfully engage in a discovery process of learning (Johnson & Johnson, 1999a).

Three individuals who deserve recognition for their research contributions to

cooperative learning are Robert Slavin and brothers David and Roger Johnson. These individuals have been the most widely-cited for their work in the cooperative learning field (Sapon-Shevin & Schniedewind, 1992). Slavin (1996b) viewed cooperative learning research results to be one of the greatest success stories in the history of educational research. In his inquest, Slavin (1980) emphasized that cooperative learning should be integrated with three elements of what he refers to as *classroom technology*: (a) task structure, (b) reward structure, and (c) authority structure. These three essentials have significance because each restructures the framework of a classroom based on traditional design.

Task structure incorporates the mix of activities that occupy the lives of students such as lecture, discussion, seatwork, and group work. When integrated with cooperative-based principles, the structure and environment of the classroom take on new meaning regarding how effective learning takes place. The reward structure of a classroom can also be very different from a traditional setting when viewed in light of cooperative learning principles. An interpersonal reward structure highlights rewards by how they are linked to students. In a negative reward interdependence system, competition in the classroom is emphasized. Competition in this framework refers to one student's success necessitating another student's failure. Conversely, in a positive reward interdependence system, cooperation within groups is emphasized. One student's success allows all group members to experience success in the classroom. Finally, authority structure ascribes relevance to the amount of control students have over various aspects of a classroom such as an activity, learning, or framework. Authority structure can range from high student autonomy to high teacher autonomy; in either case, the authority structure is relatively

one-dimensional (Slavin, 1980).

Cooperative learning has had such a solid educational foundation because it has been one of the most thoroughly and carefully researched of all instructional methods (Slavin, 1990). According to Slavin (1987), "Cooperative learning refers to a set of instructional methods in which students work in small-mixed-ability learning groups" (p. 8). In addition, learners are encouraged to discuss, examine, contend, and disagree with the ultimate goal of teaching each other during the learning process (Slavin, 1991). Small groups provide accountability for the students not only to learn the material being taught but also to assist those in their groups to ensure that they also understand the material. Success of one member translates to success for all. One defining feature of a cooperative learning environment, states Slavin (1987), is that of the group goal, in which all students within a group are striving toward the same objective or target. The commonality in goals places a higher value on academic work and increases students' motivations in their learning. Slavin (1991) accentuates this point in stating that "when the group's task is to ensure that every group member *learns* something, it is in the interests of every group member to spend time explaining concepts to his or her groupmates [*sic*]" (p. 77). Motivational theorists have stated that students assist those in their group; in the student's mind, to help his or her classmate is to help himself or herself. A social theorist, however, would disagree and argue that students give support to those in their group because they genuinely desire to help their group mates.

According to the Slavin's research, a cooperative learning environment does not just happen in a classroom because students are placed in groups. Nor does the research support cooperative learning existing merely when students collaborate on a project. Yet

research has confirmed that students master the material more effectively when they work in cooperative groups rather than as individuals (Slavin, 1987). “The structure of the traditional classroom is highly inconsistent with adolescent development and peer norms. Traditional classrooms expect students to work independently and to compete for good grades, teachers’ approval, and recognition” (Slavin, 1996a, p. 1). Slavin would advocate using specific cooperative learning tools that have been investigated, rigorously tested in the classroom, and proven through sound research.

> Yet education has failed to embrace this dynamic, and as a result, education moves from fad to fad. Educational practice does not change over time, but the change process more resembles the pendulum swings of taste characteristic of art or fashion . . . rather than the progressive improvements characteristic of science and technology. (Slavin, 2002, p. 16)

Slavin (2002) contended that too often educational research is not truly experimental but rather too succinct and involving matters of theory rather than what is practical for the classroom. Studies must be completed in classroom situations over an extended period if educational research is going to benefit educators and improve student outcomes.

According to Slavin (1980), cooperative learning differs from mere group activities in five specific areas of interest: (a) reward interdependence, (b) task interdependence, (c) individual accountability, (d) teacher-imposed structure, and (e) the use of group competitions. Slavin has detailed each of these facets of cooperative learning as follows:

1. Reward interdependence is defined by groups' receiving specific rewards based on their performance as a group.
2. Task interdependence is defined as groups' relying on the skill sets of the entire group to be able to succeed in a task.
3. Individual accountability is defined as group scores being comprised of individual team member scores.
4. Teacher-imposed structure is the degree to which the teacher establishes tasks, rewards, and schedules.
5. Group competitions are prizes or rewards the teacher gives to the highest scoring groups in the class.

Successful modeling of cooperative learning techniques involves the augmenting, not replacing, of direct classroom instruction (Slavin, 1989). There is a strong consensus that cooperative methods must have two specific conditions met in order for them to flourish and experience raised student academic achievement. Primarily, each group must be striving for a common goal that the group must embrace. Individualism or competitiveness can stifle a cooperative learning setting and neutralize any progress that was gained. In a positive interdependent setting, teammates must work together to earn rewards, grades, or recognition; individuals progress and move forward as a group. Second, the group succeeds only if each individual succeeds; and each individual succeeds only if the group succeeds. Consequently, each group member is accountable to all other members to ensure that they know and understand the material their teacher presented. This individual accountability among group members moves students away from the idea of personal advancement to a greater concern for each other (Slavin, 1990).

Concepts and Context of Cooperative Learning: David W. Johnson and Robert T. Johnson

The research and classroom investigations of cooperative learning David and Roger Johnson performed have similar end goals but differing methodologies to that of Robert Slavin. The Johnson brothers observed a model of classroom teaching that they believed lacked vision, challenge, and true student learning. Proven theory and research substantiated their modified paradigm of teaching (see Table 1).

Johnson et al. (1991) summarized the following ideals of learning:

1. Students discover, construct, and extend knowledge into meaning; faculty create the conditions in which learning takes place.
2. Students construct their own knowledge in the classroom by linking previous knowledge to new material.
3. Faculty direct their efforts to develop students' talents and abilities for enculturation into society.
4. Education is a personal, social process between faculty members and students.
5. Learning must take place with a cooperative environment.
6. Effective teaching is a combination of the application of theory and research; faculty members must continually strive for mastery of instructional techniques.

Johnson et al. (1991) based their cooperative approach to learning on the premise that student-to-student interaction can be structured within a classroom in three ways: competitive, individual, and cooperative. In a competitive environment, one student's success would be translated into another student's failure. Students work against each

Table 1

Comparison of Individual/Competitive Structures versus Cooperative Classroom Structures

Context	Individual/Competitive	Cooperative
Knowledge	Faculty transfers knowledge	Students construct and discover knowledge
Environment	Passive classroom environment	Active, engaging classroom environment
Relationships	Impersonal transactions among students and between faculty and students	Personal transactions among students and between faculty and students
Assumption	Any person can dispense knowledge	Faculty teaching requires specific training and mentoring

Note: Adapted from "Active learning: Cooperation in the college classroom," by D. W. Johnson, R. T. Johnson, and K. A. Smith, 1991, Edina, MN: Interaction Book Company. Reprinted with permission of the author.

other because the entire group is unable to successfully meet the goals; rather, only one of the students can meet them. Resources are limited, and the class structure promotes a negative interdependence among students.

In an individualistic classroom structure, students are expected to succeed in isolation from other students, and goals and criteria are often expected to be met without the resources of others within the classroom. Students become focused on their specific self-interests and value success by how well they do individually. In addition, learning achievement is unrelated to how others are doing; achievement matters only to the individual learner. Finally, in a cooperative setting, learners work together to accomplish group goals in a shared framework. The primary difference between a cooperative setting versus a competitive and individualistic environment is that cooperative learning seeks end goals that promote the well-being of all group members, not just individuals. Johnson et al. (1991) defined cooperative learning as "the instructional use of small groups so that students work together to maximize their own and each other's learning" (p. 1:14). In addition, Johnson & Johnson (1992) have given a foundational thought for cooperative learning by stating, "Our goal is based on the premise that if students' learning goals are structured cooperatively, then students will help, assist, encourage, and support each other to achieve" (p. 174).

Educators must understand the essential elements of cooperative learning for cooperative learning to be successful in the classroom. Johnson et al. (1991) have built cooperative learning on five essential elements that distinctly separate it from the idea of students simply getting together in groups to work on an assignment. The first essential element of cooperative learning is positive interdependence. If students are to

successfully learn material and ensure that their group members also learn, students must have the perception that their personal attainment is linked to the attainment of the entire group. Interdependence promotes the sharing of resources, mutual support, and group celebration for the accomplishment of assigned tasks (Johnson & Johnson, 1999b). Students must know that their work benefits their group and that the work of the group benefits them (Johnson & Johnson, 1999a). Students can accomplish interdependence using several different techniques as illustrated by Johnson et al. (1991):

1. Goal interdependence—Groups unite around a common goal and succeed only if the group succeeds.
2. Reward interdependence—Group members receive the same reward when the group accomplishes its goal.
3. Resource interdependence—Each group member receives a limited portion of an overall resource or set of information to be combined to complete an objective.
4. Role interdependence—Each member of the group is assigned a role that complements the overall function of the group for a class activity.
5. Task interdependence—A class project or activity is divided among the group such that the completion of one member's activity is necessary for the completion of all group members.

A second foundational element of cooperative learning is individual accountability. Though group success is critical, cooperative activities must also have a level of accountability whereby individual group members are also assessed. This can be accomplished using individual tests or by holding each group member responsible for his

or her contribution to a task. In this manner each group member is made stronger as a contributing member of the group (Johnson et al., 1991). Individual accountability involves assessments being given back not only to the individual but also to the group. It is important for all members to know who needs further assistance, help, or encouragement to succeed (Johnson & Johnson, 1993).

Third, a flourishing cooperative learning group must include promotive interaction. Promotive interaction is characterized by individuals who provide the support, encouragement, and care needed for other members to be accomplished in their work and progress within the group (Johnson et al., 1991). “Students are expected to discuss what they are learning, explain to each other how to solve the assigned problems or complete the assignments, and provide each other with help, assistance, support, and encouragement,” state Johnson and Johnson (1992, p. 177). A well-functioning cooperative group looks to promote the success of every other member of the team in order to socially model the accountability each member has to his or her peers (Johnson & Johnson, 1999a).

In addition to promoting each member’s success, an appropriate use of small-group social skills is also necessary. No one should assume that students will know how to properly interact with each other in ways that promote group success and the handling of conflict. Instructors must teach and model skills to students such as communication, leadership, conflict-management, decision-making, and trust-building (Johnson & Johnson, 1992). Group social skills are the key to high productivity within a cooperative setting (Johnson et al., 1991).

In conclusion (Johnson & Johnson, 1999b), highly-functioning cooperative

groups need to strongly assess their own strengths and weaknesses. Groups need to be able to discuss those actions and statements that promote or hinder effective work within the group. Johnson and Johnson (1992) stated that the benefits of groups who evaluate their own production included the ability to maintain group effectiveness, learn critical social skills, receive feedback about participation, and provide reminders regarding the importance of group collaboration. Johnson et al. (1991) noted in their research that group processing can take two forms: small-group processing and whole-class processing. The instructor initiates small-group processing, usually toward the end of the class period, whereby each group receives time to assess its own effectiveness and how the group worked together. In whole-class processing, the instructor provides feedback to the entire class regarding what he or she observed during class while groups were interacting. Johnson and Johnson (1999a) asserted the following conclusion:

> Understanding these five basic elements and developing skills in structuring them allows teachers to (a) adapt cooperative learning to their unique circumstances, needs, and students, (b) fine tune their use of cooperative learning, and (c) prevent and solve problems students have in working together. (p. 71)

Contrasting Elements of Cooperative Learning Versus Collaborative Learning

Definition and characteristics. In looking at the instructional technique of cooperative learning, it is beneficial that this author describe not only what it is but also what it is not. The effective use of cooperative learning in the classroom requires that this researcher also look at a related term that is frequently interchanged with cooperative learning: collaborative learning. The defining of both terms will assist the reader in

clarifying why this author has chosen to use cooperative learning within the structure of his research. It is important to keep in mind that though both methodologies have dissimilarities in their processes, their long-term goals are very similar in nature (Bruffee, 1995).

In its purest form, collaborative learning refers to learning activities in which the mode of learning is carried out between pairs of learners or small groups of learners. Learning within the classroom is intentional and by design not left up to the whim of the teacher or the students. The shifting of responsibilities to students aids in meaningful learning taking place within a classroom. The definition of the word *collaborate* means to work together or to co-labor together. In like manner, collaborative groups work together toward a common goal the teacher has articulated (Barkley et al., 2005). As with cooperative learning, collaborative learning has found its roots in a constructivist epistemology. Johnson et al. (1991) summarize their thoughts:

1. Students discover, construct, and extend knowledge into meaning; faculty create the conditions in which learning takes place.
2. Students construct their own knowledge in the classroom by linking previous knowledge to new material.
3. Faculty direct their efforts at developing students' talents and abilities for acculturation into society.
4. Education is a personal and social process between faculty members and students.
5. Learning must take place with a cooperative environment.
6. Effective teaching is a combination of the application of theory and research;

faculty members must continuously strive for mastery in instructional techniques.

In its foundational elements, collaborative learning is more student-centered whereas cooperative learning is more teacher-centered. Collaborative learning is designed to shift the responsibility of learning away from the teacher as an expert and more toward the students. In his research on the differences between collaborative and cooperative learning, Ted Panitz (1997) defined both instructional methodologies: (a) "Collaboration is a philosophy of interaction and personal lifestyle where individuals are responsible for their actions, including learning and respect [for] the abilities and contributions of their peers" (p. 1), and (b) "Cooperation is a structure of interaction designed to facilitate the accomplishment of a specific end product or goal through people working together in groups" (p. 1). In highlighting some key thoughts in the above definitions, the authority within the classroom remains with the instructor in a cooperative learning setting whereas in a collaborative environment, the instructor transfers most (if not all) authority to the group once he or she has announced the class task. The collaborative technique is a very open-ended process while focusing on the overall goal of the class (Panitz, 1997).

When one views the unique elements of cooperative and collaborative learning, it can be helpful to compare the philosophies in terms of the following five direct contrasts (Panitz, 1997):

1. Collaborative learning is established in theories of the social nature of human knowledge; cooperative learning is grounded in social interdependence theory, cognitive-development theory, and behavioral learning theory.
2. Collaborative learning focuses on the *process* of working together;

cooperative learning focuses on the *product* of the working together.

3. Collaborative learning advocates more of a distrust atmosphere in allowing students more say in choosing groups; cooperative learning tends toward a teacher-centered classroom, reinforcing cooperation skills and positive interdependence.
4. Collaborative learning is more focused on interacting and being responsible for actions; cooperative learning concentrates on accomplishing a goal.
5. Collaborative learning would ask the question, "How do we teach children various roles within a group setting?"; cooperative learning would ask the question, "How can we empower children to become autonomous learners?"

Recognized concerns and weaknesses. Though this author supports the use of cooperative learning in the classroom, it is important to note some of the concerns and weaknesses with this strategy in light of the characteristics of current college students. Twenge (2006) has discussed an attitudinal change among students she has labeled as "Generation Me," referring to those born in the 1970s, 1980s, and 1990s. This group is characterized by a broad philosophy that encourages no single right way to live and a complete absorption with personal rights and success. Twenge (2006) does not see this plight as a total self-focus or as a problem of just being isolated; instead, "it's a way of moving through the world beholden to few social rules and with the unshakable belief that you're important" (p. 49). The relationship between Twenge's ideas and cooperative or collaborative learning is worth noting. The Christian educator must be very careful not to abdicate his or her authority in favor of a student-centered environment as is seen with collaborative learning. "When 'instructor-domination' decreases, a few students step up

their learning, but most of them cut their discipline, now and then blowing off in-class duties and all the time ignoring their teachers out of class," writes Mark Bauerlein (2008, p. 189). As the instructor-led classroom begins to decrease, a dangerous mindset can begin to flourish in the classroom, cites Twenge (2006):

> Classrooms are increasingly structured for teachers to be "facilitators" rather than authority figures. Lecturing is frowned upon; "collaborative learning" is in. Class presentations and group projects are common. Sometimes the teacher hardly says anything. If they don't understand something, they are supposed to ask each other, not the teacher. "And who's the last person you ask for help?" says the teacher. "You are," the students reply. The teacher goes on to say: "I don't teach. If I teach, who knows what they will learn. Teaching's out….If they stop and think about it, they are the authority! They are in charge of their own learning." (p. 29)

It is worthy to mention that this author does not support this type of classroom environment since it undermines the classroom's authority structure, thereby going contrary to the Bible's commands. In supporting this thought, Romans 13:1 states, "Let every person be subject to the governing authorities. For there is no authority except from God, and those that exist have been instituted by God."

It is this author's opinion that being an educator is a high calling from God to influence and disciple students for Great-Commission living. In light of that fact, the more a teacher abdicates his or her role in the classroom, the less opportunity that teacher will have to mentor and shape a student's ideas and values. The bestowing of intellectual independence on students appears to assist them in moving forward; but in actuality it

hurts students and causes them to focus only on the present, thereby diminishing the effects of past wisdom (Bauerlein, 2008). Students expect their mentors to be the authority in regard to their discipline, regardless of a student's personal feelings toward a teacher. The effects of this type of student autonomy breed sobering results, as Bauerlein (2008) cited in the following powerful statement:

> When the mentors disavow their authority, when they let their discipline slacken, when they, in the language of the educator, slide from the "sage on the stage" to the "guide on the side," the kids wonder what goes. They don't consider the equalizing instructor a caring liberator, and they aren't motivated to learn on their own. They draw another, immobilizing lesson. If mentors are so keen to recant their expertise, why should students strain to acquire it themselves? (p. 186)

The idea of cooperative learning for this author is not to provide an escape from the rigors of teaching in the classroom. Rather, it is to provide student guideposts in which to participate, interact, discuss, and collect thoughts so that in the end, new truth is not created but rather existing truth is unfolded and solidified. To abdicate responsibility in the classroom is paramount to "releasing students from the collective past" (Bauerlein, 2008, p. 190). This disassociation from past traditions can often mean that students no longer value or confer with the wisdom from prior generations that has withstood the test of time and has proven to be reliable. Bauerlein (2008) succinctly stated this truth in the following:

> As time goes by . . . the transient, superficial, fashionable, and hackneyed show up more clearly and fall away, and a firmer, nobler continuity forms.

> Tradition provides a surer standard, a basis for judgment more solid than present comparisons, than political, practical, and commercial grounds. (p. 190)

Bauerlein (2008) has also asserted that using youth-driven classroom methodologies tends to disengage the teacher from the learner. The teacher's role as a mentor provides a means for the Christian educator to become a sounding board for students in helping them come to conclusions that are true and based on truth, not based on feelings or simply the need of the moment.

In conclusion, the teacher must also address the concept of competitiveness in the class since it is an important facet of cooperative learning. In light of the self-esteem movement that has become more mainstream in education, discouraging competition in the classroom can be a misguided effort to promote a child's self-esteem. Competition is an element that can make learning enjoyable and beneficial for students, yet it can also be criticized because it can hurt a student's self-concept and his or her need to feel accepted (Twenge, 2006). Unfortunately, the self-esteem movement has received support in the educational setting and "is popular because it is sweetly addictive: teachers don't have to criticize, kids don't have to be criticized, and everyone goes home feeling happy. The problem is they also go home ignorant and uneducated" (Twenge, 2006, p. 67).

Philosophical differences: Cooperative versus collaborative. In conclusion, it is also significant to view the philosophical differences within a collaborative environment in light of how it opposes many of the accountability ideals of cooperative learning:

1. Collaborative learning does not recommend the variety of social roles that exist within a cooperative setting to ensure participation among all group

members.

2. Collaborative learning recommends that teachers not intervene within the learning groups but rather allow the learning groups to construct their own correctness of an answer without absolutes.
3. Collaborative learning does not recommend incorporating group processing that focuses on students' evaluating the working relationships of the group.
4. Collaborative learning promotes the authority of the group and not of the teacher. Conflict and sometimes dissent toward the teacher or toward an assignment are necessary components of effective collaboration (Bruffee, 1995).

Within an educational realm, the defining of a cooperative versus a collaborative setting is often intermixed with the terms used interchangeably. In general, elements within each methodology are similar and have utility within a classroom. In reviewing the instructional methodologies of cooperative and collaborative learning, though, this author is compelled to express his aversion to adopting a purely collaborative philosophy in the classroom. As one who embraces a Christian worldview of education, this author holds to the Bible as his sourcebook and framework of truth. In light of that, this author cannot embrace some philosophical components of collaborative learning. Primarily, this author's concern with collaborative learning is in the premise as stated by Bruffee (1995):

> Collaborative learning assumes that, relative to the most important questions and problems, the correctness of an answer or solution is seldom absolute. What is considered correct is more likely to be a matter of the relationship of the answer to a current consensus in the larger disciplinary

> or cultural group that the teacher belongs to and represents in the classroom. Teachers design collaborative learning tasks specifically, therefore, to make sure that an answer or solution cannot be judged in any absolute way correct. (p. 7)

Though students should have the opportunity to discuss divergent opinions and experiences and to resolve conflict, it is imperative that a framework of absolute truth exists within any classroom, especially a Christian classroom. The psalmist David stated in Psalm 119:16, “The sum of your word is truth, and every one of your righteous rules endures forever.” A lack of absolute truth leads to a false idea of God’s holiness and relevance in a person’s life. Though there are some intersecting ideas between collaborative and cooperative learning, this educator cannot wholly endorse or use these components of collaborative learning, as Bruffee (1995) discussed, within a classroom.

As a secondary thought, this author believes that God has given the authority in the classroom, and the teacher should be the one providing the guideposts students should follow. Teachers should be heavily involved in the learning process of their students. Setting aside authority to devise truth can be a very dangerous proposition. Hebrews 13:17 says,

> Obey your leaders and submit to them, for they are keeping watch over your souls, as those who will have to give an account. Let them do this with joy and not with groaning, for that would be of no advantage to you.

This educator believes that students should have liberty in the classroom to discuss ideas and engage in constructive conflict, but only within the bounds of truth the instructor has provided; to do otherwise could present to the students a false sense of security or a

warped idea of truth.

Theoretical Backgrounds

Theoretical Roots of Cooperative Learning: Constructivist Theory

Huitt and Hummel (2003) state that Jean Piaget was one of the foremost researchers of his day in the area of developmental psychology. Piaget's theory of learning offered two major aspects: (a) how a person came to know an idea or concept and (b) the phases through which a person moved to obtain this ability to know thoughts or concepts. In the process of obtaining knowledge, a person must go through both assimilation and accommodation. "Assimilation is the process of using or transforming the environment so that it can be placed in preexisting cognitive structures. Accomodation [*sic*] is the process of changing cognitive structures in order to accept something from the environment" (Huitt & Hummel, 2003, p. 1).

As structures became more complex, Piaget organized them into four hierarchal structures, identified as four stages in cognitive development. He defined these stages in the following manner (Huitt & Hummel, 2003):

1. The sensorimotor stage includes infancy with intelligence demonstrated through motor activity.
2. The pre-operational stage includes the toddler into early childhood, with intelligence demonstrated through using symbols and speech.
3. The concrete operational stage includes elementary through early adolescence, with intelligence demonstrated through logically relating symbols to their concrete counterpart.
4. The formal operational stage includes adolescence through adulthood, with

> intelligence demonstrated through logically relating symbols to their abstract counterpart.

Jean Piaget was one of the earliest advocates of learning within a constructivist environment. According to Piaget, children were able to construct knowledge because of interactions with their environment. Interactions could be comprised of physical activity and mental activity; but in either case, learning occurred first by encountering some new object or idea; and then further learning occurred by exploration, adding structure to the blueprint called a schema (Harlow, Cummings, & Aberasturi, 2006).

> Initially, the child tries to assimilate this new information into existing schema or thought structures. If the exploration of the object or idea does not match current schema, the child experiences cognitive disequilibrium and is motivated to mentally accommodate the new experience. Through the process of accommodation, a new schema is constructed into which the information can be assimilated and equilibrium can be temporarily reestablished. Disequilibrium reoccurs, however, each time the child encounters new experiences that cannot be assimilated. This is how construction of knowledge takes place. (Harlow et al., 2006, p. 45)

For Piaget, new knowledge could be constructed for an individual only when the student was confronted with an object or situation that was not part of the student's prior knowledge. The mind had to reform or reshape prior knowledge to allow for the new experience to be integrated into thought (Harlow et al., 2006).

In order to obtain a full picture of the concept of constructivism, it is significant for this graduate student to discuss another influential mind related to this topic of study:

Karl Popper. Popper was a philosopher who dedicated his life to the exploration of the various ways this world could be represented in relationship to the reality that people experience. His paradigm of thinking laid the groundwork for the constructivism of Piaget (Harlow et al., 2006). Popper's vision of constructivism took shape in the form of three worlds that, in his opinion, represented reality. World One consists of the physical world people can experience and know. The interpretations of how a person views World One through use of senses or prior experiences define World Two. One should note, however, that he or she should not take World Two as an exact likeness of World One, for World Two is shaped by the beliefs and views of those who hold them. In other words, World One reality could be interpreted differently by two different individuals through their World Two interpretations (Harlow et al., 2006).

It was in the formation of World Three by Popper that the elements of constructivism began to form and take shape. World Three was the development or construction of meaning and utility dependent on the interaction with Worlds One and Two. In other words, it was the end result of forming reality based on the physical models of World One through the lens of interpretation of World Two. For example, if a sculptor were creating a work, the stone would represent World One. World Two would be best identified through the creative imagination and interpretation of what the sculptor believed the block of stone could be. The finished work of art would be representative of World Three (Harlow et al., 2006).

In exploring the effects of constructivism and its meaning for a child, it would behoove this graduate student to reference the work of John Dewey and his thoughts on the matter of education in relation to constructing knowledge. For John Dewey, the most

critical influencer of the meaning and the interpretation of life lay in the social conditions of education. In Dewey's thoughts of constructivism for a child, the goal of education was essential; but the process of getting to the goal was just as important. "I believe finally," stated Dewey (1897), "that education must be conceived as a continuing reconstruction of experience; that the process and the goal of education are one and the same thing" (p. 5). To experience true learning, Dewey said the child would participate in the influencing social conditions that he or she met. Education would lie in the student's being involved in a constant process of reconstructing and interpreting the experiences that were met with each day (Dewey, 1897). This philosophy was not new to the world of education, for Plato referenced this idea centuries earlier when he noted that a society was most stable when each individual recognized his or her own aptitude for achievement and used his or her skills to progress social ends (Dewey, 1916).

For John Dewey, education was a social process that offered two complementary sides: (a) psychological, and (b) sociological. The psychological side of this social process provided the foundation for education through the aptitude and abilities of the child. This side of the social process provided a beginning for the child as well as a benchmark for interpreting these powers into social utilities. In contrast, the sociological side of this social process provided a means by which the aptitude and abilities of the child could be used toward social ends. A child's capabilities and competencies would never be fully made known until they could be decoded into what Dewey calls "social equivalents" (1897, p. 1). The psychological and sociological sides of the educational process together provided a means of constructing meaning and interpreting reality. "These powers, interests, and habits must be continually interpreted—we must know

what they mean. They must be translated into terms of their social equivalents—into terms of what they are capable of in the way of social service" (Dewey, 1897, p. 2). It is for these reasons that the process of education was so critical to Dewey, for in it lie the tools for recognizing skills and abilities, integrating these skills and abilities into the educational process and then interpreting those experiences to construct and reconstruct meaning for use in social ends.

So how does this theory of constructivism coalesce with the role of the teacher in the classroom? According to Holt-Reynolds (2000), teachers must learn to envision rooms that are engaging to the learner and dynamic in their approach to learning. Knowledge is not just a commodity to be received but one to be developed by both the teacher and student through thoughtful discussion and questioning. Exploration rather than memorization must permeate the arena of learning, and participation must be the expected culture. Holt-Reynolds (2000) expressed this sentiment in stating that

> we no longer educate teachers solely for a role as a dispenser of knowledge. Some teacher educators may, in fact, actively work to bias prospective teachers against such a role. Increasingly, we ask new teachers to learn how to elicit student participation and then use students' existing ideas as a basis for helping them construct new, more reasoned, more accurate or more disciplined understandings. (p. 22)

Theoretical Roots of Cooperative Learning: Social Interdependence Theory

In order to understand the essential elements of cooperative learning, it is important that the author delineate the topic of social interdependence in order to provide a foundational building block for the essence of cooperative learning. Social

interdependence is an effective example of how theory, research, and practice can be integrated to produce a synergistic result more grand than each of the individual components. Over 750 studies involving social interdependence validated the effects of cooperative learning in the classroom. The basic premise behind social interdependence is that the interaction of students is defined primarily by how the teacher structures goals in each classroom. Student involvement with each goal helps to create the outcomes of learning desired by the teacher (Johnson, 2003).

One can find the historical roots of social interdependence in the early studies of Morton Deutsch. In his research on cooperation and competition, Deutsch (1949) integrated these ideas into how they affect small group interactions. These small group interactions were the basis for investigating the effects of interdependence among groups. In order to better understand the logistics of interdependence, one would benefit by viewing his definitions (Deutsch, 1949):

1. Promotively Interdependent Goals
    a. If A, B, C, etc., does not obtain his goal, X does not obtain his goal.
    b. X obtains his goal only if A, B, C, etc., obtain theirs.
    c. A, B, C, etc. obtain their goals only if X obtains his.
2. Contriently Interdependent Goals
    a. If A, B, or C obtains his goal, Y does not obtain his goal.
    b. Y obtains his goal only if A, B, C, etc., do not obtain theirs.
    c. A, B, C, etc., do not obtain their goals if Y obtains his. (p. 133)

The work of Deutsch was instrumental in researching how the tension systems that group members experience can be interrelated to create a cohesive understanding of

interdependence. One problem Deutsch believed needed to be addressed was that many schools were not providing their students with the opportunities necessary for learning how to constructively interact with each other in the classroom. Deutsch (1993) has stated that the recognition of this problem has displayed itself in specifically three different yet overlapping solutions: (a) cooperative learning, (b) conflict resolution, and (c) educating for peace in the classroom.

In his studies of the topic of interdependence, Johnson (2003) differentiated among the types of social interdependence:

> Positive interdependence exists when there is a positive correlation among individuals' goal attainments; individuals perceive that they can attain their goals if and only if the other individuals with whom they are cooperatively linked attain their goals. Negative interdependence exists when there is a negative correlation among individuals' goal achievements; individuals engaged in such processes perceive that they can obtain their goals if and only if the other individuals with whom they are competitively linked fail to obtain their goals. No interdependence exists when there is no correlation among individuals' goal achievements; individuals perceive that the achievement of their goals is unrelated to the goal achievement of others. (p. 934)

In an important meta-analysis, Johnson (2003) gathered all available studies on social interdependence from the previous 110 years to quantify the effects of cooperative behavior. According to the study, the meta-analysis found that "the average person engaged in cooperative behavior performed at about two thirds of one standard deviation

above the average person operating within a competitive (effect size = 0.67) or individualistic (effect size = 0.64)" (Johnson, 2003, p. 936). In looking at the premise for why social interdependence works, it is necessary to state that this theory makes the assumption that cooperative efforts among classmates exist to the point that there is intrinsic motivation within the members and that all members desire to reach a common goal. But as seeds resting beneath the surface of the soil, it is only under the proper conditioning that growth in this area will occur (Johnson et al., 1998). As a concluding thought to the significance of social interdependence theory, Johnson (Johnson, 2003) has aptly stated the following in his work within cooperative learning:

> The application of social interdependence theory in education has resulted in the demonstration that cooperation may be used to involve students actively in learning situations and to achieve multiple educational goals simultaneously while accommodating individual differences and addressing a variety of social problems. (p. 942)

Theoretical Roots of Cooperative Learning: Sociocultural Theory

As a final contribution to the conceptualization of cooperative learning, one must also address the topic of socioculturalism for its relevance and contributions to the field of learning. While constructivism has focused more on constructing new information from prior schema, "the more likely contribution of the sociocultural program lies in helping us view the scholarly and scientific disciplines as social institutions—groups of people functioning together by virtue of shared cultural practices" (Bereiter, 1994, p. 22). Socioculturalism has often been pitted against constructivism (Cobb, 1994), yet each adds a necessary component to cooperative learning that makes it more complete in its

effectiveness. “Stripped to their essentials,” cites Bereiter (1994), “constructivism tells us to pay close attention to the mental activities of the learner, and socioculturalism tells us to pay close attention to cultural practices in the learner’s milieu” (p. 21). Cobb (1994) has argued that the proper mindset is not having to decide which of two, constructivism or socioculturalism, is best and adhering to only one theory. While there is a distinct difference between the two perspectives, they each offer significant benefits to learning in their own right.

Mathematics, for example, is a field that has aroused disputes over the constructivist versus sociocultural philosophies. These tensions have come about because of the opposing views of how a student learns best in a classroom. Typically, the constructivists have linked the conceptual and motor skill facets of learning together in identifying the best practices of teaching. On the other hand, those embracing socioculturalism have stated that it is the participation or enculturation of the student in the classroom activities that has provided the most influence in learning. Enculturation within the classroom would include completing worksheets, going to a store to calculate cost or sales tax, or being involved in a classroom activity that mirrors a real-life experience (Cobb, 1994). Cobb (1994) has presented a scenario in which both learning perspectives were not mutually exclusive but rather worked together to provide a balanced classroom of learning. “In particular,” cites Cobb (1994), “I will argue that mathematical learning should be viewed as both a process of active individual construction and a process of enculturation into the mathematical practices of wider society” (p. 13). In other words, pedagogy should focus not only on having the student construct new knowledge based on previous knowledge but also on allowing the learning

to occur within the confines of participation, engaging with other students.

One should not minimize the impact of socialization within a learner's environment. In fact, lack of socialization in the classroom has even been described in terms of being a crisis in the educational community. An isolated learning environment can create disconnected relationships between students and their peers, teachers, and parents. The results of this type of education translate into an inability to build and foster relationships that are critical for success in life, the classroom, and beyond the classroom.

> All of these facets of school life ignore the importance of relationships with other children and adolescents for *constructive* socialization and healthy cognitive and social development. Constructive peer relationships, characterized by caring, commitment, support, and encouragement, are just as important as constructive adult-child relationships for the development of healthy, productive adults. In most schools, however, legitimate peer interaction among students has been limited to extracurricular activities – and these are run by the same small groups of students who run everything in the school. (Johnson et al., 1984, p. 6)

Empirical Studies Within Cooperative Learning

Empirical Studies: Robert Slavin

In reviewing the empirical studies related to the topic of cooperative learning and the classroom environment, this author will first highlight a particular and early study completed by Robert Slavin. In his research, Slavin (1982) reported the results of two studies that centralized his investigation on the effects of cooperative learning and individualized instruction on the achievement, attitudes, and behavior of students. The

results of this research were categorized into two separate studies. In the initial study, researchers selected 504 students from third, fourth, and fifth grades and taught mathematics using one of three methods: (a) cooperative-individualized instruction, (b) a materials-only instructional scenario, and (c) a traditional class using small groups and classroom textbooks. In the second study, the population included 375 students in third, fourth, and fifth grades who used the same teaching methodologies found in the first study, with the exception that the second study compared only a single cooperative learning strategy to a traditional classroom setting. Both population groups were from schools within a suburban Maryland school district.

The group using the cooperative-individualized instruction employed Team-Assisted Individualization (TAI). The primary elements of TAI include the following six elements (Slavin et al., 1982): (a) teams consisting of four to five students, with each team having low, average, and high achievers as designated by an achievement test, (b) students placed in the appropriate place within the individualized program based on the results of a diagnostic test, (c) curriculum materials, (d) specific team study methods with classroom instructions, (e) scores based on team performance and teams given recognition for their scores, and (f) review sessions with the instruction for students who were struggling with any concepts. The group which was taught using the Materials-Only Program used the same curriculum materials as the group using TAI except students did not work on teams but worked individually; and students did not receive team scores or team recognition. In the final group, the control group, teachers taught using a traditional learning environment with established curriculum and textbooks (Slavin et al., 1982).

To measure mathematical achievement, Slavin used the Comprehensive Test of

Basic Skills (CTBS), administered as both a pretest and posttest. In order to quantify the attitude of students among the three testing groups, two eight-item inventories were given as pretests and posttests. One of the attitude scales was Liking of Math Class, which asked students to rate how much they liked the math class. The other scale was Self-Concept, which quantified a student's conception of his or her own work and effort in the classroom. In conclusion, the behavioral aspect of the research was determined using pre- and posttest scores from the School Social Behavior Rating Scale (SSBRS). The four scales employed for this test were Classroom Behavior, Self-Confidence, Friendships, and Negative Peer Behavior (Slavin et al., 1982).

First, study results revealed that the achievement scores of the groups using the TAI were significantly higher ($p < 0.03$) than the scores of the classes taught in a traditional manner, though the scores were not significantly different from the materials-only methodology. Moreover, for the behavioral inventories, the TAI students had significantly fewer problems ($p < 0.001$) than either the traditional or materials-only scenarios. This graduate student would like to focus his attention on the results of the attitude inventory since it presented the element most parallel to this graduate student's research. In controlling for both pre- and post-tests, survey results revealed the following information (Slavin et al., 1982): (a) the Liking of Math scale indicated a significant overall treatment effect on attitude scores over the control group ($p < 0.001$); (b) the Liking of Math scale indicated a significant increase in scores ($p < 0.001$) when using the TAI technique over the traditional classroom; (c) the Self-Concept in Math scale indicated a significant overall treatment effect on attitude scores over the control group ($p < 0.01$); and (d) the Self-Concept in Math scale indicated a significant increase in scores

($p < 0.01$) when using the TAI technique over the traditional classroom.

The second study analyzed the data in the same manner as in the first study. The CTBS results were similar to those found in the first study. The students using the TAI methodology scored significantly higher ($p < 0.03$) in their achievement scores than those in the traditional classroom setting. In addition, in the behavioral scale scores, teachers reported significantly fewer problems ($p < 0.05$) using TAI than those teachers in the traditional classroom. However, though attitudes were improved using TAI, the comparing of attitude scale results between TAI and the control groups suggested no significant differences in scores within either the Liking of Math Class or the Self-Concept in Math scales.

Empirical Studies: David W. Johnson and Roger T. Johnson

In order to begin the review of the significant research conducted by Johnson and Johnson, this author finds it is noteworthy to discuss an important meta-analysis completed in the area of cooperative learning. The strength of cooperative learning has been supported in this research and is summarized in the following statement (Johnson et al., 2000):

> In the past three decades, modern cooperative learning has become a widely used instructional procedure in preschool through graduate school levels, in all subject areas, in all aspects of instruction and learning, in nontraditional as well as traditional learning situations, and even after-school and non-school educational programs. (p. 2)

Johnson and Johnson have seen three contributing factors to the widespread use of cooperative learning: (a) cooperative learning has been based on theory and validated by

research; (b) more than 900 studies have validated the effectiveness of using cooperative learning; and (c) the teacher can implement numerous conceptual and concrete cooperative learning techniques in the classroom (Johnson et al., 2000).

Johnson et al. (2000) included research in this meta-analysis from both published and unpublished relevant studies in the field of cooperative learning. In order for the research to be selected, the criteria were that the study had to review the effects of a specific cooperative learning technique on the achievement of students. A total of 164 studies were included in the analysis; and with some reports containing multiple studies, a total of 194 separate comparisons were made through the meta-analysis. The meta-analysis comprised two independent variables and one dependent variable. The first independent variable was the specific cooperative methodology used in the research. Moreover, in the included study, some form of positive interdependence had to be exhibited, such as positive goal interdependence, positive reward interdependence, resource interdependence, or role interdependence (Johnson et al., 2000).

The second independent variable to be declared in this systematic review was the classification of the cooperative learning strategy as either direct or conceptual. Direct cooperative learning methods were defined in this study as having procedures and step-by-step instructions to be followed in an exact manner by a teacher. Comparatively, conceptual cooperative learning methods were defined as a structural framework that could be applied to general classroom methods and operations within a classroom setting. In addition, the author defined the dependent variable of this study to be student achievement. Achievement included both standardized and teacher-made assessments and grades (Johnson et al., 2000).

In total, the meta-analysis was comprised of 158 research studies on specific cooperative learning strategies. The analysis categorized studies by decade, by randomly assigned individuals or groups, by grade, by publisher medium, by number of weeks the cooperative learning technique was employed, and by gender. In addition, the analyses were categorized by types of cooperative learning strategies: (a) Learning Together, (b) Teams-Games-Tournament (TGT), (c) Group Investigation, (d) Academic Controversy, (e) Jigsaw, (f) Student-Teams-Achievement-Divisions (STAD), (g) Team-Assisted Individualization (TAI), and (h) Cooperative Integrated Reading and Composition. For each of the learning methodologies, researchers compared both competitive and individualistic learning environments. In addition, the effect size for each treatment was calculated as well as the average effect size and mean weighted effect size to determine the size of the relationship between the two variables (Johnson et al., 2000).

The conclusion of this meta-analysis yielded positive results in favor of cooperative learning. For each of the cooperative learning strategies listed above, each revealed that cooperation promoted higher achievement than either competitive or individualistic efforts in the classroom. In addition, each cooperative learning exercise was evaluated according to five dimensions: (a) ease of learning the method, (b) ease of initially using the strategy in the classroom, (c) ease of using the strategy long term, (d) the applicability of the technique to multiple classes and disciplines, and (e) ease of modifying the technique to accommodate changes in classroom conditions. For this experiment, each score was correlated with the effect-size of each method. The conclusion was that the cooperative learning strategies that were more conceptual in nature were more effective in achievement than the direct cooperative learning methods.

Overall, cooperative learning methods that are constructed effectively and implemented according to plan were shown to have a high likelihood of producing positive results within the classroom (Johnson et al., 2000).

> The results of this meta-analysis provide evidence that considerable research has been conducted on cooperative learning methods, that eight diverse methods have been researched, all methods have produced higher achievement than competitive and individualistic learning, and the more conceptual approaches to cooperative learning may produce higher achievement than the direct methods. These conclusions are all the stronger due to the diversity of the research on which they are based, ranging from controlled field experimental studies to evaluational field studies. (p. 14)

This meta-analysis is of great importance to this author in communicating the degree of interest and level of experimentation that the topic of cooperative learning has undergone in the field of educational research. Strategies and techniques used in the classroom must have a high level of credibility within the educational community. Effective methods and procedures employed in the classroom must be field-tested to create a hypothesis and transform it into theory. “University faculty should be as intellectually rigorous about their teaching methods as they are about their research,” states Johnson and Johnson (2002). “This means they need to base their teaching practices directly on theory and research” (p. 119).

A second study that this graduate student would like to highlight concerned a meta-analysis Johnson (2003) performed on the topic of social interdependence as found

within cooperative learning. Among the social sciences, the research on interdependence has yielded a high external validity and a generalization of results because of consistency in its ability to be tested. Field studies relating to social interdependence have shown themselves to exemplify the diversity necessary to be able to make broad generalizations about the effectiveness of cooperative learning. This systematic review of the effects of cooperative learning is a valuable resource for this author because it provides reliable and trusted field research in areas that parallel this author's work such as measuring aspects of a learning environment and assessing reasoning and critical thinking skills.

This secondary study was a meta-analysis research project related to the effects of social interdependence on multiple variables of achievement characteristics in the classroom. Researchers made comparisons between cooperative environments versus competitive environments, cooperative environments versus individualistic environments, and competitive environments versus individualistic environments. For this meta-analysis, cooperative learning as influenced by social interdependence was designated as the independent variable. The dependent variables consisted of the following classroom characteristics: (a) achievement, (b) interpersonal attraction, (c) social support, (d) self-esteem, (e) time on task, (f) attitudes toward task, (g) quality of reasoning, and (h) perspective taking (Johnson, 2003).

The mean effect sizes were calculated in order to be able to make proper comparisons regarding the relationship between cooperative learning and the dependent variables. In comparing the effect sizes in regard to all studies included in the meta-analysis, key results included cooperative learning that gained higher scores in all the aforementioned characteristics of the study compared to competitive or individualistic

learning (Johnson, 2003). These results have provided a necessary element of reliability in raising the credibility of cooperative learning as an instructional tool. Johnson (2003) echoed these thoughts when he made the following observation:

> The application of social interdependence theory in education has resulted in the demonstration that cooperation may be used to involve students actively in learning situations and to achieve multiple educational goals simultaneously while accommodating individual differences and addressing a variety of social problems. (p. 942)

Other Significant Studies

In addition to the aforementioned studies by Robert Slavin and David and Robert Johnson, this author would like to expound on the results of a study by Walberg and Anderson (1968). The premise of this early study focused on the critical relationship between a student's individual satisfaction with the climate of a class and the student's learning. The purpose of the research was stated as

> the examination of the hypothesis that individual student achievement and interest in the subject at the end of the school year can be predicted from structural and affective aspects of classroom climate measured at midyear. It seeks to determine the learning of individuals with different perceptions of classroom climate rather than the mean perception of the entire class. (Walberg & Anderson, 1968, p. 415)

For this study, the structural aspects of classroom climate referred to how students related to each other organizationally within the classroom as defined by the group behavior. The affective aspect of the classroom climate referenced how satisfied the students were with

the class as well as the intimacy or tension experienced in the classroom. The results of these two dimensions culminated in student learning as defined by cognitive, affective, and behavioral constructs.

The population of this research consisted of 2,100 junior and senior high school students in 76 separate classes throughout the United States. Each class participated in an evaluation of the Harvard Project Physics, an experimental course concentrating on a new methodology for teaching physics in the high school classroom. Within this project were batteries of tests used to measure cognitive and affective behaviors: (a) the Physics Achievement Test, (b) the Science Process Inventory, (c) the Semantic Differential for Science Students, the (d) the Pupil Activity Inventory, and (e) the Classroom Climate Questionnaire.

The research results revealed that distinct perceptions of classroom climate were instrumental in how students perceived their growth during a course. The results of the research provided 32 correlations that were statistically significant ($p < .05$). A summary of the research results yielded the following two interpretations in relation to the cognition and classroom climate (Walberg & Anderson, 1968):

1. Students who were high performers on the Physics Achievement test tended to see the class as close, intimate groups working toward a common goal.
2. Students who grew the most in their science understanding viewed the class climate as well-organized and producing social harmony among classmates and teachers. In other words, there was the perception of little conflict taking place during the course.

The affective growth predictors yielded statistically significant results as well. A

summary of the results yielded the following interpretations (Walberg & Anderson, 1968):

1. Students who perceived their lab courses as being more enjoyable also saw the class as providing an atmosphere of equal treatment, choices in setting course policies, clarity in course goals and objectives, and intrinsic rewards.
2. Students who gained the most interest in their physics courses perceived their courses to be well organized and free of stratification among students.
3. Students who identified their classes as more friendly perceived those same classes to have clarity in goal setting and course policies and unbiased relationships that lacked friction and promoted communication.
4. In conclusion, students who engaged themselves in additional physics activities observed their courses to have close relationships with their peers, a sense of being united with their classmates, and the opportunity for involvement in class decisions.

The study results are important in relating a perceived classroom experience or environment to statistically significant growth in both cognitive and affective behaviors. In other words, they give clarity to what makes for a good learning climate. The quantifying of the relationships between teaching methodology, perceived classroom climate, and achievement is highly significant for this author. As Walberg and Anderson (1968) stated at the conclusion of their study,

> Moreover, from a practical point of view, the ability to predict learning outcomes from assessments of classroom climate may have implications for teacher education, behavior modification of in-service teachers, and

> the assessment of teaching effectiveness, provided educators can agree on measureable goals of education. (p. 418)

In conclusion, one final study this author would like to highlight is an early study that quantified the perception that either a teacher or a student has of his or her classroom environment. This study provided an important link between something considered intangible and achievement subsets in the classroom. For purposes of this study, the classroom environment referred to the shared perceptions of various aspects of the class. Trickett and Moos (1973), in referring to their study, noted that "the present study is an attempt to develop an assessment technique for 'capturing' the psychosocial environment of the junior high and high school classroom by asking teachers and students to report their perception of various aspects of the class" (p. 94). In other words, instead of using an observer as a third party in the classroom, the classroom environment would be defined through the eyes of the actual students and teachers, thereby producing advantages that could not be obtained through the objective observations of an outside observer.

The survey instrument used for this research was the Classroom Environment Scale (CES), which consisted of 242 questions and represented 13 different conceptual dimensions. The initial testing group was comprised of 504 high school students in 26 classrooms in 6 public schools and 1 private school. The instrument contained nine subscales used to assess student or teacher perceptions of the classroom environment. The subscales included the following: (a) Involvement, (b) Affiliation, (c) Support, (d) Task Orientation, (e) Competition, (f) Order and Organization, (g) Rule Clarity, (h) Teacher Control, and (i) Innovation (Trickett & Moos, 1973).

The consistency of the CES proved to have significant implications for the study of psychosocial behavior in the classroom. The quantifiable assessment of the classroom environment could then be used to research the types of classroom environments that would be best for learning both behaviorally and academically. “In short,” quoted Trickett and Moos (p. 100), “such assessment techniques can aid in understanding the socialization effects of differing classrooms and differing teaching styles. In addition, it becomes possible to test varied assumptions about ‘where’ classroom environment comes from and who sets the tone” (1973). In conclusion, the CES provided yearly data the teacher could analyze and use to bring a class from its current disposition to where it should be. The author anticipated that results could be used to understand student behavior more effectively and used to produce change and development in adolescents (Trickett & Moos, 1973).

Conceptual Framework of a Classroom Environment

Classroom Environment Defined

This author has chosen to concentrate a majority of his research on the effects of cooperative learning on a collegiate classroom environment. According to Wilson (1996), a classroom environment can be labeled in two different manners: (a) an instructional environment or (b) a learning environment. To accentuate one over the other reveals a teacher’s pedagogical philosophy regarding the nature and utility of knowledge. Wilson’s (1996) text on constructivist learning environments correlates a teacher’s view of knowledge to his or her view of instruction by the following:

1. If the teacher views knowledge as merely content to be relayed to the student, instruction is simply a product a teacher delivers.

2. If the teacher views knowledge as the processes of manifested thought in the classroom, then instruction becomes teaching strategies for the classroom designed to change how students think or do tasks.
3. If the teacher views knowledge by how a student interprets his or her interactions within an environment, then instruction is the process by which a student employs the tools and resources around him or her in an environment of discovery.
4. If the teacher views knowledge as the adoption of a group's methodologies, then instruction is the process by which a student is involved in the activities of his or her learning community.

For purposes of this graduate student's research, this author has chosen to focus on a constructivist learning environment within his study. A learning environment should be a place where a student cannot only be involved in a discovery learning process but also use various class resources to bring meaning and solutions to a subset of learning. Defining a learning environment, a constructivist denotes the importance of how the instruction will take place: using engaging and dynamic activities that will allow the students to develop meaning and skills pertaining to problem solving. This idea is implemented and sustained by creating learning communities within the class that support each other and assist each other in using the tools of their culture (B. G. Wilson, 1996). In light of the multiple aspects discussed in the formation of a meaningful classroom, Wilson (1996) defines a constructivist learning environment as "a place where learners may work together and support each other as they use a variety of tools and information resources in their guided pursuit of learning goals and problem-solving

activities" (p. 5).

A classroom environment that creates meaning for its students can often be hard to define because it cannot be turned into a prepackaged product (B. G. Wilson, 1996). Some may think of the environment as an intangible element of a classroom experience; nevertheless, the learning environment is an important consideration in higher education among faculty and administrators (Fraser, 1993). Yet despite its relevance and emphasis, few early programs assisted teachers in how to improve classroom environment (Treagust & Fraser, 1986). According to Logan et al. (2006), a learning environment consists of the following:

> The learning environment in formal educational settings can be described as the tone, ambience, culture or atmosphere of a classroom or school. It evolves from the relationships between students, and between teacher and students, and the types of activities, actions and interactions that are rewarded, encouraged and emphasised [*sic*] in the classroom. (p. 67)

The classroom environment is not only of importance to teachers, but it is a high priority at the student level as well. Fraser (1993) commented that "to meet student needs at the post-compulsory education level, it is desirable that a distinctive pedagogical, social and psychological environment be created and maintained" (p. 3). Classroom environment has a unique characteristic in that it can be represented or measured by the shared perceptions of both students and teachers in the classroom. This aspect provides an advantage to the researcher since the observer is not as critical to the process of research; the class can be assessed through the efforts of those most affected by the study results (Fraser, 1993).

Historical View of the Perception of Learning Environment

The advent of quantifying the perception of learning environments can be traced back to the 1960s when Walberg and Anderson created the Learning Environment Inventory as part of the Harvard Project Physics. Concurrent to this inventory was creation of the Classroom Environment Scale by Trickett and Moos, which was the product of a series of environment measures. These two studies have together provided much of the momentum toward research and investigation into the classroom learning environment. In reviewing the work accomplished on this subject, the author should mention that Moos's work provided three main categories of psychosocial learning dimensions which have been the impetus for other learning surveys. These three broad categories include (a) relationship dimensions, (b) personal development dimensions, and (c) change dimensions (Logan et al., 2006). The relationship dimension defines the nature and intensity of human relationships. The personal development dimension relates to how relationships grow, either among individuals or self-growth in an individual. In conclusion, the change dimension shows the extent to which an environment is orderly, is able to maintain control, presents clear expectations, and reveals how the environment responds to change (Treagust & Fraser, 1986).

How students view their learning has become a topic of interest within educational research (B. G. Wilson, 1996). Research has suggested that students' conceptions of their learning—or how they view their learning—are closely related not only to various approaches to learning but also to the creation and maintenance of learning environments. In 2000, a learning environment study was published about research performed in two metropolitan Australian secondary schools. Participants

included 457 students from 22 classes with the 2 schools. According to Dart et al., “We tested a hypothesized model that students’ conceptions of learning influence how they perceive their classroom learning environment, which, in turn, is related to how they learn” (p. 264).

The definition of a classroom environment for this particular study incorporated the care and consideration of students’ feelings, positive interactions between the teachers and the students, and a supportive atmosphere. To measure the learning environment, this study used the following three inventories: (a) the Conceptions of Learning Inventory (COLI), (b) the Individualized Classroom Environment Questionnaire (ICEQ), and (c) the Learning Process Questionnaire (LPQ). These questionnaires specifically targeted how students viewed their learning, how students viewed their learning environment, and how the students approached a given task. The authors asked questions in the context of classes typically offered in Australian secondary schools: mathematics, science, English, German, Japanese, history, art, and accounting (Dart et al., 2000).

In the investigation of the aforementioned study, this author would like to summarize each of the components of this research and their correlation to each other. In noting the relationship between how a student views learning and his or her approaches to learning, Dart et al. (2000) defined concepts of learning as (a) the proliferation of one’s own knowledge, (b) the memorization of information for reproduction, (c) the application of information to new settings, (d) the understanding of information, (e) the viewing of material in a new manner, and (f) the utilization of new information to produce change. In assessing how a student approaches his or her learning tasks, the Learning Process Questionnaire assessed both motives for studying and strategies adopted for completion

of a task. The components associated with both motives and strategies were defined as deep and surface approaches. In a deep approach, the student intends to seek out meaning for use in new situations, while in a surface approach, the student is pursuing understanding only to complete the task (Dart et al., 2000).

In conclusion, this study used the ICEQ to measure the learning environment perception among the students. In an attempt to relate approaches to learning to how the student perceived a learning environment, Dart (2000) found "that a deep approach is related to a classroom learning environment perceived as having high levels of personalization, participation, and investigative learning skills; the three dimensions of the environment are significantly related to each other" (p. 264). Therefore, deep approaches to learning are linked to a supportive classroom, a feeling of closeness, and independence in learning; surface approaches to learning are characterized more by achievement in the classroom (Dart et al., 2000). It is noteworthy to add that each of these skill sets has been included in defining a cooperative learning environment (Johnson & Johnson, 1993).

The results of this analysis revealed several measureable results that have significance to this educator's work. In summary, "teachers can promote deep approaches to learning through the creation of learning environments that students perceive as safe, supportive, and that offer helpful relationships" (Dart et al., 2000, p. 269). It is worthy to note, as supported by this research, that simply providing a supportive, helpful, and interactive learning environment does not by itself promote deeper approaches to learning. This climate, though, is instrumental in fostering a spirit of investigation, discovery, and problem solving. It is this growth within students that leads to a deeper

learning environment in which students begin to seek the meaning of material and contemplate how it is connected to other topics. “Such dimensions of the learning environment,” states Dart et al., “are more likely to be perceived by students who have qualitative conceptions of learning” (2000, p. 268).

Additionally, if a student was found to perceive a learning environment that accentuated meaning and related it to past information or experiences, then that student was more likely to use a deeper approach in his or her assessment of the completion of tasks. Students were more inclined to use investigative skills in their approaches to learning when the learning environments were perceived as being high in personalization skills. Moreover, the research outcome revealed that though an effective classroom climate had no direct influence on students’ depth of learning, it was those character traits that promoted an interactive problem-solving environment; and those relationships were instrumental in influencing deeper approaches to learning. Though students made choices in how they responded to various learning environments, the results of this inquiry stressed the importance of the teacher’s role in creating a classroom environment that emphasized meaning, discovery, and deeper approaches to learning (Dart et al., 2000).

Classroom Environment Inventories

College and University Classroom Environment Inventory

Design and validation. The author will measure the perception of classroom environment using the College and University Classroom Environment Inventory (CUCEI). The author will use this particular inventory because of its suitability of use in small higher education classrooms of about 30 students. A unique factor of this survey, its design, allows it to be used to measure the perceptions of both actual and preferred

learning environments for both teachers and students. This methodology is in contrast to differing studies where an observer is present to objectively journal the events in a classroom environment. Past research regarding the relationships between perceived and preferred learning environments has revealed interesting patterns between the students and the teacher. In research completed by both Moos and Fraser, teachers and students preferred a more positive learning environment than they actually perceived in the classroom. In addition, teachers tended to perceive a classroom environment more positively than did their students in the same classroom (Treagust & Fraser, 1986).

Though there have been a strong presence of learning environment studies in primary and secondary schools (Treagust & Fraser, 1986), Joiner, Malone, and Haimes (2002) have noted that educational reform has not addressed the learning environment of students with the same deliberation as other areas of education. The three learning climate inventories most used in prior research at the secondary level were the Learning Environment Inventory, the Classroom Environment Scale, and the Individualized Classroom Environment Questionnaire (Fraser & Treagust, 1986).

Four principles guided the design of the CUCEI:

1. The researchers examined the dimensions and factors used in primary and secondary surveys for consistency in the use of the CUCEI.
2. The dimensions used in the CUCEI referenced the work of Moos regarding human environments: relationships, personal development, and system maintenance. These three dimensions were designated as the minimum one must be assessed in order to obtain a full picture of any learning environment. In response to this, the CUCEI was designed using dimensions from each of

Moos's three categories.

3. Higher education students and teachers reviewed the design and dimensions of the CUCEI to solicit feedback regarding the validity of the instrument.
4. Researchers designed the inventory with fewer questions for ease in both answering questions and processing the results (Treagust & Fraser, 1986).

The final version of the CUCEI contained 49 items separated into the following seven categories:

1. Personalization—The interaction between the students and instructor as well as concern for the welfare of the students.
2. Involvement—The extent to which students engage in the classroom environment and have opportunity to participate in activities.
3. Student cohesiveness—The extent to which students interact with each other and help each other.
4. Satisfaction—The extent that a student enjoys a class.
5. Task orientation—The extent to which classroom activities are well-organized and clearly explained.
6. Innovation—The extent to which new and interesting activities are introduced in a lesson.
7. Individualization—The extent to which students are able to make decisions and show autonomy in the classroom.

The validation of the College and University Classroom Environment Inventory proved successful for use in the tertiary classroom. In a study by Fraser and Treagust (1986), samples consisted of 372 tertiary students from various disciplines who resided at

two higher education institutions in western Australia as well as 65 tertiary students from the University of Illinois. A sample of instructors consisted of 20 different teachers from both western Australia and the University of Illinois. The first index of validity reported was scale reliability, using student actual, student preferred, teacher actual, and teacher preferred responses. The estimates of the internal consistency were calculated using Cronbach's alpha coefficient. The final results of the alpha coefficient ranged from 0.53 to 0.90 with the individual and 0.78 to 0.96 with the class. The second index of validity reported was discriminant validity for each of the four forms of the CUCEI using both individuals and the class as the units of analysis. The CUCEI revealed that each of the seven dimensions of the survey had sufficient discriminant validity and were able to measure distinct aspects of a classroom environment. The test results gave credence that each CUCEI scale had internal and discriminant reliability consistency for both the preferred and actual perceptions, for both students and instructors, using the unit of analysis as either the individual student or the class average (Fraser & Treagust, 1986).

CUCEI: modifications. It is significant to note that the original study by Fraser and Treagust (1986) was modified in a subsequent study by Nair (2003) in 1999. For the research completed by Nair, the CUCEI was modified in three ways:

1. The actual and preferred versions of the inventory were personalized with new wording so that students were answering the questionnaire in light of their personal perception as opposed to what their class might perceive.
2. Two of the CUCEI scales were replaced with new scales.
3. The four-point Likert scale was replaced with a five-point Likert scale to better represent the personalized nature of the questionnaire (Nair, 2003).

This graduate student would like to focus attention on the scales that were modified within the CUCEI. The modified CUCEI involved replacing the involvement and satisfaction scales with two new scales, cooperation and equity. The newly included scales were defined as follows: (a) Cooperation—The extent to which students cooperate rather than compete with one another on learning tasks; and (b) Equity—The extent to which students are treated equally by the teacher (Nair & Fisher, 1999).

The sample used for the study's validation included 504 higher education students in a variety of science subjects. Of the total sample, 205 participants were from Canadian institutions, and 299 students were from Australian institutions. In reviewing the reliability and validity of the modified CUCEI, the Cronbach alpha reliability coefficients ranged from 0.73 to 0.93 when using the individual student as the item of analysis. When using the Actual and Preferred versions of the inventory, the Cronbach alpha reliability coefficients ranged from .76 to 0.94 (Nair & Fisher, 1999).

The research also tested the discriminant validity of the instrument to view the extent to which a scale of the CUCEI measured a unique dimension not covered by the other inventory scales. The mean correlations of the CUCEI scales ranged from 0.15 to 0.38 for the Actual Version of the instrument; the mean correlations of the scales for the Preferred Version ranged from 0.25 to 0.47. This research element confirmed that the CUCEI scales, though somewhat overlapping, have distinct qualities that make them unique to the questionnaire. This study was distinct in its use of the modified CUCEI in a tertiary learning environment, and the research concluded that the modified and personalized version of the CUCEI was a valid and reliable tool for the higher education classroom (Nair & Fisher, 1999). It is essential to note that the modified form was the

form this author employed for his research.

Empirical studies using the CUCEI. As a case for further examination, this author would like to present an exemplary study completed by the National Institute of Education in Singapore. This study was of particular interest because it has defined itself as one of the first analyses to examine the tertiary learning environment within Singapore. This research was completed at the only teacher-training institution in Singapore, the National Institute of Education. In this study, the CUCEI was used to measure how graduate students perceived their learning environment. In addition, the study also viewed the psychosocial links between classroom attitude and environment. The report findings provided further validation for using the CUCEI as a reliable instrument in measuring perceptions of a learning environment among preservice teachers (Khine & Chiew, 2001).

The investigation sample was comprised of 151students from the graduate level elementary training program as well as 184 students from the graduate level secondary training program. The purpose of the study's first element was to test both the validity and reliability of the CUCEI the National Institute of Education used. In the analysis of the CUCEI data, the Cronbach Alpha reliability ranged from 0.65 to 0.90. These numbers were similar to the results Fraser and Treagust (1986) found in their validation of the CUCEI. The study findings validated the use of the CUCEI in a cross-cultural setting. The experiment was also designed to review the correlations between the attitude of a student and the class environment. The researchers measured the attitudes using a questionnaire that targeted both the class difficulty as well as the speed at which the lessons were presented. The research methodology used a calculation of correlation

coefficients between each of the scales and their corresponding attitudinal measures. In addition, the authors completed a multiple regression analysis to test the association of the CUCEI scales to the attitudinal scores when the other scales of the CUCEI were controlled.

The study results confirmed statistical significance between a graduate student's perception of his or her learning environment and that student's attitude toward the course. In reviewing the results, one can see that the scales as represented by Student Cohesiveness, Innovation, and Satisfaction were significantly correlated to the attitude scale of Difficulty at the $p < 0.001$ level. In addition, two other scales of the CUCEI, Involvement and Personalization, were significantly correlated to the attitude scale of Difficulty at the $p < 0.05$ level (Khine & Chiew, 2001). The research results yielded the following general conclusions: (a) the CUCEI proved to be a valid tool for measuring learning environment factors at a tertiary school outside of the United States; (b) the results of the study validated a positive link between the CUCEI and the attitudes of graduate students towards their classes; and (c) the preservice teachers, having experienced a positive teaching environment, would be more likely to model that same type of environment in their own classroom setting upon graduation (Khine & Chiew, 2001).

The final conclusion is of great relevance to this author. It is imperative that classroom teachers model for their students the type of culture and atmosphere that is most conducive to learning. The final statement this study listed revealed how influential the teacher is in setting the proper model of pedagogy for preservice teachers who will one day have their own classes to engage in a vibrant, interactive learning environment.

In conclusion, it is appropriate to note that not all published research regarding the College and University Classroom Environment Inventory has been favorable in regard to it statistical performance. As a case in point, this author references two independent studies, published in 2005, that were completed in New Zealand. The study participants were secondary and tertiary students enrolled in a computer class in schools located in Wellington, New Zealand. The secondary study incorporated upperclassmen enrolled in an elective computer course in seven different schools in Wellington while the tertiary study investigated first-year students enrolled in a programming course in three different Wellington undergraduate institutions. The study objective was to ascertain students' perceptions of their computer learning environments in various classroom dimensions (Logan et al., 2006).

In the secondary study, a major research focus was to investigate whether a computer culture existed within the schools, if perceptions of the learning environment differed between boys and girls, and if learning environment perceptions differed among mixed- and single-sex schools. In this specific study, students were given both the preferred and actual versions of the CUCEI. The secondary study population consisted of 120 males and 145 females. During the course of this study, the research encountered three problems: a lack of understanding in the meaning of some of the items, an annoyance with similarly worded questions between the actual and preferred versions of the test, and complaints about the length of time necessary to take both tests (Logan et al., 2006).

In the tertiary analysis, the investigation focused on first-year students' perceptions of the learning environment, differentiated by gender, and on those who were

classified as immigrant or international status in their classification. The group sample size was 239 students, with 135 males, 97 females, and 7 other students who did not report their gender. Of the sample population group, 125 students completed both the actual and preferred versions of the test, 56 completed only the actual version, and 51 completed only the preferred version. In viewing the results of the test, the CUCEI did not prove as valid and as reliable as had been shown in other independent studies. The researchers, in reviewing the unique elements of computer programming, were not satisfied that the CUCEI accurately reflected the perceptions of the learning environments of each class. Computer programming classes were deemed to have distinct characteristics that made them different from a typical discipline of learning. As an example, many statements under the scale of Task Orientation were not considered appropriate for a computer programming class structure and were therefore eliminated from the research. In light of the mentioned shortcomings, the conclusion was that the CUCEI was not completely satisfactory in terms of the test's statistical adequacy, emphasizing the need to evaluate an instrument's psychometric properties to ensure its measurement competency (Logan et al., 2006). Logan et al. (2006) summed up the research by stating the following:

> Learning environments which do not conform to a controlled environment and which are known to have a subculture, as does computing, cannot be assessed solely by an instrument such as the CUCEI. Other kinds of data are required to build a more complete picture. (p. 84)

Though the conclusions of the aforementioned study merit consideration, the weaknesses the research presented are considered unique and not germane to this author's

research work. The original study completed by Treagust and Fraser (1986) proved the College and University Classroom Environment Inventory a suitable inventory for small higher education classes of about 30 students. Moreover, the research performed in modifying the CUCEI (Nair & Fisher, 1999) confirmed the CUCEI to be both a reliable and valid tool in a tertiary setting. In conclusion, the study by Khine and Chiew (2001) proved the CUCEI a valid, reliable tool in measuring the perception of the learning environment of preservice teachers. Because of this fact, this graduate student believes the CUCEI to be a legitimate, efficient inventory for measuring the perceptions of the learning environment of preservice teachers at Midwest Bible College.

In addition, this author would like to include a study that employed the CUCEI in a similar focus to his own graduate work. The study took place in a large university setting in Brisbane, Australia. The study's purpose was to investigate the relationship between a student's perception of his or her learning environment within a specific course and the satisfaction with that course. At the particular time of the investigation, the sample population group was enrolled in a required Educational Psychology course. According to the study's parameters, the students completed the Preferred Form of the CUCEI at the onset of the experiment and concluded by completing the Actual Form of the CUCEI at the end of the semester. Results of the study revealed significant differences ($p \leq .01$) between the preferred and actual perceptions by students in the scales of Personalization, Involvement, Task Orientation, Involvement, and Individualization categories (Clarke, Chant, & Dart, 1989).

In other words, "Contrary to student expectations, classrooms were more personable, there was more opportunity to get involved in classroom activities, classes

were more well organized and catered more for student individual differences" (Clarke et al., 1989, p. 17). This particular study's conclusion noted that whether the preferred or actual perception is being measured in the classroom, both are critical aspects that contribute to the overall satisfaction with a course; it is not merely academic achievement or the fulfillment of learning outcomes. According to Clarke (1989), prior research has focused on either how the actual perception of a student influences the satisfaction of a course or how the disparity between the actual versus the preferred perception of a learning environment is most influential in satisfaction. This study extended these ideas by noting that, depending on the course circumstances, the actual perception, dissonance, or a combination of both factors may have a more prominent role.

While the latter research study noted differences in actual versus preferred perceptions of a learning environment, this author believes that it is necessary to include one additional study that is also parallel in nature to the work of this graduate student. The focal point of this research work was to compare the effects of teaching two types of calculus reform classes: (a) a computer-assisted, student-centered course and (b) a teacher-only, teacher-centered course. "The principal aim of calculus reform," cites Joiner, Malone, and Haimes (2002), "is to use active, constructivist learning to shift calculus education away from just providing skills in symbolic manipulation to providing deeper conceptual understanding" (p. 52). In other words, both calculus reform classes were patterned after elements of a cooperative learning setting. The teacher assigned group members, and heterogeneous skill sets existed within each group. The quantitative analysis of the classroom environment was fulfilled using both the Actual and Preferred versions of the CUCEI in order to better determine the ways in which students desire

improvements in the teaching methodologies of a class. In addition, the study integrated a qualitative analysis comparing the reform classes to traditional lecture. It was noted that many tertiary-level mathematics courses were not in tune with the preferred learning styles of many students and that an overall appraisal of the course should include an assessment of the learning environment (Joiner et al., 2002).

The study sample consisted of 218 first-year engineering and science students enrolled in a calculus reform class. The research was performed at the Australian Defence Academy, a training ground for military cadets. The overall distribution of scores revealed that the actual student perception was significantly lower ($p < 0.01$) than their preferred perception of the classroom environment for all CUCEI dimensions of the survey. This disparity highlighted the general dissatisfaction of the students' perception of their learning environment compared to what actually took place in the classroom. Joiner (2002) observed that part of this response could be attributed to the emphasis on individual learning by universities. "Several students supported the new style of learning as being more relaxed, more focused, done at their own pace, and more interactive" (Joiner et al., 2002, p. 62). This report suggested that the gap between the actual and preferred perceptions of the learning environment could be bridged by noting that students valued classroom interaction and collaboration. This fact served to accentuate the obligation that a university had in attending to the students' socio-emotional needs.

IDEA Center Survey Form

Design and validation. As means of comparison, this author would like to emphasize a research study that incorporated a tool similar to that of the College and University Classroom Environment Inventory. In a recent study, Gilliam (2002)

completed research intended to test the theory of social interdependence in a community college setting. The sample population included 1,264 students enrolled in multiple courses within the community college. The research goal was to find the relationship between classroom instructional techniques and student ratings of learning outcomes and learning environment factors. In this particular instance, the methodologies of classroom instruction included those classes taught using cooperative learning and those classes taught without using cooperative learning. Gilliam's premise was that cooperative learning techniques that included interdependence theory would have a positive effect on students' perceptions of their different learning environments (Gilliam, 2002).

Gilliam (2002) chose to focus this study on the following four research questions:

1. What impact does cooperative learning versus non-cooperative learning strategies have on learning environment factors within the course?
2. What impact does cooperative learning versus non-cooperative learning strategies have on student ratings of learning outcomes and on student ratings of course excellence?
3. What impact do course learning environment factors have on student ratings of learning outcomes and on student ratings of course excellence?
4. What impact do learning methodologies (cooperative learning and non-cooperative learning) and course learning environment factors have on student ratings of learning outcomes and on student ratings of course excellence?

In helping to define this study more fully, the study's author chose to implement specific learning environment factors that were deemed influential in how a student perceived a classroom and rated the excellence of the instruction. The IDEA Center

deemed 12 learning environment factors to be statistically relevant through both empirical research and factor analysis of previous data collected from the IDEA Center Survey Form (Gilliam, 2002). Those elements IDEA Center included are the following: (a) learning techniques used in course instruction, (b) degree of course difficulty, (c) how a student perceives his or her own participation and motivation levels, (d) degree of student-faculty contact, (e) the level to which students are involved in the course, (f) the level to which faculty have high expectations of student involvement and student achievement, (g) the level to which the instructor is clear in the presentation of his or her content, (h) the degree to which he or she emphasizes assessment and classroom feedback, (i) the degree to which the instructor emphasizes key points of the curriculum, (j) the level to which the instructor instills interest within the student for the course, (k) the degree to which the instructor emphasizes and uses collaborative learning skills in the classroom, and (l) the degree to which the instructor employs multiple instructional approaches in teaching a lesson (Gilliam, 2002).

The instrument used to assess the student satisfaction of both the instruction within a classroom and the course was the IDEA Center Survey Form—Student Reactions to Instruction and Courses (ICSF-SRIC). This instrument contains 47 questions used to quantify the learning environment factors employed in evaluating student satisfaction in the classroom. The form is comprised of questions relating to the instructor, progress in course objectives, comparisons to other courses, attitudes toward the course, a self-rating of personal attitudes and behavior, and personal judgments regarding the course (Gilliam, 2002).

The questions incorporate 12 learning outcomes, or learning objectives, as one of

the components of the ICSF-SRIC. The form includes the following objectives as dependent study variables (Hoyt & Lee, 2002): (a) gaining factual knowledge; (b) learning fundamental theories and principles; (c) learning to apply course material to new situations; (d) developing diverse skills, competencies, and points of view; (e) acquiring skills as a productive team member; (f) developing creative skills in thinking and production; (g) developing a broad understanding and appreciation for both intellectual and cultural activity; (h) developing skill sets needed in oral and written communication; (i) learning how to find and use needed resources; (j) developing a clearer understanding of personal values and how to use them in decision-making opportunities; (k) developing critical thinking skills; and (l) becoming a life-long learner.

The data collection involved administering three separate forms: the IDEA Center Survey Form—Student Reactions to Instruction and Courses (IDSF-SRIC), the IDEA Center Faculty Information Form, and a questionnaire on the use of cooperative learning in the classroom. In reviewing the research results, the authors noted two key outcomes: (a) cooperative learning courses had significantly higher means on the students' perceptions of learning environment factors than non-cooperative learning courses; and (b) cooperative learning courses had significantly higher means on the students' perceptions of learning outcomes than non-cooperative learning courses (Gilliam, 2002).

Defense of the CUCEI

In reviewing these two survey instruments, both the CUCEI and the ICSF-SRIC have merit in how they approach the quantifying of a student's perception of his or her learning environment. For this graduate student's research work, the CUCEI has proved to be a more useful tool for the outcomes and purposes of this particular study. Fraser

(1993) noted in his study that it is important for the development of learning environments of secondary students versus higher education students that they be treated differently from each other. It is not that entirely new emphases need to be cultivated in the classroom but rather that a distinct set of priorities be implemented at different levels of learning.

> Irrespective of whether or not a separate physical environment can be created for post-compulsory education, it is clear that student needs cannot be satisfied well by the traditional learning environments found in conventional high schools that have been designed to cater for a large population of younger children. Indeed, to meet student needs at the post-compulsory education level, it is desirable that a distinctive pedagogical, social and psychological environment be created and maintained. (Fraser, 1993, pp. 41-42)

According to Fraser (1993), it is necessary that educators direct their efforts into viewing how students perform both in terms of academic achievement and the associated learning outcomes. However, these two elements alone are not exclusive to showing the full learning process within an educational setting. In order to give a more complete picture of what shapes the learning of a student, the learning environment itself must also be considered. In light of this need, the development and validation of the College and University Classroom Environment Inventory (CUCEI) have proven to be both a valid and reliable survey tool. Fraser (1993) emphasized this tool's ability to aid in conceptualizing and assessing the perceptions that students have of their social and psychosocial elements of their learning environment. Though originally designed for a

high-school setting, the CUCEI was found to be a suitable tool for post-compulsory education within colleges in western Australia (Fraser, 1993). It is because of the aforementioned reasons that this author has chosen the CUCEI for use in his graduate research.

Conceptual Framework of Critical Thinking

Introduction

The idea of critical thinking is not as new to the field of education as is cooperative learning. In the earliest, traceable roots of critical thinking, Socrates' methods appear at the forefront. In listening to the smooth rhetoric of his day, Socrates often found speeches laced with confusion of meaning and inadequate evidence. He viewed his political authorities as having irrational thought, the proofs of which were devoid of solid evidence (The Critical Thinking Community, 1997). Socrates "established the importance of asking deep questions that probe profoundly into thinking before we accept ideas as worthy of belief" (The Critical Thinking Community, 1997, p. 1). Socrates defined the traditional view of critical thinking with four essential elements: (a) the pursuit of evidence that uncovers truth, (b) the examination of the reasoning and assumptions that underlie a person's thinking, (c) the analyzing of basic terms and definitions, and (d) the implications of thought and action. His agenda of critical thinking became the benchmark for purposed, clear thinking that is logical in its foundation (The Critical Thinking Community, 1997). As an additional historical reference, the medieval liberal arts curriculum consisted of seven disciplines, three of which composed the Trivium. The Trivium consisted of grammar, rhetoric, and logic, or dialectic. Dialectic was a very essential element in a young person's education because it prepared that

student to be proficient in the art of argument and debate; both were considered to be part of the learning process for higher thinking skills. Raising questions and supporting answers were practices young learners highly sought after (California State Polytechnic University Pomona, n.d.).

This period of the Middle Ages saw critical thinking championed through the work of Thomas Aquinas. Aquinas believed not only in the systematic use of higher reasoning skills but also in reasoning that would be developed when others critiqued his own thought processes. In other words, Aquinas deemed that in order to come to valid conclusions within his own thought processes, it was necessary to systematically consider and evaluate the criticisms of those who opposed his own thought (The Critical Thinking Community, 1997). During the Renaissance, scholars began to question and analyze areas of religion, art, human nature, and society in general. England's Francis Bacon propagated the idea that observation and experimentation were the only true methods for coming to valid and reliable conclusions. In Bacon's book *The Advancement of Learning,* he argued that empirical learning fostered critical thinking because the mind, when left to its own devices, created inner idols that fostered beliefs in misleading ideas. Empiricism, through observation and the gathering of data, kept the mind from drifting into error through its own natural tendencies (The Critical Thinking Community, 1997). Within the same period, Descartes authored another notable text on critical thinking, *Rules for the Direction of the Mind*. In the text, Descartes cited the following (Cape Breton University, n.d.):

> As regards any subject we propose to investigate, we must inquire not what other people have thought, or what we ourselves conjecture, but what

> we can clearly and manifestly perceive by intuition or deduce with curtains. For there is no other way of acquiring knowledge. (p. 1)

One noted author who deserves mentioning is William Graham Sumner. In 1906, he published a well-received text on the study of anthropology and sociology titled *Folkways*. This book received much acclamation because it showed how the human mind tends to think in terms of its own group of people and the social benefits derived from its interactions. In addition, this mindset found a parallel theme in the public schools, which saw education as a social process having social ends. In his text, Sumner criticized the schools of his day for creating the same type of thinking within its students instead of teaching its students how to think on an individual level (Sumner, 1906). "Schools make persons all on one pattern, orthodoxy**.** School education, unless it is regulated by the best knowledge and good sense, will produce men and women who are all of one pattern, as if turned in a lathe," stated Sumner (Sumner, 1906, p. 630). Yet at the same time, Sumner also saw the need for the educational system to be the one to equip the children with the ability to think critically. Sumner (1906) made the following appeal to mainstream education:

> Our education is good just so far as it produces well-developed critical faculty. A teacher of any subject who insists on accuracy and a rational control of all processes and methods, and who holds everything open to unlimited verification and revision is cultivating that method as a habit in the pupils. Education in the critical faculty is the only education of which it can be truly said that it makes good citizens. (p. 630)

Critical Thinking in Education

The development of critical thinking skills in a student demands educators' focused attention in the classroom. "Very special preparation is necessary," states Paul (1984), "if we want children to develop into adults who are comfortable with and skilled in weighing, reconciling, and assessing contradictory arguments and points of view through dialogue, discussion, and debate" (p. 6). According to Paul, the ramifications of students who do not develop their critical thinking skills carry consequences far beyond the classroom. Paul (1984) states that "without the ability to reason dialectically, students are intellectually, emotionally, and morally incomplete" (p. 4).

The lack of critical thinking within the classroom does not entirely fall on the shoulders of those in educational leadership; educators must also cope with the notion that students often resist critical thinking in favor of an atmosphere that simply relays the answers to questions instead of making the students think to an appropriate end. In her article about student resistance to critical thinking, Keeley (1995) noted that teachers must adopt a resistance management strategy, divided into two phases: (a) addressing resistance to critical thinking *before* it occurs and (b) addressing resistance to critical thinking *after* it occurs. Proactive planning in the classroom can often be the greatest aid to providing an alliance with students. Keeley (1995) noted the following aspects of proactive bridge-building for teachers in the classroom: (a) communicate a credibility with students, (b) create an atmosphere of trust, (c) create high expectations of success in the use of critical thinking strategies, and (d) encourage participation by all students. In addressing the resistance to critical thinking after it occurs, Keeley (1995) gave the following recommendations: (a) do not take resistance personally, (b) develop a problem-

solving attitude toward resistance, (c) instruct the student to explore why he or she is resistant to the change, and (d) join the students in problem solving about their own resistance to critical thinking strategies in the classroom.

Bauerlein (2008) has referred to the current generation of secondary and collegiate learners as the *Dumbest Generation* not because of a lack of ability but rather because of the chasm between the available resources and the intellectual attainments. Never before has a generation of learners had so many technological advancements and so much information available yet such low motivation to use it. “All the occasions and equipment for learning are in place,” cites Bauerlein (2008), “but he [the student] uses them for other purposes” (p. 36). For all the increased wealth and resources, the knowledge outcomes for students have not increased, and the very things that should have progressed students forward have now begun to hold them back in their thinking. This self-perpetuating cycle severely limits the critical thinking capabilities of students in the classroom (Bauerlein, 2008). Bauerlein (2008) has made some astute observations in summarizing the problems educators face in the realm of thinking critically:

> Young users have learned a thousand new things, no doubt. They upload and download, surf and chat, post and design, but they haven’t learned to analyze a complex text, store facts in their heads, comprehend a foreign policy decision, take lessons from history, or spell correctly. Never having recognized their responsibility to the past, they have opened a fissure in our civic foundations, and it shows in their halting passage into adulthood and citizenship. (pp. 201-202)

The Disposition of Critical Thinking

In characterizing what being the ideal critical thinker in the classroom means, this author finds it meaningful not only to look at what defines a critical thinker but also to contemplate the disposition of the critical thinker in regard to education. A disposition to critical thinking is not a skill set but rather a predominant tendency or outlook to how one thinks (Facione, Giancarlo, & Facione, 1995). Facione (1990b) has expounded on this idea in the definition given by the Delphi research of the American Philosophical Association:

> The ideal critical thinker is habitually inquisitive, well-informed, trustful of reason, open-minded, flexible, fair-minded in evaluation, honest in facing personal biases, prudent in making judgments, willing to reconsider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in the selection of criteria, focused on inquiry, and persistent in seeking results which are as precise as the subject and the circumstances of inquiry permit. (p. 3)

Facione (1990b) has delineated the idea of the disposition to critical thinking in the creation of the California Critical Thinking Disposition Inventory (CCTDI), which assists in measuring the following seven constructs of critical thinking: (a) inquisitiveness or one's desire to learn; (b) open-mindedness, which includes the propensity to accept others' ideas; (c) systematicity, which refers to a person's organization in his or her own research for information; (d) analyticity or the ability to infer ideas from information; (e) truth-seeking, which includes honest and fair inquiry into a matter; (f) self-confidence, which is the measure of how much one trusts in his or her own reasoning ability; and (g)

maturity, which includes the ability to show sound judgment in decision-making.

In another opinion regarding the disposition toward critical thinking, Bailan, Case, and Daniels (1999) believed that misconceptions about the idea of critical thinking could be misleading. These misinterpretations were most notably found in how critical thinking was defined by educators in terms of skill sets, processes, and procedures in the classroom. To view critical thinking as merely a collection or growth of specific skill sets minimizes a key component of successful critical thinking: attitude. “Critical thinking involves more than the ability to engage in good thinking,” cites Bailan et al., (1999) “It also involves the willingness or disposition to do so” (p. 272).

As a second argument, the authors cited that critical thinking should not be viewed as merely a set of mental processes the learner performs. Their argument would state that it is not the process that should be sought but rather a familiarizing with specific objectives. According to Bailan et al. (1999), critical thinking should not be treated as a commodity that translates across the curriculum for students in any subject area. This familiarization is made manifest in three distinct ways: (a) teaching specific concepts such as a valid argument and what characterizes it, (b) stimulating the thought of the student to take note of the specific concept and why it is important to note, and (c) equipping students with the skill set that enables them to be familiar with future parallel concepts.

The learner’s goal is not merely to think. As John Dewey (1910) has so aptly stated, “The need of thinking to accomplish something beyond thinking is more potent than thinking for its own sake” (p. 41). The amassing of knowledge for the sake of knowledge is unprofitable for the learner. By disposition to thinking, Facione (1995)

refers to the characteristic profile, the set of attitudes, or the habits of mind that define a person in his or her thinking. The words of Dewey (1910) echo this disposition to critical thinking:

> At present, the work of teaching must not only transform natural tendencies into trained habits of thought, but must also fortify the mind against irrational tendencies current in the social environment, and help displace erroneous habits already produced. While it is not the business of education to prove every statement made, any more than to teach every possible item of information, it is its business to cultivate deep-seated and effective habits of discriminating tested beliefs from mere assertions, guesses, and opinions; to develop a lively, sincere, and open-minded preference for conclusions that are properly grounded, and to ingrain into the individual's working habits methods of inquiry and reasoning appropriate to the various problems that present themselves. (pp. 26-28)

Thus, it is imperative that a more full and complete approach to critical thinking be developed and propagated in the classroom. This would include not only the skills of critical thinking but a disposition toward critical thinking that influences the pedagogical aspects of the training of preservice teachers.

Empirical Studies Related to Critical Thinking Within Cooperative Learning

In reviewing the literature, this author would like to present four significant studies that have established a relationship between a cooperative learning environment and critical thinking. In a 1992 published study, 208 university students were selected to be participants in a cooperative learning environment research project. Of the 208

participants, 27 were forestry majors while the remainder majored in education. All participants were involved in courses using cooperating learning strategies such as Think-Pair-Square, Think-Pair-Share, Jigsaw strategies, and cooperative group investigation. Near the conclusion of the spring term, instructors surveyed each of the classes using the Cooperative Learning Survey. The survey was comprised of 15 questions targeting various aspects of cooperative learning. In addition, a question was added, asking if the students preferred courses that were predominantly cooperative learning, lecture, or a balance of each (Fennell, 1992).

The research findings indicated that the statement “I often engage in critical thinking” (evaluating ideas and opinions, solving problems through this approach) garnered higher ratings for cooperative learning than for lecture or discussion. In addition, cooperative learning scored higher in the areas of sharing ideas, listening skills, enhanced relationships with teachers, and application of ideas. In conclusion, it is key to note that almost 85 percent of participants involved in the research preferred a classroom environment that exhibited a balance between both cooperative learning and lecture. This study was of interest to this author because the critical thinking component was not evaluated purely from an achievement standpoint but rather from assessing a student’s perception of the critical thinking skills he or she believed to have occurred in the classroom (Fennell, 1992).

As a secondary study, research was conducted in a Lithuanian university to determine the effects of cooperative learning on students’ critical thinking skills. In the spring of 2004, 90 second-year students, pursuing an Economics and Management degree, were taught in a classroom environment that incorporated varying levels of

cooperative learning strategies into each lesson. Cooperative learning strategies included Think-Pair-Share, Jigsaw, Teams-Games-Tournaments, and Group Investigation. The particular class for the study met for three hours each week and stayed together for the four months of the semester. During the semester, researchers gave both a pretest and a posttest to assess the level of critical thinking skills inherent within the students (Barzdziukiene, Urboniene, & Klimoviene, 2006).

During the semester, students were given a scenario and asked to create a credible solution. In order to assess the students' critical thinking skill levels, a survey was created using seven different constructs to measure the level of critical thinking present within a student. The seven facets of the survey instrument, as stated by Barzdziukiene, Urboniene, and Klimoviene (2006), were as follows: (a) the ability to state issues clearly, accurately, and succinctly; (b) the ability to ask relevant and suitable questions; (c) the ability to cultivate and support a position in an argument; (d) the ability to summarize and locate the relevant personal positions of others; (e) the ability to analyze and synthesize information; (f) the ability to break down ideas and integrate new thought; and (g) the ability to use language that clearly communicates the intended message.

Researchers made assessments on the critical thinking components on an individual basis both for the pretest and the posttest. For each of the integral elements, a numerical score from 1 to 3 would be given to an individual, where 1 represented no evidence of skills, 2 represented some evidence of skills, and 3 represented a competent level of skills. The comparison of the pretest and posttest scores revealed that more students achieved a mastery score of 3 following the cooperative learning strategies. In each of the seven criteria, posttest scores were higher than pretest scores when integrating

cooperative learning techniques into the classroom (Barzdziukiene et al., 2006).

In a 2005 published investigation, a quasi-experimental study was conducted to view the effects of group-dynamic learning on critical thinking skills of nursing students. The inquiry's sample population involved 60 nursing students who were experiencing their final year of clinical training at an Iranian university. The investigators randomly divided the population into two equal groups representing a control group and an experimental group. The hypothesis of the experiment (Khosravani et al., 2005) was that "the critical thinking skills of nursing students passing their community health training by participating in group-dynamic sessions would increase compared with those of the control group" (p. 6).

For both the treatment group and the control group, mean scores were compared for each subgroup rating using *t*-tests. The experimental group demonstrated higher mean scores in all six categories, but only the scores for diagnosis, clinical reasoning, clinical judgment, predication, and creativity were significant ($p < 0.01$) (Khosravani et al., 2005). The study results concluded that "the more educators provide scenes for better and deeper thinking, the better learners can understand and analyze phenomena in the surrounding world to be better thinkers for better life" (Khosravani et al., 2005, pp. 9-10).

In conclusion, this student would like to review a 2006 study linking problem-based learning (PBL) to an increase in students' critical thinking abilities. This project was of particular interest to this author because PBL has similar traits to that of cooperative learning in that both teaching methodologies are student centered and incorporate student activities and participation into the lesson. The study participants included 70 first-year nursing students pursuing an undergraduate nursing degree at a

university in Hong Kong. On the first day of the course, researchers asked the participants to take a pretest using the California Critical Thinking Disposition Inventory (CCTDI). Students were then randomly assigned either to a course that incorporated PBL or a parallel course that used the lecture method. Participants had prior experience with the lecture method but did not have experience with a PBL classroom structure (Tiwari, Lai, So, & Yuen, 2006).

The PBL approach was structured using PBL tutorials for three to six hours per week for two semesters. Nursing cases were constructed using real data from real situations. Students were to define and analyze the cases, present hypotheses, and follow up with their tutorial instructor. For those involved in the lecture, students received three to six hours of class lecture per week for two semesters, with the primary objective being the transmittal of information to the students. Following two semesters of instruction, a posttest was administered to both study groups, with additional tests conducted one year and two years later to verify the lasting effects of PBL and lecture on the nursing students. The study goal was to review the effects of PBL and lecture on the critical thinking dispositions of participating students. The study's quantitative results revealed that those having PBL scored significantly higher on the CCTDI than those students enrolled in the lecture-based classroom. In addition, the higher scores continued for the two ensuing years in which both groups were tested (Tiwari et al., 2006).

Critical Thinking Inventories

The Watson-Glaser Critical Thinking Appraisal, Form-S

Design and validation. In the Short Form manual for the WGCTA-FS, Watson and Glaser (2006) viewed critical thinking as a combination of attitudes, knowledge, and

skills. In relation to the facets integrated into their forms, Watson and Glaser (2006) believed that critical thinking should include the following:

> The ability to recognize the existence of problems and an acceptance of the general need for evidence in support of what is asserted to be true, knowledge of the nature of valid inferences, abstractions, and generalizations in which the weight or accuracy of different kinds of evidence are logically determined, and skills in employing and applying the above attitudes and knowledge. (p. 3)

This author would like to highlight several aspects of this definition: (a) critical thinking is not just arriving at the solution to a problem but having the ability and skill set to recognize a problem; (b) critical thinking must provide foundational support for what one asserts to be true; (c) critical thinking must include the ability to conceptualize before concrete ideas are used in a solution to a problem; (d) critical thinking must include the ability to evaluate and make judgments among several similar evidences; and (e) critical thinking must be able to synthesize the aforementioned attitudes and knowledge into the creation of a sound, credible solution.

The Watson-Glaser Critical Thinking Appraisal, Form-S, is a 16-scenario, 40-question test that has been separated into five subtests. Each of the five tests is designed to measure a different aspect of critical thinking. Watson and Glaser (2006) have defined the five subtests as follows:

1. Inference—The ability to discriminate among levels of truth or falsehood from a given statement.
2. Recognition of Assumptions—The ability to recognize an unstated

expectation or belief in a given statement.

3. Deduction—The ability to assimilate information or statements and make valid conclusions.
4. Interpretation—The ability to take evidences and accurately assess if a conclusion or generalization is warranted.
5. Evaluation of Arguments—The ability to look at arguments and differentiate those arguments that are weak from those that are strong.

"Each test is composed of reading passages or scenarios that include problems, statements, arguments, and interpretations of data similar to those encountered on a daily basis at work, in the classroom, and in newspaper or magazine articles" (Watson & Glaser, 2006, p. 4). Each scenario in each test provides a number of items to which the student responds. Reading passages have been classified as either neutral or controversial. A neutral scenario involves a situation in which a participant would tend to have no opinion about the matter while the controversial category would tend to use situations that elicit strong emotional feelings on the part of the reader. The score of the WGCTA-FS is the total of all questions answered correctly within the inventory and not within each individual subtest. The reliability of the test lies within its ability to assess an overall critical thinking score as opposed to individual scores in each of the five subtests. This is partially due to the fact that there are not many items within each subtest; therefore, it lacks the reliability to measure individual aspects of critical thinking (Watson & Glaser, 2006).

In compiling the scenarios of each subtest, the *Mental Measurements Yearbook* (Impara & Plake, 1998) stated five primary goals in developing the Short Form from

Form A: (a) allowing for the five subtests that appear in Form A, (b) selecting items and scenarios that were psychometrically accurate to measure intended objectives, (c) ensuring that the Short Form continued to be reliable as Form A, (d) establishing a reading level comparable to Form A, and (e) increasing the acceptance of the test among the public as a valid, reliable tool to measure critical thinking skills. According to Impara and Plake (1998), the test publisher was successful in meeting these criteria.

Though the WGCTA-FS has received commendations regarding its validity and reliability, there has been some criticism in the construction of the test items. *The Buros Mental Measurements Yearbook* (Impara & Plake, 1998) has noted that 33 of the 40 test items are questions with only two possible answers, a scenario that is considered problematic. Though the reliability coefficients were calculated to be .81, these results could prove to be lower within specific groups. For this reason some have suggested that the WGCTA-FS be used as only one of several inventories or surveys used to assess the true critical thinking skills of individuals. In a separate study, Wagner and Harvey (2003) made a similar observation:

> Despite its popularity in research and practical applications, an examination of the item response format used in the WGCTA immediately raises potential questions regarding its psychometric properties—in particular, its susceptibility to successful random guessing of the correct item responses. That is, the WGCTA uses a *two-alternative* multiple-choice format in four of the five logical divisions in Forms A and B (a five-alternative multiple choice format is used in the first section. (p. 1)

Defense of the Watson-Glaser Critical Thinking Appraisal, Form-S. In

reviewing the credibility of the Short Form as compared to the original and longer Form A, *The Thirteenth Mental Measurements Yearbook* (Impara & Plake, 1998) noted that though the WGCTA-FS was designed to be a shorter, more quickly administered form, it has the same identical subsets as the original form. Moreover, the test items and most of the research completed on the WGCTA-FS were taken from studies completed on the original Form A. Impara and Plake (1998) stated the WGCTA has a long history of use and has been frequently reviewed for research purposes. Though both the Form A and the Short Form do differentiate among the five subtests, Watson and Glaser (2006) emphasize that the inventory reliability lies in a composite score as opposed to referencing the individual subtest scores. The original Short Form was developed in 1994 using 1,608 participants. In reviewing the research for the sample used in the tests, the Cronbach's alpha coefficient was $r = .81$ (Watson & Glaser, 2006). Though this coefficient is considered to have good reliability projections, this is a lower score than the coefficient for the Form A (Impara & Plake, 1998). In more recent reliability studies, estimates were comparable to former scores, ranging from .76 to .85. The evidence for strong validity of the WGCTA-FS has been supported primarily through the use of predictive validity studies involving both college and graduate students.

Though some legitimate concerns have been expressed regarding the use of the Watson-Glaser Critical Thinking Appraisal, Form-S, it has still received high recommendations for its use in evaluating critical thinking skills. Overall, inventory critics have been favorable in its use, as Modjeski and Michael (Impara & Plake, 1998) have viewed the WGCTA-FS to be one of the finest instruments in accurately assessing critical thinking skills. In addition, the following assenting comments have been made by

The Thirteenth Mental Measurements Yearbook (Impara & Plake, 1998):

> The WGCTA measure comes with a long history of successful use in instructional and evaluation research in such programs and courses. This short form does appear to continue to represent the long history of the Watson-Glaser Critical Thinking Appraisal successfully. It is sufficiently reliable and should be expected to be approximately as valid as one would expect given the shorter length. Form S of the Watson-Glaser Critical Thinking Appraisal is a short, practical measure of critical thinking. (pp. 1123, 1125)

Though not without its weaknesses, the WGCTA-FS appears to be an effective, useful tool for measuring critical thinking skills in preservice teachers in an educational setting. For these reasons, this author has chosen to use the Watson-Glaser Critical Thinking Appraisal, Form-S for this research.

Empirical studies using the Watson-Glaser Critical Thinking Appraisal, Form-S. This author reviewed four studies in which the WGCTA-FS was implemented as part of research in testing critical thinking skills. The most relevant study for this author's work involved the investigation of the reliability and validity of the WGCTA-FS in measuring the critical thinking skills of preservice teachers in an educational setting. The following study proved to be of great value to this graduate student because the study's population group was comprised of the same type of subjects used in this author's research work. Gadzella et al. (2005) included in their sample 137 students enrolled in an Educational Psychology course at a state university. Of the total number of students involved in the study, 28 were male, and 109 were female. The course involved in the study assessed

grades using four criteria in the class: (a) research methods, including social and moral development; (b) cognitive development with behavioral learning; (c) cognitive learning; and (d) measurement and evaluation.

The purpose of using the Watson-Glaser Critical Thinking Appraisal, Form-S, in this particular study was to assess the correlation between course grades and the respective scores of the critical thinking assessment. The scores for the WGCTA-FS ranged from 14-39 points out of a total of 40 points. The percentage scores for the psychology course ranged from a low of 43 percent to a high of 99 percent. To obtain valid test results, an internal consistency test was performed. For the total group, the KR-20 score was equal to .76, and the split-half reliabilities test revealed a score of $r = .44$. These test results showed themselves to be lower than the internal consistency and split-half reliability scores of .81 for the historical reliability of the WGCTA-FS (2005), but this could have been attributed to the small size of the sample population (Gadzella et al., 2005).

The test validity was performed by correlating the total critical thinking and subset scores with the course grades. The correlation between the total critical thinking scores and the course grades was .31 and was significant at the $p < 0.01$ level. In addition, two of the subset scores, Deductions and Evaluation of argument, revealed correlation coefficients of $r = .33$ and $r = .32$, respectively, with both having significance at the $p < 0.01$ level. Moreover, the subset score of Inference had a correlation coefficient of $r = .15$, significant at the $p < 0.05$ level (Gadzella et al., 2005). Holmgren and Covin (1984), in a previous study of students majoring in education, found the total scores of the WGCTA to have a coefficient of $r = .50$ with a student's GPA and $r = .46$ with an

English proficiency test score. The small size of the sample population could have affected the validity scores of the aforementioned study (Gadzella et al., 2005).

In addition to the previous analysis, an analysis of variance (ANOVA) test was performed, dividing the group into two subsets: those students who earned an A or B, categorized as a high grade, and those students who earned a C or lower, categorized as a low grade. When the researcher examined the data, the tests demonstrated that those who earned high grades received higher scores on the WGCTA-FS than those who received low grades in the class. This was true not only for the total critical thinking score but also for two of the subset scores, Deduction and Evaluation of Arguments, with $p < 0.01$. Overall this study proved valuable in confirming the WGCTA-FS to be a valid and reliable instrument for measuring the critical thinking skills of preservice teachers (Gadzella et al., 2005).

In a separate study, Gadzella et al. (2006) focused their research on a southwestern state university to investigate whether the WGCTA-FS was also a valid and reliable instrument not only for preservice teachers but also for general academics as a whole. In this study, 586 students participated in the research, of which 56 were majoring in psychology, 228 were enrolled in educational psychology, 155 were enrolled in special education, 79 were enrolled in graduate courses, and 68 had not declared a major at the time of the study. The study data compared the WGCTA-FS scores by subset and total to the student's semester course grades. In analyzing the test data, results showed internal consistency scores ranged from .74 for the educational psychology majors to .92 for the total group. These outcomes proved to be comparable to the historical reliability scores of .81 from the original WGCTA-FS inventory. Moreover, the Pearson product-moment

correlations between the WGCTA-FS and the course grades between total groups and subgroups ranged from a low of .20 for those who were undeclared in their major to a high of .62 for the psychology major. In summary, the WGCTA-FS revealed itself to be a valid and reliable tool in measuring the critical thinking skills of students involved in academic coursework.

As a third piece of research this author queried, Gadzella, Ginther, and Bryant (1996) focused their study on determining whether teaching students to critically analyze scenarios would improve their overall critical thinking skills. The subjects used for this experiment included 113 students enrolled in freshman level courses at a southwestern state university. Forms A and B of the Watson-Glaser Critical Thinking Appraisal were employed to measure the critical thinking skills of these students through a pre-test and a post-test. This rendition of the WGCTA is parallel in purpose to the WGCTA-FS but is simply a longer version of the short form. The tests' data were analyzed using a paired *t*-test on each of the five subsets and the total score of the WGCTA-FS. The analysis results disclosed that the post-test scores were significantly higher ($p < 0.01$) on two of the subsets, Interpretation and Evaluation, as well as the overall critical thinking score. Thus the WGCTA showed that critical thinking skills were improved overall as well as in the areas of Interpretation and Evaluation.

In a final example, Burbach, Matkin, and Fritz (2004) investigated how active learning in an introductory college leadership course influenced the students' critical thinking scores. Active learning was defined as including small group projects, case studies, role playing, and student presentations in a classroom setting. In addition, Socratic questioning techniques were employed in the classroom to facilitate discussion.

The study participants included 80 students from a Midwestern university, 19 years of age or older, who were enrolled in six sections of an introductory leadership course. Three different instructors taught the sections and the gender breakdown for the research was 57 men and 23 women. To facilitate the research, a pre-test and post-test were given 14 weeks apart during the course of the semester using the WGCTA Form B. A paired-samples *t*-test was employed to evaluate whether there were significant differences in the WGCTA total scores or within any of the five subtest scores. The analysis results confirmed that the WGCTA total score was significantly higher at the end of the semester than at the beginning with significance at the $p < 0.05$ level. Furthermore, among the critical thinking skills subset, Deduction and Interpretation were significantly higher ($p < 0.05$) with Evaluation of Arguments being very close to significance.

The California Critical Thinking Disposition Inventory

Design and validation. As a contrast to the Watson-Glaser Critical Thinking Appraisal, Form-S, an additional inventory, the California Critical Thinking Disposition Inventory (CCTDI) has been reviewed for the assessment of the disposition of critical thinking skills. While the WGCTA-FS measures actual critical thinking skills, the CCTDI measures the internal motivation to solve problems and make decisions using thinking skills (Giancarlo & Facione, 2001). Facione, Giancarlo, and Facione (1995) believe a thorough approach to developing college students into seasoned critical thinkers must include a nurturing of their disposition toward critical thinking. Facione, et al. (1995) observed the following in the relationship between critical thinking and other necessary character traits:

> Colleges which embrace the development of leadership, citizenship, and

> good judgment as among their foremost educational goals will achieve these goals only if their general studies programs succeed not just in teaching the skills, but in actually cultivating in their students the disposition toward critical thinking. (p. 14)

The concept of thinking has always been a core element of any liberal arts education. This emphasis on critical thinking can be traced back to the thought of John Dewey, who wrote on the integration of reflective thinking into the dynamics of education. In addition, Dewey was also an advocate of building and shaping the attitude of scientific inquiry within the minds of young students (Giancarlo & Facione, 2001). A disposition toward critical thinking does not necessarily imply the teaching of critical thinking skills. The disposition toward critical thinking, according to Giancarlo and Facione (2001), means

> to describe a person's inclination to use critical thinking when faced with problems to solve, ideas to evaluate, or decisions to make. The disposition toward critical thinking, as a dimension of personality, refers to the likelihood that one will approach problem framing or problem solving by using reasoning. (p. 30)

A disposition toward critical thinking is an important component because it separates the tools and strategies that go into the development of critical thinking within students from the actual ability to critically think in the classroom. Though these are distinct elements of critical thinking, it is important that they be treated and developed in harmony with each other. "Some might argue that cultivating the disposition is necessary before implanting the skills, but a developmental perspective would suggest that skills and

dispositions are mutually reinforced and, hence, should be explicitly taught and modeled together," says Facione, Sanchez, and Facione (1994, p. 5).

The California Critical Thinking Disposition Inventory contains 75 Likert-style scores arranged among seven different dispositions: Inquisitiveness, Open-Mindedness, Systematicity, Analyticity, Truth-Seeking, Self-Confidence, and Maturity (Facione et al., 1995). Each of the categories is defined as follows:

1. The Inquisitiveness scale measures curiosity and desire towards learning even when the concept application has not been made known.
2. The Open-Mindedness scale measures a person's tolerance toward divergent thoughts and the ability to note one's own bias.
3. The Systematicity scale addresses the extent of a person's organization, focus, and diligence in asking questions.
4. The Analyticity scale measures the use of reasoning and evidence to resolve problems.
5. The Truth-Seeking scale addresses the propensity to search out the best and most honest knowledge even if it contradicts the self-interests of a person.
6. The Self-Confidence scale measures how much a person places trust in his or her ability to reason through an issue.
7. The Maturity Scale quantifies the ability to be discerning in the ability to make decisions.

None of the scales is specific to any given discipline yet has the readiness to be interpreted among all the liberal arts and sciences.

Empirical studies using the California Critical Thinking Disposition Inventory. The author considered two studies using the California Critical Thinking Disposition Inventory noteworthy. In the primary study, the directive was to compare the effects of Problem-Based Learning (PBL) and lecturing on the critical thinking skills of undergraduate students. The research sample was comprised of 79 first-year undergraduate nursing students at a university in Hong Kong. Each of the students was randomly assigned to parallel courses throughout the academic year. The courses were parallel in content, but one course was taught to use PBL techniques and the other was taught only using lecture techniques. To measure the students' critical thinking disposition, investigators gave students the California Critical Thinking Disposition Inventory and students were also interviewed to assess each of their learning experiences in the classroom. Data was initially collected with the pretests and then also one time per year over the next three academic school years (Tiwari et al., 2006).

In analyzing the pretest results, there was not a significant difference in the test scores between the two groups of participants. Over the course of the next three years, the group scores involved with the PBL methods were significantly higher than the group that learned via lecture. Analysis results were as follows (Tiwari et al., 2006):

1. From the first to the fourth time points, the overall CCTDI score was significantly higher ($p = 0.0048$), as well as the subtest scores of Truth Seeking ($p = 0.0008$), Analyticity ($p = 0.0368$), and Self-Confidence ($p = 0.0342$).
2. From the first to the third time points, the overall CCTDI score was significantly higher ($p = 0.0083$), as well as the subtest scores of Truth

Seeking ($p = 0.0090$) and Analyticity ($p = 0.0354$).

3. In conclusion, from the first to the fourth time points, the subtest scores of Truth Seeking ($p = 0.0173$) and Systematicity ($p = 0.0440$) were significantly higher.

This study was relevant to this author because of the correlation between PBL and increased critical thinking scores. Problem Based Learning is designed to challenge student thinking by involving and engaging the student in a realistic problem-solving environment. The focus of PBL is on the student's learning while moving away from the teacher as being the sole entity of knowledge. Students take responsibility for their own work and labor collaboratively to accomplish goals. Much of what is found in the framework of PBL can also be found in a cooperative learning environment (San Francisco State University, n.d.).

The second relevant study that used the CCTDI was a research project from mainland China. The study's emphasis aimed to discover how the thinking styles of students affected each of the seven components of the CCTDI or how thinking style influenced critical thinking. The study's first sample was comprised of 268 students in various disciplines from a research-oriented university in Beijing. The second sample of participants was made up of 296 students in various disciplines from a large teacher-training university in Nanjing. The tools that were used for the experiment were the Thinking Styles Inventory (TSI) and the California Critical Thinking Disposition Inventory (Zhang, 2003).

The TSI employed 65 statements to measure 13 different thinking styles, based on the research of Sternberg and his theory of mental self-government. The TSI was

categorized into Type 1 and Type 2 thinking styles: Type 1 thinking styles were associated with more creative and complex thinking while Type 2 thinking styles were associated with lower levels of cognitive thinking. According to the author of the analysis, the CCTDI was matched up with the TSI because of the similarity of constructs within each instrument. As defined within the study, a thinking style refers to the preferred manner in which students prefer to use their abilities. Likewise, a disposition for critical thinking refers to the propensity for a student to engage in critical thinking. Thus, common to both instruments is the emphasis of looking at the habits of thinking. For this study, both samples took both the TSI and the CCTDI inventories (Zhang, 2003).

In the analysis of the results, both sample population groups had similar conclusions for the tests and many positive correlations between thinking style and critical thinking disposition. Neither of the two samples yielded a negative relationship between the two scales within either inventory. Moreover, the CCTDI subscale of Maturity had the fewest significant correlations for both groups. In addition, the CCTDI subtests of Open-Mindedness and Analyticity were positively correlated to every thinking style for both samples. Finally, three of the thinking styles (local, oligarchic, and anarchic) were positively correlated to all seven of the CCTDI subscales (Zhang, 2003).

The aforementioned study was relevant to this graduate student because of the parallel thought between many of the thinking styles in the TSI and stated benefits of cooperative learning as stated in the research. These benefits would include increased critical thinking skills, the enhancement of satisfaction with the learning experience, the development of social interaction skills, active and exploratory learning, student responsibility for learning, and diverse learning styles (Panitz & Panitz, 1998).

CHAPTER THREE: METHODOLOGY

The purpose of this study was to quantify the effects of cooperative learning techniques on the following two aspects of a higher education classroom: (a) the perception of a student's learning environment, and (b) a student's critical thinking skills. Results were compared among classes with traditional lecture versus classes integrating cooperative learning techniques with traditional lecture.

The methodological details of this research study include the following elements: (a) the context of the study, including the research site, selection of the target population, and course logistics; (b) the instruments utilized in the study; (c) the research questions and associated hypotheses; (d) the design of the study, including the research perspective, research type, research method, the procedures followed in the administration of the instruments, and the collection of the data; and (e) the statistical methods of analyzing the data. This author understands that each element is potentially impacting to this study in influencing the outcomes and the application of the data. Careful handling of the data and of the procedures for analysis is necessary to validate the conclusions of this investigation.

Context of the Study

Research Site

The author's research took place at Midwest Bible College (MBC), a four-year, religiously affiliated Bible college located in the Midwest. ("Midwest Bible College" is a fictitious name used to preserve confidentiality.) The research site of this study was a Bible college that offers a variety of emphases including Biblical Studies, Cross-Cultural

Studies, English, History, Education, Church Ministries, and Music. The study's timeframe included the fall semester of 2007 and the fall semester of 2008. Each semester was 14 weeks long, commencing in September and concluding in December. At the commencement of this study, the enrollment of the undergraduate classification was approximately 516 students. Of those who were undergraduates, approximately 20 students were considered foreign students, and 152 were classified as students pursuing an education emphasis.

Selection of the Target Population

The study's target population included 127 preservice teachers at MBC who were pursuing an emphasis in education. The courses included in this study were a Foundations of Education class and an Instructional Techniques class. The same instructor taught all the courses included in this investigation. Among the population for this inquiry were 40 male students and 87 female students. Within this sample were the following specific education emphases: English, History, Mathematics, Science, Music, Speech, Elementary Education, and Cross-Cultural Studies. The author taught both courses during the fall semester of 2007 and during the fall semester of 2008. During each semester, only one section of each class was offered to students for enrollment. During the fall of 2007, 44 students enrolled in the Foundations of Education class, and 25 students enrolled in the Instructional Techniques class. During the fall of 2008, 39 students enrolled in the Foundations of Education class and 19 students enrolled in the Instructional Techniques class.

Course Logistics

The courses this author integrated into this research were the Foundations of

Education class and the Instructional Techniques class. The Foundations of Education curriculum examined from a biblical perspective the history of critical philosophical debates concerning the nature and purpose of education. The curriculum for the course emphasized (a) evaluating various schools of educational philosophies in light of scriptural teaching, (b) developing practical responses to current educational practices, (c) developing a personal philosophy of education, (d) explaining the influence of select events and personalities in the development of Western education, and (e) interpreting classic writings in education. In comparison, the Instructional Techniques curriculum provided an overview of secondary school techniques from an instructional perspective with an emphasis on the integration of theory and practice. The program of study emphasized (a) identifying character traits of a successful teacher, (b) developing effective lesson plans, (c) using principles of communication to present a 20-minute lesson, (d) determining the soundness of various pedagogical techniques, and (e) articulating an effective classroom management plan. The Foundations of Education class was designed to be a sophomore-level class while the Instructional Techniques class was designed to be a junior-level class. The author taught each course for 50 minutes three times per week each semester.

The Instruments

College and University Classroom Environment Inventory

Reliability and validity. The author used the College and University Classroom Environment Inventory (CUCEI) to measure the perception of classroom environment. This particular inventory was used because of its suitability for use in small higher education classrooms of about 30 students (Fraser & Treagust, 1986). A unique factor of

this survey is that its design allows it to be used to measure the perceptions of both actual and preferred learning environments for both teachers and students. In other words, this form can be used to gather useful information about how a teacher or student would like a classroom environment to be versus how it is actually perceived. This methodology is in contrast to differing studies where a present observer objectively journals the events in a classroom environment. Past research regarding the relationships between perceived and preferred learning environments has revealed interesting relationships between the results of the students and the teacher. In early research completed by both Moos and Fraser, teachers and students preferred a more positive learning environment than they actually perceived in the classroom. In addition, teachers tended to perceive a classroom environment more positively than their students did within the same classroom (Treagust & Fraser, 1986).

Though a strong presence of learning environment studies has existed in primary and secondary schools, some researchers have found little research about this topic in higher education (Treagust & Fraser, 1986). The three inventories most used in prior research at the secondary level were the Learning Environment Inventory, the Classroom Environment Scale, and the Individualized Classroom Environment Questionnaire (Fraser & Treagust, 1986).

The following four principles guided the creation of the College and University Classroom Environment Inventory:

1. The researchers examined the consistency of the dimensions and factors used in primary and secondary surveys in the use of the CUCEI.
2. The dimensions used in the CUCEI referenced the work of Moos regarding

human environments: relationships, personal development, and system maintenance. These three dimensions were designated as the minimum that must be assessed in order to obtain a full picture of any learning environment. In response to Moos's research, the CUCEI was designed using dimensions from each of Moos's three categories.

3. Both higher education students and teachers reviewed the design and dimensions of the CUCEI to solicit feedback regarding the validity of the instrument.
4. The inventory was designed to be frugal in its length to accommodate answering questions and processing the results (Treagust & Fraser, 1986).

The final version of the CUCEI contained 49 items separated into the following seven categories:

1. Personalization—The interaction between the students and instructor as well as concern for the welfare of the student.
2. Involvement—The extent to which students engage in the environment of the classroom and have opportunity to participate in activities.
3. Student cohesiveness—The extent to which students interact with each other and help each other.
4. Satisfaction—The extent to which a class is enjoyed.
5. Task orientation—The extent to which classroom activities are well organized and clearly explained.
6. Innovation—The extent to which new and interesting activities are introduced in a lesson.

7. Individualization—The extent to which students are able to make decisions and show autonomy in the classroom.

The validation of the College and University Classroom Environment Inventory proved successful for use in the tertiary classroom. In an initial study by Fraser and Treagust (1986), samples consisted of 372 tertiary students from various disciplines who resided at two higher education institutions in Western Australia as well as 65 tertiary students from the University of Illinois. A sample of instructors consisted of 20 different teachers from both Western Australia and the University of Illinois. The first index of validity reported was scale reliability, using student actual, student preferred, teacher actual, and teacher preferred responses. The estimates of the internal consistency were calculated using Cronbach's alpha coefficient. The final results of the alpha coefficient ranged from 0.53 to 0.90 with the individual and 0.78 to 0.96 with the class. The second index of validity reported was discriminant validity for each of the four forms of the CUCEI using both individuals and the class as the units of analysis. The CUCEI revealed that each of the seven dimensions of the survey had sufficient discriminant validity and were able to measure distinct aspects of a classroom environment. The results of the test gave credence that each CUCEI scale had internal and discriminant reliability consistency for both the preferred and actual perceptions, for both students and instructors, using the unit of analysis as either the individual student or the class average (Fraser & Treagust, 1986).

CUCEI: Modifications. It is significant to note that the original study by Fraser and Treagust (1986) was modified in a subsequent study by Nair (2003) in 1999. For the research completed by Nair, the College and University Classroom Environment

Inventory was modified in three ways:

1. The actual and preferred versions of the inventory were personalized with new wording such that students were answering the questionnaire in light of their personal perception as opposed to what their class might perceive.
2. Two of the CUCEI scales were replaced with new scales.
3. The four-point Likert scale was replaced with a five-point Likert scale to better represent the personalized nature of the questionnaire (Nair, 2003).

This author would like to focus on the scales that were modified within the CUCEI since the adjusted version was the instrument used for this graduate student's research. The modified CUCEI involved replacing the Involvement and Satisfaction scales with two new scales, Cooperation and Equity. The newly included scales were defined as follows: (a) Cooperation—the extent to which students cooperate rather than compete with one another on learning tasks, and (b) Equity—the extent to which the teacher treats students equally (Nair & Fisher, 1999). This particular version of the CUCEI is of interest to this graduate student since the Cooperation scale is more in harmony with the type of study this author is performing in the classroom with cooperative learning.

The sample used for the validation of the modified instrument included 504 higher education students in a variety of science subjects. Of the total sample, 205 participants were from Canadian institutions, and 299 students were from Australian institutions. In reviewing the reliability and validity of the modified CUCEI, the Cronbach alpha reliability coefficients ranged from 0.73 to 0.93 when using the individual student as the item of analysis. When using the Actual and Preferred versions of the inventory, the Cronbach alpha reliability coefficients ranged from 0.76 to 0.94

(Nair & Fisher, 1999).

Researchers also tested the discriminant validity of the instrument to view the extent to which a scale of the CUCEI measured a unique dimension not covered by the other scales of the inventory. The mean correlations of the CUCEI scales ranged from 0.15 to 0.38 for the actual version of the instrument; the mean correlations of the preferred version scales ranged from 0.25 to 0.47. This element of the research confirmed that the scales of the CUCEI, though somewhat overlapping, do have distinct qualities that make them unique to the questionnaire. This study was distinct in its use of the modified CUCEI in a tertiary learning environment and the research concluded that the modified and personalized version of the CUCEI was a valid and reliable tool for the higher education classroom (Nair & Fisher, 1999).

The Watson-Glaser Critical Thinking Appraisal, Form-S

Design and validation. The Watson-Glaser Critical Thinking Appraisal, Form-S has been designed to measure important facets of critical thinking and has been used in a variety of educational settings (Watson & Glaser, 2006). In a 2005 published study, Gadzella stated that “the WGCTA-FS is a good instrument to measure critical thinking for students pursuing the teaching career” (p. 12). In the short form manual for the WGCTA-FS, Watson and Glaser (2006) viewed critical thinking as a combination of attitudes, knowledge, and skills. In relation to the facets integrated into their forms, Watson and Glaser (2006) believed that critical thinking should include the following:

> The ability to recognize the existence of problems and an acceptance of the general need for evidence in support of what is asserted to be true, knowledge of the nature of valid inferences, abstractions, and

> generalizations in which the weight or accuracy of different kinds of evidence are logically determined, and skills in employing and applying the above attitudes and knowledge. (p. 3)

The author would like to highlight several aspects of this definition: (a) Critical thinking is not just arriving at the solution to a problem but having the ability and skill set to recognize a problem; (b) critical thinking must provide foundational support for what is asserted to be true; (c) critical thinking must include the ability to conceptualize before concrete ideas are used in a solution to a problem; (d) critical thinking must include the ability to evaluate and make judgments among several similar evidences; and (e) critical thinking must be able to synthesize the aforementioned attitudes and knowledge into the creation of a sound and credible solution.

The Watson-Glaser Critical Thinking Appraisal, Form-S, is a 16-scenario, 40-question test that has been separated into five subtests. Each of the five tests was designed to measure a different aspect of critical thinking. Watson and Glaser (2006) have defined the five subtests with the following constructs:

1. Inference—The ability to discriminate among levels of truth or falsehood from a given statement.
2. Recognition of Assumptions—The ability to recognize an unstated expectation or belief in a given statement.
3. Deduction—The ability to assimilate information or statements and make valid conclusions.
4. Interpretation—The ability to take evidences and accurately assess if a conclusion or generalization is warranted.

5. Evaluation of Arguments—The ability to look at arguments and differentiate those that are weak from those that are strong.

"Each test is composed of reading passages or scenarios that include problems, statements, arguments, and interpretations of data similar to those encountered on a daily basis at work, in the classroom, and in newspaper or magazine articles" (Watson & Glaser, 2006, p. 4). Each scenario in each test has a number of items to which the student responds. Reading passages have been classified as either neutral or controversial. A neutral scenario involves a situation in which a participant would tend to have no opinion about the matter while a controversial category would tend to use situations that elicit strong emotional feelings on the part of the reader. The score of the WGCTA-FS is the total of all questions answered correctly within the inventory and not within each individual subtest. The test's reliability lies within its being able to assess an overall critical thinking score as opposed to individual scores in each of the five subtests. This is partially due to the fact that there are not many items within each subtest; they therefore lack the reliability to measure individual aspects of critical thinking (Watson & Glaser, 2006).

In compiling the scenarios of each subtest, the *Mental Measurements Yearbook* (Impara & Plake, 1998) stated five primary goals in developing the Short Form from the longer Form A: (a) allowing for the five subtests that appear in the Form A, (b) selecting items and scenarios that were psychometrically accurate to measure intended objectives, (c) ensuring that the Short Form continued to be reliable as the Form A, (d) establishing a reading level comparable to the Form A, and (e) increasing the acceptance of the test among the public as a valid and reliable tool to measure critical thinking skills.

According to Impara and Plake (1998), the test publisher was successful in meeting these criteria.

Though the Watson-Glaser Critical Thinking Appraisal, Form-S, has received commendations regarding its validity and reliability, some have criticized the construction of the test items. *The Buros Mental Measurements Yearbook* (Impara & Plake, 1998) has noted that 33 of the 40 test items are questions with only two possible answers. This fact is considered problematic. Though the reliability coefficients were calculated to be .81, these results could prove to be lower within specific groups. For this reason, some have suggested that the WGCTA-FS be used only as one of several inventories or surveys used to assess the true critical thinking skills of individuals. In a separate study, Wagner and Harvey (2003) made a similar observation:

> Despite its popularity in research and practical applications, an examination of the item response format used in the WGCTA immediately raises potential questions regarding its psychometric properties – in particular, its susceptibility to successful random guessing of the correct item responses. That is, the WGCTA uses a *two-alternative* multiple-choice format in four of the five logical divisions in Forms A and B (a five-alternative multiple choice format is used in the first section).” (p. 1)

Defense of the Watson-Glaser Critical Thinking Appraisal, Form-S. In reviewing the credibility of the Short Form as compared to the original and longer Form A, *The Thirteenth Mental Measurements Yearbook* (Impara & Plake, 1998) noted that though the goal of the WGCTA-FS was designed to be a shorter, more quickly administered form, it had the same identical subsets as the original form. Moreover, the test items and most of

the research completed on the WGCTA-FS were taken from studies completed on the original Form A. It is the statement of these authors that the WGCTA-FS has a long history of use and has been frequently reviewed for research purposes. Though both the Form A and the Short Form do differentiate among the five subtests, Watson and Glaser (Watson & Glaser, 2006) emphasize that the reliability of the inventory lies in a composite score as opposed to referencing the individual subtest scores.

The original Short Form was developed in 1994 using 1,608 participants. In reviewing the research for the sample used in the tests, the Cronbach's alpha coefficient was $r = .81$ (Watson & Glaser, 2006). Though this coefficient was considered to have good reliability projections, this is a lower score than the coefficient from the original Form A (Impara & Plake, 1998). In more recent reliability studies, estimates were comparable to former scores, ranging from .76 to .85. The evidence for strong validity of the WGCTA-FS has been supported primarily through the use of predictive validity studies involving both college and graduate students.

Though some have expressed legitimate concerns about the use of the Watson-Glaser Critical Thinking Appraisal, Form-S, it has still received high recommendations for its use in evaluating critical thinking skills. Overall, critiques of the inventory have been favorable in its use. Modjeski and Michael (Impara & Plake, 1998) have viewed the WGCTA-FS to be one of the finest instruments available in accurately assessing critical thinking skills. In addition, the following affirmative statements appeared in *The Thirteenth Mental Measurements Yearbook* (Impara & Plake, 1998):

> The WGCTA measure comes with a long history of successful use in instructional and evaluation research in such programs and courses. This

> short form does appear to continue to represent the long history of the Watson-Glaser Critical Thinking Appraisal successfully. It is sufficiently reliable and should be expected to be approximately as valid as one would expect given the shorter length. Form S of the Watson-Glaser Critical Thinking Appraisal is a short, practical measure of critical thinking. (pp. 1123, 1125)

Although not without its weaknesses, the WGCTA-FS appears to be an effective and useful tool for measuring critical thinking skills among preservice teachers in an educational setting. It is for these reasons that this author has chosen to use the Watson-Glaser Critical Thinking Appraisal, Form-S, for his research.

The Research Questions and Hypotheses

The Research Questions

Within the classrooms of Midwest Bible College, this educator sought to answer the following questions through his research:

1. What effect does cooperative learning have on students' perceptions of a classroom learning environment?
2. What effect does cooperative learning have on students' critical thinking skills?

The Hypotheses

The following null hypotheses for each of the research questions were tested. Hypotheses were rejected at the .05 alpha level.

H_{0a}: There will be no difference in the perception of the learning environment of preservice teachers who have been taught using cooperative learning techniques

compared to preservice teachers who have been taught using conventional lecture methods, as measured by the College and University Classroom Environment Inventory (CUCEI).

H_{0b}: There will be no difference in the critical thinking skill scores of preservice teachers taught using cooperative learning techniques compared to preservice teachers taught using conventional lecture methods, as measured by the Watson-Glaser Critical Thinking Appraisal, Form-S (WGCTA-FS).

Design of the Study

Research Perspective

The purpose of this study was to quantitatively measure differences in both the perception of learning environment and growth of critical thinking skills of preservice teachers. To maximize the validity of this research, this graduate student selected a classroom, using the normal routine of a classroom environment to accomplish his research. In light of this particular focus, this author has chosen to use a quantitative analysis for his research perspective. Glatthorn (2005) confirm this perspective in stating that “the quantitative perspective emphasizes studies that are experimental in nature, emphasize measurement, and search for relationships” (p. 40).

Research Type

The general approach to this research was a quasi-experimental design since it was impossible to randomly assign the subjects to treatment groups due to the fulfilling of the research in an educational setting. Ary, Jacobs, Razavieh, and Sorensen (2006) state that in this situation, a quasi-experimental design should be used. For this experiment, the author employed a nonrandomized control group with a post-test design

for this study. The classes were pre-assigned; therefore, this author did not have control over the assignment of the groups to each of his classes. As stated per Ary et al. (2006), the main shortcoming of a quasi-experimental design is that it does not provide full control of the population; therefore the researcher must be aware of both internal and external validity issues. Ary et al. mentioned that selection bias can pose serious internal validation problems for the study. Other internal issues, though, such as maturation, instrumentation, pre-testing, history, and regression of groups should not pose significant problems due to the nature of the design since the subjects were close in age and the tests were administered in close proximity to each other. Furthermore, this author was the instructor of all courses included in this quasi-experimental research.

One threat to external validity that the author must consider is the selection-treatment interaction, where "an effect found with certain kinds of subjects may not hold with different subjects" (Ary et al., 2006, p. 316). Because of the characteristics of the subjects within a Bible college environment, the results of this study may not be able to be generalized to different population groups. The author will discuss this limitation in more detail in Chapter Five of this dissertation.

Research Method

The research method employed for this quasi-experimental design included both tests and measurements. The tests used to collect data were the survey instruments previously described: the College and University Classroom Environment Inventory and the Watson-Glaser Critical Thinking Appraisal, Form-S. Each of these survey instruments were administered at the end of the fall semester of both 2007 and 2008. Moreover, the data from these tests were used to determine the statistical significance

between the means of the testing scores within the two population groups.

Variable Types

Independent variable. The independent variable included in this study was the instructional method used in the classroom. The instructional method within this investigation had two levels: (a) classroom instruction using a traditional lecture approach, and (b) classroom instruction using traditional lecture integrated with cooperative learning techniques. Moreover, the treatment group comprised the classes instructed using the cooperative learning techniques; the control group comprised the classes instructed using the traditional lecture methods.

Dependent Variable. The dependent variable included in this study had two levels: (a) the measurement of the perception of learning environment as evaluated by the College and University Classroom Environment Inventory and (b) the level of measurable critical thinking skills as quantified by the Watson-Glaser Critical Thinking Appraisal, Form-S.

Procedures

Request for permission. For purposes of this analysis, the author first obtained written permission from the administration of Midwest Baptist College to test students (see Appendix A). Once that process was completed, the author also obtained written permission from the Institutional Review Board (IRB) of the sponsoring university. The sponsoring university's IRB allowed this study to be submitted as a research exemption request since the study was comprised of anonymous participant data involving non-sensitive topics and minimal risk. The IRB committee chair approved the process with corrections to the participant consent letter (see Appendix B). Finally, the author also

obtained permission from the student participants themselves (see Appendix C).

Collection of the data. During the fall of 2007, the author taught the Foundations of Education course using only traditional lecture methods, and he taught the Instructional Techniques course using cooperative learning techniques integrated into the daily classroom teaching. For the fall of 2008, the methodologies were switched: the author taught the Foundations of Education course using cooperative learning techniques integrated into the daily classroom instruction, and he taught the Instructional Techniques course using traditional lecture methods. This graduate student taught both of the aforementioned courses during each of the fall semesters. For the courses that received the cooperative learning methods, the author notified the students on the first day of class that a cooperative learning paradigm would be adopted into the instructional methodologies of the classroom on a daily basis. The author instructed the students about the foundational elements of cooperative learning, including (a) positive interdependence, (b) promotive interaction, (c) individual accountability, (d) appropriate use of social skills, and (e) group processing (Johnson, 2003). Cooperative learning strategies were implemented into the classroom curriculum during each of the class periods. For both the Foundations of Education course and Instructional Techniques courses, classes met every Monday, Wednesday, and Friday for 50 minutes for 14 weeks from September through December.

During the last week of each fall semester, the author informed the subjects from both classes that they would have the opportunity to participate in a dissertation research project. Each participant was given information as to the nature of the study, the background of the study, the procedures, risks and benefits, confidentiality, and the

voluntary nature of the investigation (see Appendix C). Students who did not want to be part of the study received the option not to be included in the completion of the surveys. The author gave the College and University Classroom Environment Inventory to students in both classes during the last week of the semester. The College and University Classroom Environment Inventory and Watson-Glaser Critical Thinking Appraisal, Form-S were distributed and collected in a random fashion to ensure anonymity. The author was present only as a proctor for the survey instrument. The proctor assigned identification numbers to survey forms to ensure anonymity of the inventory and asked subjects not to write their names on the instrument. Therefore, there was no correlation between the subject's name and the identification number to prevent any research bias. The author assured students before taking the CUCEI that their answers would be shared only with those involved in the research and that in no way would the CUCEI responses affect their course grade (see Appendix C). Students were instructed to consider only their present class when answering the statements and to carefully think through the questions.

In addition, the author administered the Watson-Glaser Critical Thinking Appraisal, Form-S, to each class during the last week of the fall semester. Instruments were distributed and collected in a random fashion to ensure anonymity. The researcher was present only as a proctor for the survey instrument. Survey forms were assigned identification numbers by the proctor to ensure inventory anonymity, and the proctor asked the students not to write their names on the instrument. Therefore, no correlation existed between the subject's name and the identification number to prevent any research bias. The author assured the students before they took the test that he would share their

answers only with those involved in the research and that in no way would the WGCTA-FS responses affect their course grade (See Appendix C). All survey instruments were collected, sorted by class, and transferred to a depository for safe keeping.

Data Analysis

The College and University Classroom Environment Inventory offered the following seven constructs, each of which was tested for both the control group and the treatment group: cohesiveness, individualization, innovation, cooperation, personalization, equity, and task orientation. Information from each survey was entered into an SPSS statistical spreadsheet. A two-tailed *t*-test was executed between groups for each of the constructs to determine if any significant differences existed between the means of the courses taught using cooperative learning strategies versus the courses taught using traditional lecture methods. In contrast to the Watson-Glaser Critical Thinking Appraisal, Form-S, the College and University Classroom Environment Inventory has the ability to be tested between constructs. Treagust and Fraser (1986) have supported this conclusion in stating the following:

> These data together suggest that each CUCEI scale has adequate internal consistency, especially for scales containing only seven items each, in both its actual and preferred forms, for both students and instructors, and with either the individual or the class mean as the unit of analysis. (p. 43)

Additionally, means were also compared between groups in the overall CUCEI scores of the control group and the treatment group. The independent variable was the type of class instruction and the dependent variable was the corresponding posttest scores from each construct as well as the overall scores on the CUCEI. Significance was tested at the $p <$

.05 level.

The Watson-Glaser Critical Thinking Appraisal, Form-S, consisted of the following five constructs, which the author tested for both the control group and the treatment group: inference, recognition of assumptions, deduction, interpretation, and evaluation of arguments. Though the inventory was comprised of five distinct tests, it has been advised that one not rely upon individual test scores by construct for comparison. This cautionary statement has been delineated by Watson and Glaser (2006) in their assertion regarding the purpose and appropriate use of the WGCTA-FS:

> Though the Watson-Glaser comprises five tests, it is the total score of these tests that yields a reliable measure of critical thinking ability. Individually, the tests are composed of relatively few items and lack sufficient reliability to measure specific aspects of critical thinking ability. Therefore, individual test scores should not be relied upon for most applications of the Watson-Glaser. (p. 4)

In light of this information, a two-tailed *t*-test was employed to determine if there was a significant difference between the means of the courses taught using cooperative learning strategies versus the courses taught using traditional lecture methods. The independent variable was the type of class instruction and the dependent variable was the corresponding posttest scores from the WGCTA-FS. Significance was tested at the $p <$ .05 level.

CHAPTER FOUR: FINDINGS AND RESULTS

As stated in Chapter One, the study reported here examined in detail the influence of cooperative learning techniques on two aspects of a classroom learning environment. This chapter is organized in a parallel fashion to the two research questions the author posed in Chapter One: (a) What effects do cooperative learning techniques have on students' perception of their classroom environment, and (b) what effects do cooperative learning techniques have on the development of critical thinking skills of students in a classroom environment? As articulated in Chapter One, the study emphasis of this graduate student is summarized in the following null hypotheses:

> H_{0a}: There will be no difference in the perception of the learning environment of preservice teachers who have been taught using cooperative learning techniques compared to preservice teachers who have been taught using conventional lecture methods, as measured by the College and University Classroom Environment Inventory (CUCEI).
>
> H_{0b}: There will be no difference in the critical thinking skill scores of preservice teachers taught using cooperative learning techniques compared to preservice teachers taught using conventional lecture methods, as measured by the Watson-Glaser Critical Thinking Appraisal, Form-S (WGCTA-FS).

Descriptive Statistics

The study's target population included 127 students majoring in the field of education. The majority of students were of either sophomore or junior classification. The courses included in this study were a Foundations of Education class and an Instructional

Techniques class. This author taught all the courses included in this investigation. The inquiry's population was comprised of 40 male students and 87 female students. Within this sample were the following specific education emphases: English, History, Math, Science, Music, Speech, Elementary Education, and Cross-Cultural Studies. The author taught both courses during the fall semester of 2007 and the fall semester of 2008. During each semester, the author offered only one section of each class to students for enrollment.

During fall 2007, the Foundations of Education class had 44 enrolled students and the Instructional Techniques class had 25 enrolled students. During fall 2008, the Foundations of Education class was comprised of 39 enrolled students, and the Instructional Techniques class had 19 enrolled students. For the completion of the College and University Classroom Environment Inventory, 62 students who had been taught using conventional lecture methods completed the instrument, and 64 students who had been taught using cooperative learning methods completed the instrument. For the completion of the Watson-Glaser Critical Thinking Appraisal, Form-S, 61 students who had been taught using conventional lecture methods completed the instrument, and 62 students who had been taught using cooperative learning methods completed the instrument.

Research Results

College and University Classroom Environment Inventory

For the College and University Classroom Environment Inventory, the author conducted two-tailed *t*-test analyses using the results from the surveys and the following subset scores: (a) Personalization, (b) Innovation, (c) Student Cohesiveness, (d) Task

Orientation, (e) Cooperation, (f) Individualization, (g) Equity, and (h) Total Score. For each subset score, the author compared the mean response scores between the lecture group and the cooperative learning group. He used an alpha level of .05 for all statistical tests.

Consideration of outliers. In previewing the data under consideration, this researcher did check the overall Total score of the inventory to determine if any outliers existed that necessitated examination. For calculation of outliers, this researcher employed quartile one (Q1), quartile three (Q3), and the interquartile range (IQR) to check the data set for any data values that were smaller than Q1 – 1.5*(IQR) or larger than Q3 + 1.5*(IQR) (Bluman, 2008). This process yielded no outliers within the lecture group but did produce three data values for consideration in the cooperative learning group. Each of these values was less than Q1 – 1.5*(IQR). The researcher reviewed each of the outliers and decided to allow the low total scores in the sample and not remove them from the *t*-test statistical comparison. Although outliers should be considered and reviewed, a researcher must also determine whether to allow or remove the outliers from the data set (Bluman, 2008). The College and University Classroom Environment Inventory is an instrument that allows students to express their perceptions of a learning environment (Nair, 2003); therefore, this researcher has chosen to include all perceptions as noted on the College and University Classroom Environment Inventory to best represent the entire student population from which information was queried.

Total of all scales. The author conducted an independent samples *t*-test to compare the equality of the mean Total scale scores of the inventory between the cooperative learning group and the lecture group. As stated by Nair and Fisher (1999),

the Total scale score is designed to quantify an overall perception by the student of his or her learning environment. For this comparison, the author did not assume equal variances for the *t*-test. Results of the statistical test revealed a significant difference in the mean scores for the cooperative learning group (*Mean* = 182.83, *Standard Deviation* = 9.38) versus the mean score for the lecture group (*Mean* = 170.85, *Standard Deviation* = 14.68), $t(103.16) = 5.44$, $p = 0.00$ (two-tailed).

As shown in Table 2, the results suggest that the use of cooperative learning techniques in the classroom yielded significant and favorable results among students in their overall perception of the classroom environment compared to the lecture-driven classroom. The null hypothesis, H_{0a}, stated that there will be no difference in the perception of the learning environment of preservice teachers who have been taught using cooperative learning techniques compared to preservice teachers who have been taught using conventional lecture methods, as measured by the College and University Classroom Environment Inventory (CUCEI). The null hypothesis, H_{0a}, was not retained for the Total score of the CUCEI.

Table 2

Results for t-Test Using Total Scores

Variable	*n*	*M*	*SD*	*t*	*df*	*p*	*d*	*SEM*
Cooperative Learning	64	182.83	9.38					1.17
				5.44**	103.16	.00	.97	

Lecture	62	170.85	14.68	1.86

** $p \leq .01$.

Personalization scale. The author conducted an independent samples *t*-test to compare the equality of the mean Personalization scale scores of the inventory between the cooperative learning group and the lecture group. The purpose of this subscale was to quantify the extent to which students perceived being able to interact with the teacher and the level of personal interest the instructor had for the student (Nair & Fisher, 1999). For this comparison, the author assumed equal variances for the *t*-test. Statistical test results revealed no significant difference in the mean scores for the cooperative learning group (*Mean* = 28.36, *Standard Deviation* = 3.08) versus the mean score for the lecture group (*Mean* = 27.73, *Standard Deviation* = 3.25), $t(124) = 1.13$, $p = 0.26$ (two-tailed).

The results of Table 3 suggest that the use of cooperative learning techniques in the classroom had no significant, measurable effect on students' perceptions of their interaction with the instructor compared to the lecture-driven classroom. The null hypothesis, H_{0a}, stated that there will be no difference in the perception of the learning environment of preservice teachers who have been taught using cooperative learning techniques compared to preservice teachers who have been taught using conventional lecture methods, as measured by the College and University Classroom Environment Inventory (CUCEI). The null hypothesis, H_{0a}, was retained for the Personalization scale score of the CUCEI.

Table 3

Results for t-Test Using Personalization Subscale Scores

Variable	*n*	*M*	*SD*	*t*	*df*	*p*	*d*	*SEM*
Cooperative Learning	64	28.36	3.08					.39
				1.13	124	.26	.20	
Lecture	62	27.73	3.25					.41

Innovation scale. The author conducted an independent samples *t*-test to compare the equality of the mean Innovation scale scores of the inventory between the cooperative learning group and the lecture group. The purpose of this subscale was to quantify the extent to which students perceived the instructor to be using new and innovative techniques and assignments in the classroom (Nair & Fisher, 1999). For this comparison, the author did not assume equal variances for the *t*-test. Statistical test results revealed a significant difference in the mean scores for the cooperative learning group (*Mean* = 26.42, *Standard Deviation* = 2.50) versus the mean score for the lecture group (*Mean* = 22.11, *Standard Deviation* = 3.80), $t(105.02) = 7.50$, $p = 0.00$ (two-tailed).

The results of Table 4 suggest that the use of cooperative learning techniques in the classroom had a significant, positive effect on students' perceptions of the creative and innovative instructional classroom techniques used in the classroom compared to the lecture-driven classroom. The null hypothesis, H_{0a}, stated that there will be no difference in the perception of the learning environment of preservice teachers who have been taught using cooperative learning techniques compared to preservice teachers who have

been taught using conventional lecture methods, as measured by the College and University Classroom Environment Inventory (CUCEI). The null hypothesis, H_{0a}, was not retained for the Innovation scale score of the CUCEI.

Table 4

Results for t-Test Using Innovation Subscale Scores

Variable	*n*	*M*	*SD*	*t*	*df*	*p*	*d*	*SEM*
Cooperative Learning	64	26.42	2.50					.31
				7.50**	105.02	.00	1.34	
Lecture	62	22.11	3.80					.48

** $p \leq .01$.

Student cohesiveness scale. The author conducted an independent samples *t*-test to compare the equality of the mean Student Cohesiveness scale scores of the inventory between the cooperative learning group and the lecture group. The purpose of this subscale was to measure the students' perceptions of their ability to form relationships in the classroom with other students (Nair & Fisher, 1999). For this comparison, the author assumed equal variances for the *t*-test. Statistics test results revealed no significant difference in the mean scores for the cooperative learning group (*Mean* = 20.34, *Standard Deviation* = 2.10) versus the mean score for the lecture group (*Mean* = 21.03, *Standard Deviation* = 2.76), $t(124) = -1.58$, $p = 0.12$ (two-tailed).

The results of Table 5 suggest that the use of cooperative learning techniques in

the classroom had no significant effect on students' perceptions of forming relationships with other classmates compared to the lecture-driven classroom. The null hypothesis, H_{0a}, stated that there will be no difference in the perception of the learning environment of preservice teachers who have been taught using cooperative learning techniques compared to preservice teachers who have been taught using conventional lecture methods, as measured by the College and University Classroom Environment Inventory (CUCEI). The null hypothesis, H_{0a}, was retained for the Student Cohesiveness scale score of the CUCEI.

Table 5

Results for t-Test Using Student Cohesiveness Subscale Scores

Variable	*n*	*M*	*SD*	*t*	*df*	*p*	*d*	*SEM*
Cooperative Learning	64	20.34	2.10					.26
				-1.58	124	.12	.28	
Lecture	62	21.03	2.76					.35

Task orientation scale. The author conducted an independent samples *t*-test to compare the equality of the mean Task Orientation scale scores of the inventory between the cooperative learning group and the lecture group. The purpose of this subscale was to measure the perception of how students believe the class to be clear and organized in its activities and assignments (Nair & Fisher, 1999). For this comparison, the author

assumed equal variances for the *t*-test. Statistical test results revealed no significant difference in the mean scores for the cooperative learning group (*Mean* = 22.91, *Standard Deviation* = 2.31) versus the mean score for the lecture group (*Mean* = 23.27, *Standard Deviation* = 2.03), $t(124) = -0.95$, $p = 0.34$ (two-tailed).

The results of Table 6 suggest that the use of cooperative learning techniques in the classroom had no significant effect on students' perception of the clarity and organization of the class compared to the lecture-driven classroom. The null hypothesis, H_{0a}, stated that there will be no difference in the perception of the learning environment of preservice teachers who have been taught using cooperative learning techniques compared to preservice teachers who have been taught using conventional lecture methods, as measured by the College and University Classroom Environment Inventory (CUCEI). The null hypothesis, H_{0a}, was retained for the Task Orientation scale score of the CUCEI.

Table 6

Results for t-Test Using Task Orientation Subscale Scores

Variable	*n*	*M*	*SD*	*t*	*df*	*p*	*d*	*SEM*
Cooperative Learning	64	22.91	2.31					.29
				-.95	124	.34	.17	
Lecture	62	23.27	2.03					.26

Cooperation scale. The author conducted an independent samples *t*-test to compare the equality of the mean Cooperation scale scores of the inventory between the cooperative learning group and the lecture group. The purpose of this subscale was quantify the extent to which students believed they were cooperating with one another in the classroom (Nair & Fisher, 1999). For this comparison, the author did not assume equal variances for the *t*-test. Statistical test results revealed a significant and positive difference in the mean scores for the cooperative learning group (*Mean* = 30.28, *Standard Deviation* = 4.39) versus the mean score for the lecture group (*Mean* = 22.82, *Standard Deviation* = 7.82), $t(95.33) = 6.58$, $p = 0.00$ (two-tailed).

The results of Table 7 suggest that the use of cooperative learning techniques in the classroom had a significant positive effect on students' perception of a cooperative environment in the classroom compared to the lecture-driven classroom. The null hypothesis, H_{0a}, stated that there will be no difference in the perception of the learning environment of preservice teachers who have been taught using cooperative learning techniques compared to preservice teachers who have been taught using conventional lecture methods, as measured by the College and University Classroom Environment Inventory (CUCEI). The null hypothesis, H_{0a}, was not retained for the Cooperation scale score of the CUCEI.

Table 7

Results for t-Test Using Cooperation Subscale Scores

Variable	*n*	*M*	*SD*	*t*	*df*	*p*	*d*	*SEM*
Cooperative	64	30.28	4.39					.55

Learning							
				6.58**	95.33	.00	1.18
Lecture	62	22.82	7.82				.99

** $p \leq .01$.

Individualization scale. The author conducted an independent samples *t*-test to compare the equality of the mean Individualization scale scores of the inventory between the cooperative learning group and the lecture group. The purpose of this subscale was to measure the perception of how students were allowed to make decisions within the classroom and were treated according to ability and interest (Nair & Fisher, 1999). For this comparison, the author assumed equal variances for the *t*-test. Statistical test results revealed no significant difference in the mean scores for the cooperative learning group (*Mean* = 20.14, *Standard Deviation* = 2.84) versus the mean score for the lecture group (*Mean* = 20.68, *Standard Deviation* = 2.79), $t(124) = -1.07$, $p = 0.29$ (two-tailed).

The results of Table 8 suggest that the use of cooperative learning techniques in the classroom had no significant effect on students' perception of making decisions in the classroom and being treated according to ability compared to the lecture-driven classroom. The null hypothesis, H_{0a}, stated that there will be no difference in the perception of the learning environment of preservice teachers who have been taught using cooperative learning techniques compared to preservice teachers who have been taught using conventional lecture methods, as measured by the College and University Classroom Environment Inventory (CUCEI). The null hypothesis, H_{0a}, was retained for the Individualization scale score of the CUCEI.

Table 8

Results for t-Test Using Individualization Subscale Scores

Variable	*n*	*M*	*SD*	*t*	*df*	*p*	*d*	*SEM*
Cooperative Learning	64	20.14	2.84					.36
				-1.07	124	.29	.19	
Lecture	62	20.68	2.79					.36

Equity scale. The author conducted an independent samples *t*-test to compare the equality of the mean Equity scale scores of the inventory between the cooperative learning group and the lecture group. The purpose of this subscale was to measure students' perceptions of being treated equally by the teacher in relation to other students in the classroom (Nair & Fisher, 1999). For this comparison, the author did not assume equal variances for the *t*-test. Statistical test results revealed a significant difference in the mean scores for the cooperative learning group (*Mean* = 34.38, *Standard Deviation* = 1.34) versus the mean score for the lecture group (*Mean* = 33.21, *Standard Deviation* = 3.61), $t(77) = 2.39$, $p = 0.02$ (two-tailed).

The results of Table 9 suggest that the use of cooperative learning techniques in the classroom had a significant positive effect on students' perception of being treated equitably in the classroom compared to the lecture-driven classroom. The null hypothesis, H_{0a}, stated that there will be no difference in the perception of the learning

environment of preservice teachers who have been taught using cooperative learning techniques compared to preservice teachers who have been taught using conventional lecture methods, as measured by the College and University Classroom Environment Inventory (CUCEI). The null hypothesis, H_{0a}, was not retained for the Equity scale score of the CUCEI.

Table 9

Results for t-Test Using Equity Subscale Scores

Variable	*n*	*M*	*SD*	*t*	*df*	*p*	*d*	*SEM*
Cooperative Learning	64	34.38	1.34					.17
				2.39*	77	.02	.43	
Lecture	62	33.21	3.61					.46

* $p \leq .05$.

Watson-Glaser Critical Thinking Appraisal, Form-S

For the Watson-Glaser Critical Thinking Appraisal, Form-S, the author conducted a two-tailed *t*-test analysis using the overall results from the short form. As delineated in Chapter Three, the reliability of the Watson-Glaser Critical Thinking Appraisal, Form-S, lies in its ability to assess an overall critical thinking score as opposed to individual scores in each of the five subtests. This is partially due to the fact that not many items are within each subtest; therefore, it lacks reliability to measure individual aspects of critical thinking (Watson & Glaser, 2006). In light of this information, this researcher will

compare only the total test scores of students and not of individual subscales.

The author conducted an independent samples *t*-test to compare the equality of the mean total scores of the critical thinking short form between the cooperative learning group and the lecture group. For this comparison, the author assumed equal variances for the *t*-test. Statistical test results revealed that there was not a significant difference in the mean scores of the cooperative learning group (*Mean* = 27.45, *Standard Deviation* = 5.56) versus the mean score of the lecture group (*Mean* = 27.31, *Standard Deviation* = 5.75), $t(121) = .14$, $p = .89$ (two-tailed).

The results of Table 10 suggest that the use of cooperative learning techniques in the classroom had no significant effect on the total score of critical thinking skills as measured by the WGCTA-FS compared to the lecture-driven classroom. The null hypothesis, H_{0b}, stated that there will be no difference in the critical thinking skill scores of preservice teachers taught using cooperative learning techniques compared to preservice teachers taught using conventional lecture methods, as measured by the Watson-Glaser Critical Thinking Appraisal, Form-S (WGCTA-FS). The null hypothesis, H_{0b}, was retained for the Total score of the WGCTA-FS.

Table 10

Results for t-Test Using Total WGCTA-FS Scores

Variable	*n*	*M*	*SD*	*t*	*df*	*p*	*d*	*SEM*
Cooperative Learning	62	27.45	5.56					.71

				.14	121	.89	.02
Lecture	61	27.31	5.75				.74

The results presented for the College and University Classroom Environment Inventory and the Watson-Glaser Critical Thinking Appraisal, Form-S statistical tests suggest there is merit in using cooperative learning strategies in a college setting within preservice teacher courses. Though each inventory showed varying results within the statistical procedures, clearly there was an indication within specific facets of the College and University Classroom Environment Inventory that cooperative learning strengthened students' perceptions about their learning environment. A more detailed summary and discussion of the findings of the College and University and Classroom Environment Inventory and the Watson-Glaser Critical Thinking Appraisal, Form-S, are presented in Chapter Five.

CHAPTER FIVE: SUMMARY AND DISCUSSION

This chapter provides a summary of the author's research problems and reviews the major statistical methods he used to complete the study. In addition, a synopsis of the results and discussion of the relevant findings from the statistical tests will be provided. Finally, the author will give implications for educators, delimitations of the study, as well as recommendations for further analysis for necessary understanding and insight.

Statement of the Problem

This inquiry sought to investigate two questions within the collegiate classroom: (a) what are the effects of cooperative learning techniques on the perceived learning environment of preservice teachers as measured by the College and University Classroom Environment Inventory (CUCEI), and (b) what are the effects of cooperative learning techniques on the critical thinking skills of preservice teachers as measured by the Watson-Glaser Critical Thinking Appraisal, Form-S (WGCTA-FS)?

Statement of the Hypotheses

There were two main hypotheses under consideration for this study:

> H_{0a}: There will be no difference in the perception of the learning environment of preservice teachers who have been taught using cooperative learning techniques compared to preservice teachers who have been taught using conventional lecture methods, as measured by the College and University Classroom Environment Inventory (CUCEI).
>
> H_{0b}: There will be no difference in the critical thinking skill scores of preservice teachers taught using cooperative learning techniques compared to preservice

teachers taught using conventional lecture methods, as measured by the Watson-Glaser Critical Thinking Appraisal, Form-S (WGCTA-FS).

Review of the Methodology

As explained in Chapter Three, the dual purposes of this study sought to understand the influence and impact of cooperative learning strategies on both student perceptions of learning environment and critical thinking skills at the undergraduate level. The study's target population included 127 preservice teachers at Midwest Bible College. ("Midwest Bible College" is a fictitious name used to preserve confidentiality.) The courses used for this investigation included a sophomore level Foundations of Education class and a junior level Instructional Techniques class. The author measured the perception of classroom environment using the College and University Classroom Environment Inventory (CUCEI). He used this particular inventory because of its suitability for use in higher education classrooms (Nair, 2003). In addition, he employed this instrument to quantify the perceptions of the subjects toward their classroom environment according to seven separate scales: (a) Personalization, (b) Innovation, (c) Student Cohesiveness, (d) Task Orientation, (e) Cooperation, (f) Individualization, and (g) Equity (Nair & Fisher, 1999).

The author measured critical thinking skills using the Watson-Glaser Critical Thinking Appraisal, Form-S (WGCTA-FS). He used this survey instrument because of its high recommendations in evaluating critical thinking skills (Impara & Plake, 1998). As noted in Chapter Three, this instrument differentiates between the following constructs within critical thinking: (a) Inference, (b) Recognition of Assumptions, (c) Deduction, (d) Interpretation, and (e) Evaluation of Arguments. The test's reliability lies in that it is able

to assess an overall critical thinking score as opposed to individual scores in each of the five subtests. A weakness of the WGCTA-FS is an absence of multiple questions within each subtest; therefore, the WGCTA-FS lacks the reliability to measure individual aspects of critical thinking (Watson & Glaser, 2006).

During fall 2007, the author taught the Foundations of Education course using only conventional lecture methods and the Instructional Techniques course using cooperative learning techniques integrated into the daily classroom teaching. For fall 2008, the methodologies were switched: the author taught the Foundations of Education course using cooperative learning techniques integrated into the daily classroom instruction and the Instructional Techniques course using conventional lecture methods. For the courses the author taught using the cooperative learning methods, he notified the students on the first day of class using a PowerPoint presentation that he would be daily adopting a cooperative learning paradigm into the instructional methodologies of the classroom. He instructed students on the foundational elements of cooperative learning, including (a) positive interdependence, (b) promotive interaction, (c) individual accountability, (d) appropriate use of social skills, and (e) group processing (Johnson, 2003). He also implemented cooperative learning strategies into the classroom curriculum during each class period. This researcher taught each of the fall classes for this investigation.

During the last week of each fall semester, the author informed the populations of both classes that they would have the opportunity to participate in a dissertation research project. He gave each participant information on a participant consent form explaining the nature of the study, the background of the study, the procedures, the risks and

benefits, the confidentiality, and the voluntary nature of the investigation. Subjects who did not want to be part of the study received the option not to be included in the completion of the surveys (see Appendix C). The author gave the College and University Classroom Environment Inventory (CUCEI) to students in both classes during the last week of the semester. In addition, each class had the Watson-Glaser Critical Thinking Appraisal, Form-S, administered to them during the last week of the fall semester.

The author assessed the results of the College and University Classroom Environment Inventory using independent-samples two-tailed *t*-tests. He executed separate *t*-tests between the means of each of the seven constructs as well as the total score to determine if there were any significant, positive differences between the means of the courses taught using cooperative learning strategies versus the courses taught using traditional lecture methods. The independent variable was the type of class instruction, and the dependent variable was the corresponding posttest scores from each construct as well as the overall total scores on the CUCEI. Moreover, the author assessed the results of the WGCTA-FS using an independent-samples two-tailed *t*-test. The author executed one *t*-test for the mean of the total inventory score to determine if there was a significant positive difference between the mean of the courses taught using cooperating learning strategies versus the courses taught using traditional lecture methods. The independent variable was the type of class instruction, and the dependent variable was the corresponding posttest scores from the WGCTA-FS.

Summary of the Results

College and University Classroom Environment Inventory

The results of the independent-samples *t*-tests revealed that four of the eight

statistical tests affirmed a positive and significant difference between the means of the cooperative learning versus lecture groups. Significance was tested at an alpha level of .05.

1. The author conducted an independent samples *t*-test to compare the equality of the mean Total scale scores of the inventory between the cooperative learning group and the lecture group. Statistical test results revealed that the mean score for the cooperative learning group (*Mean* = 182.83, *Standard Deviation* = 9.38) was significantly higher than the mean score of the lecture group (*Mean* = 170.85, *Standard Deviation* = 14.68). The null hypothesis, H_{0a}, was not retained for the Total scale score of the College and University Classroom Environment Inventory.
2. The author conducted an independent samples *t*-test to compare the equality of the mean Innovation scale scores of the inventory between the cooperative learning group and the lecture group. Statistical test results test revealed that the mean score for the cooperative learning group (*Mean* = 26.42, *Standard Deviation* = 2.50) was significantly higher than the mean score of the lecture group (*Mean* = 22.11, *Standard Deviation* = 3.80). The null hypothesis, H_{0a}, was not retained for the Innovation scale score of the College and University Classroom Environment Inventory.
3. The author conducted an independent samples *t*-test to compare the equality of the mean Cooperation scale scores of the inventory between the cooperative learning group and the lecture group. Results of the statistical test revealed that the mean score for the cooperative learning group (*Mean* =

30.28, *Standard Deviation* = 4.39) was significantly higher than the mean score of the lecture group (*Mean* = 22.82, *Standard Deviation* = 7.82). The null hypothesis, H_{0a}, was not retained for the Cooperation scale score of the College and University Classroom Environment Inventory.

4. The author conducted an independent samples *t*-test to compare the equality of the mean Equity scale scores of the inventory between the cooperative learning group and the lecture group. Statistical test results revealed that the mean score for the cooperative learning group (*Mean* = 34.38, *Standard Deviation* = 1.34) was significantly higher than the mean score of the lecture group (*Mean* = 33.21, *Standard Deviation* = 3.61). The null hypothesis, H_{0a}, was not retained for the Equity scale score of the College and University Classroom Environment Inventory.
5. The author conducted an independent samples *t*-test to compare the equality of the mean Personalization scale scores of the inventory between the cooperative learning group and the lecture group. Statistical test results revealed that the mean score for the cooperative learning group (*Mean* = 28.36, *Standard Deviation* = 3.08) was higher than the mean score of the lecture group (*Mean* = 27.73, *Standard Deviation* = 3.25) but was not significant. The higher mean suggests that there may be some advantage to using cooperative learning according to the Personalization scale score, but further research would need to occur to substantiate this statement. The null hypothesis, H_{0a}, was retained for the Personalization scale score of the College and University Classroom Environment Inventory.

In conclusion, the independent-samples *t*-test scores of the subscales of Student Cohesiveness, Task Orientation, and Individualization failed to show significant differences in the mean scores between the cooperative learning group and the lecture group. All three scales had slightly higher means for the lecture group compared to the cooperative learning group. The null hypothesis, H_{0a}, was retained for the Student Cohesiveness, Task Orientation, and Individualization scale scores of the College and University Classroom Environment Inventory.

Watson-Glaser Critical Thinking Appraisal, Form-S

The results of the independent-samples *t*-test for the Total score of the Watson-Glaser Critical Thinking Appraisal, Form-S revealed that the mean of the cooperative learning group (M = 27.45, SD = 5.56) was higher than the mean score of the lecture group (M = 27.31, SD = 5.75). No significant differences were found by instructional type when comparing the means of the two groups. Significance was tested at an alpha level of .05. The null hypothesis, H_{0b}, was retained for the Total score of the Watson-Glaser Critical Thinking Appraisal, Form-S.

Interpretations of the Findings

This Christian educator's passion is to teach his courses in a manner that reflects not only the glory of God but also an excellence in both pedagogy and classroom practice. Educators must frequently ask the question, "What works best?" so they do not fall into educational ruts of thinking. One should note, however, that he or she must first evaluate any technique or practice against a biblical framework lest decision-making for instruction turn pragmatic. In light of this researcher's study, it is important to draw correct insights and conclusions as to what the research states as well as what it does *not*

state.

College and University Classroom Environment Inventory

On the basis of this study alone, the statistical results suggest the following two conclusions this author will build upon: (a) cooperative learning strategies impact a student's view of his or her learning environment in a positive significant manner; and (b) students value the facets of a learning environment and notice them in the classroom as being either present or absent. Though a learning environment may possess intangible elements, the concept of a learning environment is a necessary aspect of managing a classroom that "emphasizes the importance of meaningful, authentic activities that help the learner to construct understandings and develop skills relevant to solving problems" (B. G. Wilson, 1996, p. 3). The skills of problem solving and conceptualization are not designed exclusively for the classroom but far beyond as well. In other words, the classroom is training for life.

The interpretation of this research parallels similar studies regarding cooperative learning and the learning environment. The statistical outcomes of this study support the work of Dart et al. (2000), who found that courses that had deep or meaningful approaches to the learning within the classroom were characterized by relationships in the classroom, student participation in the structure of the learning environment, and investigative skills inherent to the teaching of the class. The very nature of the College and University Classroom Environment Inventory alludes to the idea that the interactions within the classroom, how learners work together and support each other, and how students are guided in their learning are all components of a learning environment one should take into consideration when investigating how students learn best. The college

classroom should not primarily be an emphasis on the dissemination of information but also include a synergy of experiences and relationships that bring an education fullness (Johnson et al., 2007). Johnson et al. referenced this idea when they stated the following regarding cooperative learning:

> For students to hold their college experience in their hearts and remember it as one of the most meaningful periods of their lives, students must (a) be faced with intellectual challenges and succeed, (b) be involved in caring and supportive relationships that develop into life-long friendships, (c) develop the habits of the heart and mind that lead to the competencies they need to relate appropriately to others and cope successfully with the adversity and stress they may face in the future. The road to these outcomes lies through cooperative learning. (p. 28)

In light of this present study, it is noteworthy to analyze the statistical results of the College and University Classroom Environment Inventory to discover what is of value and importance to this researcher's population sample. In review of earlier statements, the results indicate that cooperative learning techniques do have a positive effect on students' perceptions of their learning environment. In addition, the results reveal some differentiation among the population groups as to what they perceived their classroom to offer them through a learning environment. Previous research by Nair and Fisher (1999) in this area has shown that "learning environments are accurate predictors of the quality of learning that students receive" (p. 3). Nair (2003) has also indicated that the learning environments of students have significant influence on the outcomes of student learning within the classroom.

An examination of the scales of the College and University Classroom Environment Inventory provides some insights as to what classroom characteristics were deemed to be significantly stronger by the preservice students in the courses influenced by cooperative learning strategies. Though not all means of the cooperative learning group versus the lecture group revealed significance, it is useful to reflect on the four scales of the CUCEI that did show significance.

1. One characteristic the students perceived to be significantly higher was that of Innovation, or the extent to which students perceive activities to be creative or unusual in classroom instruction. Students perceived the cooperative learning classroom to offer them more opportunities to try creative and innovative ideas than that of the lecture classroom.
2. A second characteristic the students perceived to be significantly higher was Cooperation, or the extent to which students recognize the opportunity to work and learn from others in addition to the teacher, share resources, and work together toward common goals. The significant difference in means between the cooperative learning group and the lecture group supports the idea that the cooperative learning strategies foster the perception of a more student-engaged environment than an individualistic or competitive environment.
3. A third characteristic the students perceived to be significantly higher was Equity or the extent to which students perceive that they are the recipients of equal attention and opportunities in the classroom as provided by the instructor. Students perceived that the instructor in the cooperative learning

environment provided more equality in help, praise, treatment, encouragement, and classroom opportunities than he did in a lecture-driven environment.

4. A final scale of significance for the students was the Total score of the instrument. Overall, the cooperative learning environment was perceived by students to be more supportive, safe, and helpful in the formation of relationships in the classroom.

Though not all scales in the CUCEI reported significant differences in the means of the two groups, it is important to note what was valued between the two types of class instruction. Two sides to this research merit reflection: (a) the effects of cooperative learning on classroom environment, and (b) what the student is taking away from the classroom in a cooperative learning environment versus a traditional lecture environment. The scales that revealed significance, as listed previously in this chapter, nurture the opportunity for improved and increased learning in the classroom. Dart et al. (2000) stated that classroom environments perceived as offering protection, support, and helpful relationships advance deeper meaning in the classroom.

As a final component of interpretation for this particular study, it is important for this Christian educator to look at ideas and philosophies through the grid of a biblical worldview. To do otherwise creates the possibility of embracing techniques that could be philosophically in opposition to Scripture. As an initial comparison, one must consider the construct of Innovation. In reviewing how His teaching influenced and impacted others, the Lord Jesus Christ showed Himself to be the master teacher on this earth. For example, Jesus was innovative in teaching by using the parables. He said in Mathew

13:13, “This is why I speak to them in parables, because seeing they do not see, and hearing they do not hear, nor do they understand.” The Lord had perfect clarity in His teaching, and He frequently used parables to articulate His message to His listeners. In addition, to combat the false teaching of the spiritually blind Pharisees, Jesus provided insights to kingdom living through parables. Jesus told the disciples in Matthew 15:14, “Let them alone; they are blind guides. And if the blind lead the blind, both will fall into a pit.” In conclusion, the master teacher took his own teaching very seriously and articulated why the role of the teacher was so significant with the learners. Jesus stated in Luke 6:40, “A disciple is not above his teacher, but everyone when he is fully trained will be like his teacher.” Jesus modeled an innovative learning environment.

As a secondary comparison, one must consider the construct of Cooperation. Jesus preached a cooperative mission when He stated in Matthew 28:19-20, “Go therefore and make disciples of all nations, baptizing them in the name of the Father and of the Son and of the Holy Spirit, teaching them to observe all that I have commanded you.” The Lord also used resource interdependence in creating an ultimate and common resource need within each of His disciples when he stated in John 15:5, “I am the vine; you are the branches. Whoever abides in me and I in him, he it is that bears much fruit, for apart from me you can do nothing.” In addition to an example of relationship emphasis between the teacher and the student, one should also note that the essence of working together toward a common goal and creating peer synergy is modeled for the Christian in Ecclesiastes 4:9-12:

> Two are better than one, because they have a good reward for their toil.
>
> For if they fall, one will lift up his fellow. But woe to him who is alone

> when he falls and has not another to lift him up! Again, if two lie together, they keep warm, but how can one keep warm alone? And though a man might prevail against one who is alone, two will withstand him—a threefold cord is not quickly broken.

In addition to the strength of cooperation, it is also evident that the interaction between like-minded students provides mutual benefit to each of the learners. Solomon referred to this idea in Proverbs 27:17: “Iron sharpens iron, and one man sharpens another.” Jesus modeled a learning climate of cooperation.

As a final comparison, one must consider the construct of Equity. Jesus loved all men and women He encountered, and each who followed Him received the same care, encouragement, treatment, and attention as any other person. Jesus’ mission emphasized this role; Matthew 20:28 says of Christ, “Even as the Son of Man came not to be served but to serve, and to give his life as a ransom for many.” People who came into contact with Jesus were equally encouraged and helped, both physically and spiritually. Jesus modeled a learning atmosphere of equity.

Watson-Glaser Critical Thinking Appraisal, Form-S

In terms of instructional type of influence, it appears that the influence of cooperative learning techniques did not have a measureable effect on the critical thinking skills of the population sample for this specific study. Though the mean of the cooperative learning group (*Mean* = 27.45, *Standard Deviation* = 5.56) was higher than the mean score for the lecture group (*Mean* = 27.31, *Standard Deviation* = 5.75), the results failed to show any significant difference between the means of the two instructional types. Based on related studies, these are not the generally expected results

for the outcomes of this research. As reported in a study by Fennell (1992), the results of a survey of 208 undergraduate students indicated that cooperative learning techniques led to higher ratings in the area of critical thinking. In other words, students believed that they engaged more in the evaluation of ideas and opinions and in problem solving when the author incorporated cooperative learning techniques into classroom instruction. Barzdziukiene et al. (2006) have suggested that cooperative learning techniques employed in the classroom improve students' critical thinking skills when compared to a traditional lecture environment. In this particular study, critical thinking was also linked to creative thinking. The authors wrote, "Creative thinking is generally considered to be involved with the creation or generation of ideas, processes, and experiences, whereas critical thinking is concerned with their evaluation" (Barzdziukiene et al., 2006, p. 80). As a more recent study of contrast, Abdulghani (2003) noted in her research that the integration of cooperative learning strategies showed no statistical significant difference on the Watson Glaser Critical Thinking Appraisal for secondary students compared to those who learned through lecture techniques.

The fact that the experimental group did not show statistically significant gains may have resulted because this researcher did not implement a sufficient collection of cooperative learning exercises intentionally focused on the core idea of creativity as noted by Barzdziukiene (2006). Johnson et al. (2007) noted that some cooperative learning techniques focus on relational aspects of the classroom to a greater extent. Another facet of this research that aids in the understanding of the unanticipated results of the WGCTA-FS is the potential weakness of the instrument itself. In research presented by Wagner and Harvey (2003), the authors raised the concern that four of the five

constructs within the Watson-Glaser Critical Thinking Appraisal, Form-S, use a two-alternative multiple-choice format, hence raising questions as to the susceptibility of successfully guessing. Wagner and Harvey (2003) have expressed their concern by stating that "successful guessing on optimal-performance ability tests represents a potentially serious problem that can cause a range of psychometrically undesirable outcomes" (p. 1).

Implications of the Study

The outcomes of this study suggest to this author that cooperative learning techniques have merit and profit for this educator in the undergraduate classroom. Notwithstanding the favorable results of the statistical tests, this researcher surmised that additional scales of the College and University Classroom Environment Inventory would have shown significantly higher means for the cooperative learning group over the lecture group. For this research, this author is specifically referring to the scales of Personalization and Student Cohesiveness. Previous research in the field of cooperative learning gives credence to this conclusion (Nair & Fisher, 1999) . Characteristics of the two aforementioned scales, such as (a) opportunities to interact with the instructor, (b) the instructor's concern for the students, and (c) the extent to which students assist and are friendly to each other in class have been linked to success in a cooperative learning environment (Johnson et al., 2007).

Educators should actively seek the integration of research-based techniques that create and maintain an effective learning environment. When speaking about the lecture-based environment, "Some ideas are so widely accepted and successful that they become immune from criticism—they become sacred cows. As a result, changing or challenging

these sacred cows becomes increasingly difficult" (Barger & McCoy, 2009, p. 414). Based on this study's findings, collegiate educators should be willing to re-evaluate their own classroom learning environments to determine if what they are doing is moving their students forward and supplying their students with the necessary tools for success.

This research is specific to a student population currently majoring in varying emphases of education. The burden of this graduate student is that the preservice teachers whom he mentors would have a passionate devotion to their students when they inherit their own classroom. It is for this reason that the author of this study views the suggested implications of this research to have merit. In their interpretation of standards for the mathematical classroom, the American Mathematical Association of Two-Year Colleges (1995) noted that "since it is common for teachers to teach the way that they were taught, faculty must use in their own classes the instructional techniques that prospective teachers will be expected to use" (p. 46). This statement suggests that teachers must be aware of the techniques they most often use in their own classrooms and assess them to ensure that proper modeling takes place. An educator's success will manifest itself in the classrooms of those new educators who were once under his or her care in an educational learning environment.

While a single research investigation cannot provide a sound basis for the practicing of key learning environment concepts, this study's findings support the premise that educators should be willing to evaluate their own teaching techniques to expose weaknesses that could have long-range implications for their students. This study and other studies with similar findings may suggest that professors of preservice teachers incorporate the teaching of learning environment practices into the classroom curriculum.

Though every classroom has a specific learning environment, for good or for bad, teachers need thought and effort to create a learning climate that fosters academic and emotional success in the classroom. Positive learning atmospheres do not happen automatically; they are climates the instructor molds and shapes. One cannot pinpoint the concept of the ideal classroom to a single concept such as learning environment. Nevertheless, this research study emphasizes the need to consider elements beyond assessment scores and curriculum to enable students to have a full experience of learning. Cooperative learning techniques are not designed to preclude the use of lecture in the classroom (Panitz, 1999b) but rather be a supplement to classroom activity.

Delimitations

This author would like to disclose the boundaries around which this study was conducted so no one makes faulty presuppositions regarding the research. Primarily, this educator chose to limit his investigation to preservice teachers from Midwest Bible College. This population group represents a very small percentage of the overall number of students in public, private, and Christian institutions. Therefore, these boundaries may delimit the ability to generalize results to other educational groups or settings. In addition, some experts have expressed concern regarding the psychometric properties of the Watson-Glaser Critical Thinking Appraisal, Form-S, specifically in regard to the susceptibility of successful random guessing (Wagner & Harvey, 2003). In addition, one should note the author measured critical thinking skills using a standardized testing instrument as opposed to a different method such as an essay test for assessing these skills. Despite these concerns, the Watson-Glaser Critical Thinking Appraisal, Form-S has been proven to be a reliable instrument for the measurement of critical thinking skills

for both small groups of students as well as students pursuing a teaching degree (Wagner & Harvey, 2003). Finally, it is worthy to note that the types of cooperative learning strategies employed in the control and treatment courses were only a subset of all strategies that fall within the cooperative learning instructional domain. A distinctly different set of cooperative learning techniques may have resulted in some contrasting statistical outcomes in relation to the College and University Classroom Environment Inventory and the Watson-Glaser Critical Thinking Appraisal.

Recommendations for Further Research

While these study results provided support for the use of cooperative learning techniques in the classroom, additional research may be needed to generalize results to other population groups outside preservice teachers or a Christian Bible college. This study's education majors represented a relatively small percentage of total enrollment. One may profitably further this study by using the College and University Classroom Environment Inventory and the Watson-Glaser Critical Thinking Appraisal, Form-S, in college courses not limited to education majors.

In relation to the WGCTA-FS, an additional study might include employing a different critical thinking tool to assess students' critical thinking skills. Because of the validity of the Watson-Glaser Critical Thinking Appraisal, Form-S, in measuring total critical thinking scores and not individual scale scores, a separate inventory might suggest increases in specific constructs that could provide useful insights. As cited in Chapter Two, the California Critical Thinking Disposition Inventory (CCTDI) is a separate but valid inventory that assists in measuring constructs of critical thinking. In contrast to the five constructs of the WGCTA-FS, the CCTDI includes seven constructs,

each of which can be used to measure opposition or endorsement of any individual scales (Facione et al., 1995). This researcher primarily used the Watson-Glaser Critical Thinking Appraisal, Form-S, as a posttest for comparing the critical thinking scores of students at the end of the semester; in addition, it would also prove to be beneficial to include a pretest and posttest score for comparison not only between the cooperative learning and lecture groups but also within each of the groups to measure progress from the beginning of the semester to the end. This technique is similar to a cooperative learning study by Abdulghani (2003). In this analysis, the researcher employed a WGCTA pretest to check the equivalence of the cooperative learning group and lecture group prior to the research initiation.

Finally, while the study results suggest a fairly clear connection between cooperative learning and increased classroom environment scores, it appears necessary for this study to be replicated to incorporate additional instructors in the teaching process. Including instructors beyond this researcher may present different results. For example, specific scales such as Personalization and Individualization measured relational aspects between the instructor and the student. It could be possible that perceptions may change from instructor to instructor. Adequate training among teachers, students, and administrators would be required to ensure that the cooperative learning efforts are valid and successful.

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Appendix A

Letter of Permission from Research Institution

To whom it may concern:

This letter is to grant Antone Goyak permission to complete his dissertation research in the classrooms of for the time period needed to complete his doctoral work.

Sincerely,

Kevin Priest
Academic Dean

Appendix B

Institutional Review Board Study Acceptance Communication

Dear Antone,

We are pleased to inform you that your above study has been approved by the Liberty IRB. This approval is extended to you for one year. If data collection proceeds past one year, or if you make changes in the methodology as it pertains to human subjects, you must submit an appropriate update form to the IRB. Attached you¹ll find the forms for those cases.

Thank you for your cooperation with the IRB and we wish you well with your research project. We will be glad to send you a written memo from the Liberty IRB, as needed, upon request.

Sincerely,

Fernando Garzon, Psy.D.
IRB Chair, Liberty University

Appendix C

Participant Consent Letter

Project Title

The Effects of Cooperative Learning Techniques on Perceived Classroom Environment and Critical Thinking Skills of Pre-Service Teachers at Northland Baptist Bible College

Principal Investigator

Antone M. Goyak
Liberty University
Education Department

General Information

You are invited to participate in a research study of the relationship between instruction methodology and its effects on the perception of classroom environment and critical thinking skills. You were selected as a possible participant because of your enrollment in either the Foundations of Education course or the Instructional Techniques course at Northland Baptist Bible College. We ask that you read this form and ask any questions you may have before agreeing to be in the study.

This study is being conducted by Antone M. Goyak, Northland Baptist Bible College, Education Department.

Background Information

The purpose of this study is to quantitatively compare and contrast the effects of teaching methodology on perception of classroom environment and critical thinking skills. This author is comparing a lecture-based environment with a cooperative learning environment. The research will take place in a college classroom setting. This author desires to quantify the differences in classroom environment perception and critical thinking skills in teaching classes using a traditional lecture versus a cooperative learning environment. This author will teach all courses involved in this study.

Procedures

If you agree to be in this study, we would ask you to do the following:

- Participate in completing the College and University Classroom Environment Inventory (CUCEI); and
- Participate in completing the Watson-Glaser Critical Thinking Appraisal, Form-S (WGCTA-FS)

Risks and Benefits of being in the Study

The risks involved in participating in this study are minimal and are no more than would be encountered in everyday life.
There are no benefits to the subject for their participation in the completion of the surveys.

Confidentiality

The records of this study will be kept private. In any sort of report we might publish, we will not include any information that will make it possible to identify a subject. Research records will be stored securely in the office of the Principal Investigator, Antone M. Goyak and only researchers assigned to this project will have access to the records. The survey data will be destroyed once the principle investigator's dissertation process is complete.

Voluntary Nature of the Study

Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with Antone M. Goyak or Northland Baptist Bible College. If you decide to participate, you are free to not answer any question or withdraw at any time without affecting those relationships.

Contacts and Questions

By participating in this survey, you are giving implied consent that your data can be utilized in the research and results of this study. The researcher for this study is Antone Goyak. Should you have questions about this study and/or your involvement, please contact Antone M. Goyak at agoyak@nbbc.edu. You may also reach Mr. Goyak in his office in JEC 215 or by phone at 715-324-6999, extension 2554. If you have questions at a later time, you may also contact Antone Goyak's advisor, Dr. Scott Watson, at 434-582-2445 or via email at swatson@liberty.edu.

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher(s), **you are encouraged** to contact the Human Subject Office, 1971 University Blvd, Suite 2400, Lynchburg, VA 24502 or email at irb@liberty.edu.