THE EFFECTS OF COOPERATIVE LEARNING ON LEARNING AND ENGAGEMENT

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ABSTRACT

An achievement gap exists in public education. This achievement gap has an adverse effect on African American and Latino students. Researchers developed cooperative learning in the 1960s and 1970s for the purpose of addressing the achievement gap which was not alleviated through desegregation. There are several methods of cooperative learning which are explored through this critical review of the literature. Through this review, it was discovered that cooperative learning resulted in greater achievement gains for African American and Mexican American students in many studies when compared to traditional methods.

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CHAPTER ONE

Introduction

The diversity of peoples in the United States brings together students from many ethnicities and cultures in our public school classrooms. As a teacher, I want to create an educational environment that will ensure success for all people's children. To do this, it is essential to explore practices to facilitate learning and student engagement for a diverse group of learners. Many cultures value having shared participation with others. I want to explore effective strategies for teaching students with these communal values.

This paper will discover the effects of cooperative learning on the learning and engagement of African American, Native American and Latino students. A reflection of traditional schooling, developmental theories, learning styles of Native American, Latino and African American students, controversies surrounding cooperative learning, and definitions of terms and limits of this paper will be included in chapter one. Chapter two will include early history of cooperative learning, democracy and education, desegregation, development of research on cooperative learning and modern cooperative methods. Chapter three includes a critical review of the research regarding a variety of methods of cooperative learning. Chapter four is a summary of conclusions drawn from the critical review of the research, and how that research may inform practice.

The topic of cooperative learning is of interest because education in the United States is largely based upon a competitive system that focuses on individualism. This individualism means that students are responsible for their own learning rather than sharing learning experiences with others in groups. Euro-American students are more likely to be successful at answering questions in traditional classrooms because

competitiveness is aligned with white middle class norms. Traditional methods use extrinsic rewards and allow students that have experienced success to continue experiencing success, but may cause those students that have not experienced success before to cease interest in trying in school (Slavin, et. al., 1981). Self-esteem can suffer for those students that are not successful (Lampe, Rooze, Runnels, 2001). In traditional methods, dialogue occurs between teacher and students, and is not multidirectional between student and student (Slavin, 1995). Traditional education does not give students opportunities for collaborative learning. While values in public schools are based on white middle class norms, populations in our public schools have become increasingly diverse. Educators can best meet the educational needs of diverse learners by understanding what practices are most beneficial to the learning needs of diverse groups.

I first experienced cooperative learning as an undergraduate and graduate student at The Evergreen State College. From my own experience as a student, I found that the small learning groups created through cooperative learning gave me the opportunity to experience active engagement. I thought that perhaps since I benefited from cooperative learning that other students in different settings would also find cooperative learning beneficial. My idea was that schoolchildren might enjoy cooperative learning since it would provide opportunities for active engagement. With this in mind, I decided that it would be necessary to challenge my own assumptions about the effects of cooperative learning on learning and engagement. I decided it was important to answer a question about cooperative learning, that being: Does everyone benefit?

When learning about inequality in education during my first year of the master's program I became interested in questioning whether or not cooperative learning can help

to provide an equitable classroom environment. I am particularly interested in learning whether cooperative learning is effective for advancing the academic achievement of diverse students. During my practicum placement I had the opportunity to work one day a week in a diverse elementary school. I facilitated some lessons where students worked in cooperative groups. I thought that the cooperative learning enhanced the learning and engagement for most children. Yet it is important not to make generalizations. One African American child in the classroom preferred to work alone. For this student working alone was very effective. Cooperative learning might prove to be an instructional strategy that will benefit diverse groups. However, it is very important to give consideration to the fact that not all students of the same cultural group will necessarily have the same prior experiences or learning preferences.

Rationale

Researchers have explored cooperative learning to determine if it is beneficial in reducing the achievement gap which results in a high drop out rate (Fan, 1990; Oickle and Slavin, 1981). The achievement gap is the disparity in higher achievement between white students and lower achievement which often occurs for non-white students. Although the achievement gap for African American and Mexican American students improved during the 1970s and 1980s, the gap increased again after 1992. Students have cited low expectations by teachers and a lack of challenge in schools as one of the problems attributing to the achievement gap. The achievement gap is evident in statistics released in 1999 that showed that adults aged 18-24 that completed high school or received a GED were 90% white, 81% African American and 63% Latino (Haycock, 2001).

The fact that pedagogy can have an effect on the achievement gap is not widely understood by Americans. Phi Delta Kappa did a Gallup Poll regarding public attitudes towards public schools. The result was that 74% of Americans think that the achievement gap between white, African American and Mexican American students is not related to the quality of education received in the schools (Burris and Welner, 2005).

Cooperative learning is a model of teaching to investigate for the purpose of eliminating the achievement gap (Oickle and Slavin, 1981). While traditional methods focusing on individualism in schools may attribute to the achievement gap, cooperative learning focuses on interdependence and learning teams. Researchers have explored cooperative learning for the purpose of considering alternatives to traditional teaching practices in the United States (Vaughan, 2002). Traditional practices aren't reflective of some of the developmental theories that transpired during the early twentieth century.

Lev Vygotsky, a Soviet psychologist and leader in developmental psychology in the early twentieth century, believed that development occurred through social interaction. Vygotsky's perspective was that students and their social worlds are interconnected and can't be separated. From his perspective, learning is a social process (Miller, 2002). According to Vygotsky, students learn from a person that is more skilled, not necessarily more powerful. From Vygotsky's viewpoint, peers that are skilled may help other children until those that are learning are able to accomplish the skills on their own. In some cultures, older children are given responsibility for assisting younger children and this is less predominant in the U.S. middle class (Rogoff, 1990). In addition to Vygotsky, Jean Piaget was also active in developmental psychology in the 20th century (Miller, 2002).

Piaget, author of more than 40 books related to child psychology, believed that children learn from their environment. Children interact with their environment in order to actively construct knowledge. According to Piaget, knowledge is gained through interaction with others. The difference in Piaget's and Vygotsky's views is that Piaget believed that children learn from each other when they work to resolve differences in their understanding. From Piaget's perspective, children's discussions with each other are more useful for the advancement of learning than discussions with adults because of issues of inequality. Piaget believed that when children have discussions with other children advancement in thinking occurs. Discussions with adults provide less advancement, according to Piaget (Rogoff, 1990). Furthermore, Piaget considered children makers of knowledge, not passive receivers of knowledge (Miller, 2002). This is somewhat in contrast to traditional educational methods found in schools in our country.

Understanding what the cultural norms are for ethnically diverse learners can aid teachers in developing teaching strategies. To develop strategies, it is first necessary to discover the sociocultural worlds of students, determining prior learning. Prior learning, individual student preferences and cultural learning styles are taken into consideration for the purpose of developing pedagogical practices to best facilitate student learning (Delpit, 1995; Pang and Barba, 1995; Rogoff, 1990; Valenzuela, 1999). Adapting each year to the particular needs of individual learners, teachers can also take into account that individual students also experience different levels of biculturalism (Dykeman, Nelson, Appleton, 1995). Although teachers cannot make the assumption that all children in a particular ethnic group will favor cultural norms of a particular ethnicity, teacher

familiarity with such norms enables consideration of culturally relevant pedagogical practices. The cultural norms of Native American, African American and Mexican American students are relevant to this critical review of the literature.

American Indian children may prefer small group instruction based on communal cultural norms. Extended families are important to American Indian children and adolescents. These children might enjoy working with others on teams when goals are team related (Swisher, 1990). Although group needs are important from a cultural perspective (Tatum, 1997), it cannot be assumed that all American Indian children will prefer to work in groups. Other diverse populations may have similar or different cultural norms to consider. When considering cultural norms it is important to recognize that individuals within cultural groups may have different preferences.

There are some cultures within the United States that are growing substantially. In Houston, the Latino population increased 55% during the years of 1995-2000 (Valenzuela, 1999). Over 60% of Latinos are of Mexican heritage. Mexican Americans are from a variety of backgrounds including but not limited to immigrant families, English language learners (ELL), second generation Mexican American families and others. Some of these learners are bicultural yet others struggle to learn their home language of Spanish while also trying to learn English. Cultural norms for Mexican Americans places high importance on families, and connections with others (Tatum, 2003).

Many African Americans also have communal cultural preferences. This means they have a strong connection to others, including extended families. Extended families sometimes live together which results in interpersonal communication and interactions

associated with group sharing. Families may rely on relatives and friends for support. This sociopsychological development may result in cooperative work being a cultural norm for African American students (Lucker, Rosenfield, Sikes and Aronson, 1976; Graybill, 1997). Learning styles for some African American students are socially oriented yet traditional pedagogy is not congruent with this social orientation. To close the achievement gap and give students opportunities for success, African American students need learning experiences that are energetic and interdependent (Young, Wright, Laster, Joseph, 2005).

Cooperative learning has group goals that create what is known as positive interdependence. Positive interdependence is when students believe they can reach their learning goals only when other students in their cooperative group also reach their goals (Johnson and Johnson, 1987). Positive interdependence means that individual accountability must occur. Cooperative groups work together to earn rewards, grades and recognition. There is consensus among cooperative learning reviewers that individual accountability and positive interdependence are actually essential components for successful cooperative learning (Slavin, 1989/1990).

The fact that group work could be used without individual accountability is controversial and may not be considered cooperative learning by some researchers. When there is not individual accountability and there is only one work product from the whole group, academic achievement may not occur for all students in the group. Unless there is equal distribution of responsibilities for learning, higher ability students may complete the work without the participation of others. Individual accountability and

group goals contribute to academic achievement and teachers need to do individual assessments (Slavin, 1978; Slavin, 1987).

Group rewards as well as a schedule that has structure is essential to team learning (Slavin, 1978; Whicker, Nunnery and Bol, 1997). Group rewards encourages all students to participate because individual students are rewarded only when all members of the group are successful. Students cooperate together in teams and some methods of cooperative learning promote competition between the teams. This competitive structure presents a controversy. Structure and rewards, recognition and individual accountability are all important to the cooperative teaching model. Yet teachers that believe in the democratic principles of cooperative learning may not like how structured it is or the fact that group rewards are learning incentives.

One of the other controversies about cooperative learning is the validity of the methods at all grade levels. There has been more research done on cooperative learning in the elementary and middle grades than at the high school level. The problem with the lack of research at the high school level is that there is not a way to determine whether or not cooperative learning is beneficial to high school students. High school age students are often quite social. It would be interesting to know whether or not learning and engagement is advanced at different grade levels for African American, Native American and Latino students. In addition to the lack of studies at the high school level, there are few studies available at the primary level. Therefore, the question becomes whether or not primary children are perceived as being too young to participate in cooperative learning, or whether the methods themselves are adaptable to this age group.

Another controversy that is gleaned from this critical review of the literature is the amount of teacher experience and training necessary for cooperative learning. Facilitating cooperative learning is complex for teachers (Cohen, 1994). The question raised is to what extent teacher experience or training in cooperative learning has an effect on the outcome of achievement for students learning through cooperative methods.

According to Johnson and Johnson (1987) it is essential that students learn skills that will enable them to work cooperatively in groups. Students can't be expected to know how to work collaboratively unless they have been taught these skills. Cooperative learning undertaken without explicit instruction to students regarding how to work with others collaboratively will not provide success (Johnson and Johnson, 1987).

Definitions of Terms

For the purposes of this review of the literature, *cooperative learning* is defined as students working interdependently on group goals in order to learn. *Interdependence* is when students rely on each other to support their learning while also supporting the learning of others. In interdependence, for the group to succeed, all students must succeed. *Cooperative goals* enable a student to reach a goal only when all of the students in the group also reach the goal. *Rewards* mean extrinsic rewards that students receive for their contributions toward group achievement. *Assessment* means to survey or test what a learner knows or has learned. There are many different types of cooperative learning and *method* refers to the type of cooperative group work. *Academic achievement* means academic learning gains. Achievement is often measured through testing. Testing may occur prior to and following learning activities that occur through models of instruction. The difference in the outcomes of the two tests is considered achievement.

Engagement means active involvement with others in the classroom for the purpose of learning.

Statement of Limits

This review of the literature covers studies that used the following cooperative methods: Student Teams-Academic Divisions (STAD), Teams Games Tournament (TGT), Jigsaw, Numbered Heads Together (NHT), traditional group work, Learning Together (LT), Group Investigation (GI), Complex Instruction (CI), Team-Assisted Individualization (TAI), Cooperated Integrated Reading and Composition (CIRC), and Bilingual Cooperative Integrated Reading and Composition (BCIRC). Although this critical review of the literature discusses components of the cooperative teaching methods listed above, it is limited to only the above. This literature review does not include the myriad other types of cooperative learning that are used.

Summary

This chapter discussed traditional schooling, developmental theories, and some patterns in cultural preferences for Native American, Latino and African American students, controversies surrounding cooperative learning, and definitions of terms and limits of this paper. Chapter two will include early history of cooperative learning as well as the search for democracy in education, desegregation, development of research on cooperative learning and modern cooperative methods.

CHAPTER TWO

HISTORICAL BACKGROUND

Introduction

Chapter one introduced the topic of this paper: the effects of cooperative learning on learning and engagement for African American, Native American and Latino students. Chapter one gave reasoning for the exploration of cooperative learning for students of these ethnicities. Limitations and terms were also defined. Chapter two will provide the history of cooperative learning and events in our nation that affected public education and the development of modern day cooperative learning methods.

Early Cooperative Learning

Cooperation is present in some early educational practices. In the third century the Babylonian Talmud included a center for education that promoted cooperative methods of learning. Each reader needed a partner for the purpose of promoting understanding of the Talmud (Zeitlin, 1955; Johnson and Johnson, 1994). Using cooperative learning for the purpose of promoting understanding of American culture occurred early in U.S. history.

Cooperative learning was brought to the United States from England in 1806 to a school in New York City that was of Lancastrian origin (Johnson and Johnson, 1987). Joseph Lancaster and Andrew Bell founded the school. The interest in cooperative learning for this school resulted from the desire to promote American socialization since students were from diverse backgrounds (Marr, 1997).

Early in the 19th century, Horace Mann developed the common school in the 1830s with the idea that equality of education would eliminate social class differences.

Mann believed that through education, students would be able to increase resources for themselves and society. Mann promoted socialization to achieve education. The socialization that Mann was interested in "refers to what students learn from interacting with other students, following school rules, and participating in school social events" (Spring, 2006, p.16). Student learning through the interaction with others was also promoted by Colonel Francis Parker.

In the late 1800s, Colonel Francis Parker, a school superintendent in Massachusetts, was a promoter of cooperative learning. The reason Parker promoted cooperative learning is that he felt it was directly related to democracy when students share responsibility for learning. Parker did not believe that competition in the schools was effective and thought shared learning was essential (Marr, 1997; Johnson and Johnson, 1994). Parker's methods involved students working together cooperatively. His democratic methods were popular during a thirty year period (Johnson and Johnson, 1994). However, there was a shift in educational practices in the early 20th century when education was influenced by organizations in the business sector (Johnson and Johnson, 1987).

Traditional Education

Individualism became popular in education in the 1930s. Competition among students was fueled in the 1930s by "business interests" (Johnson and Johnson, 1987, p. 10). For example, the National Association of Manufacturers and the Liberty League actually encouraged educators to promote competition in schools. By the 1960s this competitive environment was well established in our public schools, and this traditional education is still prevalent today (Johnson and Johnson, 1987). Traditional methods

focus on individual success and competitive goals which do not serve students in equitable ways (Aronson, 1997; Maruyama G., Knechel, S., Petersen, R., 1992).

Democracy and Education

Children enjoy interacting with each other. In fact, education itself occurs through social encounters. Learning occurs more readily through experience that allows for active engagement. As Dewey indicated, when children are at recess they develop ways to work together and establish cooperation (Dewey, 1960). Dewey promoted democracy in education because he believed that students must have opportunities to learn how to work together in groups, form respectful attitudes, develop understanding for others and learn problem-solving skills. Dewey believed that when students worked together they prompted each other to learn. When students are only concerned with individual learning a competitive environment rather than a caring environment is created. Dewey believed caring was essential to social progress and that learning through individualism lacked the social aspects necessary to bring about this progress (Dewey, 1960). Although Dewey promoted democracy in education, this has been difficult to achieve throughout United States history (Slavin, et. al., 1985).

Desegregation

Societal influences have interfered with the ability to eliminate class differences through schooling. Students of non-white racial backgrounds often have lower socioeconomic status and fewer resources to augment their school experiences. Desegregation did not overcome the effect that society has on education (Spring, 2006). Currently schooling still doesn't overcome these differences allowing for better

opportunities for those students of disadvantaged backgrounds. Equal opportunities do not exist without equal education (Slavin, 1985; Spring, 2006).

The Fourteenth amendment was added in 1868 to provide citizens with equal treatment regarding laws. Yet the Supreme Court decided in 1895 that equality would also occur if there was "separate but equal" treatment under the law. Finally, in 1954, separateness was eliminated through the desegregation case of *Brown v. Board of Education of Topeka.* Separateness caused a loss of self esteem for minority children. Schools that were attended by African American students were often in poverty stricken areas and the education received was inferior to what white children received (Aronson and Patnoe, 1997). One of the problems that occurred and still exists is inferior funding between school districts (Hallinan, 2001). Without proper school funding in poverty stricken areas, poorer districts do not have the necessary resources to provide the same education that wealthier districts provide. This inequality in the public schools is slowly changing. In 1998, New Jersey was the first state to mandate equal funding for all school districts in the state. While financial support for poorer schools has slowly improved, desegregation mandates have subsided (Hallinan, 2001).

As part of the Civil Rights Act passed in 1964, Title VI ensured compliance with integration. It was possible that segregated schools would lose federal funding if they did not comply with desegregation (Spring, 2006; Aronson and Patnoe, 1997). One of the purposes of desegregation was for social integration to take place. Yet there was no specific theory that relevantly outlined how integration would actually have an effect on interracial contact (Cohen, 1975). Since the 1960s and 1970s there has been a shift in integrated practices.

Desegregation did not change the achievement gap between black and white students and residential segregation started to occur after desegregation mandates. As a result, a lot of public schools became more segregated again in the 1980s and 1990s with black students living in urban areas and white students living in the suburbs (Hallinan, 2001). There are other factors that may attribute to the achievement gap besides residential segregation.

Students are often segregated within schools as a result of ability grouping or tracking. Students placed in "lower" tracked classes for an entire year lack the advantages of a more vigorous curriculum. Content in the curriculum and pedagogical practices may play a role in the achievement gap. It is necessary for schools to have high expectations for all students in order to promote academic achievement (Hallinan, 2001; Nieto, 2004).

Modern Cooperative Learning

In the early 1970s Elliot Aronson helped to develop Jigsaw classrooms in order to address problems of inequity which occurred in integrated traditional classrooms. Aronson's cooperative group work eliminated individual competition. Cooperative group work was promoted so that each child in the classroom had something to contribute to their own learning and to the learning of others. An early requirement of Jigsaw was interdependence and the Jigsaw classroom was highly structured even during its early beginning. Since Jigsaw is fashioned so differently than traditional methods, students need some time to adjust to the different teaching method when it is implemented (Aronson and Patnoe, 1997).

Considerable development and research has occurred regarding modern cooperative methods. Much of the diverse interest in cooperative learning was the result of desegregation and traditional methods of teaching. David and Roger Johnson began training teachers to facilitate cooperative methods since the 1960s at the University of Minnesota and formed the Cooperative Learning Center. David DeVries and Keith Edwards did work at Johns Hopkins University, developing Teams-Games-Tournaments (TGT). Together, they established group contingencies. Group contingencies are when one person's performance has an effect on other individuals (Sapon-Shevin, Schniedewind, 1992).

Robert Slavin continued the work of DeVries and Edwards by transforming elements of TGT into Student-Team-Achievement Divisions (STAD) in the late 1970s. Slavin and the Johnsons have had an interest in how cooperative learning effects achievement. The Johnsons have also focused on group dynamics, which Morton Deutsch originally worked on in the 1940s. Prior to Deutsch's work on group dynamics including goal interdependencies, Kurt Lewin completed early work on this aspect of cooperative learning. Sholmo and Yael Sharan developed Group Investigation in Israel, which is another form of cooperative learning reviewed critically in chapter three (Johnson and Johnson, 1994; Sapon-Shevin, Schniedewind, 1992).

From reviewing history, it is evident that many forms of cooperative learning were developed. Cooperative learning has been used to promote understanding, shared responsibility and academic achievement. Modern cooperative learning was designed when researchers saw the need after desegregation failed to eliminate the achievement gap. Many individuals have historically supported cooperative learning. However, rather

than making assumptions based on historical support and personal experience, it is important to investigate cooperative learning's effectiveness. What are the effects of cooperative learning on learning and engagement? Does everyone benefit?

CHAPTER THREE

CRITICAL REVIEW OF THE LITERATURE

Introduction

Chapter three is a critical review of the literature about cooperative learning's effect on learning and engagement for African American, Native American and Latino students. Chapter three explores this inquiry while examining Student Teams-Achievement Divisions (STAD), Teams-Games-Tournaments (TGT), Team Accelerated I Jigsaw, Cooperative Integrated Reading and Composition (CIRC), Numbered Heads Together, and Bilingual Cooperative Integrated Reading and Composition (BCIRC).

While reviewing the literature about cooperative learning it is important to consider what effects the teachers may have had on the outcomes of the studies. A teacher's expertise about a teaching method, training, or assignment to a teaching method for the purpose of a study could be a confounding variable on cooperative learning's effect of academic achievement.

Teacher Training and Assignment

Teacher assignment may have an effect on the outcome of studies. If teachers were systematically assigned to either cooperative learning or a comparison class, biases may have occurred. For example, if a teacher is highly enthusiastic about teaching cooperative methods and is assigned to teach cooperative methods, the outcome may be the result of the teacher rather than the cooperative method. Using volunteers lessens the chance for generalizability because if teachers favored cooperative learning they might have influenced the outcome of the study. Teachers assigned at random have an equal chance of being assigned to teach either cooperative learning or a comparison class.

When randomization is used the study can also be duplicated (Meltzoff, 1998). To lessen the possibility of the teacher having an effect on the outcome of the study, some researchers may have the same teacher teach both cooperative learning and the comparison classrooms.

It is also possible that teacher experience may impact results of a study. The lack of familiarity with a cooperative method may make it difficult for a teacher to implement, and therefore hinder student success. However, a teacher with a great deal of experience with cooperative learning is likely to promote student success. Taking this into consideration, it is important to realize that teacher experience may impact results.

Characteristics of Student Teams-Academic Division (STAD), Team Game Tournaments (TGT) and Team Accelerated Instruction (TAI)

Student Teams-Academic Divisions (STAD) is a form of cooperative learning that enables four or five students to work together on individual worksheets to prepare for twice weekly individual quizzes. Students are motivated to participate through rewards that go to the whole group. During the usage of STAD, individual scores are averaged for a team score and teams receive awards from the teacher such as certificates or recognition in newsletters. Students are individually accountable when students create a product based on their work in the group, and in STAD this is an individual worksheet to prepare for quizzes. During cooperative learning, students may also participate in group accountability by making a product as a group, such as a presentation or a report (Cohen, 1994).

STAD has a heterogeneous mix of students in small groups. Heterogeneous means that students of different ethnicities, abilities and genders are balanced into these

groups. Quiz scores are converted to points that are associated with achievement divisions.

The achievement divisions of STAD allow all students an opportunity to be successful. Prior to starting STAD, students are first ranked by the teacher based on former achievement. The rankings and achievement divisions allow teachers to be able to reward teams, but students are not aware of individual division placements.

> "The score that each student contributes to his or her team score is determined by the student's rank among others in the same division. The high scorer earns eight points for his or her team; the second scorer six; and so on. In this way, students who are low in the past performance are competing only with others who are low, not with the entire class. To correct for possible misassignments to divisions there is also a mechanism for changing division assignments each week to reflect actual performance. The high scorer in each division is "bumped" to the next higher division, where the competition for divisional points will be somewhat harder. When the highest division becomes too large, due to students being "bumped" into it, it is split into a "Division I" and a "Division 1A." This "bumping" system maintains the equality of the division over time" (Slavin, 1978).

In this section, eleven studies will be explored for the purpose of considering STAD, TGT or TAI's effectiveness on student learning for African American, Native American and Latino students. The majority of these studies are related to STAD. Three of the studies include Teams Games Tournaments (TGT) exclusively or in addition to STAD.

TGT is similar to STAD. Teachers do presentations in both STAD and TGT, and both cooperative methods use team work. TGT is designed so that tournaments occur

weekly instead of quizzes as done in STAD. In TGT, students first learn through presentations by the teacher and practicing with their team. Worksheets are used as study aids. Students then play academic games in three-person groups, with others of the same ability level. Students answer numbered questions during the team games. Each person in the three-person group is from a different team. Top scorers at each three-person table receive 60 points toward their team score. Teachers adjust the placement of students into the three-person groups based on ability shown in the prior week's tournament (Slavin, 1995).

One study in this section is regarding Team Accelerated Instruction (TAI). TAI is similar to STAD and TGT in many ways. Four member teams are used and teams with the highest combined scores are rewarded with certificates. Both cooperative learning and instruction that is individualized is included in TAI. Whereas STAD and TGT are adaptable to different subjects and grades, TAI is designed specifically for mathematics in grades three through six.

STAD, TGT and TAI Studies

The following three studies explored STAD's and TGT's effects on the academic achievement of African American students.

Vaughan (2002) did research for the purpose of determining the effects of cooperative learning on academic achievement of students of color outside the United States. The study measured achievement gains of black students that were taught through STAD. There were a total of 21 participants in one fifth-grade classroom in Bermuda. Eighteen of the students were black, two students were from the Azores, and one Indian student participated.

A doctoral candidate highly experienced with STAD from a university in the Midwest served as the classroom teacher in this study in Bermuda. The teacher's expertise with and belief in the effectiveness of STAD may have been a contributing factor to the outcome of the study.

The researcher used the California achievement test to measure achievement gains during the twelve week study. There was a test prior to the study, testing at five and nine weeks, and at the conclusion of the study. Results from the study showed that student achievement gains occurred in mathematical computation, ($p < .05$). Achievement in concepts and applications was also considered significant, ($p < .05$). Achievement in mathematical concepts and applications included problem-solving, number sentences, geometry and measurement.

The testing itself is a confounding variable since the researcher administered the California Achievement test on four occasions. Students may have become familiar with the questions on the test. Familiarity with the questions may have had an effect on the results of the test. The researcher could have also administered tests related to the curriculum, and then compared the results on the standardized test to results from curriculum testing. It would be useful to know whether the achievement gains on the standardized testing was due to repetitive testing or learning that occurred in the classroom.

Without the use of a control group as a comparison, it is not possible to determine the extent that STAD was involved in achievement outcomes. It is possible that the expertise of the teacher may have had an effect on the positive achievement that occurred in the fifth grade classroom. In addition, since the California Achievement Test was

given four times the repetitive testing may have allowed students to become familiar with questions on the test, contributing to positive achievement gains. Although students did have achievement benefits in this classroom, it is not possible to determine whether or not STAD contributed to the achievement gains.

Oickle and Slavin (1981), conducted a twelve week study in rural Maryland for the purpose of measuring achievement of African American and white students when learning through STAD. There were 230 participants. The participants were in sixth through eighth grade English classes, compared to the one fifth grade mathematics classroom in Vaughan's study. Four classes used STAD with a total of 84 students; 30 students were African American. The academic achievement of students taught through STAD was compared to the achievement of one hundred forty-six students taught through traditional methods; 48 were African American.

Four teachers taught both STAD and traditional methods. Another teacher taught only a traditional class. If classes are taught by different teachers, the teachers themselves may attribute to the differences in learning and engagement. Teacher effects on achievement outcome are possible. In other words, a teacher's training and experience may have an effect on student learning and engagement.

Oickle and Slavin (1981) measured academic achievement through the Hoyum-Sanders Junior High School English Test, which was a standardized test. The standardized test covered language skills including capitalization, punctuation and English usage. Similarly, Vaughan used the standardized California Achievement Test to measure math achievement. In both studies standardized testing was used before and after the study. Testing before the study enables researchers to discover students' prior

knowledge. Testing after the study allows researchers to determine achievement gains made during the study.

Black students in cooperative groups performed as well as white students in language arts over a twelve week period. Testing after the study for STAD classes resulted in scores for blacks at 74.12 and whites at 75.04. There were not significant achievement gains in the traditional classes. Black students in the traditional group scored 69.53 compared to whites in the traditional group at 76.32.

The Oickle and Slavin study showed that cooperative learning had a substantial impact on the academic achievement for African American students in punctuation, capitalization and English usage. This study raises the question of why African American students showed greater achievement gains through STAD than whites. Perhaps it is because cooperative learning is culturally congruent to the learning needs of the African American students in this study.

In a study by Slavin (1977) the effect of STAD on the academic achievement of both white and black students was measured for a seventh grade English class in Baltimore. The enrollment of black students in the school was approximately 70%. The study had one cooperative class of 34 students including 18 black students. The control group was a traditional classroom that had 31 students including 22 black students. Therefore, the traditional classroom had a higher percentage of black students than the cooperative group. It is unknown why a more even balance of students was not achieved for this study.

The same black female teacher taught both STAD and traditional methods. Since the same teacher taught both groups, it is unlikely that the teacher had an effect on the

study unless her belief in effectiveness may have impacted the way she framed instruction beyond just implementing STAD or traditional lessons. The researcher developed the curriculum that was used in STAD and the traditional class. The curriculum was taught for forty minutes a day during the nine week study.

The Hoyum-Sanders Junior High School standardized test was used to measure achievement that occurred during the study. There were significant gains for blacks in STAD versus blacks in the traditional class, $p < .001$. Additional testing to measure achievement was also done based on the curriculum. Testing from the curriculum showed significant gains for blacks in cooperative learning, $p < .01$. Quiz scores were also evaluated during the final three weeks of the study, showing the same significant gains for blacks, $p < .001$. By using three different testing instruments to measure academic achievement, the researcher strived for validity during the study.

The two English classes were randomly assigned to the two different teaching methods. This random assignment means that each participant had an equal chance of being assigned to either cooperative learning or traditional methods. Slavin (1977) found black student achievement increased significantly through STAD in the subject of English.

In summary of the effects of STAD on the academic achievement of African American students, no conclusions can be made from the Vaughan study due to confounding variables. The results of Oickle and Slavin (1981) and Slavin (1977) showed that there was substantial achievement for African American students when taught through STAD. The achievement for African American students occurred in the subject of English including spelling, capitalization, punctuation and English usage.

Oickle and Slavin's study was done with students in grades 6-8 in rural Maryland, whereas Slavin's study with seventh graders occurred in Baltimore.

From the two reliable studies it is generalizable that some black middle school students in Maryland appear to experience academic achievement gains in skills based English when taught through STAD. Both studies were several weeks long (nine and twelve weeks). The length of time that STAD was implemented may have contributed to success for students.

The following four studies examined STAD's and TGT's effects on the academic achievement of Mexican American students.

Widaman and Kagan (1987) studied the differences between achievement outcomes for STAD and TGT compared to traditional methods in the subject of spelling for Mexican American students. The study included 864 students in second through sixth grades in Riverside, California. One hundred and seventy-seven Mexican American students and 111 black students participated.

Every classroom was taught by student teachers that were assigned at random. The student teachers that taught STAD or TGT attended a two day workshop about cooperative learning. This may have been the first experience with cooperative learning for these student teachers. If that is the case, then implementing it in a classroom during the study would have been a further learning experience. This may have had an effect on the outcome of the study. Additionally, it would be interesting to know how extensively all of the student teachers had been trained in traditional methods in their teacher training program and whether biases may have been present in that program.

Spelling was the subject taught for three to five hours each week during the six week period of the study. If the time spent on spelling was not the same for STAD, TGT and traditional method classrooms, then instructional time would be a confounding variable potentially influencing the outcome of the study. It is unknown whether instructional time on spelling was held constant. The researchers should have clarified this point.

To measure academic achievement, a test was given before the study began and again after the study. The tests consisted of randomly chosen spelling words. Mexican American students had higher achievement in classrooms using traditional methods than in STAD or TGT classes, $p < .05$. African American students had slightly more achievement through cooperative methods, although the statistics were not considered significant.

Researchers wanted to generalize the effects that the teaching methods had on academic achievement. They used students' scores from the Stanford Achievement Test (SAT) for this purpose. However, the test was administered the June prior to the study. Scores from the SAT given the following June were used as a comparison. The SAT scores used were based on listening, reading, word study skills and mathematics.

Although not part of this review of the literature, researchers also measured social preferences and the relationship between achievement and the different teaching methods. Students preferring cooperativeness had more spelling achievement through STAD, whereas students preferring cooperativeness had fewer gains through TGT.

Concerning achievement, it is difficult to draw conclusions from the SAT scores because it seems doubtful that six weeks of instruction in spelling would have an effect

on mathematics scores or other subtests on the SAT. Furthermore, with a full year between SAT's and the fact that the study was only six weeks in length, the time elapsed between tests is a confounding variable for achievement on the SAT. Undoubtedly, other instructional measures used throughout the year would have an effect on achievement outcome. It is also unknown whether or not spelling time was held constant in all classrooms. With these considerations, conclusions regarding the effects of STAD and TGT on the academic achievement of Mexican American students cannot be made from this study.

In a study by Scott (1984), the effects of cooperative learning on achievement in spelling were also explored with black and Mexican American populations. Participants in the study were students in grades four through six. Two-hundred thirty-three students learned spelling through STAD whereas 219 students were in the control group that used traditional methods. There were 107 black students in the study and 90 Mexican American students. The students selected for Scott's study were from three different elementary schools in San Diego. Sixteen heterogeneously balanced classrooms participated.

Teachers that volunteered to participate in the study were randomly chosen to teach either STAD or traditional methods. There were eight cooperative learning classrooms and eight classrooms taught through traditional methods. It is interesting that the researcher did not indicate whether or not teachers received training in cooperative learning. If teachers had little no experience with STAD, training would be necessary to implement it. A lack of proper training would be a confounding variable on the outcome.

Although not part of the research for this review of the literature, the researcher also found that students in the cooperative group had more of an increase in cross-racial friendships than students taught through traditional methods.

To measure academic achievement, a test was given before the study in order to find prior knowledge in the subject of spelling. The test was based on the school district's spelling curriculum. To measure achievement gains, a second test was given after the study's completion. Principals or vice-principals from each school made sure that these tests were given concurrently in both STAD and traditional classrooms.

In contrast to the Widaman and Kagan study, Scott found achievement gains for Mexican American children taught through STAD. Unfortunately, the researcher failed to provide a p value for this finding. Scores showed that forty Mexican American students had a mean gain score of 63.17 for cooperative learning. This is compared to a mean gain score of 54.92 for the Mexican American students in the traditional group. Although there appears to have been some benefit for Mexican American students, Scott found no significant differences in achievement for all student groups as a whole, $p < .444$. This means that if the study was done 100 times, different results would occur less than 44% of the time. Therefore, there is a question of the overall reliability of the finding.

Strength in this study is the randomization of teacher assignments to STAD and traditional methods. The randomization of teachers means it is less likely that teacher effects occurred. Concurrent testing in STAD and traditionally taught classrooms also gives strength to this study. Since Mexican American students showed achievement

gains in spelling through STAD generality is limited to elementary school Mexican American students in San Diego where the study took place.

In a study by Anderson (1984), one of the assessments was the effectiveness of cooperative learning on academic achievement of Mexican American students. Anderson studied 156 fourth grade students in two schools in a metropolitan area in the Southwest. Eighty-two of the students were Mexican American and 74 were white. Students with learning disabilities and English as a second language (ESL) were not included in the Anderson study.

The six teachers involved in the study received training. The training consisted of four one hour sessions, and covered STAD, TGT and traditional teaching methods. This short amount of training is a confounding variable for the outcome of this study. A possible lack of group processing skills by students may have also affected the outcome of the study. Students were not explicitly taught group processing.

The teachers rotated through the three classrooms at their schools. This rotation reduced the possibility of teacher effects on the study. For STAD, TGT and individualistic teaching methods, teachers read a one page instruction sheet to the class at the onset of the study. Teachers also read lectures off of sheets concerning the topic which was nutrition. The process of reading lectures may have affected the outcome of the study. Students may not have been confident that the teacher had mastery of the material or method since the teacher was reading the instructions, and reading the content. The study lasted for fifteen days.

While assuring that the three classes at each of two schools were heterogeneous, the researcher also did random placement of students at the two schools making equal distributions into STAD, TGT and traditional classrooms.

There was no statistically significant achievement for Mexican American children in the cooperative classrooms (such as STAD) compared to the cooperative-competitive classrooms (such as TGT) $p = .53$ when daily achievement scores were tallied. There were no significant differences between cooperative or traditional classrooms, $p = .134$, based on daily quiz scores. The reliability of these p values raises the question of whether or not the study is reliable. In addition, although a final test was given in the subject of nutrition, a test was not administered before the study began.

Since achievement was not measured with a test before the study, it is difficult to know what effect STAD, TGT or traditional methods had on achievement. Without a test before the unit to compare with the comprehensive test after the unit, conclusions cannot be made about achievement outcomes.

Tackaberry (1980) did research for the purpose of determining if student preference for cooperative or competitiveness in the classroom had an affect on academic achievement. Individuals involved in the study were 120 students in grades four through six that attended a Catholic school in the vicinity of Washington, D.C. Fifty-one of the students in the study were Mexican American.

There were 36 students involved in competitive groups (similar to TGT), 50 in cooperative classrooms (similar to STAD) and 34 students in the traditional classes.

Seven teachers participated and were assigned to the different groups randomly. This random assignment lessens the chance of teacher effects on the results of the study.

There were three cooperative classes (similar to STAD), two competitive classes (similar to TGT), and two traditional classes.

Teachers teaching cooperative and competitive classrooms received training in those methods, but the researcher did not indicate how much training. It would have been interesting to know the amount of training the teachers received so that it could be understood whether or not the amount of training was a confounding variable. Teachers were unaware of what the researcher's hypotheses were which means that teachers were less likely to affect the outcome of the study through their own biases.

The researcher indicated that all classrooms had the same furniture arrangement which was desks in rows. It is difficult to envision rows accommodating cooperative learning groups working collaboratively together. The physical arrangement of space may have had an effect on the outcome of the study and is considered a confounding variable.

To measure academic achievement, the Comprehensive Test of Basic Skills (CTBS) was given to students before the study began, consisting of mathematics subtests. Students also took a different version of the CTBS after the study was complete. The fact that the researcher used a different version of the test gives the researcher credibility because if the test was identical students might become familiar with the questions. The study lasted for six weeks and consisted of one hour of mathematics each day.

The results of the study indicated that there were not any significant differences in achievement based on students' preferences to be competitive or cooperative. Additionally, this study found no significant differences in achievement based on ethnicity or whether students were in cooperative, competitive or control classes.

It appears that TGT and STAD weren't beneficial for advancing achievement of Mexican American students in grades 4-6 at this Catholic school. However, the fact that there was a confounding variable in the placement of furniture in rows makes it difficult to draw conclusions regarding TGT and STAD's effect on the academic achievement of Mexican American students in this study.

In summary of Mexican American achievement through STAD or TGT, there were four studies. Scott (1984) lacked confounding variables and showed positive achievement for Mexican American students in the subject of spelling. Teachers were randomly assigned, although teacher training and experience is not known. The other three studies did not find achievement gains for Mexican American students through cooperative learning. However, since confounding variables were present in those three studies and may have influenced outcomes, no conclusions are made about STAD's effect on the academic achievement of Mexican American students.

In a study by Fan (1990), the effect of tutoring and cooperative learning on academic achievement and self-concept of Native American Students was studied. There were 135 Native American students, with at least 90% of the students being either Navajo or Hopi. These high school sophomores and juniors attended a five week program at the Northern Arizona University during the summer. This was an upward bound program that included math, art, physical education, composition, career development, field trips and dance or video. Students remained at the university throughout the five week period.

The cooperative groups were four or five member learning groups. Methods used in the cooperative groups depended upon the instructor, and it is not known to what

extent STAD was used. Peer tutoring occurred in the cooperative classrooms. Adult tutors also assisted students in the classrooms and informal evening sessions.

The study did not indicate the amount of students that were specifically served by the adults that tutored. There was not a differentiation made between those students that only worked in cooperative peer groups and those that received individualized assistance. It would have been helpful if the researcher had made these differentiations. The fact that tutoring was included with cooperative learning is a confounding variable for the purpose of this critical review.

There were many other confounds in this study because several forms of study skills were instructively given. In addition to cooperative learning, teachers also taught test-taking, critical thinking, note-taking and study skills, all of which are confounding variables. Because of the extra assistance that students received during tutoring and study skill instruction that was available to students, this review cannot determine the exclusive effects that cooperative learning had on achievement gains.

There was not a control group used in this study. Without another group of students being taught through a different method as a comparison, it is difficult to measure the specific effects that cooperative learning had on academic achievement.

To measure academic achievement, there was a mathematics achievement test used before and after the study. Fan (1990) found that there were significant differences between these two tests. Statistics for the juniors in high school resulted in p being less than .001. The statistics for the sophomore students resulted in p being less than .001. Fan indicated that the significant increase in achievement was for all students in the study, regardless of whether or not they were from public or private schools, $p < .001$.

Since there were so many confounding variables in the Fan study, no conclusions are made about cooperative learning's effect on academic achievement for Native American students in northern Arizona based on the Fan study.

Slavin and Karweit, (1981), did research for the purpose of finding if cooperative methods could be used as a main form of instruction in lieu of traditional methods. STAD, Jigsaw and TGT were used extensively for a semester, and were implemented throughout each school day. There were 456 students involved in this study. Seventeen classrooms of fourth and fifth graders in six elementary schools participated in rural Maryland.

Ten teachers in two schools were asked to teach cooperative learning methods. As a comparison regarding achievement gains, ten teachers in four schools taught traditional methods. Cooperative learning teachers received three hours of training for the purposes of teaching language arts through STAD, math through TGT and social studies through Jigsaw II. Three hours of training does not seem like an adequate period of time for learning how to teach three different methods, each with a different subject.

To measure the effects of STAD, TGT and Jigsaw II on academic achievement, all classes were administered the Comprehensive Test of Basic Skills (CTBS). The test was given before the study began, and another version of the test was given after the study's completion.

One school using traditional methods was dropped from final analysis because of a significant number of lower scores for the control group on the test given prior to the beginning of the study. Math achievement in computation for the TGT group resulted after the school was dropped from the study. Since a school was dropped after the study

was over it raises a question of why the school was included at all, and whether or not researcher bias contributed to including the school, recalculating scores and dropping the school from the study.

Although researchers indicated they found significant achievement gains in reading vocabulary for classrooms that used cooperative learning $p < .01$, language mechanics, $p < .01$, language expression, $p < .01$ and mathematics computations, $p < .05$, the scores in mathematics are not being considered for the purpose of this review because mathematics achievement only resulted after the control school was dropped from the study. Achievement outcomes in other subjects were unaffected whether or not the dropped school was included.

Although not part of this critical review of the literature, this study also found that students gained more liking for school in cooperative learning classes than students in the traditional method, $p < .01$.

Since a school was dropped from the study, there is a confounding variable on the outcome of the math scores. Positive achievement gains occurred for fifth graders in rural Maryland in skills based English. Since the study lasted a semester, it is not known if achievement gains also occurred earlier in the study. It would have been interesting if researchers had also checked for achievement gains early in the study and compared later scores. Although teacher training only lasted three hours, undoubtedly teachers became more proficient with cooperative methods as the semester progressed.

Whicker, Bol and Nunnery, (1997) aimed to learn about mathematics achievement in high school when using STAD. Two classes were in the study and were randomly assigned to STAD and traditional methods. There were 15 students in the

STAD class and 16 students in the traditional group in a lower middle class rural school in the south. The students were eleventh and twelfth graders.

Sixty-seven percent of the STAD class was boys. The traditional class was more heterogeneous with 50% boys. Since the STAD class was not heterogeneously mixed by gender, the gender imbalance is considered a confounding variable. It would have been helpful if there were more participants in this study and if STAD and traditional classes were more balanced by gender. A larger balanced sampling of students in this study would have increased the possibility of generality to other high school students with lower middle class status in the same location.

The same teacher taught both classes lessening the possibility for teacher effects. Teacher experience and training were not described. Therefore, it is unknown whether teacher experience had an effect on achievement outcome. Students did learn group processing skills prior to beginning this study which may have had a positive effect on the outcome.

There were three tests and each test had ten questions including computation, explanation and graphing. The teacher involved in the study had the assistance of another mathematics teacher for the purpose of test design and scoring. The testing items were from the mathematics textbook and developed by teachers. The teacher not associated with the study assisted in providing suggestions for test development. This gives validity to the tests. The teacher not involved in the study also assisted in scoring a sample of the completed tests, contributing to test reliability. In addition, reliability for test scoring was 100%.

In this small study in a lower middle class southern rural high school, STAD effectively raised student achievement after six weeks in the subject of math, p is = .04. It is interesting that achievement gains occurred at six weeks and testing at four weeks did not reveal such significance. Teachers attributed achievement at six weeks to students becoming connected with their learning groups. This is an important observation. This observation creates the question of whether or not the length of time STAD is implemented has an effect on achievement outcomes.

It appears that STAD was an effective method raising the math achievement of fifteen high school students of lower middle class status in the rural south. Generality is not made to others in the same location due to the low number of students involved in the study. The same teacher taught both the traditional class and the cooperative class and teacher experience and training is unknown.

Slavin and Karweit, and Whicker, Bol and Nunnery did not differentiate ethnic populations in their studies. Percentages of students of color were not given. Therefore, from these two studies it is not possible to determine whether or not cooperative learning is beneficial to the academic achievement of African American, Native American or Latino students in rural southern schools or in suburban Maryland. What is gleaned is that STAD appeared to be effective in raising academic achievement for students in these studies after a significant period of time. Whicker, Bol and Nunnery found achievement in mathematics at six weeks, not at four weeks, and Slavin and Karweit found academic achievement in language skills during a study that lasted for a semester. It is also interesting to note that academic achievement was found in skills based subjects.

Slavin, Leavey and Madden (1984), measured academic achievement for third, fourth and fifth grade classes participating in TAI. Five-hundred four students were involved in the study in a Maryland school district located in the suburbs. Fifteen percent of the students were black. Seventeen percent of the students in the study required special assistance with speech or reading, and another 6% of the students were considered to have serious learning problems.

There were eighteen classes throughout six schools and the schools were randomly assigned to either cooperative learning or traditional methods. This random assignment allows for equal chance of being placed in either group. The study did not mention experience of the teachers.

Each participating school had a third grade, fourth grade and fifth grade class involved in the study. Achievement in math was measured through a test before the study and a test after the study. The test to measure achievement was the Comprehensive Test of Basic Skills (CTBS). The standardized testing that occurred is a reliable testing instrument for the study that lasted for eight weeks.

Students learned significantly more through the TAI method than through traditional methods, $p < .03$. Researchers could have also used curriculum based testing as well as the CTBS and then could have compared the results of both tests (Slavin, 1977).

Although not part of the critical review of the literature, this study found that there was a significant liking for math in the TAI classes versus the traditional classes, $p < .001$.

It appears that TAI is helpful in producing math achievement gains for third, fourth and fifth grade suburban students in Maryland. African American students were not differentiated in this study so no specific conclusions can be made regarding achievement and ethnicity.

Summary of STAD, TGT and TAI Studies

In the STAD and TGT section, eleven studies were examined for the purpose of determining the effect of STAD and/or TGT and TAI effects on academic achievement for African American, Native American and Latino students.

Two reliable STAD studies showed an increase in academic achievement for African American students compared to traditional methods (Oickle and Slavin, 1981; Slavin, 1977). In these studies, cooperative learning increased black achievement more than white achievement. Although teacher training is unknown for these two studies, in each study the same teachers taught both cooperative and traditional methods. An exploration of what factors contributed to the achievement in these two studies might be helpful in understanding the outcomes.

The achievement differences between black and white students may result from student learning preferences that are cooperative rather than competitive, and perhaps are not related to race (Oickle and Slavin, 1981). In addition to these two reliable studies, Vaughan (2002) also found positive achievement outcomes for black students taught through STAD, although that study did not contain a control group and had confounding variables.

Since the content studied in both Oickle and Slavin (1981) and Slavin (1977) was English and concerned learning skills, the question is raised about whether or not STAD

is also effective in raising achievement for African American students if the content learned is based on concepts. It would be interesting to know STAD's effect when learning requires a higher level of cognitive demand including problem-solving.

Since the STAD studies regarding black achievement were twelve weeks and nine weeks long, another question that is raised is whether or not the results would have been the same over a shorter period of time.

In addition to the above studies that provided some insight about learning for some African American students through STAD there were a three studies regarding spelling achievement through STAD for Mexican American participants, and one study that examined math achievement for Mexican American students.

Scott (1984) did a study regarding spelling achievement through STAD and found substantial achievement for Mexican American participants. The study took place in San Diego and grades four through six participated. In contrast, Widaman and Kagan (1987) also studied Mexican American spelling achievement through STAD and found more achievement through traditional methods after six weeks. The Widaman and Kagan study had a confounding variable because researchers did not indicate whether or not the amount of time spent on spelling was held constant in all classrooms. In a much shorter study lasting fifteen days which did not include a test before the study, Anderson (1984) found no achievement gains for Mexican American students taught spelling through STAD. Tackaberry also found no differences between cooperative and traditional methods for Mexican American Catholic schoolchildren in the subject of math, although the furniture arrangement was a confounding variable.

In addition to confounding variables contributing to differences in the Mexican American studies, consideration is also given to the possibility that some students have preferences for cooperativeness and other students have preferences for competitiveness (Oickle and Slavin, 1981). It is possible that biculturalism effects whether or not Mexican American students have preferences for competitiveness. Although some Mexican American students are influenced more by traditional Mexican culture that is cooperative rather than competitive, others might have been acculturated to white middle class norms, and therefore prefer individualism and competitiveness when learning. It is important to realize that individuals may have their own preferences for a variety of reasons and that not all students within various racial and ethnic groups are alike.

Due to the confounding variables present in three of the studies regarding Mexican American achievement and the fact that only one reliable study found that STAD had a positive effect on the academic achievement of Mexican American students, no conclusions are made regarding the effect of STAD and TGT on the academic achievement of Mexican American students.

Two studies in this section found positive achievement through STAD or TGT compared to traditional methods but these studies did not distinguish ethnicities. Whicker, Bol and Nunnery (1997) found achievement increased in a STAD class of 11th and 12th graders. The subject was mathematics and the study took place in lower middle-class school in the South. It is interesting that achievement occurred after six weeks but was not evident at four weeks. Teachers attributed this difference to students becoming bonded with their fellow students on their teams after six weeks. Again, the question is

raised about how much time is needed for STAD to be an effective method in raising academic achievement.

Slavin and Karweit (1981) found positive achievement in fourth, fifth and sixth grade in rural Maryland when students were taught language arts using STAD. Like the reliable studies of Oickle and Slavin (1981), and Slavin (1977), Whicker Bol and Nunnery (1997), and Scott (1984), this study measured achievement through STAD when skills-based content was taught. Although it is unknown whether or not STAD is beneficial for content that requires a higher level of cognitive demand, it appears that STAD is beneficial for advancing skills-based achievement for some students.

In this section examining eleven studies, teacher training was mentioned in only four of the studies. In three of those studies, there were confounding variables hindering conclusions regarding cooperative learning's effect on academic achievement. In one of those studies, greater achievement was found through STAD. A fifth study mentioned that the teacher was highly experienced with STAD. That study also resulted in greater achievement through STAD, yet there were other confounding variables in that study.

Based on the small amount of studies that reported teacher training without confounding variables, it is not possible to determine whether there is a relationship between teacher training and STAD's effect on academic achievement for African American, Native American or Latino students.

Numbered Heads Together

Numbered Heads Together (NHT) is another small group learning method using student teams. NHT is similar to STAD because heterogeneous groupings of students are used. Arrangement of four students per learning team, with each team counting off from

one to four is the beginning of Numbered Heads Together. There is one high achieving student, one low achieving student and two average achieving students on a learning team.

Students sit with their small team while the teacher conducts the lesson. The teacher gives a question to the class and students confer with their team. Student teams make sure that all students in their group understand the answer. The teacher then asks, for example, how many twos know the answer, and then selects at random one of the students with the number two to respond. After the first student provides an answer, the teacher asks additional questions to students of that particular number asking for further details. All students that have responded correctly or that provided additional explanations receive recognition or are rewarded by the teacher. When NHT is used with incentives, the incentives are similar to rewards used in STAD. Incentives in NHT include a variety of team certificates that are publicly displayed. The certificates are based on team averages.

In this critical review of the literature, two studies are included regarding cooperative learning through Numbered Heads Together.

Numbered Heads Together Studies

Maheady, Michielli-Pendl, Harper, Mallette (2006) did a study with sixth graders in an urban location. Researchers studied one chemistry class for the purpose of discovering achievement differences between Numbered Heads Together plus incentives and Numbered Heads Together without incentives. Teaching methods were alternated between NHT plus incentives and NHT without incentives.

There were 23 students in the study. Thirteen of the sixth grade students in the chemistry class were Mexican American and 10 were white. Eight of the students were English language learners and two were special needs. The diverse middle school was located in an urban location in New York.

The same highly experienced teacher with 28 years experience also had experience teaching NHT and taught both versions of NHT. It is possible that the teacher displayed more enthusiasm for NHT with incentives resulting in more engagement for students and higher quiz scores as an outcome. It is also possible that students in this classroom had been exposed to competitiveness associated with traditional methods and thus responded more favorably to NHT plus incentives.

The Terra Nova achievement test was given four months before the study, revealing a mean in the 36th percentile for the class. To measure achievement during the study, one of the researchers and the teacher designed daily quizzes. They also designed a test to give at the beginning of the chemistry unit and at the end of the study. The quizzes and test were congruent with state learning standards. Quizzes and tests are reliable tools to measure academic achievement which gives the study validity.

Eighty-three percent of students received their highest grades when NHT plus incentives were used. Baseline scores after five daily chemistry quizzes averaged 72.4% prior to NHT when traditional methods were used. The mean for the class when NHT plus incentives were used was 89.2%. When just regular numbered heads together was used, the mean was 82%. Rater reliability on students' daily quiz scores ranged from .94 to 1.00, so the results are reliable.

It appears that Numbered Heads Together with incentives for the sixth grade urban class was more beneficial for teaching chemistry than when Numbered Heads Together was used without incentives. Although 57% of the students in the study were Mexican American, the authors of the study did not consider impact on different ethnic groups. However, every student had higher achievement when Numbered Heads Together was used compared to traditional methods. Therefore, Mexican American students in this urban New York location benefited from Numbered Heads Together.

In another study regarding Heads Together, Maheady, Mallette, Harper and Sacca (1991) compared Heads Together and traditional methods for third grade academic achievement. Only one third grade class was involved in this study. Unfortunately the researcher did not indicate the location that the study took place.

The students were 30% Mexican American, 15% African American and 55% white. Socioeconomic status was low to middle income. Forty percent of the students received some form of special education, and six students had to repeat a grade prior to the study.

The teacher had fifteen years of teaching experience and had used a form of peer learning before. She did not have formal training in cooperative learning. A student teacher worked with the students towards the end of the study.

Prior to learning through Numbered Heads, the mean percentage on daily social studies quizzes was 70.46%. Before cooperative learning, a third of the students had averages that were below 65%, and six students had failing averages during the study in the traditional method. During Numbered Heads there were six students that kept averages above the 90% range. Researchers recorded the mean average percentage that

Achievement was measured by percentages that students got correct on daily social studies quizzes.

Before Heads Together was implemented, half the class was on task. When Heads Together was used a mean of 71% of students were on task compared to 39% on task during the traditional whole group method. In the last phase of the study, slightly over half the class was on task during Heads Together. This drop in on task behavior during the final phase may be attributable to having a different teacher whom was a student teacher. This raises the question of whether or not student engagement would have been maintained at a higher on task rate if the original teacher had finished the study. The fact that a student teacher was used during the final phase is a confounding variable on the measurement of on task behavior during HT. The student teacher may not have had training in cooperative methods, and perhaps lacked experience in teaching cooperative methods. Therefore, the student teacher rather than the method itself may have had an effect on the outcome. Furthermore, the mean percentage of rater agreement for students on task when using Numbered Heads Together was .73, which creates a question about the accuracy of the on task findings. A graduate student and an undergraduate student were raters unaware of the study's objective.

The study found that Numbered Heads Together enabled more achievement to occur than traditional methods. The mean difference in achievement between the two methods was 15.79%. Researchers noted that there were no students with failing percentages during the Numbered Heads method. Although researchers did not differentiate achievement by ethnicities, since all students passed their quizzes Numbered

Heads Together was beneficial to the academic achievement of Mexican American and African American students involved in this study.

Summary of Numbered Heads Together

Two Numbered Heads studies were reviewed in this critical review. Maheady, Michielli-Pendl, Harper and Mallette (2006) found that Numbered Heads with incentives was more effective in raising academic achievement than Numbered Heads without incentives and both methods were more advantageous for learning than traditional methods. Thirteen Mexican American students studying chemistry in an urban location in New York benefited. Maheady, Mallette, Harper and Sacca (1991) found that Numbered Heads Together was more effective than traditional methods in raising social studies achievement for third grade low to middle income students. The location was not identified. Fifteen percent were African American and 30% were Mexican American. All students had passing averages when Numbered Heads Together were used.

Both teachers in the two studies had no specific training in cooperative learning. Yet both teachers were highly experienced teachers. The experience level of the teachers was beneficial in the implementation and subsequent achievement through Numbered Heads Together. This is apparent because when a student teacher became involved in Maheady, Mallette, Harper and Sacca, there was a drop in on task behavior. Researchers noted that the drop in on task behavior was related to the student teacher having some difficulties with classroom management. This is evidence that the teacher does have an effect on academic achievement outcomes.

Characteristics of Traditional Group Work

Two studies were reviewed that have qualities of traditional group work. Although traditional group work is categorized as one type of cooperative learning, traditional group work does not have group goals, individual accountability that assures that all students are responsible for a work product, or team competition (Slavin, 1995).

In the first study by Emmer and Gerwels (2002), researchers noted individual accountability as part of the successful lessons. Perhaps the level of individual accountability may have an effect on the level of achievement. Some of the lessons that teachers used during the Emmer and Gerwels study did have some similarities to STAD. Sometimes group rewards were seldom given, and sometimes group goals weren't used. Without these measures, the lessons in this study are more characteristic of group work. The second study by Wilson-Jones and Caston (2004) does not indicate whether or not group goals, individual accountability or team competition were used in the group work that qualitative researchers observed. Therefore, for the purpose of this review, the Wilson-Jones and Caston study is also considered traditional group work.

Traditional Group Work Studies

In the study by Emmer and Gerwels (2002), seven schools in an urban area of the Southwest were used. The diverse students at these schools were mostly Mexican Americans. Minority percentages at the schools were precisely 15, 22, 42, 46, 48, 92 and 99 percent.

Selection of teachers for this qualitative study was made through nominations by school principals and university faculty. The criteria for selection were that teachers had experience in the use of cooperative learning methods. This selection of experienced teachers undoubtedly affected the study. If less experienced teachers were used, teachers

may not have been able to maintain the same level of engagement for students. Researchers did not indicate whether or not teachers were selected at random. Twenty-one teachers were chosen out of a pool of 38, and a total of 18 participated.

Observations occurred over the course of a year. Researchers studied cooperative learning lessons, observing for what lessons contained and what was being studied. Researchers also observed the ways teachers used cooperative learning and students' participation in groups. Student engagement, as well as student cooperation and performance were observed during cooperative learning lessons for elementary schoolchildren grades 2-6.

Researchers watched students working together and wrote notes about individual and group progress. Researchers also interviewed teachers. Researchers were able to monitor various levels of student engagement. These were the only methods researchers used to learn about cooperative learning's effect on student achievement.

One third of the lessons required a low level of cognitive demand. Most lessons were considered moderately complex. Ten out of fifty-one lessons used analysis and problem-solving. Some lessons that used problem-solving were in science. Heterogeneous groupings were frequently used.

Classes were observed at least three times, but some classrooms were observed five times. The length of observation times also varied considerably between classrooms. The fact that there are differences in the amount of time that classrooms were observed is a confounding variable in what the researchers discovered. Researchers indicated that they categorized lessons and throughout observations counted how many students were engaged and how many were not. Teachers were observed by both researchers but not at

the same time. Two people did the coding which was reliable at .90 for engagement, and this contributes to reliability of the study.

Occasionally the researchers acted as participant observers and interacted with the students, which is a confounding variable. This interaction could have increased student engagement or performance in particular lessons that researchers were trying to study. Researchers might have had a bias toward the lesson that students were studying if they participated with the students.

Researchers noted that when cooperative group work was used, accountability was important. When teachers reviewed work soon after it was completed it helped to keep students on task and promoted engagement and completion of assignments. One of the important findings in this study showed that student engagement is lessened if teachers do not interact with student groups during cooperative group work. Teacher interaction with student groups helped students stay engaged. To facilitate this, teachers must move throughout the groups. Another finding to consider is that researchers found that nine of the thirteen most successful lessons had manipulative materials for students.

Although specific measurements of achievement were not tested in this qualitative study, it appears that group work was successful in promoting student engagement in this study when individual accountability was used and teachers were involved in interacting with all student groups.

In another qualitative study concerning group work, Wilson-Jones and Caston (2004) examined cooperative learning's effect on academic achievement for 16 African American males in grades three through six in Mississippi.

Researchers interviewed each student six times through half hour taped interviews. This occurred over a three month period. All students said that cooperative learning was the method of preference for their learning. From this, researchers generalized that cooperative learning was the best way for these particular students to gain academic achievement. Researchers did not evaluate academic achievement using testing instruments so it is unknown what effect cooperative learning actually had on academic achievement. To measure achievement, a test before cooperative learning was implemented and a test following the study would have been appropriate.

After transcripts were coded from student interviews researchers then categorized their findings. No rater-reliability was mentioned in the study. The lack of rater-reliability limits reliability in this study. Undoubtedly the researchers composed a great deal of information based on the many interviews that they performed. Unfortunately, little reporting was made in the findings section of this study.

Since researchers used student interviews to measure academic achievement, and a testing instrument was not used, it is not possible to glean answers about academic achievement and cooperative learning from this study. What is known from the study is that the 16 African Americans that participated all preferred cooperative learning.

Summary of Traditional Group Work

There were two studies regarding traditional group work using qualitative methods. The Wilson-Jones and Caston (2004) study found that the 16 African Americans in the study preferred cooperative learning. Although researchers were aiming to measure achievement, they used student interviews as measurement. A more valid measurement for achievement would have been an achievement test. No

conclusion about African American students and achievement is made from this study. The study by Emmer and Gerwels (2002) did observe cooperative lessons and found that individual accountability promoted engagement. They also found that student engagement was promoted through teacher interaction with student groups. This means that for this study, the teachers themselves did have an effect on engagement. The teachers were experienced with cooperative learning prior to the study. From this study it appears that individual accountability, teacher experience and teacher interaction with student groups all contributed to cooperative group work engagement for Mexican American elementary students in the urban southwest.

Characteristics of Learning Together

The Learning Together (LT) cooperative method enables students to work together in groups of four to five individuals for the purpose of achieving a common goal. There is individual accountability because each student must demonstrate learning. LT also requires that students are taught group processing skills. Groups work on one worksheet together and turn that in to the teacher, receiving praise and rewards from the teacher.

Learning Together Studies

Brandt and Ellsworth (1996) did a study for the purpose of determining the difference in achievement when cooperative methods were used versus achievement in traditional methods for African American and Mexican American students in grades 9-12 with learning disabilities.

The high school that the students attended had a population of 5,000 students. Fifty-eight percent of the students at the school were Mexican American, 40% African

American, 1% white and 1% Asian. The study occurred in a New York City school. Students had low-socioeconomic status. There were 78 learning-disabled students that participated.

Twelve special education classes were chosen randomly from a selection of twenty content area classes. These twelve classes were self-contained special education classes that in the subjects of English, mathematics, bilingual science, Spanish and English as a Second Language (ESL).

There were four teachers involved in the study and they switched methods, teaching both traditional and cooperative classes. Teachers used the cooperative method called Learning Together, and were trained for 45 hours in this method. This intensive training may have contributed to positive achievement gains through Learning Together. Both cooperative learning and traditionally instructed classes had six classes each, and each class had five to nine students. The researchers had three trained observers monitoring classes to make sure teaching methods were followed, which helped the study to have internal validity.

Teachers reported that traditional classes had 20% more absences than the cooperative classes. Engagement in cooperative learning also resulted in more "why" questions asked in cooperative learning groups.

In order to measure achievement, Brandt and Ellsworth included the New York State Education Department Regents Competency Tests in math, English and Science as well as the New York State Second Language Proficiency Examination in Spanish. The tests were given before and after the study. Cooperative and traditional groups showed

no significant differences on tests before the study. The tests after the study showed significant differences in achievement gains made through cooperative learning, $p < .001$.

The results from the study are considered reliable because testing occurred before and after the study and there are no confounding variables that may have had an effect on the outcome of the study. From this study it is generalized that Learning Together can raise academic achievement for African American and Mexican American high school students with learning disabilities in New York City. With forty-five hours of training in cooperative learning, teacher expertise may have contributed to positive achievement outcomes.

Smith, Johnson and Johnson (1982) did a study comparing cooperative learning and traditional methods on the effect of academic achievement of academically handicapped, gifted and regular sixth grade students.

There were fifty-five participants including seven academically handicapped, fourteen gifted and thirty-four regular ability students. The students were from middle class backgrounds and attended a school in the suburbs in the Midwest. The study only lasted for five days. Lessons were 65 minutes in length. Four graduate students with a rater reliability of 100% checked to make sure teachers were using the methods properly.

There were two teachers involved in the study. They were randomly assigned to teach either cooperative learning or traditional methods. The random assignment means that each teacher had an equal chance in being selected to teach either method. Each teacher received thirty hours of training regarding how to teach the conditions, and participated in a five lesson study that was a pilot.

The pilot occurred with another sixth grade class enabling the achievement test to be refined. The unit was on conservation and land use pertaining to an area in Minnesota. Researchers measured achievement with a test that had twenty questions and tested for six levels of understanding. The test was given a second time, four weeks after the study, in order to determine learning retention. The fact that the test was given a second time adds reliability to the study.

This test showed significant achievement for the students taught in the cooperative learning group compared to traditional methods, $p < .01$. The significance was for all student groups, academically handicapped, regular and gifted students.

Although not part of the literature critique, this particular study also found that the cooperative learning method increased peer acceptance for all three groups of students.

It is interesting to note that regular ability sixth grade suburban students experienced greater achievement gains through cooperative learning than traditional methods when learning with low ability and high ability students in a suburban school in the Midwest.

Thirty hours of teacher training and the opportunity to work with a pilot study may have contributed to the successful implementation and usage of Learning Together. The results are not generalizable to other suburban schools in the Midwest because only seven academically handicapped students participated. Gifted students experienced greater gains in the cooperative classroom, but since there were only eight gifted students, the results for gifted students are also not generalizable to other Midwestern schools.

In a study by Johnson, Johnson and Taylor (1993), the academic achievement of high ability students taught through cooperative learning was compared with academic achievement of high ability students taught through traditional methods. Fourth graders participated in this study that involved science.

There were 17 high ability students in the one cooperative learning class and 17 high ability students in the one class taught through traditional methods.

Teachers rotated between the two classrooms. Since teachers taught both cooperative learning and traditional methods, it is less likely that individual teachers had an effect on the outcome of the study. Both teachers received thirty hours of training prior to the study.

It should be noted that this Learning Together study only consisted of six lessons and each were fifty-five minutes long. This is in contrast to the long studies that other researchers used for STAD. Those studies lasted a minimum of six weeks.

Testing did not occur prior to the unit. Therefore, it is unknown what prior knowledge students had regarding science. If students were already knowledgeable about the content then prior knowledge would be a confounding variable for the study. Achievement was measured through a test from the science curriculum book for both traditional and cooperative learning methods only at the end of the study. Testing and retesting during the study would have made results from the study more reliable.

Researchers indicated the high ability students in the cooperative method had higher achievement than their high ability peers in the traditional method. Researchers reported higher achievement occurred in the cooperative classroom for recall questions,

$p < .02$ as well as higher level questions, $p < .09$, although the mean difference between cooperative and traditional methods for higher level questions was slightly less than a two point difference.

Since the researchers only used one test to gather the above data, the data is less reliable than if researchers had used a test and retesting procedure. No conclusions about Learning Together can be made from the above study due to questions regarding reliability when only one test is used.

Johnson, Johnson, Tiffany and Zaidman (1983) examined cooperative learning and traditional methods and their effects on achievement when high achieving majority students and low achieving minority students learned together. The study lasted fifteen days.

There were 20 minority students including 18 black students, one American Indian and one Latino student that spoke Spanish that participated in the study. There were also 28 white students. Twenty-four of the fourth grade students were middle class and 24 had lower socioeconomic status. Students were randomly and equally distributed in the cooperative and traditional classrooms.

Teachers switched classrooms in the middle of the study so that they had the opportunity to teach both cooperative and traditional methods. The fact that the teachers taught both methods reduces the chance of teacher effects on the study. Both teachers had 90 hours of training for the purposes of teaching both cooperative learning and the traditional method.

Researchers looked at minority scores separately from majority white scores. Although there was only a two point difference favoring cooperative methods for white

students, minority achievement was slightly greater in cooperative methods by eight points, $p < .10$. This is similar to results that Oickle and Slavin (1991) found through STAD.

Achievement was determined by testing at five, ten and fifteen days during the study. Since researchers tested and retested, this procedure contributed to reliability. Tests were designed by the researchers and the teachers. Since teachers helped to design the tests, their assistance contributed to making the tests relevant to the content that was taught. It should be noted that tests focused on factual recall, which does not involve higher level thinking.

Although not a question associated with this critical review of the literature, this study also found that when white and minority students work in cooperative groups, they also tend to associate more with each other during free time than white and minority students that are taught through traditional individualistic methods, $p < .001$.

In summary, the test and retesting procedure contributed to reliability of this study. Since 18 of the 20 minority students were black, it can be generalized that cooperative learning was effective in raising the achievement of urban fourth grade black students in the Midwest in social studies when content is based on facts. Perhaps the training experience teachers had contributed to achievement outcomes. Generalizations can't be made concerning American Indian or Latino students from this study because each of these ethnicities only had one student.

In a study conducted by Gabbert, Johnson and Johnson (2001), effects of cooperative learning compared to traditional methods revealed achievement differences when different levels of tasks were given to first grade students. There were 52 first

grade students that participated in the study that involved mathematics. All students were from an urban Midwestern location and were from middle class backgrounds.

Students were placed in the classrooms randomly while also keeping percentages of ability levels and genders equal. There were 26 students in each classroom. Students had ten lessons that were 40 to 50 minutes in length, and two sessions of testing followed these ten lessons.

Two first grade teachers were involved in the study. Both teachers had 90 hours of training in cooperative and individualistic instruction and were experienced in these methods. Teachers were assigned at random and the teachers took turns teaching both classes. The randomization of the teachers reduced the chance that the teachers had an effect on the outcome.

Achievement in this study was measured as testing for correct answers for the learning tasks presented during the study. According to researchers, students achieved more through cooperative learning than through traditional methods, $p < .001$. Researchers did not do a test prior to the study. Only one test was given and that was at the end of the study. Without other testing procedures, the outcome of the study is less reliable than it would have been if additional tests were given.

The study also found that students in the cooperative method used more strategies that required higher level thinking than individuals in the traditional method. Researchers connected tasks to Bloom's taxonomy, which delineates different levels of cognitive demand.

This study is particularly interesting since it was conducted with first grade students. This is one of the few studies that examined cooperative learning's effect on achievement in the primary grades.

Although the urban Midwest first grade children of middle class backgrounds appeared to benefit from cooperative learning, the fact that only one test was given at the end of the study raises the question of reliability of the outcome. No conclusions are made from this study.

Summary of Learning Together

There were five studies that measured academic achievement through Learning Together compared to traditional methods. Studies included high, low and medium achievers and those with learning disabilities.

Three of the studies reliably measured academic achievement through multiple tests. These three studies found that Learning Together resulted in greater academic achievement than traditional methods. Two less reliable studies used only one test and also reported achievement gains for Learning Together.

Perhaps the extensive teacher training in the Learning Together method contributed to achievement gains. All studies had the commonality of extensive teacher training with 30 to 90 hours of training. Random assignment or teacher rotation between cooperative learning and traditional methods also existed for all studies. Each of the five studies was short ranging from six to 15 lessons, yet achievement gains were found within the short amounts of time. This raises the question of whether teacher training was advantageous in promoting achievement gains in such a short period of time. In no other cooperative method did such extensive teaching training take place. The STAD

studies showed less teacher training and some of those studies did not find achievement gains through cooperative learning.

It is interesting to note that through Learning Together, the two studies that measured peer support found that peer support did increase for students in the cooperative method versus the traditional method. Additionally, one of the studies measured that black and white students were more engaged with each other during free time when taught through Learning Together compared to traditional methods.

Two of the Learning Together studies looked specifically at minority achievement. The reliable study of Brandt and Ellsworth (1996) found academic achievement for African American and Mexican American students in grades 9-12 with learning disabilities in New York City. Johnson, Johnson, Tiffany and Zaidman (1983) found that both minority students and white students in cooperative classrooms achieved at a higher rate than students in the traditional classrooms. Since this reliable study only had 18 black students, it is not generalizable that urban African American students in the Midwest experience greater achievement through cooperative rather than traditional methods for the purpose of learning factually based lessons. However, the study suggests that cooperative learning may be beneficial to both black and white students.

In addition, Smith, Johnson and Johnson (1982) found that regular ability sixth grade suburban students in the Midwest experience greater achievement gains in cooperative groups compared to traditional methods, when both low, high and regular ability students learn together.

Two of the five studies reported higher level thinking through Learning Together. Brandt and Ellsworth (1996) had a reliable study and indicated that high school students

with learning disabilities asked more "why" questions through cooperative learning. Gabbert, Johnson and Johnson (2001), indicated that first grade students displayed more higher level reasoning strategies in Learning Together than in traditional methods, although that study is less reliable due to the fact that only one test was administered.

Characteristics of Group Investigation and Jigsaw

Group investigation allows students to develop groups with one to five other people for the purpose of group inquiry regarding a unit that the class is studying. Each student has individual responsibilities and the group works together to create a report for presentation to all classmates (Slavin, 1995).

Jigsaw allows students to become very knowledgeable on a particular section of a reading assignment, and then individuals that read the same section meet together for discussion. Following this meeting with peers that read the same material, students then disperse to groups where each person is an expert on the particular section that they read. Students then work in groups with others that read different material. Students teach each other the material that they had explicitly learned (Slavin, 1995). There are five studies in this Group Investigation and Jigsaw section.

Group Investigation and Jigsaw Studies

Lampe, Rooze and Tallent-Runnels (2001) did a study for twelve weeks with 105 students in an elementary school for the purposes of measuring effects of Jigsaw and Group Investigations on Mexican American children's achievement in elementary social studies. The students were from two elementary schools in the Southwest.

Eight fourth grade classrooms from two schools with low socioeconomic Mexican American populations participated. School A had 78% free lunches and 10% reduced

lunches. At school B 88% of the population received free lunches and another 5% qualified for reduced lunches. There were 25 boys and 26 girls that participated in the cooperative learning model which included Jigsaw and Group Investigations (GI). Each of the two schools had two classrooms that worked in the cooperative learning model and two classrooms that used traditional teaching methods.

All teachers had considerable training in cooperative learning. This included group strategies regarding cooperative-learning as learned through workshops. They also were able to have conferences with the researchers and had sample lessons. The teachers were randomly assigned to either teach a heterogeneous cooperative classroom or the traditional method. With the random assignment of teachers, it is less likely that teacher effects occurred in the study.

Student assignments to classrooms were based on prior test scores from social studies so that the classrooms could all be equally balanced. This means it was unlikely that achievement outcomes were based on prior knowledge. Texas history was studied by the control group and the cooperative group using the same teaching materials.

Achievement was measured by using a test before the study began compared with test scores after the study. The tests were social studies tests that researchers designed based on the social studies unit studied and the curriculum book's publisher data bank. It would have been helpful to have a teacher involved in the testing development to eliminate possibilities of researcher bias. Researchers found a statistically significant difference between cooperative learning and traditional methods $p < .001$ favoring cooperative methods.

Since researchers developed the test the possibility of researcher bias could have occurred. Therefore, no conclusions regarding Mexican American students and Group Investigation can be made from this study.

In a study by Martinez (1990) third grade bilingual Mexican immigrants which were children of poverty were taught reading. The study took place in California. Eighty-five percent of the students at the urban school of 800 were Mexican.

Participants were 30 children in a bilingual classroom using cooperative learning compared to 30 children in a bilingual classroom using traditional methods. The study lasted for a full year.

There was a population of 120 third grade students from which students were chosen for the study. Students with different reading levels were randomly and evenly assigned between the bilingual cooperative learning classroom and the traditional bilingual classroom. Random assignment of students to the classrooms enables the groups to be equivalent.

The fact that teachers didn't know which bilingual class was being closely studied helps to eliminate possibilities that teachers would impact the study based on teacher preferences. Martinez (1990) did not mention whether or not specific cooperative learning techniques were taught to the teacher that facilitated Group Investigation. It would have been helpful to know what the teacher's experience or lack of experience was in implementing the cooperative method of Group Investigation.

The researcher used the California Achievement Test to assess achievement differences between cooperative learning and traditional methods. Although mean scores were higher on the California Achievement Test for the cooperative learning group, the

scores were not considered statistically significant between the group using Group Investigation and the control group.

The researcher indicated that cooperative learning only took place for 40% of each school day. The researcher believed that since only 40% of class time was devoted to cooperative learning and the fact that 15% of that class time included discussing positive group processing outcomes, that the cooperative learning group's achievement was in fact significant.

Significant differences were not found in the bilingual classroom that had cooperative learning. Teacher training and experience was not mentioned by the researcher. If the teacher did not have training in group investigation, a lack of training may have had an effect on the outcome of the study. Due to the confounding variable, no conclusions regarding achievement for Mexican American bilingual third grade students in California can be made from this study.

Lucker, Rosenfield, Sikes and Aronson (1976) studied 303 fifth and sixth grade students for the purpose of determining the difference in achievement for whites, Mexican-Americans and African Americans when taught through Jigsaw and traditional methods.

Five schools participated in Austin, Texas. There were 65 whites, 14 Mexican-Americans and eight African Americans in the sixth grade. There were also 177 fifth grade students including 21 Mexican-Americans, and 18 African Americans. Jigsaw groups met daily for two weeks. Since there were not measurable differences between African American and Mexican American achievement, researchers grouped these numbers together. There were 36 minority students that participated in the study.

The school district enabled teachers to choose to do cooperative learning based on a district project. These teachers voluntarily joined the study. A random sampling of teachers would have made the study more generalizable to similar populations in the same location. Teachers teaching Jigsaw were trained at facilitating Jigsaw, although the researchers did not indicate how much training they received. Additionally, the authors of this study also indicated that "Care was taken to insure that the traditional teachers were highly competent and well respected, and that their classes had approximately the same racial composition and reading skills as the interdependent classes with which they were paired" (Lucker, Rosenfield, Sikes and Aronson, p. 117-118).

Eleven teachers participated with four Jigsaw classrooms and three traditional fifth grade classrooms. There were also two Jigsaw classrooms and two traditional classrooms from grade six. Each student was given one part of the curriculum to learn so that they could teach it to their group. The curriculum of study was from a grade 5 text regarding Colonial America.

Achievement was measured by giving students a test before the study and another test after the study in order to compare scores. Fifth grade social studies teachers supplied the researchers with test questions from a pool. Researchers then selected the test questions at random, eliminating the potential for biases related to test questions. The differences in achievement for the Mexican-American and African-American students was significant in the cooperative learning groups compared to traditional instruction, $p < .01$.

It appears that African American and Mexican American students in grades five and six in this study in Austin, Texas did better academically using Jigsaw than they did

using traditional methods. This conclusion is limited to the classrooms that the studies took place in rather than generalizing to other schools in Austin since the Jigsaw teachers were volunteers.

Box and Little, (2003), aimed to determine if Jigsaw and advanced organizers would effect academic achievement in social studies in third grade. Five third grade classes in a school in the suburbs located in the Southeast participated. Four of the classrooms used the Jigsaw method and one of the classrooms used the traditional method. It is interesting that the researchers did not have more traditional classrooms to use as a comparison.

There were 25 students in each classroom. The fact that the schools were all located in a suburb means that the student populations may not have been very diverse. The study did not report ethnicity or socio-economic status.

Researchers did not indicate whether or not teachers had received training in the Jigsaw method. Additionally, it is unknown how the teachers were selected for this study. Without knowing this information, it is not possible to determine whether or not teacher effects were part of the results of this study.

Since only one control class was used and there were four Jigsaw classes, it is difficult to determine the effect of Jigsaw on learning in this study. If the same amount of classes had used traditional instruction and Jigsaw, differences in achievement patterns could have been examined more thoroughly. In addition, the use of advanced organizers with Jigsaw is a confounding variable on the outcome of the Jigsaw method.

Researchers gave two tests as a tool to measure achievement. A test was given before the study began and another test was given after the study in order to find

achievement differences. Researchers were the test designers, using the social studies textbook to create the test. Researcher bias could have effected test questions chosen. Perhaps it would have been helpful to have teachers not associated with the study help design test questions. This would have helped assure that researcher biases were not involved in test development.

The study did not report ethnicity or socio-economic status. Researchers didn't indicate how the classrooms were chosen for the study. A diverse random sampling of classrooms would have provided more information that would have increased the possibility of generalizability to similar populations in the same area.

Researchers indicated the study found that significant achievement occurred in all four Jigsaw classrooms, $p < .05$. In addition to achievement in the Jigsaw classrooms, researchers also found that significant achievement occurred in the one traditional class used as a comparison, $p < .05$. Unfortunately researchers only used one class to measure achievement in traditional methods. Researchers think the positive achievement outcomes in the four cooperative classrooms and the one traditional classroom indicates that students and teachers were very motivated in all five classes.

It appears that other factors besides teaching method influenced the outcome of the study. The extent that graphic organizers had an effect on the outcome of achievement with Jigsaw is not known. With this confounding variable and the uneven assignment of Jigsaw and traditional classes, no conclusions are made from this study.

In a study by Chang and Mao (1999), the purpose was to determine if cooperative learning or traditional methods were more effective in raising academic achievement for ninth grade students in science. Several cooperative learning methods were used

including Jigsaw, modified group investigation, learning together and student team learning. The curriculum was the same for all classes and the study lasted for four weeks.

The Chang and Mao study was conducted with 20 ninth-grade classrooms in Taiwan at seven junior high schools. Random assignment occurred for the ten classrooms using cooperative learning and the ten classrooms that used traditional methods. All 770 participants and eight teachers were volunteers for this study.

Teachers took a fifteen hour workshop to learn how to implement cooperative methods. Additionally, teachers had three to eight years experience. Students had some prior experience with cooperative learning because they were given practice opportunities with different content in order to be prepared to use cooperative learning. This means that there were no confounding variables for lack of knowledge about cooperative methods.

A meteorology achievement test designed by four professors from the Earth Sciences Department of a Taiwan University was used to measure academic achievement. Students were tested before the study and after the study. It is interesting that grade level teachers were not involved in the development of the achievement tests, because grade level teachers would have an understanding of curriculum development that was age appropriate.

Researchers found no statistically significant difference in overall achievement in earth science, p is greater than .05 and no differences in knowledge-level scores, p is greater than .05. Researchers did find that cooperative learning classes had significant achievement over traditional classes in application, $p < .05$. In application, students had to apply solutions to the suitable situation.

Although this study in Taiwan showed cooperative learning had a positive effect on achievement in math application, the study cannot be generalized to schoolchildren in the United States since cultural practices differ between countries. What is gleaned from this study is that interest in cooperative learning is not limited to the United States. Additionally, teacher training through a fifteen hour workshop correlates with academic achievement.

Summary of Group Investigation and Jigsaw Studies

Three of the five studies in this section indicated that teacher training was used. Two of the studies with teacher training resulted in positive academic achievement gains. Lucker, Rosenfield, Sikes and Aronson (1976) indicated that teachers were trained in Jigsaw and that significant achievement occurred for African American and Mexican American students. Chang and Mao (1999) had a fifteen hour teacher workshop regarding cooperative learning and positive achievement occurred in earth science application. Conclusions were not made in this literature review for the third study that had teacher training because researchers developed the tests in that study.

Concerning African American and Mexican American achievement specifically, significant achievement was found for fifth and sixth graders in Lucker, Rosenfield, Sikes and Aronson (1976). Martinez (1990) found slight, but not significant achievement gains through group investigation for bilingual immigrant third grade children of poverty in the study of reading. It appears that minority students did experience some achievement gains through Jigsaw and group investigation. Perhaps it is because in Jigsaw and group investigation each student is given an opportunity for involvement whereas in traditional methods students that are more competitive may actually have an advantage.

Characteristics of Collaborative Strategic Reading and Cooperative Integrated Reading and Composition (CIRC)

Cooperative learning and reading comprehension strategy instruction were combined as Collaborative Strategic Reading. Collaborative Strategic Reading allows students to work together in small groups with each person having a defined task. This method was designed to allow for structured discussions regarding comprehension of texts (Klingner, Vaughn, Schumm, 1998). This method is of interest to this critical review as a method for teaching reading, as is the more well known Cooperative Integrated Reading and Composition (CIRC), for instruction in reading.

Similar to other cooperative methods, CIRC instruction begins with instructions from the teacher. Students are members of teams that have pairs from two or more reading levels. Students participate in pairs within their teams and focus on making predictions, reading together and discussing texts. Teams discuss main idea, have writer's workshop, practice vocabulary words and participate in oral reading. Cooperative rewards are given which encourages teams to work toward recognition. Individual assessments occur and these individual scores are averaged to create scores for student teams. CIRC was designed specifically for reading, writing, and language arts (Stevens, Madden, Slavin, Farnish, 1987; Slavin, 1995).

Collaborative Strategic Reading and CIRC Studies

In a study by Klingner, Vaughn and Schumm (1998), 141 fourth grade students participated in a study. The suburban school was located in the Southeast. The purpose of the study was to determine the effectiveness of cooperative learning's Collaborative Strategic Reading compared to traditional methods. Sixty-eight percent of the population

was Mexican American, 7% were black, 24% were white and 1% was American Indian. Students studied Florida economy from a textbook.

There were 85 students involved in the cooperative learning classrooms and 56 students involved in the control classrooms. All students participated in small groups and groups had clear tasks to complete. Students had discussions in their small groups with some structure for doing these discussions. Discussions were about the text and were used for the purposes of increasing comprehension.

It is interesting that the researchers acted as teachers in both the traditional classrooms and the cooperative classrooms because they wanted to teach the Collaborative Strategic Reading "before asking classroom teachers to do so" (p. 7). Researchers did not teach the strategic reading to the traditional classrooms and followed the teacher's manual for those classes. The fact that researchers served as teachers is a confounding variable because researchers may have had biases towards the cooperative group.

Researchers tested students in advance of the study with the Woodcock-Johnson Tests of Achievement-Revised which enabled researchers to establish equal classes for the cooperative and control methods. Students in both methods learned the same social studies unit through eleven lessons that were each 45 minutes long. This consistency between the cooperative learning and traditional methods classrooms gives the study credibility.

In order to measure academic achievement, researchers gave the Gates-MacGinitie Reading standardized test to all participants before and after the study.

Researchers also measured achievement by giving a test about the content that was studied. The content test was fifty questions regarding social studies.

It should be noted that researchers did not give the students a test before the study regarding content about Florida. Researchers compared testing outcomes between cooperative learning and traditional methods after the study about Florida in order to come to their conclusions. Researchers could have done a test prior to the study about Florida to determine student knowledge with a follow-up test after the study in order to more accurately measure achievement gains.

Researchers did not find differences in the level of content knowledge gained in social studies between cooperative groups and traditional classrooms. Researchers did report achievement through strategic reading in reading comprehension, $p < .001$. The study did have 68% Mexican American students and 7% black students. However since researchers acted as the teachers for this study researcher bias could have had an effect on the outcome of this study, so no conclusions are made from this study.

In a study by Stevens and Slavin (1995), researchers wanted to examine the effectiveness of CIRC when used in grades two through six, compared to traditional methods. The study lasted for a period of two years and covered elementary grades second through sixth. This CIRC study involved 1,299 students in a Maryland suburb.

There were thirty-one cooperative learning classrooms and thirty two traditionally taught classrooms. The population served by the school district had working class status. Schools using CIRC and schools using traditional methods were paired based on similar socioeconomic status, ethnicity, and similar achievement.

All teachers were volunteers for the study. Volunteer teachers may have had an effect on the study due to their own biases. Researchers did not indicate how they determined which teachers would teach CIRC and which teachers would teach traditional methods. Randomly assigning the volunteers would have been appropriate. Two days of training occurred for teachers teaching CIRC. An equal amount of time was spent on both reading and language arts during the training. Teachers were observed throughout the first six weeks of the study to make sure they understood CIRC. After-school coaching for teachers was also offered.

Researchers measured achievement using the California Achievement Test (CAT). Scores from a prior CAT test served as an assessment of achievement prior to the study. The fourth grade CAT scores used as an assessment before the study were a year old. Therefore, other factors besides CIRC may have influenced the differences in achievement for fourth grade classes. However, second, third and fifth grade prior scores were recent, so differences found in achievement between the first and subsequent tests are considered valid for those grades. Sixth grade was not included in the analysis because the sixth graders would be in middle school during the second year of the study.

All grades in this study experienced the same achievement gains through CIRC. After the first year of the study, significant achievement gains were found in CIRC classrooms for reading vocabulary, $p < .05$, and reading comprehension, $p < .05$. CIRC did not have significant gains in language mechanics and language expression during the first year. After the second year, there were significant gains in academic achievement in reading vocabulary, $p < .05$, and reading comprehension, $p < .05$. There were also significant gains in language expression after the second year, $p < .05$.

CIRC achievement gains were significant after the first year for learning disabled students mainstreamed with regular ability students. Learning disabled student achievement was significant in reading vocabulary, $p < .05$ and reading comprehension, $p < .05$. The same achievement increase occurred during the second year. Likewise, during the second year, learning disabled students had significant increase in achievement of language expression, $p < .05$.

It is not known whether teachers were randomly assigned to teach cooperative or traditional methods. Whether or not random assignment was used, a question to consider is whether a teacher's preference regarding a teaching method or the teacher's skill has on an effect on the outcome. Although these are factors to consider, the cooperative method was effective in boosting the academic achievement in this study. Since 1,299 students participated from a Maryland suburb, it is generalizable that cooperative learning may also be effective in other locations of suburbia in Maryland.

Cooperative learning was effective in second, third, and fifth grade as shown by comparison of CAT scores that were recent at the time of the study. Since researchers used year old fourth grade CAT scores to compare to achievement scores after the study, no conclusions are made for the fourth grade participants. It is concluded that for the students in this study CIRC did raise achievement for regular and academically handicapped students in grades two, three and five in reading vocabulary and comprehension during year one, and reading vocabulary, comprehension and language expression during year two. Since researchers didn't differentiate ethnicities, no information is gleaned from this study about Native American, African American or Latino achievement.

In a study by Stevens, Madden, Slavin and Farnish (1987), Cooperative Integrated Reading and Composition was developed, tested for outcomes, and compared with traditional instruction. This study lasted for 12 weeks. The study was done with 461 third and fourth grade students in a Maryland suburb. Minority students averaged 16.1% of the population in the four schools participating.

CIRC was compared to traditional classes, and all teachers in both the traditional method and CIRC classes offered to participate in the study. Teachers did have initial training for a total of six hours. The researchers did not indicate whether the assignments to teach either CIRC or traditional methods were done at random. Without randomization generality to similar populations cannot occur. Those teaching traditional methods were offered CIRC training and materials at the conclusion of the study. This incentive may have attributed to teacher willingness to participate.

To make sure the study was looking at equal groups of students, scores from the California Achievement Test were used and then classes were matched based on those scores. The third grade scores were from the same year, however, fourth grade scores were a year old. To measure academic achievement, these old CAT scores were compared with new CAT scores after the study was finished in order to compare outcomes in cooperative and traditional methods. The fact that a year elapsed between the first test for fourth grade and the beginning of the study means that other variables besides CIRC could have had an effect on achievement outcomes for fourth grade.

Four raters were involved in scoring writing samples, but they were not aware of what the study was about. This undoubtedly lessened the opportunity for rater biases. Two raters scored each sample and they had to come to an agreement about the score.

Raters had an average reliability of .94, which gives reliability to their scores. Concerning the writing samples, there were significant achievement differences for organization in the CIRC group, $p < .02$. No other significant differences for writing occurred.

The researcher reported that achievement significance occurred in CIRC in reading comprehension, $p < .04$, reading vocabulary, $p < .05$, language expression, $p < .05$ and spelling $p < .003$ for third and fourth grade students who attended schools in a Northeastern suburb.

Since fourth grade scores were based on achievement differences between a test that was a year old and the test at the end of the study, it is possible that other measures not associated with CIRC had an effect on achievement outcomes for fourth grade. Third graders in this study in a Maryland suburb had greater achievement in CIRC than with traditional methods in the reading comprehension, reading vocabulary and language expression. The study is not generalizable to other Maryland suburban schools because researchers did not indicate how the volunteer teachers were assigned to cooperative or traditional methods. Although 16% of the students were minorities, researchers did not provide specific information about this group of students so conclusions about African American, Native American or Latino achievement are not made from this study.

In a second CIRC study by Stevens, Madden, Slavin and Farnish (1987b), researchers sought to find the differences in achievement between CIRC and classes taught through traditional methods. This study is similar to the former study but lasted for 24 weeks whereas the former study lasted for 12 weeks.

The mean minority percentage of students in this study was 22.4%, and the mean percentage of disadvantaged students was 18.3%. Researchers did not differentiate

ethnicities when they studied achievement. Classes were matched so that cooperative classrooms and traditional classrooms had socioeconomic and ethnic similarities.

Cooperative learning and traditional teachers were volunteers for this study. Researchers did not indicate whether teachers were randomly assigned to cooperative or traditional methods. Those teaching the traditional methods were offered CIRC training and materials at the conclusion of the study. This incentive may have attributed to teacher willingness to participate. Teachers teaching CIRC received training in the method but the researchers did not indicate how many hours of training.

For the purposes of measuring achievement outcomes from CIRC and traditional methods, researchers used standardized test scores from the California Achievement Test (CAT). There were no differences between the two groups on the tests before the study began. Researchers found that CIRC classes had significant achievement for reading comprehension, $p < .002$, language expression, $p < .042$, and language mechanics, $p < .012$. There was not significant achievement through CIRC in reading vocabulary, except for special education students. Researchers reported that mainstreamed special education students had significant achievement in reading vocabulary, p is = .046, and marginally significant reading comprehension achievement, p is = .074. Stevens, Madden, Slavin, Farnish (1987b) also reported significant achievement in CIRC classes for ideas for writing, $p = .05$, but there were no other significant achievement gains in other writing categories.

Like the former study by the same researchers, in the case of the fourth grade scores, test scores were a year old. The reliability of year old scores is questionable. Achievement gains may have occurred from other instruction not associated with CIRC.

The fact that fourth grade year old scores were used as a comparison to test scores after the study means that the achievement gains are not necessarily attributable to CIRC. Other factors may have occurred throughout the year, influencing achievement gains. Third grade CIRC classes, including mainstreamed special education students were the students that benefited. The study is not generalizable to other suburban populations in Maryland because it is unknown whether or not the volunteer teachers were randomly assigned to either cooperative learning or traditional methods.

Calderon, Hertz-Lazarowitz and Slavin (1998) conducted a study in Ysleta Independent School District in El Paso, Texas. The study measured the effects of Bilingual Cooperative Integrated Reading and Composition (BCIRC) on academic achievement in language, reading and writing in both Spanish and English. In this program, students learn to read in Spanish before proceeding to English.

There were 222 second and third grade children that participated in the study and all were Spanish limited English proficiency (LEP) students. There were three schools that used BCIRC and four schools that used traditional methods as a comparison. The specific schools in this study were high poverty schools. BCIRC classes were in schools that were a bit smaller than the schools where control classes were. BCIRC schools also had more title I students. It is interesting that researchers did not have BCIRC and control classes at the same schools and smaller schools were selected for BCIRC. A question raised is whether or not the size of the school may in some way effect academic achievement.

It is unclear how teacher selection occurred. Random assignment of teachers to either CIRC or traditional methods would have allowed for generality to a similar

population. Teachers in the control groups were not trained in BCIRC specifically and didn't use it. However, teachers in the control group were trained in cooperative learning and used it, although not routinely. BCIRC teachers had extensive training and taught lessons through constructivism.

Achievement was measured through tests. Scores before the study began were taken from a Bilingual Syntax Measure (BSM) done in kindergarten and first grade. Second grade achievement was measured by the difference in the BSM scores and the Texas Assessment of Academic Skills (TAAS). Third grade achievement was measured by the difference in the BSM scores and the Norm-Referenced Assessment Program for Texas (NAPT). Since researchers used scores that were a couple of years old to compare to scores at the conclusion of the study, it is possible that other factors not related to BCIRC had an effect on achievement scores. Achievement scores for the comparison classes were arrived at in the same manner.

Results from the NAPT showed that students in the BCIRC program for at least one year scored higher in reading than students in the comparison classes, ($p < .01$). Students scoring above the fortieth percentile in reading and language per the NAPT test were able to advance out of bilingual education.

There were four times as many BCIRC students that met the 40^{th} percentile in reading; $p < .01$, compared to the control group. Additionally, compared to the control group, there were twice as many BCIRC students that met the 40^{th} percentile in language scores; $p < .06$.

All students in the BCIRC classes and control classes used the same texts and had the same amount of instructional time. However, students in the control group alternated

between English and Spanish texts on a daily basis, whereas students in the BCIRC classes alternated Spanish and English texts every two weeks. It would be interesting to know if the longer period of time working with a text actually contributed to achievement gains. Since texts were used with different frequencies, the text usage is a confounding variable.

Another difference in the BCIRC group and the control group was that ESL was incorporated into the BCIRC program whereas in the control group ESL was taught separately.

Since test scores used as a baseline for the study were from a few years prior to the study achievement scores are perhaps related to other factors, not necessarily the BCIRC program. Since BCIRC classes alternated Spanish and English texts every two weeks and control classrooms alternated the texts on a daily basis, this difference is text usage is a confounding variable that may have caused differences in achievement outcomes for this study.

Summary of Collaborative Strategic Reading CIRC and BCIRC

Teachers were predominantly volunteers in the CIRC studies with the exception of one study where researchers served as the teachers. Researchers in the studies did not indicate whether or not teachers were randomly assigned to teach cooperative or traditional methods. With the exception of the study where researchers served as teacher, all studies indicated that teachers received training. It appears that training is helpful to the implementation of CIRC.

Three studies had reliable positive achievement gains through CIRC compared to traditional methods. These studies were Stevens and Slavin (1995), Stevens, Madden,

Slavin and Farnish (1987), and Stevens, Madden, Slavin and Farnish (1987b). All three of these studies had achievement in reading comprehension. Stevens, Madden, Slavin and Farnish (1987), and Stevens, Madden, Slavin and Farnish (1987b) showed that CIRC was beneficial to both regular and special education students when mainstreamed together. Stevens, Madden, Slavin and Farnish (1987) indicated that there are many learning activities in CIRC that may help the advancement of comprehension, and that multiple factors are likely responsible. These factors include partner reading time and specific comprehension exercises.

CHAPTER FOUR

CONCLUSIONS

Summary of Findings

In Chapter two, the history pertaining to the development of cooperative learning was addressed. In review of the history section, desegregation was supposed to provide equal opportunities for all students. However, traditional schooling has been unable to overcome societal differences, and the achievement gap between black and white students has persisted despite integrated practices. Researchers began researching the effects of cooperative learning on learning and engagement in the early 1970s. Part of the reason in doing so was to discover whether or not cooperative learning benefited learning and engagement for students of different ethnicities. Their interest in cooperative learning had to do with the fact that traditional methods used in education were not congruent with African American, Native American and Latino students' backgrounds. These ethnicities often have family backgrounds where cultural norms are different than the norms that are promoted through traditional education. Due to these differences in cultural norms and traditional education, students can suffer academically and the achievement gap persists.

Effects of Cooperative Learning on Learning and Engagement for African American Students

Through this critical review of the literature, thirty studies were examined for the purposes of finding outcomes for effects on academic achievement. Sixteen of those studies looked specifically at achievement for African American, Mexican American or Native American students. Ten of the sixteen studies examined academic achievement for African American students. Through this critical review of the literature, it became

apparent that cooperative learning compared to traditional methods had significant effects on achievement gains for African American students. Of the ten studies, six reliable studies found that cooperative learning had a positive outcome on academic achievement. There was one out of ten that showed there were no substantial differences for African American students. Conclusions could not be made from the other three studies. A brief summary of findings is given for each of the ten studies and then a discussion follows regarding why cooperative learning resulted in achievement.

Substantial achievement occurred through the STAD method in middle school language arts for urban and rural African American students and achievement increased more for blacks than for whites, closing the achievement gap (Oickle and Slavin, 1981; Slavin, 1977). African American students in grades 9-12 that had learning disabilities and were from a metropolitan area benefited academically through Learning Together (LT) compared to traditional methods (Brandt and Ellsworth, 1996). Additionally, fourth grade inner city African American schoolchildren had significant achievement in LT compared to traditional methods in factually based lessons (Johnson, Johnson, Tiffany and Zaidman,1983). Numbered Heads Together was very effective in raising academic achievement for African American students in sixth grade chemistry (Maheady, Michielli-Pendl, Harper and Mallette, 2006). It was also very effective in raising academic achievement of African American students in third grade social studies. All students had passing scores and 40% of the students were special education students (Maheady, Mallette, Harper and Sacca, 1991). Conversely, it should be noted that there were no substantial differences in spelling achievement for urban fourth grade African American students participating in cooperative learning compared to traditional methods,

(Scott, 1984). Conclusions could not be made from Vaughan (2002), Wilson-Jones and Caston (2004) or Widaman and Kagan (1987), although researcher results favored cooperative learning.

There is a correlation between teacher experience and the academic achievement found in the African American studies. In five of the six reliable studies, researchers indicated that either teachers received extensive training or were highly experienced in teaching. In one of the Learning Together studies that examined African American achievement, teachers had 45 hours of training (Brandt and Ellsworth, 1996). In the other Learning Together study, teachers had 90 hours of training (Johnson, Johnson, Tiffany and Zaidman, 1983.) In Lucker, Rosenfield, Sikes and Aronson, teachers had also received training in Jigsaw. Highly experienced teachers taught in both Numbered Heads Together studies.

An important amount of research has shown that a teacher's knowledge has greater influence on student learning than student demographics (Kaplan, L.S., 2001). With this in mind, a question that surfaces is whether or not during the desegregation process in the 1960s and 1970s educators and administrators realized the essentiality of teacher training and experience. Perhaps the issue of integration was seen as the only educational solution at the time, whereas many realms in education needed to be examined in order to close the achievement gap. Since desegregation did not alleviate the achievement gap between black and white students, perhaps teacher bias and the lack of experience by teachers regarding ways to engage diverse groups of learners played a role in continuing the disparities in black and white achievement.

Since demographics may have less to do with achievement than teacher experience, perhaps poorer districts in urban areas lack the ability to hire the more educated teachers. Highly capable teachers may be drawn to higher salaries in suburban school districts. It is possible that due to the disparity in funding, achievement scores might continue to be adversely effected.

Effects of Cooperative Learning on Learning and Engagement For Latino Students

The effects of cooperative learning on the learning and engagement of Mexican American students were not as clear as they were for African American students. There were twelve studies that measured academic achievement for Mexican American students. No conclusions could be made regarding six of those studies because of confounding variables. While keeping this in mind researchers in three of the six less reliable studies claimed that they didn't find that cooperative methods were more effective for Mexican American students. In the other three less reliable studies, researchers did claim achievement gains for Mexican American students through cooperative learning.

There were six reliable studies that measured the effects of cooperative learning on the academic achievement of Mexican American students. Brandt and Ellsworth (1996) reported achievement for students in grades 9-12 that had learning disabilities that were from a metropolitan area. These students benefited from Learning Together in the subjects of Math, English and Science. Researchers reported that the students asked more questions related to "why" in the Learning Together method compared to the traditional method. Small achievement gains not considered significant were possible for third grade urban immigrant children of poverty in bilingual reading taught through group

investigation (Martinez, 1990). Scott (1984) found that through STAD Mexican American students in grades four through six in San Diego experienced positive learning gains. Lucker, Rosenfield, Sikes and Aronson (1976) found significant achievement in the study of social studies for Mexican American students in six and fifth grade learning through Jigsaw in Austin, Texas. Maheady, Michielli-Pendl, Harper and Mallette (2006) found that Numbered Heads and Numbered Heads Together plus incentives were both very effective in boosting the academic achievement of sixth grade students in the study of chemistry. Likewise, Maheady, Mallette, Harper and Sacca (1991) found significant achievement for Mexican American students in third grade social studies.

In the six reliable studies that measured the effects of cooperative learning on academic achievement for Mexican American students, two of those studies had teachers that were considered highly experienced. Another study had 45 hours of teacher training. A fourth study prepared teachers with training although the amount of training was not known. It is unknown whether training was given to teachers in Scott (1984) and Martinez (1990). In the less reliable studies, four out of six researchers indicated that teachers received training. In a fifth study, researchers acted as the teachers. From this high percentage of teacher training given to teachers for purposes of teaching cooperative learning it appears that researchers placed high value in teacher preparedness for teaching. Therefore, when deciding to implement a cooperative learning strategy it is important to be fully informed about the techniques through educative practices.

Both African American and Mexican American students had higher achievement through cooperative methods than through traditional methods in the majority of the studies that were reviewed. Since there was only one study that measured cooperative

learning's effect on Native American students and that study had confounding variables, no conclusions are made concerning cooperative learning's effect on the academic achievement of Native American students.

It is interesting that the studies represent many different types of cooperative learning. There were one or more studies that examined STAD, Jigsaw, NHT, TGT, CIRC, TAI and Learning Together. The question becomes why cooperative learning worked so effectively in studies when it did.

In the STAD section, Oickle and Slavin (1981) indicated that positive achievement differences for African American students in middle school English may be attributable to student preferences for learning. The idea is that students may prefer working in a cooperative manner with others rather than competitively working alone. Similarly, Whicker, Bol and Nunnery (1997) studied achievement for students using STAD for high school math. Teachers believed that it took six weeks for students to develop bonding within their cooperative groups. Achievement was not evident at four weeks but was evident at six weeks.

The implication for practice is that student preferences for learning may effect whether or not the student is actively engaged through a particular method of teaching. Since classrooms have diverse learners, not all students may respond positively. Therefore, as a teacher, it is important to know learning preferences and to use a variety of strategies so that all students in the classroom are successful. It also appears that teachers should be mindful that when using cooperative groups students may need time to develop camaraderie before successful achievement gains can occur. A strategy that

enables a variety of cooperative learning methods and other diverse teaching methods is necessary in order to honor the diverse learning preferences of a diverse classroom.

It is interesting that in all the reliable STAD studies, content that was used in the studies was based on learning skills, rather than concepts. Higher order thinking was not necessary to master the content that students studied through STAD. Therefore, I would use caution before assuming that implementing STAD will support learning involving higher levels of Bloom's taxonomy.

Conversely to the STAD section, two of the studies in Learning Together mentioned that there was some higher level thinking that occurred during achievement through cooperative learning. Gabbert, Johnson and Johnson (2001) specifically chose tasks that were a variety of levels of Bloom's taxonomy, including two that required higher levels of cognitive demand for first graders. Johnson, Johnson and Taylor (1993) found that there was just a two point difference for students on higher level questions. From just two studies, it is not possible to consider implications about higher order thinking and Learning Together. However, this sparks an interest in specifically looking at studies in the future that are associated with higher level thinking and Learning Together.

It is interesting that the studies that found positive achievement for African American students represent many different types of cooperative learning. STAD, Jigsaw, NHT and Learning Together each had one or more studies that examined African American achievement. There are many factors to consider regarding the studies that examined the effect of cooperative learning on academic achievement when compared to traditional methods. For example, teacher experience and training may have contributed

to the successfulness of the studies. Additionally, it is important to consider whether or not the teacher was effectively using group work.

Even though there are patterns reflecting that cooperative methods can boost academic achievement for some African American and Latino students, it is important to remember that the these methods may not be the preference for every African American and Latino student. Each student is an individual with their own learning preferences. Again, remembering the African American student that I worked with that preferred working alone rather than doing group work is an example of an individual student preference.

It is likely that diverse classrooms will have many different ethnicities and different learning preferences. Therefore, using a variety of methods while being apprised of the individual funds of knowledge that students already bring into the classroom will be most advantageous to serving all students. Being skilled at determining what best meets the learning needs of each individual student is important. Valuing the different cultural backgrounds of students is essential to culturally responsive teaching.

Culturally responsive teaching includes challenging one's own assumptions. By challenging my own assumptions about my own learning preferences, I continue to consider the question: Does everyone benefit? As a teacher it is important to challenge my own assumptions because what works for me may not work for everyone.

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