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Mathematics Teachers' Working with Cooperative Learning

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MATHEMATICS TEACHERS' WORKING
WITH COOPERATIVE LEARNING

A Thesis

by

JAIME GOMEZ

Submitted in Partial Fulfillment of the
Requirements for the Degree of
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August 2022

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ABSTRACT

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Teaching styles vary greatly amongst educators. One being extensively researched and highly discussed is the method of cooperative learning. Although many studies have shown the benefits of incorporating cooperative learning into classrooms, it has not been a widely used method of teaching in high school mathematics classrooms. This study explores some of the efforts that teachers, who utilize cooperative learning in their classrooms, make to implement cooperative learning lessons successfully. Furthermore, this study also explores the challenges these teachers have encountered when using cooperative learning. Data was collected qualitatively by interviews and surveys from six in-service high school teachers who planned and incorporated cooperative learning lessons in their classes. The data collected from interviews and surveys revealed that although many teachers potentially saw the benefits of the social interaction aspect of cooperative learning, they would not use this method of teaching regularly due to the difficulties of implementing an effective cooperative learning lesson. These difficulties included the amount of time it took to plan a cooperative learning lesson, not being trained on how to implement a cooperative learning lesson, and the students not knowing how to properly work together in a cooperative learning setting. It is beneficial to learn the challenges high school mathematics teachers have encountered in incorporating cooperative learning lessons so that those issues (challenges) can be addressed and be used to

improve future cooperative learning lessons to make them as effective as possible.

Furthermore, analyzing the various efforts teachers used to create an effective cooperative learning lesson and the challenges they encountered, indicates teachers would benefit from trainings on how to properly structure and implement cooperative learning lessons in their classrooms. With proper training and the willingness of teachers to apply cooperative learning in their classrooms, high school mathematics teachers can utilize effective cooperative learning strategies.

DEDICATION

I would like to dedicate this thesis to my family. To my mom and dad (Jose and Leonor Gomez) thank you for taking the time to instill the importance of education in me from a young age. To my amazing wife (Chrissy), who if not for your support, help, and encouragement, this thesis never would have been completed. To my beautiful daughters (Jayme-o and Cass-o), I hope this, in part, encourages you and serves as an example letting you know that you can graduate college and hopefully one day, go beyond your father. I'd also like to dedicate this to my grandfather (Pepe). I know you always told me; you'd like to see me become a doctor of something before you passed away. I am one step closer to your wish, and if I don't fully get there, I know you're still looking down smiling, and proud of me. Lastly, I'd like to thank God, for helping me throughout my education. I love everyone mentioned in this dedication more than words can explain.

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I would also like to express a great deal of gratitude to my thesis committee members, Dr. Younggon Bae, Dr. Jenq-Jong Tsay, and Dr. Cristina Villalobos. I have taken courses with each of these wonderful people, and they are amazing at what they do. I'd like to thank Dr. Younggon Bae for serving as my co-advisor. His kindhearted and meaningful suggestions, along with his willingness to offer help was an invaluable piece of the puzzle to completing my thesis.

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CHAPTER I

INTRODUCTION

Many studies on cooperative learning indicate various benefits of implementing cooperative learning strategies in the classroom (Johnson & Johnson, 1990; Li et al., 2015; Sharan, 1994). Cooperative learning has been shown to transcend the learning boundaries of the traditional teaching method, where students sit in rows, and the teacher drives the classroom lesson. The benefits of this teaching method are regardless of grade level and teaching concentration and can be implemented in classrooms across the globe (Gillies, 2004; Zahn et al., 1986). Some benefits of cooperative learning in mathematics are increased mathematical academic achievements, improved attitude towards mathematics, increased critical mathematical thinking, and improved behavior and willingness to work with others while problem-solving mathematical problems (Tarim & Akdeniz, 2007).

Despite the known benefits of implementing cooperative learning in mathematics classrooms, many teachers are hesitant to incorporate cooperative learning into their classrooms (Gillies & Bolyem, 2011) because cooperative learning comes with its fair share of disadvantages. Some of the potential disadvantages of cooperative learning deal with the internal dynamics of groups working cooperatively, the uneven workloads distributed among the members in a group, and the lack of classroom management abilities for teachers (Johnson & Johnson, 1985). The dynamics of the group can be a disadvantage because not all students have the maturity, or the social skills needed to solve conflicts or set aside differences to work

with one another (Johnson & Johnson). The group's workload can become uneven by the higher achieving students taking over most of the workload to finish quickly, instead of working together as a group, or the lower achieving students giving up and not putting in their part (Johnson & Johnson). Lastly, cooperative learning can be difficult for teachers to monitor each group to ensure they are staying on track since cooperative learning involves students communicating with one another, which can lead to chaos if not properly organized and monitored (Johnson & Johnson).

Baloche and Brody (2017) suggest teachers have not been successful in implementing cooperative learning strategies due to the "perceived pressures of time and curriculum" (p. 278). Teachers have a local, state, or national standard, under which they are required to teach students within a set amount of time. Due to the time restraints to teach students the needed content, teachers may feel they do not have the time to adopt a teaching method they are unfamiliar with in their classrooms. In addition, as Giles (2008) points out, teachers may lack the training and understanding to effectively implement cooperative learning strategies in their classrooms, which leads to the unsuccessful implementation of a cooperative learning lesson. Further research has shown teachers find it challenging to implement cooperative learning strategies due to the reduction of control in the classroom and the time it takes to show students how to socially interact while working in cooperative groups (Baloche & Brody, 2017). As such, there has been limited uptake of cooperative learning strategies, and those who implement cooperative learning strategies have not been successful. To understand such phenomena, this study attempts to learn the strategic efforts high school mathematics teachers use in implementing the pedagogical approach of cooperative learning within their classrooms to produce a successful cooperative learning lesson.

In discussing the dynamics of student interactions during cooperative learning, researchers considered how students engaged in cooperative learning, specifically how students interacted on the line between competition and cooperation (Johnson & Johnson, 1974; Deutsch, 1949, 1962). Competition occurs when the accomplishment of one individual is achieved on the failure of another individual with whom they were competitively linked to. Cooperation occurs when the accomplishment of one individual is achieved if the other individuals to whom they are cooperatively connected to also accomplish their goal (Johnson & Johnson, 1989, 2011, 2013, 2015). (Competition and cooperation are further discussed in Chapter III).

Johnson and Johnson (1974, 1978, 1989) and Johnson et al. (2013) further saw that effective cooperative learning is associated with five aspects of student behaviors, which the authors call *basic elements of effective cooperation*: positive interdependence, individual accountability, promotive interaction, appropriate use of social skills, and group processing. These basic elements of effective cooperation have been shown to produce less competitive outcomes (low efforts to achieve, negative relationships, and psychological illness) and more cooperation outcomes (high efforts to achieve, positive relationships, and psychological health). In this study, we explore to what extent high school mathematics teachers adopt the basic elements of effective cooperation to reduce competition and encourage cooperation and the challenges they encounter in implementing the cooperative learning method. Specifically, we raise the following questions in the context of teaching high school mathematics:

1. What efforts do high school mathematics teachers incorporate to implement cooperative learning strategies successfully regarding the basic elements of effective cooperation?

2. What challenges do high school teachers of mathematics encounter in implementing cooperative learning strategies in their classrooms regarding the basic elements of effective cooperation?

Using research and studies done on implementing effective cooperative learning strategies could serve as a guide to all teachers. Every first-year teacher has a mentor to help guide them during their first year of teaching, and every teacher has asked for suggestions from other teachers to help them learn and develop their own teaching style. Studies and research on cooperative learning could help teachers incorporate it effectively into their teaching style with minimal challenges. In the next chapter, research previously done on cooperative learning in the general education classroom and the mathematics classroom is explained.

Learning the challenges teachers may encounter when implementing the basic elements of effective cooperation could benefit mathematic teachers. If mathematic teachers know what challenges other mathematic teachers have encountered in the past, then they (the teachers) have a better understanding of what some of the challenges they should expect to encounter are. In the same aspect, if mathematics teachers know what efforts other mathematic teachers have made in the past in creating an effective cooperative learning lesson, then they (the teachers) have a starting guide to follow when implementing an effective cooperative learning lesson in their classroom.

CHAPTER II

BACKGROUND

In this chapter, a discussion is given on some of the recent research done on cooperative learning from how to define cooperative learning, the benefits of cooperative learning in the general education classrooms, and the benefits of cooperative learning in the mathematics classroom. Lastly, a discussion on the challenges teachers may encounter when planning and enacting cooperative learning in the classroom in terms of the four phases of curriculum (Stein et al., 2007) is given.

Cooperative Learning

The long history of cooperative learning may date back to the first century under a different name known as *peer work*. During the 18th century, schools began opening where students were taught using peer learning groups (Yassin et al., 2018). During this time, a school in England started by Joseph Lancaster and Andrew Bell would influence group work in the United States beginning in the 19th century (Yassin et al.). During the 19th and 20th centuries, researchers such as Johnson and Johnson, Sharan, Slavin, Zhan, etc., would go on and further study, create extensions and define cooperative learning.

Here are a few of the widely known adaptations of what cooperative learning is. Johnson and Johnson (2018) define cooperative learning “to exist when small groups of students work to enhance their own and their groupmates” learning. (p. 62). Sharan (1994) defines cooperative

learning as “a group-centered and student-centered approach to classroom teaching and learning” (p.336). Slavin (2011) states cooperative learning is “instructional methods in which teachers organize students into small groups, which then work together to help one another learn academic content” (p.344). Zhan et al. (1986) define cooperative learning as “small groups of students working cooperatively in teams toward academic goals” (p.351). The definition of cooperative learning by Zhan et al. (1986) is utilized throughout this study.

Cooperative Learning in the General Context

Even though cooperative learning has been studied and its benefits well documented for numerous years, many teachers are still reluctant to use this teaching method in their classrooms (Gillies & Boyle, 2011). Gillies and Boyle (2011) conducted a study interviewing teachers who had been actively teaching using cooperative learning over a two-year period to examine their responses to this teaching method. They identified some of the difficulties associated with cooperative learning to be “the time students spend socializing in groups; the composition of groups; the time and organization required to implement cooperative learning strategies; and the need to train students in social skills, including how to manage conflict to prevent groups imploding” (p. 66). After their study, the authors reported that the participating teachers indicated that implementing cooperative learning during the two-year research made them feel more skilled and confident in their abilities as teachers.

Cooperative learning is a teaching method used by teachers to replace independent work done by students when it would typically occur in the traditional teaching method. Cooperative learning involves students working together to reach a goal. It does not necessarily abandon lecturing (direct instruction of the teacher) “but uses a combination of teacher-directed lectures

and student-centered active learning techniques to supplement lectures” (Li et al., 2015, p. 80). Cooperative learning allows students to communicate their thoughts and ideas to their peers and work cooperatively to practice and learn the material the teacher has just instructed on. This teaching method requires more active participation from the students than the passive lecture and work independently format of the traditional teaching method (Li et al., 2015).

According to Johnson and Johnson (2015), the desire to increase the effectiveness of cooperative learning centers around the investigation of the variables that mediate between cooperative, competitive, and individualistic efforts. The more the efforts to facilitate the effectiveness of cooperation are understood, the greater the chance for an effective cooperative learning lesson. Furthermore, the basic elements of effective cooperation were identified because of the efforts to understand the internal dynamics of cooperation to produce a more effective implementation. They are positive interdependence, individual accountability, promotive interaction, appropriate use of social skills, and group processing (Johnson and Johnson, 1974, 1978, 1989, 2015; Johnson et al., 2013).

Positive interdependence is achieved when students recognize that the group's success depends on every member's contribution. In other words, each member's work benefits everyone in the group. This can be attained by groups setting mutual goals, dividing the workload, materials, roles, and assigning a joint reward. For example, if every group member scores above 85% on an assignment, each member receives an additional 5 points. It also requires each group member to ensure they have completed their part of the work and that all other members of their group have completed their part.

Individual accountability requires students to understand they are accountable for their learning and involvement in the group. This aspect of cooperative learning ensures all students are participating and learning and not just depending on the work of others. This element of successful cooperative learning also allows each group member to see who may need more guidance in completing a task. According to Johnson and Johnson, positive interdependence and individual accountability are related, whereby positive interdependence usually promotes individual accountability and vice versa. Common ways to increase individual accountability are to randomly choose one person (who represents the whole group) to explain the solution to a question, do a think-pair-share activity where each student must explain a specific topic or problem-solving strategy to a partner in their group, and to assign individual formal assessments for each member of the group (2002).

Promotive face-to-face interaction involves students supporting and encouraging other members of their group to learn. This is where students in the group can peer-tutor other group members who are having difficulties learning or completing the material. According to Johnson and Johnson, the benefits of increasing face-to-face interaction lead to peer accountability, increased social support from the group, and the ability to influence members of the group's thought process. In addition, members of a healthy cooperative learning group must have the social skills to work together efficiently. It is easy to see that students with more social skills are more likely to engage in positive team-building dialogue faster than those without. Ensuring students use appropriate social skills allows students to build trust, apply conflict management and communicate well with others (2002).

Lastly, allowing students to group process permits them to analyze how well they are performing as a group to make group improvements in a self-group reflection. According to Johnson and Johnson (2002), allowing students time to group process increases the achievement of all members, helps bridge the relationships formed in class (so that they may continue outside of class), enhance problem-solving success, and increase the attitude of the students towards the subject.

In this study, we regard the elements of effective cooperation as a starting foundation for teachers to build their successful cooperative learning lessons on. According to Johnson and Johnson (2018), these basic elements of effective cooperation are essential to helping teachers structure any lesson for student activeness and engagement. Furthermore, Gillies (2014) stated that students who work in small structured groups of three to four, preferably with students of mixed ability, are more likely to have higher achievements. Lou et al. (1996) stated, “heterogeneous ability groups may foster learning through the use of elaborated explanations whereby the more able students tutor the less able ones” (p. 427). Hossain and Rezal (2018) examined the effects of three different types of teaching: structured cooperative learning, unstructured cooperative learning, and traditional teaching. They found that students in structured cooperative groups share each other’s knowledge to reach a common goal and are more supportive and encouraging of each other.

Under the view that the elements of effective cooperation lead to an effective cooperative learning lesson, this study utilizes the basic elements of effective cooperation to discover to what degree teachers incorporate these elements into producing an effective cooperative learning lesson in their classrooms. Additionally, the elements implemented by teachers are analyzed to

determine if the implementation of the elements creates any challenges the teachers encounter when presenting a cooperative learning lesson.

Cooperative Learning in Math Education

The influence of the basic elements of effective cooperation can be seen in the study conducted by Gillies (2004). She investigated the effects of cooperative learning on junior high students' behavior and willingness to work with others while working on mathematics problem-solving activities using observations and questionnaires. She analyzed her data using MANOVA and ANOVA from a sample of 223 students. The data showed students who participated in the structured cooperative learning groups “demonstrated less non-cooperative behaviors and less off-task behaviors than their peers in the unstructured groups” and “were more willing to work with others on the task, listen to what they had to say, and share ideas and information and they did this by giving both solicited and unsolicited explanations to each other” (Gillies, 2004, p. 209).

Structured cooperative learning makes a difference between students working together (unstructured cooperative learning) and students working cooperatively to reach a common goal. Hossain and Rezal (2018) conducted experimental research to compare the effects of teaching students using structured cooperative learning, unstructured cooperative learning, and traditional learning. They wanted to see how the different teaching methods would affect students' mathematics achievement and attitudes towards mathematics for 105 secondary students in Natore, Bangladesh. Their study consisted of a pre-test and post-test to measure students' mathematics achievement and attitudes towards mathematics. Hossain and Rezal (2018) used ANOVA, MANOVA, and post hoc pairwise comparison to analyze the data received from their

experimental research. Their research showed students participating in structured cooperative learning outperformed students in unstructured cooperative learning and those in a traditional classroom setting on mathematics achievements and attitudes towards mathematics (Hossain & Rezal, 2018). Tarim and Akdeniz (2007) conducted a similar study comparing the effects of cooperative learning versus traditional learning on students' mathematical achievements and attitudes towards mathematics. Their study included 248 fourth-grade students in a primary state school. They used data from an attitude scale of mathematics and an achievement test. The results of their study indicated cooperative learning methods were "more effective in terms of academic achievement than the traditional methods" (Tarim & Akdeniz, 2007, p. 85). However, in analyzing the data on attitudes towards mathematics, there was a slight increase in attitudes towards mathematics when using cooperative learning but not enough to be considered significant for elementary students.

In another study comparing cooperative learning versus traditional learning, Li et al. (2015) compared the outcomes of students' critical thinking, retention rates, and passing rates in an Intermediate Algebra course. Using pretests and posttests, they conducted a quasi-experimental non-equivalent control with 105 students enrolled in the Intermediate Algebra course in the Fall 2011 and Fall 2012 semesters. Both semesters and tests were analyzed and compared. Li et al. (2015) concluded implementing cooperative learning promoted students' critical thinking and promoted a greater number of students to remain in the course until the end of the semester.

These quantitative studies were aimed at discovering what advantages occurred from incorporating an effective cooperative learning method into the mathematics classroom. They

suggest cooperative learning produces positive outcomes when utilized in the mathematics classroom. They further suggest that a structured cooperative learning lesson proves to be more effective than an unstructured one. These studies analyzed and compared different cooperative learning structures (structured cooperative learning, unstructured cooperative learning, and traditional learning) and compared the cooperative learning teaching method to the traditional method. None of these studies analyzed the efforts implemented or challenges encountered by teachers in the mathematics classroom when using cooperative learning. The education levels included in these studies were primary, secondary, and tertiary. The secondary level was included in two of the stated studies: one focused on the junior high level, and the other did not specify an exact grade level. This study analyzes the efforts implemented and challenges explicitly encountered by mathematic teachers at the high school level (9th – 12th grade) in implementing effective cooperative learning strategies.

Formation of Teachers' Classroom Practices

Cooperative learning is a teaching strategy focused on both the learner and the content because it is a student-centered, teacher-instructed strategy. Cooperative learning does not move away from the teacher's direct instruction, which is when the teacher focuses directly on the content. After the teacher's direct instruction of the content, they focus on the learners by incorporating students working cooperatively in small groups. When teachers implement cooperative learning strategies into their teaching, they interpret the written curriculum and enact what they intend to teach in their classroom. The enactment of a teacher's written curriculum is expected to result in desired student learning outcomes. The process in which teachers design their teaching lessons by (1) using the written curriculum, (2) creating their intended curriculum,

(3) having an enacted curriculum, through (4) promoting students' learning is known as the four phases of the curriculum (Stein et al., 2007).

The written curriculum phase is the instructional content and teaching objectives (standards) being taught, often set by the state or national government (Stein et al., 2007). In the state of Texas, the standards are known as Texas Essentials Knowledge and Skills (TEKS). These standards are the topics/skills that must be taught to students by grade level and subject area. These skills are often open to interpretation by the teacher.

The teachers' intended curriculum phase is implemented after teachers' have interpreted the TEKS. Teachers develop ideas on what they believe the TEKS requires them to teach their students. Teachers at this phase create a plan on what to teach, how to teach it, and how to deliver the content to the students best. They have just developed a belief system based on their personal views and knowledge of the content. Teachers must plan for all aspects of cooperative learning when implementing cooperative learning strategies. They must plan the direct instruction of the content and plan the work/practice students need to complete cooperatively in small groups (Stein et al., 2007).

The teachers' enacted curriculum phase occurs after teachers' have created their belief system (plan). This is the phase where teachers actually "transfer" the information of the content and interact with the students to see what students create as their own beliefs to the intended content (Stein et al., 2007). The student transforms their beliefs into their own internal knowledge, which is when students are considered to have learned the content. Teachers may have to return to the planning phase (intended) or the teaching phase (enacted) during the four phases of the curriculum to ensure student learning (Stein et al., 2007). Cooperative learning ties into these phases by observing what occurs after the teacher has given the direct instruction and

students work cooperatively in small groups. This allows the teacher to listen to the discussions between students in the groups to see if the beliefs the students are discussing are the beliefs the teacher wanted to transfer. In other words, did the students learn the content the way the teacher intended them to learn it.

This study analyzes teachers' efforts and challenges in preparing their intended curriculum, specifically regarding the basic elements of effective cooperation. The efforts teachers implement, and the challenges teachers encounter when presenting their cooperative learning lesson (enacted curriculum), specifically regarding the basic elements of effective cooperation, are also analyzed. Furthermore, any challenges teachers encounter regarding their intended or enacted curriculum is examined to discover where the difficulties arise. Are teachers having difficulties preparing the intended cooperative learning curriculum, or are they having difficulties with the students reacting negatively to working cooperatively in groups with other students?

CHAPTER III

THEORETICAL PERSPECTIVE

In Chapter I, research on cooperative learning helped define it and discussed some of the known benefits of cooperative learning within the general education field and the mathematics classroom. In this Chapter, a brief discussion of the theoretical perspectives that Johnson and Johnson state support cooperative learning is discussed. A greater emphasis on the social interdependence theory occurs since Johnson and Johnson (2015) state it is the most crucial theory to cooperative learning.

Theories Supporting Cooperative Learning

According to Johnson and Johnson (2015), “the future of cooperative learning depends on it being a part of a cycle of theory-research-practice” (p.2). Theory research practice is the continuous cycle between a theory, the practice of a theory, and the research of the theory. Figure 1 displays this relationship between theory, research, and practice. In the case of cooperative learning, it is taking the theory of cooperative learning, doing research on cooperative learning, and practicing cooperative learning, then repeating the cycle.

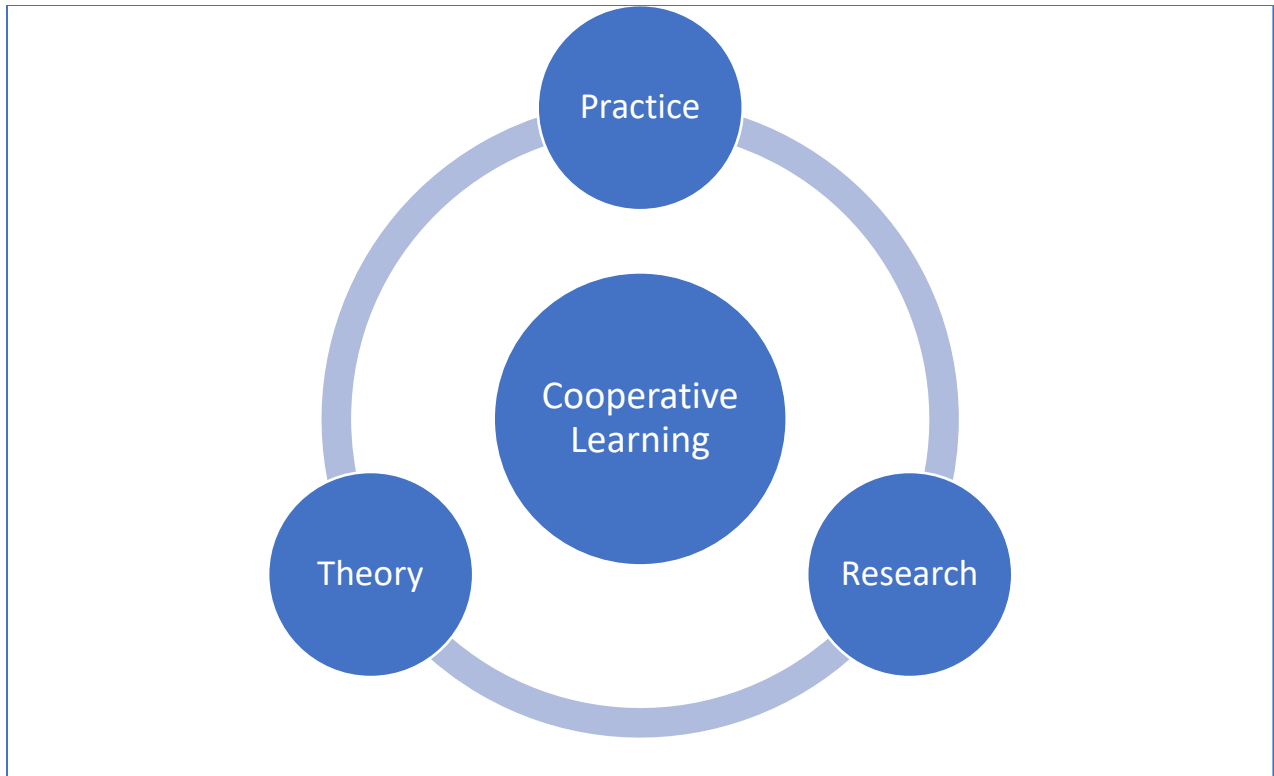


Figure 1. Theory Research Practice

According to Johnson and Johnson (2015), four major theories of cooperation have been used to guide its research: cognitive-development theory, social cognitive theory, behavioral theory, and social interdependence theory. In the paragraphs that follow, I give a brief description of these four theories.

Two significant contributors to the cognitive-development theory were Jean Piaget and Lev Vygotsky (Tran, 2013). Piaget (1926) favored the perspective of cognitive development where knowledge, morals, values, and regulations can be effectively learned from people who hold opposing views and reach a consensus via social interaction. Vygotsky (1978) stressed the importance of children working together and claimed cooperative learning amongst children was more effective than working alone. Without social interaction in learning, there cannot be

cognitive conflicts or arguments (Slavin, 1996). According to cognitive development theory, a focal point of cooperation is the idea of conflict amongst ideas (Johnson & Johnson, 2015).

The social cognitive theory focuses on the idea that cooperation occurs when every group member shares the belief that by working cooperatively, they can accomplish the desired task (Bandura, 2000; Lave & Wenger, 1991).

The behavioral-learning theory assumes individuals only work with the tasks that have a reward and ignore the tasks that do not (Johnson & Johnson, 2015). In this theory, cooperation is achieved when group members behave in a manner that maximizes rewards for the group and minimizes those behaviors that hurt the group.

The roots of social interdependence theory can be traced back to Kurt Koffka and Kurt Lewin. Koffka was a German psychologist who helped introduce Gestalt psychology to the United States (Hartfield, 2012). During the early 1900s, Koffka proposed groups were a “dynamic whole” in which the interdependence among its members could change (Koffka, 1935). Kurt Lewin was a German American psychologist whose work generated many concepts still used during the second half of the twentieth century (Malone, 2019). Throughout the 1920s and 1930s, Lewin further extended Koffka’s. Lewin claimed if a group created common goals (goal interdependence), then the group would achieve a “dynamic whole,” where any change that happens within the group alters the state of the members of the group (Johnson & Johnson). Johnson and Johnson state, “of all the theories of cooperation, social interdependence theory is the most important in terms of research generated and practical applications” (p. 6).

Social Interdependence Theory

Using Koffka's and Lewin's group proposals, social interdependence theory can be defined as occurring when every group member shares a common goal, and each of their accomplishments are affected by the actions of the other members. Today's use of social interdependence theory originates from Lewin's graduate student, Morton Deutsch. He extended Koffka and Lewin's findings about the relationships formed by groups who set goals together to a two or more individual setting and developed a theory of cooperation and competition (Deutsch, 1949, 1962). Using Deutsch's theory of cooperation and competition, social interdependence theory is composed of two main parts: cooperation (also known as positive interdependence) and competition (also known as negative interdependence). Deutsch states that positive interdependence occurs when individuals understand that their goals can be reached if and only if other individuals with whom they are cooperatively connected also accomplish their goals. In other words, each person is promoting the success of another by working cooperatively to accomplish shared learning goals. Deutsch states negative interdependence occurs when individuals understand that their goals can be achieved if and only if the other individuals with whom they are competitively linked to fail to obtain their goals. In other words, one person's actions obstruct the success of another in achieving learning goals by having individuals work against each other. When there is no interdependence, one individual can reach their goals regardless of whether another individual in the same situation reaches their goal or not. In this study, we view student behaviors in cooperative learning on the line *between* cooperation and competition.

Social interdependence theory also consists of two different interaction patterns based on the interdependence: promotive interaction and oppositional interaction (Johnson & Johnson

2015). Promotive interaction is a positive interdependence that occurs as individuals encourage and facilitate each other's efforts to reach the group's goals; in other words, students work together. Oppositional interaction is a negative interdependence and occurs as individuals discourage and obstruct the efforts of others (to reach their goals) in order to reach their own individual goals. When there is no interdependence, no interaction patterns are involved (Johnson & Johnson, 2008).

Table 1. Social Interdependence Theory

Social Interdependence Theory			
Process	Cooperation	Competition	Individualistic
Interdependence	Positive	Negative	None
Interaction pattern	Promotive	Oppositional	None
Outcome 1	High effort to achieve	Low effort to achieve	Low effort to achieve
Outcome 2	Positive relationships	Negative relationships	No relationships
Outcome 3	Psychological health	Psychological illness	Psychological pathology

The basic premise of social interdependence theory can be briefly described in Table 1 (Johnson & Johnson, 2002). The idea of the table is to summarize how the type of interdependence used in a given situation determines how an individual interacts with another, which then determines the outcome. Positive interdependence, with a promotive interaction, results in a high effort to achieve, positive relationships, or psychological health, which comprises being cooperative. Negative interdependence, with an oppositional interaction, results in a low effort to achieve, negative relationships, or psychological illness, which comprises being competitive. Lastly, having no interdependence nor interaction results in having low effort to achieve, no relationships, or psychological pathology, which comprises as being individualistic.

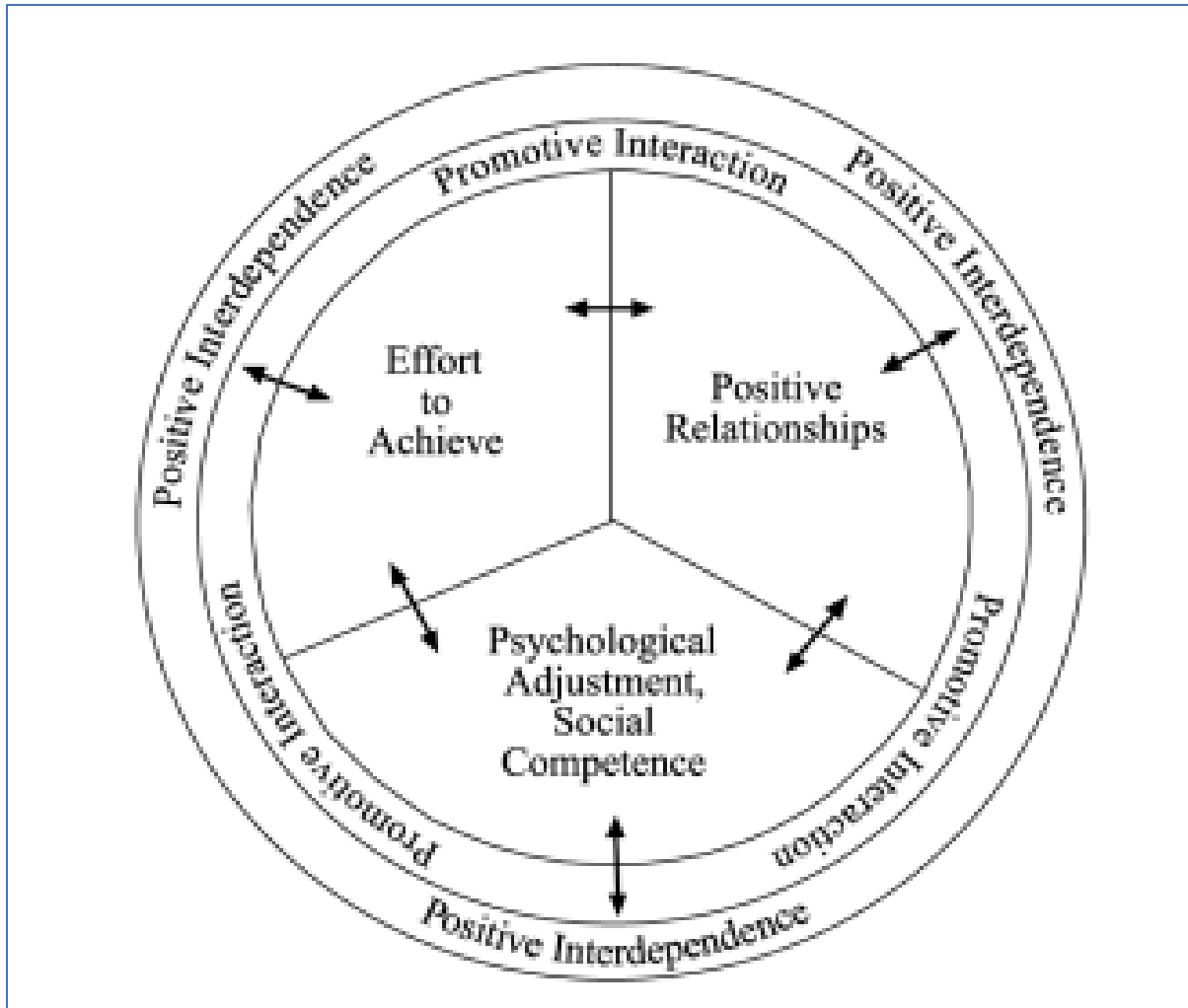


Figure 2. Outcomes of Cooperative Learning. Source: Johnson and Johnson (1989)

Positive interdependence has three primary outcomes: effort to achieve, quality of relationships, and psychological health. These outcomes influence one another and are likely found together (Johnson and Johnson, 1989). Figure 2 shows the relationship between the three outcomes of interactions and how they influence promotive interaction, which develops positive interdependence (cooperation). According to Johnson and Johnson (2002), the link between the outcomes can be explained as follows:

- When students join together to accomplish a mutual goal (an effort to achieve), the bonding that results from the joint efforts creates caring and committed friendships (quality of relationships). Therefore, the more students care about each other (quality of relationships), the harder they work to achieve mutual goals (an effort to achieve).
- When students join together to achieve mutual goals (an effort to achieve), it promotes higher levels of self-esteem, self-efficacy, personal control, and confidence in one's competencies (psychological health). Therefore, students are better able to work with others to achieve mutual goals (an effort to achieve) when they are psychologically healthy.
- When students feel loved, respected, and cared for (quality of relationships), it builds psychological health. Therefore, the healthier people are psychologically, the more caring and committed to their relationships (quality of relationships).

Teachers must understand how these three outcomes influence promotive interactions, which develop positive interdependence. Teachers need to understand how they can encourage students to build on these three outcomes to develop promotive interactions and positive interdependence. When students create promotive interactions and positive interdependence, they participate in Johnson and Johnson's basic elements of effective cooperative learning. Promotive interaction and positive interdependence have critical roles in social interdependence theory, but they are not the only Johnson and Johnson basic elements that can be found in social interdependence theory.

Social Interdependence Theory and Johnson and Johnson Framework

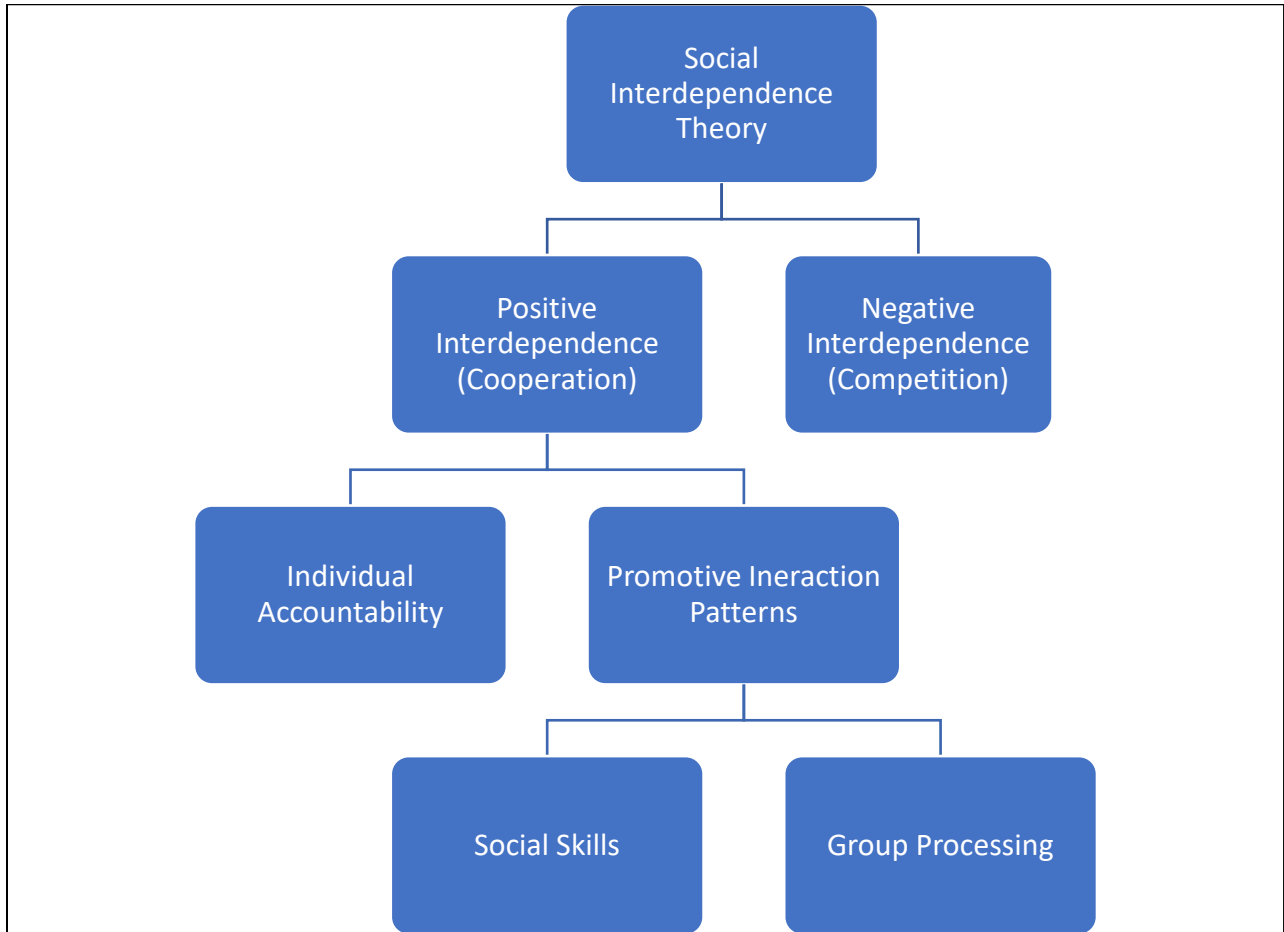


Figure 3. Social Interdependence Theory and the Basic Elements of Cooperative Learning Framework.

As previously stated, social interdependence theory comprises two main parts: positive interdependence (cooperation) and negative interdependence (competition). Positive interdependence is a basic element of creating an effective cooperative learning framework. Negative interdependence has no role in the Johnson and Johnson framework. As seen in Figure 3, the remaining four Johnson and Johnson basic elements are also influenced by social interdependence theory. Positive interdependence is one of the two main parts of social interdependence and is connected to the remaining four elements. Positive interdependence

occurs when individuals understand that their goals can be reached if and only if other individuals with whom they are cooperatively connected also accomplish their goals. Positive interdependence helps develop two of the basic elements of effective cooperation: individual accountability and promotive interaction.

Because positive interdependence occurs when individual students understand their goals can be reached only if all group members accomplish their goals, which helps to develop individual accountability (Johnson & Johnson, 2008). Individual accountability occurs when every member of the group is responsible for their own learning; in other words, every member of the group is pulling their own weight, and not one student is getting a free ride at the expense of the others. Each group member should be assessed by their performance within the group and provided with the results to analyze how they contributed to the group's success. This holds students to a higher standard of responsibility and increases their motivation to perform well within the group. Positive interdependence also helps to develop promotive interaction, which occurs when individuals encourage and facilitate each other's efforts to accomplish the group's goals (Johnson & Johnson, 2008). When students interact with one another to achieve the group goals by encouraging one another, they enhance the remaining two basic elements: appropriate use of social skills and group processing.

Appropriate use of social skills occurs when the group communicates and builds trust with one another. Promotive interaction helps to enhance the use of appropriate social skills because as students interact with one another, they are getting to know and trust one another by learning how to communicate accurately and resolve conflicts constructively. Group processing occurs when the group collectively analyzes and critiques their performance and asks each other

what they can do to improve next time. Promotive interaction may be enhanced by group processing because as students are interacting with one another, it allows the students an opportunity to discover what they see works well within the group and what can be improved within the group, to be discussed when the group collectively analyzes and critiques the performance of the group (Johnson & Johnson, 2008).

Understanding how the basic elements for effective cooperative learning correlate with one another is important because it can help teachers identify the kind of classroom climate in which they are conducting their cooperative lessons. This study explores to what extent teachers understand cooperation and competition and what efforts, if any, teachers make to transform the competition into cooperation when implementing the Johnson and Johnson effective cooperative learning framework in their mathematical lessons. By analyzing Figure 4, teachers are given an overview of how the efforts they put into changing the classroom environment from a negative interdependence (competitive) environment to a positive interdependence (cooperative) environment can look like in their classroom.

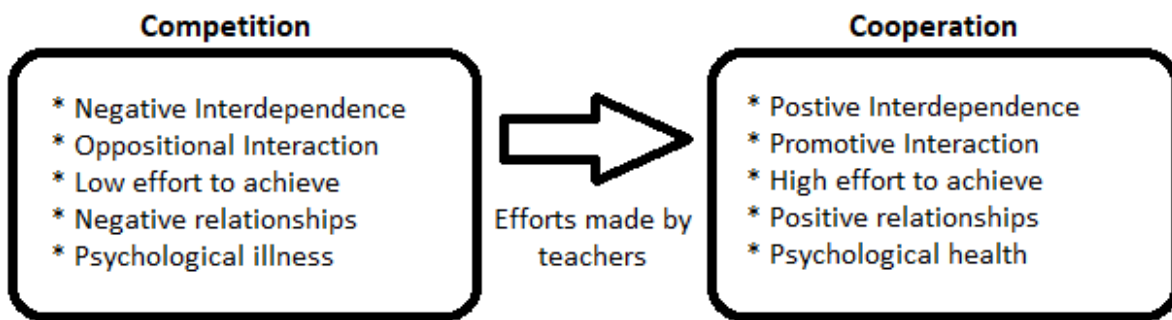


Figure 4. Efforts Made to Move Competition to Cooperation

CHAPTER IV

METHODS

This study employs a general case study research design aimed at studying a group of mathematic teachers at two high school campuses. According to Gerring (2007), a case study is the “intensive study of a single case where the purpose of that study is – at least in part – to shed light on a larger class of cases (a population)” (p.20). Moreover, a case study research design is aimed at studying multiple cases. This study investigates high school mathematic teachers’ efforts in the *basic elements of effective cooperation* and the challenges they encountered. To explore these efforts, the participating teachers serve as the sample population of high school mathematics teachers.

As previously stated, this study aims to explore to what extent mathematic teachers understand cooperation and competition and what efforts, if any, teachers made to change the negative (competition) into the positive (cooperation). In this chapter, I discuss the research questions and sub-questions used and the type of data collection needed to collect data for each research question and sub-questions. To begin studying the efforts and challenges encountered by teachers when implementing cooperative learning strategies, the following questions are utilized:

Research Questions

1. In a classroom where cooperative learning is implemented, what efforts do high school mathematics teachers incorporate to implement cooperative learning strategies successfully regarding the basic elements of effective cooperation?
 - a. (Positive Interdependence) What efforts do teachers make to have their students recognize that the success of the group depends on every group member's contribution?
 - b. (Individual Accountability) What efforts do teachers make to have their students understand they are accountable for their own learning and involvement in the group?
 - c. (Promotive Interaction) What efforts do teachers make to have their students support and encourage other members in their group to learn?
 - d. (Appropriate use of Social Skills) What efforts do teachers make to have their students build trust, apply conflict management and communicate well with others?
 - e. (Group Processing) What efforts do teachers make to have their students analyze how well they are performing as a group in order to make a group improvement?

2. In a classroom where cooperative learning is implemented, what challenges do high school teachers of mathematics encounter in implementing cooperative learning strategies in their classrooms regarding the basic elements of effective cooperation?
 - a. What challenges do teachers encounter in promoting positive interdependence?
 - b. What challenges do teachers encounter in promoting individual accountability?
 - c. What challenges do teachers encounter in promoting group interaction?
 - d. What challenges do teachers encounter in promoting appropriate use of social skills?
 - e. What challenges do teachers encounter in promoting group processing?

Data Collection

Research Questions Data Collection

Research question one is designed to study what efforts participating mathematic teachers made to ensure students have an effective cooperative learning lesson. In other words, this question aims to answer what efforts teachers made in each of the basic elements of effective cooperation to ensure students move from the competitive (negative) to the cooperative (positive). To discover what efforts teachers made in each of the basic elements of effective cooperation, each question is studied as shown in Table 2. As seen in Table 2, the research questions and sub-questions were reworded so that teachers could understand what was being asked even if they had never heard of the basic elements of effective cooperation before.

Research question two is designed to study what challenges participating mathematic teachers encountered when implementing the basic elements of effective cooperation. Table 3 shows the research question and sub-questions and the data collection method used to gather data to discover what challenges mathematic teachers encountered. Both research questions and sub-questions are studied by collecting data from open-ended surveys and teacher interviews, which are discussed in the survey and interview sections.

Table 2. Data Collection Methods for Identifying Teacher Efforts

	Unstructured Survey	Unstructured Interview
1. In a classroom where cooperative learning is implemented, what efforts do high school mathematics teachers incorporate to implement cooperative learning strategies successfully regarding the basic elements of effective cooperation?		X
1a. (Positive Interdependence) What efforts do teachers make to have their students recognize that the success of the group depends on every group member's contribution?	X	X
1b. (Individual Accountability) What efforts do teachers make to have their students understand they are accountable for their own learning and involvement in the group?	X	X
1c. (Promotive Interaction) What efforts do teachers make to have their students support and encourage other members of their group to learn?	X	X
1d. (Appropriate use of Social Skills) What efforts do teachers make to have their students build trust, apply conflict management, and communicate well with others?	X	X
1e. (Group Processing) What efforts do teachers make to have their students analyze how well they are performing as a group in order to make a group improvement?	X	X

Table 3. Data Collection Methods for Identifying Challenges

	Open Ended Survey (Unstructured questionnaires)	Interview
2. What challenges do mathematics teachers encounter in implementing cooperative learning?		X
2a. What challenges do teachers encounter in promoting positive interdependence?	X	X
2b. What challenges do teachers encounter in promoting individual accountability?	X	X
2c. What challenges do teachers encounter in promoting group interaction?	X	X
2d. What challenges do teachers encounter in promoting the appropriate use of social skills?	X	X
2e. What challenges do teachers encounter in promoting group processing?	X	X

Participants

The participating teachers of this study are high school mathematics teachers who have implemented cooperative learning in their classrooms. They have firsthand knowledge and experience regarding the efforts and challenges a teacher may encounter when implementing a cooperative learning lesson. The district superintendent granted the researcher permission to contact the principals of the two participating high schools. The researcher contacted the principals, informed them of the study details, and asked for permission to conduct the study and interviews on-site. Once the principals agreed to have their campus be part of this study, they emailed their respective math departments detailing the study. They informed the teachers that anyone interested in participating in the study was asked to email the researcher directly to notify him of their desire to participate. A link to a survey on Qualtrics was also included in the email

the principals sent out, which the teachers were asked to complete. After teachers emailed the researcher and completed the survey on Qualtrics, the researcher contacted teachers via email or text about potential face-to-face interview times. Once both researcher and participant agreed upon these times, a face-to-face interview was conducted in the teacher's classroom during their conference period.

Target Population

The sample being used is a non-probability convenience sample of secondary mathematics teachers from two urban high schools in south Texas, identified as Campus A and Campus B. All teachers in the study are experienced teachers teaching in the traditional method with occasional unstructured cooperative learning (group work). The group of teachers in the study comprises of both male and female teachers. During this study, all teachers have a Year-At-A-Glance (YAG) document. The team leaders of each subject create this document. It is essentially a tentative calendar of the state standards broken down over the course of the year (written curriculum). Teachers are then asked to create individual lesson plans indicating what and how a topic is covered in class (intended curriculum - planning). Embedded in these lesson plans, teachers systematically select topics to incorporate cooperative learning, adhering to the basic elements of effective cooperation, and then teachers implement the cooperative learning lesson (enacted curriculum - acting). During the lesson, teachers observe how students react to the basic elements of effective cooperation (student learning - observing). Using these results, teachers reflect and adjust their lessons accordingly before creating the next cooperative learning lesson (reflecting). Thus, the cycle of planning, acting, observing, and reflecting occurs.

The district where the study was conducted does not formally have a cooperative learning model that all teachers use. In 2015, the district sent representatives from both high school campuses to be trained on the engage2learn cooperative learning model. In this cooperative learning model, teachers create their cooperative learning lesson focused on five key phases: launch, plan, research, create, and share (E2L Learning Model). Of the four participating teachers in this study, one (Teacher C) has been formally trained in the E2L Learning Model. It is interesting to note that she is also the only participant to implement a form of group reflection.

However, in a 2019 article showcasing how the elementary classes in the district were replacing all traditional student desks with something more modern and conducive to interactive learning, the Administrator for Organizational Development stated these desks would help create collaborative learning spaces. Currently, volunteer teachers are being trained in an educational program known as blended learning. This form of learning is the district's future and is set to be implemented district-wide within the next few years. Blended learning is a formal educational student-centered learning program where students learn through an integration of methods: online, in school, and in some retrospect, at their own time and pace (Ossiannilsson 2017). Blended learning incorporates direct teaching, online teaching, and cooperative learning into a teacher-customized classroom; each piece plays a vital role in the blended learning model.

In 2015, when the district sent a few representatives from both high schools to be trained on the E2L Learning Model, the district did not further train anyone else or implement this cooperative learning model district-wide. Three of the four participants of this study were not formally trained by the district on any type of cooperative learning model. I observed no similar strategies in the basic elements of effective cooperation displayed by all four teachers. In contrast, blended learning is set to be implemented district-wide from the elementary level to the

high school level within a few years. However, in the cooperative learning phase of the blended learning model, I have not seen the implementation of the basic elements of cooperation.

Blended learning is a fully customizable teaching method but leaves room for teacher interpretation on how to incorporate cooperative learning.

Surveys and Interviews

Surveys and interviews are the methods for data collection to study the efforts mathematic teachers use in incorporating effective cooperative learning strategies and what challenges mathematic teachers encountered when implementing cooperative learning strategies. Surveys are a data collection method used to collect information because they “are an excellent vehicle for measuring a wide variety of unobservable data” (Bhattacharjee, 2012, p. 73).

The unstructured surveys conducted in this study were created and hosted online via Qualtrics. The questions on the survey were open-ended questions aimed at answering the questions found in Table 2 and Table 3, with additional questions on teachers’ backgrounds and curriculum planning. At the start of the survey, participants were asked questions about their educational background, teaching experience, and teaching background. In the second half of the survey, participants were asked to describe how they plan and prepare for a cooperative learning lesson and to describe if they thought the lesson was effective. They were also asked to rate each of the basic elements of effective cooperation regarding how important they thought each element was when planning a cooperative learning lesson. Additionally, participants were asked if each of the basic elements of effective cooperation was incorporated into the lesson and to what extent. Teacher participants were given a four-week window to complete the survey and were able to save their progress and finish later.

Interviews with open-ended questions are utilized in this study because open-ended questions allow the researcher to enter the interviewee's frame of mind. Patton (2002) states, "the purpose of gathering responses to open-ended questions is to enable the researcher to understand and capture the points of view of other people without predetermining those points..." (p. 21). Through the use of interviews, direct quotations can be obtained and utilized. Direct quotations are a very powerful qualitative tool that reveals the interviewee's emotions, their thought process about what is happening, their experiences, and their insight (Patton, 2002).

The teacher interviews utilized unstructured questioning designed to correspond to Table 2 and Table 3. Teacher participants were asked additional questions about their experiences with the cooperative learning method and the strategies they implement in the basic elements of effective cooperation. Teachers were interviewed at their high school campus and recorded via a voice recording device in a one-to-one setting. The interviews were uploaded to a computer, and the software Descript was used to convert the voice recording to a written transcript. On average, each interview lasted approximately 15-20 minutes from start to finish.

Validity

The use of face validity, content validity, and triangulation are utilized to examine the validity (often called construct validity) of this study. Construct validity is how well a measure adequately represents the underlying construct it is supposed to measure (Bhattacharjee, 2012). According to Oluwatayo (2012), "face validity refers to researchers' subjective assessments of the presentation and relevance of the measuring instrument as to whether the items in the instrument appear to be relevant, reasonable, unambiguous and clear" (p. 392). The questions utilized in the study's surveys and interviews were worded so that high school mathematic

teachers could understand their meaning without ever hearing of cooperative learning or the basic elements of cooperation. Furthermore, two experts in math education were consulted when creating the survey and interview questions for their face validity. Bhattacharjee (2012) defines content validity as “an assessment of how well a set of scale items matches with the relevant content domain of the construct that it is trying to measure” (p. 59). The constructs of this study are “teacher efforts” and “teacher challenges” regarding effective cooperative learning. The survey and interview questions contained inquiries to examine the extent of efforts implemented or challenges encountered by teachers when incorporating the basic elements of cooperation. These basic elements of cooperation are the basic elements in creating an effective cooperative learning lesson. Triangulation is defined as “collecting information from a diverse range of individuals and settings, using a variety of methods” (Maxwell, 2008, p. 245). The data in this study was collected from two high school campuses and from mathematic teachers who taught in different grade levels and content subjects. Additionally, the use of surveys and interviews were utilized. It was intended for in-person classroom observations to be used in this study, but due to time restraints and COVID restrictions in the district, in-person classroom observations were not allowed to be conducted at the time of this study.

Data Analysis

After the teacher interviews were conducted and audio recorded, they were analyzed in the following four steps (in order): (1) the audio recordings were transcribed, (2) the transcripts were coded using the line-by-line strategy, (3) the focused strategy to code was used, and (4) themes were developed relating to the research questions.

Transcription

In this study, the data collection methods used were unstructured surveys and unstructured interviews. The open-ended surveys were geared to obtain demographic data about the teachers and their experiences with cooperative learning strategies. Six teachers participated in the unstructured teacher interviews, and all six participating teacher interviews were audio recorded and transcribed completely. The transcriptions were then coded using the line-by-line coding strategy. Four out of the six teachers were then selected to be further analyzed by applying the focused coding strategy. The four teachers I selected to be further analyzed by the focused coding strategy were because their responses to the interview questions held more informative data needed to address the needs of my research questions. How I incorporated line-by-line coding and focused coding in my data analysis is explained in greater detail in the following sections.

Line-by-line Coding Strategy

Line-by-line coding is usually the first step in approaching the data to be coded. According to Vollstedt and Rezat (2019), line-by-line coding aims to break up the data into smaller parts and develop a code to describe the core idea of each part. They further state that the overall goal of line-by-line coding is to describe the data by developing a variety of codes. Charmaz (2006) states that line-by-line coding compels you to look at the data again, leading you to discover any ideas you can build upon. I incorporated line-by-line coding as part of my data analysis to discover any emerging themes I may have missed during my initial data review.

I first began my line-by-line coding by organizing the transcript of each teacher interview by the interview question with the teacher responses. I then looked at each teacher's response,

determined the “main idea” of each response, and made individual notes on how it answered my research question. During this process, I also wrote down my interpretation of the teacher’s responses to give further explanation on why a teacher may have answered the way they did to a particular question. With line-by-line coding, I created and classified initial codes and unrefined assumptions regarding the efforts and challenges of cooperative learning.

Focused Coding Strategy

After I created initial codes and unrefined assumptions, I continued to further analyze my data by changing my coding strategy from line-by-line coding to the focus coding strategy. Focus coding “is the second major phase in coding” (Charmaz, 2006, p. 57) and is used to select specific codes to create categories and developing themes (Charmaz, 2004).

Charmaz (2006) states that focused coding means using the most significant codes to examine large quantities of data. These initial codes must then be scrutinized to determine which ones make the most logical sense to categorize your data. When moving from line-by-line coding to focused coding, I reviewed my research questions and sub-questions. I realized that four of the six teachers interviewed held more informative data geared towards finding the mathematics teachers' efforts and challenges when incorporating cooperative learning. The codes discovered in this study after implementing line-by-line coding and focus coding are shown in Table 4.

In the basic element column of Table 4, “P” represents positive interdependence, “A” represents individual accountability, “I” represents promotive interaction, and “S” represents appropriate use of social skills.

Table 4. Code List

Group	Basic Element	Code	Meaning
Efforts in Intended Curriculum (EI)		CLD	Teachers consider their classroom design (such as the amount of space in the classroom and the number of students)
		AB	Teachers consider the abilities of the students
		ACC	Teachers consider the accommodations needed by certain students (such as SpEd, 504, and LEP)
Efforts in Enacted Curriculum (E)	P	W	Teachers use group rewards
	PA	AR	Teachers assign roles to each member of the group
	PA	SC	Teachers utilize student contracts for every member of the group
	A	A	Teachers give students formal or informal individual assessments
	PI	EM	Teachers explain or model to their students their expectations and group norms
	PA	MT	Teachers modify their timeline or pacing of the lesson
	IS	AGB	Teachers assign groups based on class dynamics (such as special populations of the class and the abilities of students)
	S	PSS	Teachers promote social skills within the groups
Challenges in Intended Curriculum (CI)		AI	Teachers have difficulty applying information learned from outside resources
		TU	Teachers have difficulty planning for cooperative learning lessons due to time restrictions or unexpected events
		MGI	Teachers have difficulty modifying information learned from outside resources
Challenges in Enacted Curriculum (C)	PA	MT	Teachers modify their timeline or pacing of the lesson depending on student feedback
	PAIS	OS	One student completes all group work
	PIS	SS	Students lack appropriate social skills
	S	AS	Students have difficulty applying appropriate social skills

I briefly explain a few of the codes I used in Table 4. For example, the code “MT” was when a teacher needed to modify the timeline or pacing of their lesson. This code can be seen as both an effort and a challenge. When teachers stated they had difficulty having students apply appropriate social skills, the code “AS” was used. The last code explained is “AR” which was used to indicate when a teacher assigned roles for students within the group. Developing these

codes led to the creation of some common ideas, which led to the creation of being able to form categories.

The codes discovered were categorized into four groups and two sub-groups. The first group consists of teachers' efforts in preparing their intended curriculum. The second group consists of teachers' efforts in transferring the intended curriculum (planned) into the enacted curriculum (acting). This group consists of the first sub-group: the efforts teachers apply to the basic elements of effective cooperation when they (teachers) enact their curriculum. The third group consists of teachers' challenges in preparing their intended curriculum (planned). The fourth and final group consists of teachers' challenges in transferring the intended curriculum (planned) into the enacted curriculum (acting). This group consists of the second sub-group: the challenges teachers encountered when applying the basic elements of effective cooperation.

While implementing focus coding, I modified and added categories initially produced by the line-by-line coding. Through this process, I was able to determine overlying codes and themes found in multiple transcripts.

Developing Themes

After conducting line-by-line coding and focus coding, I compared the categories and codes shown in Table 4. I also re-read my notes and personal interpretations of the teacher transcripts to discover commonalities between the teachers that would suggest an emerging theme to the data. I found emerging themes in the efforts and challenges teachers encountered when incorporating the basic elements of effective cooperation, refined in Chapter V.

CHAPTER V

RESULTS

As previously stated, this study aims to explore the efforts teachers made to change the negative (competition) into the positive (cooperation) to have an effective cooperative learning lesson. The research questions utilized in this study were (1) What efforts do high school teachers of mathematics incorporate to implement successful cooperative learning strategies regarding the basic elements of effective cooperation? and (2) What challenges do high school teachers of mathematics encounter in implementing cooperative learning strategies in their classrooms, regarding the basic elements of effective cooperation? As part of identifying the efforts mathematics teachers implement and the challenges mathematics teachers encounter when utilizing cooperative learning, I take into account the line *between* the efforts implemented and the challenges encountered as teachers plan for cooperative learning (intended curriculum) *and* the feedback they receive from students when the lesson is presented (enacted curriculum).

This study collected data from six high school mathematics teachers (Teachers A through F). However, the author concluded that the interview responses of only four teachers would be reported as they were found to be more informative and relevant to the research questions after completing line-by-line coding. Each section provides background information about a single teacher and examines the interview responses. The teacher interview sections are in the following order: Teacher B, Teacher C, Teacher D, and Teacher F. The background information of the teacher in each section includes the teacher's educational background, years of teaching

experience, and their teaching content, which I obtained from teacher surveys. The interview discussion provides excerpts and the claims made relevant to the research questions based on the excerpts.

The excerpts show how each participating teacher modified the basic elements of effective cooperation to best meet their students' needs. Participating teachers did not utilize the same strategies, but the strategy used addressed some of the same elements. Efforts ranged from teachers using group rewards, teachers requiring students to sign contracts, or teachers assigning roles to students within the groups. The challenges encountered by participating teachers had some similarities, such as teachers finding it difficult to apply learned information from outside resources and teachers finding the students' lack of social skills or engagement as a difficulty.

Teacher B

Teacher B is a female who has been in the teaching field for 22 years and has spent the last ten years at Campus A. She has a Master's in Curriculum and Instruction in Education and a bachelor's degree in Mathematics. When data was collected, she taught two different preps; Geometry and College Prep (a state-accredited class to help seniors get a TSI waiver). Throughout her teaching career, she has tried various methods of cooperative learning in her classroom, ranging from grouping by student ability to randomly selecting groups. She notes how over the years, experience has taught her there is no perfect way to group students together and that she can usually gauge the personality of each class and the students within to form the best set of groups for her lesson. Teacher B's reasoning for utilizing cooperative learning stems from students needing to complete a project or major assignment, as she sees the cooperative aspect of cooperative learning as being beneficial. She enjoys seeing students help and reteach

one another in a way that makes sense to them when they form a unique bond where everyone is held accountable for each other's learning. With respect to the implementation of cooperative learning, Teacher B states she often needs to modify the implementation of the cooperative lesson due to the different dynamics of each class. Teacher B believes strongly that a cooperative learning lesson should include individual responsibility, team-building skills, and academic and personal group support such that every member of the group supports one another.

Efforts Made to Render Cooperative Learning Effective

The interview with Teacher B showed that she puts effort into making her cooperative learning lesson effective by modifying the lesson and how she groups the students.

For the interview question asking, "Did you have to modify your planned lesson at any time, and if so, what modifications did you make and for what reasons?" Teacher B replied as follows:

"Always pacing. Having certain supplies ready, making sure you give deadlines because then students will use too much time. Maybe just constantly reminding them of things that are due up to a certain point, if it's going to take longer than a couple of days, okay."

(Teacher B, Excerpt 1)

Teacher B's "always pacing" comment demonstrates that she modifies her planned lesson. Teacher B's comments further explain that she modifies her pacing in the amount of time she provides to her students to complete the lesson. The constant modification that Teacher B does for the pacing of her planned lesson shows that Teacher B is aware of the challenges students encounter following the pace she intended before instruction. This is an indication of a

disjuncture between intended and enacted curricula. The code used in this excerpt was E.PA.MT, indicating it was an effort used in Teacher B's enacted curriculum using the basic elements of cooperation when teachers modify their timeline or pacing of the lesson.

Excerpt 2 shows what Teacher B does to improve support and encouragement among the group members in cooperative learning. For the interview question, "What strategies have you implemented within your classroom to help students understand they should support and encourage other members in their group to learn?" Teacher B replied as follows:

"... I've mostly always let kids pick their group...So it usually works out because they're working with people that they're comfortable with. And I don't want to make anyone feel like, you know, embarrassed to share ideas. So, I try; I want them to be as comfortable as possible. So, um, I think them being in a group they want to be with, and it's, yeah, sometimes it helps propel the the activity better. I think that leads the students to encourage and support each other." (Teacher B, Excerpt 2)

Teacher B allows students to pick their own groups because she wants students to feel comfortable with the people they are working with and does not want anyone to be embarrassed to share ideas. Teacher B states when she allows students to pick their own groups, it helps to propel the activity better and leads the students to encourage and support each other. Although Teacher B's action of having students pick their own groups does not directly promote students to support or encourage each other within a group, she sets the group activity environment that allows more support and encouragement among the group members. The code used in Excerpt 2 was E.S.PSS, indicating it was an effort used in Teacher B's enacted curriculum using the basic elements of effective cooperation.

Challenges Encountered in Improving the Effectiveness of Cooperative Learning

While Teacher B placed efforts into making an effective cooperative learning lesson, she encountered some challenges. Some challenges Teacher B encountered were being unprepared, adding time to a lesson, and the students themselves.

Excerpt 3 is Teacher B's response to the interview question, "When you plan a cooperative learning lesson, what makes it difficult to transfer the information you obtained from outside resources into your lesson plan?"

"So sometimes, um, when you learn about a new way to do cooperative learning, um, it sounds so good in the perfect environment, but then reality happens in the classroom. Um, you might have to deal with other things other than what you're doing that day. Um, also sometimes, um, you have an idea of how to present it, and then it just changes as it goes, depending on how the kids are being. Sometimes you forget all the details."

(Teacher B, Excerpt 3)

Teacher B states the difficulty in transferring information lies in the reality of the classroom, dealing with things unexpected, and the gap between her idea of how to present the cooperative learning lesson and how the students are being. Lastly, Teacher B states sometimes she can forget all the details she has learned from outside resources. Excerpt 3 highlights a few of the difficulties Teacher B faces while trying to incorporate what she has learned from outside resources into her cooperative learning lesson leading to the code of CI.AI. This code indicates a challenge in the intended curriculum when teachers have difficulties applying information learned from outside resources.

For the interview question asking, “What do you believe makes it difficult for the transfer of your content information to follow your planned lesson, based on the interaction and feedback information you received from your students? In other words, what challenges did you encounter when presenting your lesson to your students?” Teacher B replied as follows:

“...there's always going to be that one student who can help the others, but um, the entire group is confused. So, you spend more time on sorting out little details that, that maybe you didn't plan for. So, then it makes the activity stretch out a little longer than you planned. Um, but when it's good feedback, then it helps you come up with ideas to enhance it and use it again. And then you start applying it to other, other things.”

(Teacher B, Excerpt 4)

Teacher B finds it challenging when students work cooperatively in groups and notices the entire group is confused. She sees this as a challenge because when this happens, she has to spend extra time sorting out the little details she did not initially plan for. When Teacher B spends extra time sorting out these details, it causes the cooperative learning activity to stretch out longer than she planned. This is also an indication of a disjuncture between intended and enacted curricula. Excerpt 4 is coded (C.PA.MT) as a challenge to the enacted curriculum when teachers have to modify their lesson timeline based on student feedback when using the basic elements of effective cooperation. It is important to note that she uses students' feedback to improve the quality of her lesson.

When Teacher B was asked, “When allowing students to work cooperatively together in small groups, please explain what challenges you have encountered.” she replied as follows:

“If I select the group, sometimes the students aren't happy with my selection;... If more than one doesn't want to work, it kind of ruins the whole vibe for the rest of the group. Um, but it depends on the individual. Sometimes that one individual will say, well, I'm not going to fail. I'm going to keep doing all the work. So, you just have to be prepared for all the different personalities and what mood they might be in that day.” (Teacher B, Excerpt 5)

Teacher B sees the lack of cooperation as challenging when students work cooperatively together. She stated two examples: (1) the ambiance of the group unravels when one or more member(s) of the group are unhappy with her selection and do not want to work together (C.S.AS), and (2) when a student completes the activity for the group independently of other group members (C.PAIS.OS). Excerpt 5 briefly explains a few difficulties Teacher B encountered while allowing students to work cooperatively in small groups. These codes indicate challenges to the enacted curriculum when incorporating the basic elements of effective cooperation.

Teacher C

Teacher C is a female who has been in the teaching field for ten years, all at Campus B. She has a Bachelor of Science in Mathematics and a Master's in Educational Leadership. When data was collected, she taught Geometry and Math Models with Applications. In her ten years as a teacher, she states she has been a part of one school implementation program (E2L Learning Model) to help get students more involved in groups and has several group projects implemented in her Geometry classes. Teacher C plans for her cooperative learning lesson with the finished product in mind beginning with her analyzing how many students per group she thinks it would

take to finish the project. She states that if a group is more than four students, you may have some students slack off, so she helps minimize this by telling the groups they must have assigned roles and are given expectations based on these roles to help the group function. In addition, Teacher C states that she sometimes assigns the groups herself to help the classes that need more structure so that she does not have “all low-level lower performing” students in one group and helps reduce “all the smart kids” grouping together. Teacher C utilizes cooperative learning in her classroom because she “knows that students learn from their peers...more than the teacher”. She also states that these peer interactions can help build the life skills needed in the workforce. Teacher C also mentions that she has learned in her graduate administration classes, that teamwork is a very effective tool that can also be applied to classrooms. Regarding implementing cooperative learning in her class, Teacher C states that she modifies the lesson as needed based on if “something does not work” in her cooperative lesson. Teacher C believes strongly that a cooperative learning lesson should incorporate individual responsibility, where every member in the group understands they are responsible for contributing to the group’s success.

Efforts Made to Render Cooperative Learning Effective

The interview with Teacher C showed she implements efforts to make her cooperative learning lesson effective by considering the dynamics of her classes, modifying her lesson, grouping students, and modeling her expectations.

For the interview question asking, “When you were planning a group work activity, did you do any type of planning geared towards how the students would be grouped, the number of kids per group, the kind of activities you were going to use?” Teacher C replied as follows:

“Yes. Whenever you do cooperative work, you got to take into consideration the student ability levels, the Sp.Ed. accommodations. You have to, uh, see the design of how many students, because if it’s a full class, you may not have enough space to make groups of four or three. You have to really take into account the class number and how you’re going to pair them up.” (Teacher C, Excerpt 1)

Teacher C considers the dynamics of her classroom while planning for a cooperative learning activity by considering the students’ ability levels (EI.AB) and the Sp.Ed. accommodations (EI.ACC) (Sp.Ed. is an abbreviation for Special Education). Teacher C also considers the design of her classroom regarding the number of students per class and the amount of space she has available in the physical classroom (EI.CLD). The preparation Teacher C exhibits in Excerpt 1 assists in planning her intended curriculum.

Excerpt 2 shows Teacher C’s response to the interview question, “Did you have to modify your planned lesson at any time, and if so, what modifications did you make and for what reasons?”

“Um, well, usually the main problem for some of these students is that the school sometimes has testing or something. So, we have to modify the original plan or extend the time to be able to finish the activity and sometimes change the groups. Like if the group wasn't working well together, I might just say this group is going to be all by themselves, and have the students complete the project by themselves.” (Teacher C, Excerpt 2)

Teacher C modifies her planned lesson by extending the amount of time groups need to complete an activity (E.PA.MT) or by making changes to student groups. Extending time is

necessary when unexpected occurrences happen on her campus, and group changes occur when students are not working well together. The changes Teacher C made to the initial planned lesson time and grouping of the students indicate a disconnection between the intended and enacted curriculum.

When Teacher C was asked, “What strategies have you implemented within your classroom to help students understand the success of the group depends on every group member’s contribution?” she replied as follows:

“... I let them pick their own groups. And sometimes if they're your friends, there's more of like, the friendship is also on the line because if they mess up, ...it's more personal because now it's affecting their grades. ..., make everyone sign a contract. I know for one year, one of our things, we had everyone sign a contract. Hey, you are responsible for this, this, and this. And that keeps everyone in check.” (Teacher C, Excerpt 3)

Teacher C required group members to sign a contract indicating what they were responsible for within the cooperative learning activity to ensure all members understood their duty to make the group successful (E.PA.SC). Teacher C stated she allows students to pick their own groups because it will enable students to have a personal connection with their group members and are more likely to work cooperatively to help maintain friendships (E.S.PSS). Although Teacher C’s action of allowing students to pick their own group members does not directly help students understand the success of the group depends on every group member’s contribution, she is setting up a group activity environment that allows students to work more cooperatively within the group to achieve group success.

The interview question asking, “What strategies have you implemented within your classroom to help students understand they should support and encourage other members in their group to learn?” Teacher C replied

“...just kind of encourage everyone to try their best on the project... because if I show encouragement, they'll, they'll be like, hey, you need to encourage...”. (Teacher C, Excerpt 4)

Teacher C models (E.PI.EM) how students should encourage and support each other by encouraging everyone in her class to try their best on their cooperative learning assignment. Teacher C claims if she shows encouragement, the students may do the same. Teacher C’s strategy is to lead by example.

Challenges that Hinder the Effectiveness of Teacher C’s Cooperative Learning

While Teacher C placed efforts into making an effective cooperative learning lesson, she encountered some challenges. Some challenges Teacher C encountered were time restraints, how students worked on the lesson, and one student taking over.

Excerpt 5 is Teacher C’s response to the interview question, “When you plan a cooperative learning lesson, what makes it difficult to transfer the information you obtained from outside resources into your lesson plan.” Teacher C replied as follows:

“... That's one of the biggest things that they want us to do, cooperative lessons and plan and do lesson plans. But sometimes, there's just not enough time to think of every facet that's going to happen. And, um, make sure that again, teach the regular students take into, uh, um, into account the modifications or accommodations for certain students.

(Teacher C, Excerpt 5)

Teacher C identifies the lack of time as a hindrance in preparing for an effective cooperative lesson. She states there is not enough time to prepare for every possible scenario that may occur in her cooperative lesson (CI.TU) while teaching her students and considering the modifications or accommodations needed by certain students. Excerpt 5 demonstrates a difficulty Teacher C encountered while trying to apply information from outside resources into her planning of a cooperative learning lesson.

When Teacher C was asked, “What do you believe makes it difficult for the transfer of your content information to follow your planned lesson, based on the interaction and feedback information you received from your students? In other words, what challenges did you encounter when presenting your lesson to your students?” she replied as follows:

“... the students sometimes don't want to work cooperatively together, or they take too long in their own planning stage, or they want to mess around or do other things like being on their phone rather than actually focusing on the actual, uh, project. Um, sometimes you have to even extend the time of the project because they'd work slower than what you anticipated...”. (Teacher C, Excerpt 6)

Teacher C stated the difficulty when presenting her lesson to her students lies in her students' lack of engagement. Students not wanting to work cooperatively, taking too long to

plan, or focusing on other aspects (C.PIS.SS), made it difficult to present her lesson. This lack of engagement sometimes requires an extension of the time needed to complete the project (C.PA.MT). The lack of student engagement creates a disconnection between the intended and enacted curricula.

For the interview question asking, “When allowing students to work cooperatively together in small groups, please explain what challenges you have encountered.” Teacher C replied as follows:

“Sometimes only one student that tends to do the work and the rest are there. They're trying to help, or they slack off...That's the biggest thing with group work Usually, one student, you know, wants to carry the load because they want an “A,” but they might be paired up with a lower performing student while the lower student may feel like, ah, I'm okay with whatever.” (Teacher C, Excerpt 7)

Teacher C identifies a challenge students encounter while working in small groups as the lack of cooperation (C.S.AS). She describes the lack of cooperation in two parts: (1) where one student takes over the group activity and completes the task individually (C.PAIS.OS), and (2) the remaining group members accept that one student is completing the work. Excerpt 7 describes a challenge Teacher C encountered when not all students were afforded the opportunity to work cooperatively.

Teacher D

Teacher D is a male who has been in the teaching field for 15 years, all at Campus B. He has a Bachelor of Science in Industrial Technology with a teaching certificate in Mathematics.

When data was collected, he taught College Math Prep and Math Models. During his time at Campus B, he states that in his experience, he notices when students work in small groups, sometimes only one or two students pull their weight. He also mentions students are sometimes reluctant to help their groupmates, even if the class is advanced. Teacher D states that he has not been able to implement cooperative learning in the last two years due to COVID. Teacher D plans for his cooperative learning lesson by thinking of how to group his students first. He prefers to have students in groups of four based on their academic strength where his ideal situation would be one strong student, one “almost as strong,” one “less strong,” and one low-performing student. Teacher D believes the effectiveness of cooperative learning only works in ideal situations where “all students participate and ask questions from each other.”

In implementing cooperative learning in his class, Teacher D states his lessons sometimes go according to plan and do not need to be modified, but other times they do not and need modifications. Teacher D states the training and self-reading he has gone to have helped him implement cooperative learning in his classroom. He believes cooperative learning should include team building, individual responsibility, team building skills, academic and personal group support, and some group analysis.

The interview with Teacher D indicates he implements efforts to make his cooperative learning lesson effective by modifying the lesson, implementing strategies he learned from the military, and implementing individual assessments.

For the interview question asking, “Did you have to modify your planned lesson at any time, and if so, what modifications did you make and for what reasons?” Teacher D replied as follows:

“You always have to modify your, your lesson plans... You may even have to modify your lesson from one class period to the next, depending on, um, the, the class dynamics you might have, you know, more special education students in one class period or more, um, uh, ESL kids and in another. So, modifications are, are always needed regardless.”

(Teacher D, Excerpt 1)

Teacher D’s comments “always have to modify your lesson” (E.PA.MT) indicate he modifies his planned lesson. Teacher D’s comments further explain he modifies his planned lesson based on his class dynamics, such as the special populations of his classroom (EI.ACC). The constant modification Teacher D applies to his planned lesson shows that Teacher D is aware of the needs of his students.

Excerpt 2 is Teacher’s D response to the interview question, “What strategies have you implemented within your classroom to help students understand the success of the group depends on every group member’s contribution?” Teacher D replied as follows:

“... give examples of my, uh, real-life experience. I, I was in the military...we were each assigned roles (E.C.AR) in the military and, you know, if we did well as a group, then we receive like, uh, a group reward... I try to instill that in my group. I try to use my real-life, um, experiences. I, I try to assign student roles within the group, and I try to do a reward system for the students...”. (Teacher D, Excerpt 2)

Teacher D gives real-life examples based on his military experience regarding group success (E.PI.EM). He also applies the strategies he experienced firsthand to his classroom lessons by assigning roles (E.PA.AR) and using a reward system (E.P.W). Excerpt 2

demonstrates how Teacher D implements strategies he has personally experienced to help his students understand they should contribute to promote group success.

When Teacher D was asked, “What strategies have you implemented within your classroom to help students understand they are accountable for their own learning and involvement in the group?” he replied as follows:

“...I randomly, uh, pick on one person to, to explain one of the problems...to explain, you know, how they, the process that they use to work it out, uh, to see if they're actually learning...I also do, uh, individual tests. Um, the test, uh, the kids are not able to work in groups, and that helps me to see which students were actually, you know, being accountable for their own work. (Teacher D, Excerpt 3)

Teacher D assesses students individually using informal and formal assessments (E.A.A). He uses these assessments as a way to measure if students are learning the topic and as a way of holding students accountable for their own learning. Excerpt 3 showcases how Teacher D applies different ways to verify students are being responsible for their own learning.

Challenges that Hinder the Effectiveness of Teacher D’s Cooperative Learning

While Teacher D placed efforts into making an effective cooperative learning lesson, he encountered some challenges. Some challenges Teacher D encountered are perfect world training, students trained to work alone, and students not knowing how to work well together.

Excerpt 4 is Teacher D's response to the interview question, "When you plan a cooperative learning lesson, what makes it difficult to transfer the information you obtained from outside resources into your lesson plan?" he replied as follows:

"I find that the trainings that I've been to, um, they're almost geared for a perfect world with perfect students...I feel I would get more out of it if, if I was actually in the, there in real life to see how it's actually done, you know, from the very beginning. How they started, how they do it, uh, throughout the whole thing." (Teacher D, Excerpt 4)

Teacher D feels a disconnect between the information he receives from trainings and the application of that information into his cooperative learning lesson planning (CLAI). Teacher D expresses training would be beneficial if seen from an insider's perspective rather than an outsider's perspective. Excerpt 4 demonstrates how challenging it can be for Teacher D to plan a cooperative learning lesson using outside resources.

For the interview question asking, "What do you believe makes it difficult for the transfer of your content information to follow your planned lesson, based on the interaction and feedback information you received from your students? In other words, what challenges did you encounter when presenting your lesson to your students?" Teacher D replied as follows:

"... I think what the major problem is that students have been sort of like trained to work alone, or they've been trained to work against each other. You know, we have a class ranking where students want to be the best or, students just, you know, just don't want to work together...". (Teacher D, Excerpt 5)

Teacher D identifies the lack of cooperation (C.S.AS) as a challenge when presenting his cooperative learning lesson to his students. He further expresses two examples: (1) students have been accustomed to working alone, and (2) students compete against one another for a higher-class ranking. Excerpt 5 shows a difficulty Teacher D has encountered when presenting his planned lesson to his students, demonstrating a disconnection between his intended and enacted curricula.

Excerpt 6 is Teacher D's response to the interview question, "When allowing students to work cooperatively together in small groups, please explain what challenges you have encountered." he replied as follows:

"... students, um, they don't know how to work well together. Um, when they are together, they spend more time talking about other things rather than the assignment. Um, I've seen mostly it's one person that wants to do all the work... I also think part of it is, uh, students lack the, the appropriate, the needed social skills, um, that they need to work together with, you know, COVID that happened and everything, uh, and technology, text messaging and everything. Kids don't know how to actually communicate with each other, uh, face to face." (Teacher D, Excerpt 6)

Teacher D expresses the lack of students' social skills (C.PIS.SS) as a challenge when students work cooperatively. He further explains students do not know how to work appropriately together, nor do they know how to communicate with one another (C.S.AS). Excerpt 6 highlights how the lack of social skills hinders students' ability to work cooperatively in groups.

Teacher F

Teacher F is a female who has been in the teaching field for five years, all at Campus B. She has a Bachelor of Science in Mathematics. When data was collected, she was teaching Geometry, Math Models, and Algebra 2. Teacher F plans for cooperative learning by pre-assigning her learning groups (between 4-5 students) to ensure students are in the most successful environment where they play a role in their group. Teacher F states that she enjoys incorporating cooperative learning into her classes because when students are provided with in-depth and easy-to-follow directions, students do well and do better on post-activity assessments. She believes students have “a greater understanding of the material when they work together to achieve a goal.” Teacher F feels that cooperative learning can occur in different ways in her math class. One of these ways is to incorporate cooperative learning using “scaffolding discovery cards” per each topic. She gives an example of using these cards to help her students look for a pattern of parallel lines and their slopes. Teacher F claims that when groups work through these short tasks, they work well together and complete the overall task. She states that she is “almost always” modifying her cooperative learning lesson depending on her class dynamics while walking and observing her class. She explains that group dynamics are “how often students have questions or need further guidance or explanation to achieve the overall goal.” Teacher F strongly believes that cooperative learning should incorporate individual responsibility, academic and personal group support, team-building skills, and some form of group analysis.

Efforts Made to Render Cooperative Learning Effective

The interview with Teacher F indicates she implements efforts to make her cooperative learning lesson effective by assigning roles, providing different assessments, and fostering communication between students.

For the interview question asking, “What strategies have you implemented within your classroom to help students understand the success of the group depends on every group member’s contribution?” Teacher F replied as follows:

“... Uh, so they had to do all their work in certain colors. So, and it couldn't change. So, like if one person didn't do something, then half of the project was not complete. So yeah, um they had different colored markers... so if this particular student didn't know what they were doing or didn't want to participate, then that color wasn't shown.” (Teacher F, Excerpt 1)

Teacher F assigns a specific color to each student in a group (E.PA.AR). Teacher F identifies two reasons for assigning colors: (1) the color of the student who did not participate in the activity is not represented, and 2) the project is marked incomplete. Excerpt 1 demonstrates how Teacher F ensures all group members contribute to the group's success.

When Teacher F was asked the interview question, “What strategies have you implemented within your classroom to help students understand they are accountable for their own learning and involvement in the group?” she replied as follows:

“... an individual assessment on Quizizz. Uh, so if they didn't participate, they didn't get that, um, that learning from it. Uh, then they obviously wouldn't do well on the Quizizz” (Teacher F, Excerpt 2).

Teacher F utilizes individual assessments (E.A.A) to hold students accountable. She clarifies if students did not participate in the group activity, they would not be successful in their learning. Excerpt 2 showcases how Teacher F applies assessments to verify students are involved and learning within a group setting.

Excerpt 3 is Teacher F's response to the interview question asking, “What strategies have you implemented within your classroom to help students understand the importance of building trust within the group to solve conflicts and communicate appropriately?”

“Uh, I think more of like, uh, questioning their questions. Uh, so, so instead of just answering them directly, I kind of like ask someone else, you know? Okay. Well, what do you think, or do you agree with what, you know, student A said? Um, anyway, so that it more made them communicate with each other instead of just always running to me with questions.” (Teacher F, Excerpt 3)

Teacher F redirects student questions back to fellow group members. Teacher F states this requires students to communicate and depend on fellow group members instead of the teacher (E.S.PSS). Teacher F demonstrates a strategy she uses to build communication and trust between group members.

Challenges that Hinder the Effectiveness of Teacher F's Cooperative Learning

While Teacher F placed efforts into making an effective cooperative learning lesson, she encountered some challenges. Some challenges Teacher F encountered were access to materials, students dividing the work, and one or two students doing all the work. The following Teacher B excerpts answer research question two examining teachers' challenges when implementing cooperative learning.

For the interview question asking, "When you plan a cooperative learning lesson, what makes it difficult to transfer the information you obtained from outside resources into your lesson plan?" Teacher F replied as follows:

"Um, basically our access to certain materials or technology, like a lot of things from trainings incorporate a lot of techniques, uh, technology use. Um, sometimes it's expecting all the students to have a certain device or access to Wi-Fi, and that's not always the case. Uh, so having to transition that to be more, um, accessible to our own students, it's a little bit difficult." (Teacher F, Excerpt 4)

Teacher F identifies the accessibility of materials or technology as difficult when incorporating new techniques into her planned lesson. She further states techniques used in trainings requiring specific materials or technology are not always readily available to her students (CLMGI). Teacher F modifies the information she has learned from outside resources to fit the needs of her lesson and students.

Excerpt 5 is Teacher F's response to the interview question asking, "What do you believe makes it difficult for the transfer of your content information to follow your planned lesson,

based on the interaction and feedback you received from your students? In other words, what challenges did you encounter when presenting your lesson to your students?" she replied as follows:

"... the students were supposed to complete the tasks in order. Um, and that would just build, you know, second question builds off the first and then lead them to their final goal. And the students did more of like a divide and conquer approach, um, which didn't lead them to getting the overall goal. Uh, so that was like, I didn't anticipate them not going in the order they should have." (Teacher F, Excerpt 5)

Teacher F finds it challenging when students do not follow the activity as she had planned. She further states when the activity is not followed as intended, it does not lead students to achievement (CI.TU). Excerpt 5 demonstrates a difficulty Teacher F encountered when presenting her lesson to her students. This is an indication of a disjuncture between intended and enacted curricula.

The interview question asked, "When allowing students to work cooperatively together in small groups, please explain what challenges you have encountered." Teacher F replied as follows:

"Oh, so most of the time, a certain student or maybe two students in the group take a lead, uh, and then they kind of shun or like take over. Um, and then the other students either let them have it, or they're too shy to say or put their input in." (Teacher F, Excerpt 6)

Teacher F states students' lack of cooperation is difficult when allowing students to work in small groups. She further identifies a lack of cooperation in two parts: (1) one or two student(s) taking over the workload (C.PAIS.OS), and (2) not every group member is allowed to provide input (C.S.AS). Excerpt 6 highlights a difficulty Teacher F encountered when students worked cooperatively in small groups

CHAPTER VI

CONCLUSION

This study raised two questions: (1) What efforts do high school teachers of mathematics incorporate to implement successful cooperative learning strategies regarding the basic elements of effective cooperation? and (2) What challenges do high school teachers of mathematics encounter in implementing cooperative learning strategies in their classrooms, regarding the basic elements of effective cooperation? In the Teacher Efforts section of this chapter, I discuss teachers' efforts to make cooperative learning effective in terms of the basic elements of effective cooperation. In the Teacher Challenges section, I discuss the challenges teachers encounter when implementing cooperative learning are synthesized. The effort and challenges in terms of competition and cooperation of social interdependence theory are discussed in the section titled Efforts and Challenges Regarding the Social Interdependence Theory. The section Implications of Cooperative Learning in High School Mathematics discusses the implications of cooperative learning in high school mathematics. Lastly, the section titled Summary discusses possible future directions of the study.

As previously discussed in Chapter III, effective cooperative learning was viewed under the social interdependence theory on the line between competition and cooperation: effectiveness occurs when students' interdependence moves from competition to cooperation. Competition occurs when there is negative interdependence and oppositional interaction, with the outcomes of low effort to achieve, negative relationships, and psychological illness. Cooperation occurs when

there is positive interdependence and promotive interaction, with the outcomes of high effort to achieve, positive relationships, and psychological health. The basic elements of effective cooperation are positive interdependence, individual accountability, promotive interaction, appropriate use of social skills, and group processing. Chapter II discussed that positive interdependence and individual accountability are related, whereby positive interdependence usually promotes individual accountability and vice versa. Promotive interaction and appropriate use of social skills are also related and promote one another.

Teacher Efforts

After analyzing the four teacher interviews, it was found that while the four teachers used different types of efforts to develop effective cooperative learning, there were some commonalities. Some of the teachers' efforts may be the same strategy but were used to foster different results. All teachers utilized the basic elements of effective cooperation in their teaching to best fit the needs of their classroom and students.

I found it interesting to note that all teachers placed efforts into the preparation of their intended curriculum and the modification of their planned lessons based on outside feedback received. Additionally, I found it interesting that although it is not a direct effort to the basic elements of effective cooperation, two out of the four teachers stated they allowed students to select their own group members to build an accepting cooperative learning classroom environment. Lastly, I found it interesting that not all the teachers had the same effort for the same basic element of cooperation.

For example, when asked if they (teachers) had to modify their planned lessons, all four teachers indicated that they had to modify their lessons. Teachers B, C, and F each stated they

had to modify their planned lesson due to the time students took to complete an activity. Teacher D was the only teacher who stated he always had to modify his planned lesson due to the student dynamics of his class (See Excerpt 1 for Teacher D). Teacher B and Teacher F also stated in their survey they had to modify their planned lesson due to the class dynamics. In contrast, Teacher C stated during her interview she had to consider her class dynamics while preparing for her cooperative learning lesson. Even though all four teachers stated they had to modify their planned lessons, they had to modify their lessons for different reasons. Class dynamics were also considered either for planning purposes (Teacher C) or for being a reason to modify their planned lesson (Teachers B, D, and F). These efforts are not directly related to any of the Johnson and Johnson elements, but they demonstrate how a mathematics teacher prepares (intended curriculum) or changes their lesson based on the needs of their students after the lesson was presented (enacted curriculum). Having to modify a cooperative learning lesson after the lesson has been delivered demonstrates a disjunction between the intended and enacted curricula since the lesson did not go as planned.

Assigning roles to students was an effort both Teacher D and Teacher F implemented in their classrooms to help students understand the group's success depends on every group member's contribution, which is the Johnson and Johnson element of positive interdependence. Teacher C also stated in her survey that she assigns students roles while in groups to help the group function. In her Excerpt 2, Teacher F gives an example of a cooperative learning activity she did in class where roles were assigned to students. Teacher F's example demonstrates how she ensures students have the opportunity to contribute and are held accountable for their work in the cooperative learning activity by assigning students with specific-colored markers. This example was in response to helping students understand that the group's success depends on its

members' contribution, which is the Johnson and Johnson element of positive interdependence. This effort would also be a strategy to ensure that all group members are held accountable for their own learning and involvement in the group, which is the Johnson and Johnson element of individual accountability.

Another strategy observed was teachers telling or showing students how something should be done. Teacher D used examples of his real-life military experience to explain to his students how a group should function. He used this strategy to help students understand that the group's success depends on every member's contribution, which builds the Johnson and Johnson element of positive interdependence. Teacher C used modeling as a way to help students understand they should support and encourage other members of their group to learn. She stated in Excerpt 4 that students would follow her example if she encouraged them to try their best on the project. Teacher's C example demonstrates how she builds a classroom environment where students support and encourage one another, which is the Johnson and Johnson element of promotive interaction. By Teacher C modeling to her students how to support and encourage one another, she begins to illustrate to her students how they should communicate with their group members, which is the Johnson and Johnson element of the appropriate use of social skills.

Lastly, both Teacher B and Teacher C stated they allowed students to select their own group members when working on cooperative learning activities. Teacher B stated in her Excerpt 3 she allowed students to pick their own group members as a way of helping students support and encourage one another (promotive interaction). She claimed that since students tend to select other students, they are comfortable with, they are not embarrassed to share ideas. Teacher C stated in her Excerpt 3 she allowed students to pick their own group members to help students understand that the group's success depends on every member's contribution. Teacher C

explained that sometimes students select their friends to work with cooperatively, which made it more personal because now it can affect their grades if not everyone contributes. Teachers B and C used the same strategy of allowing students to select their own group members, but for different reasons. Teacher B's reasoning was to build the Johnson and Johnson element of promotive interaction, while Teacher C's reasoning was to create the Johnson and Johnson element of positive interdependence.

Although not directly stated in the data analysis, the Johnson and Johnson element of group reflection was analyzed with no common themes between the four teachers to discuss. An interesting note when analyzing Teacher C's interview was that she was the only participant who mentioned incorporating a group reflection at the end of her project. Teacher C plans for her students to go back and compare their final project to others in the class. She also has her students individually assess themselves and the other group members by asking who the strongest member of the group was, who brought the materials, and who did not help. Perhaps because she is the only teacher to have formal training on cooperative learning, she understands the importance of group reflection.

The element seen to have been given the greatest efforts by teachers was the element of positive interdependence, which is related to and promotes the element of individual accountability. The elements seen to have been given the least efforts by teachers are the elements of promotive interaction and appropriate use of social skills. It is interesting to note that promotive interaction and appropriate use of social skills are related and promote one another, according to Johnson and Johnson (2002), as stated in Chapter II.

Teacher Challenges

After analyzing the four teacher interviews, it was found that while the four teachers implemented many different efforts to make cooperative learning effective, they also encountered many challenges. Teachers encountered challenges in the planning and implementation of cooperative learning and the basic elements of effective cooperation. Teachers encountered challenges within the elements of positive interdependence, individual accountability, promotive interaction, and appropriate use of social skills. The last element of group reflection was not mentioned as a challenge by any of the interviewed teachers. However, Teacher D stated it was not implemented in his cooperative learning lesson.

I found it interesting that most teachers expressed the same challenges to their intended curriculum and the basic elements of effective cooperation. Teachers considered either promotive interaction or appropriate use of social skills to be a challenging aspect of the basic elements of effective cooperation. Additionally, I found it interesting when all teachers stated it was difficult to apply or modify learned information from outside resources, like trainings, as a challenge to their intended curriculum.

A common challenge Teachers B, C, and F indicated was when one group member completes the cooperative learning activity independently from the other group members. This is a direct challenge to positive interdependence because not all group members contributed to the group's success. Furthermore, Teacher C states in her Excerpt 7 the remaining students of the group accept that one member of the group is completing the activity independently, which is a direct challenge to individual accountability. Individual accountability is being challenged because not all group members are responsible for their own learning or involvement. Teacher F

also claims in her Excerpt 6 that when one group member completes the work independently, they are not allowing other members to provide input, which would be a direct challenge to promotive interaction and appropriate use of social skills. Promotive interaction is challenged because the student doing the work is not supporting or encouraging the other members, and appropriate use of social skills is challenged because students are not communicating properly.

Another common challenge Teachers B, C, and D expressed was students not wanting to work cooperatively. Teacher B states in her Excerpt 5 that the group can unravel when group members do not want to work together, which can indicate a direct challenge to promotive interaction because students are not given a supportive and encouraging group to work in. Teacher D states in his Excerpt 6 that students lack the social skills to work appropriately together. This is a direct challenge to the Johnson and Johnson element of appropriate use of social skills because students do not know how to communicate with one another in a group setting. Teacher D also states in his Excerpt 5 an interesting challenge to the elements of promotive interaction and appropriate use of social skills. He indicates students have been accustomed to working alone and competing against one another due to the class ranking of the school system.

Due to time, teachers B, C, and F found it challenging to plan for and anticipate all aspects of cooperative learning. Teacher C states in her Excerpt 5 that there is not enough time to think of every facet that's going to happen, while Teacher B, in her Excerpt 4, expresses how she has to spend extra time sorting out additional details she did not initially plan for when presenting the cooperative learning activity to her students. These challenges do not directly challenge the basic elements of effective cooperation, but they do show a direct challenge to the intended and enacted curricula. When a teacher plans a cooperative learning lesson, they must

prepare for all aspects of the cooperative learning lesson. If teachers are not afforded the time needed to plan for all aspects of the lesson, the intended curriculum is not as effective of a lesson. Furthermore, after enacting the curriculum, a teacher finds they did not anticipate a particular aspect of the lesson, the teacher needs the time to return to the intended phase to best revise the lesson to fit the new information given by the students.

Lastly, for different reasons, all four teachers found applying learned cooperative learning information (from outside resources) challenging to incorporate into their cooperative learning lessons. Teacher C finds it challenging due to a lack of time. Both Teacher B and Teacher D feel the cooperative learning trainings they have attended are disconnected from the reality of the dynamics of their actual classroom. Teacher B also stated in her Excerpt 3 she sometimes forgets all the information given in trainings when preparing her cooperative learning lesson. Teacher F finds it difficult to incorporate learned information because the materials needed for the learned techniques are not always readily available at her campus. These challenges do not directly challenge the basic elements of effective cooperation, but they do directly challenge the intended curriculum. If teachers cannot apply the learned information from outside resources, then their intended curriculum is not as effective of a lesson.

Although not directly stated in the data analysis, teachers stated time was a challenge for planning or modifying their cooperative learning lesson; they then stated an effort created by the challenge. For example, Teacher B stated when she has to take the time to sort out all the little details that arise when presenting the cooperative learning lesson (See Teacher B Excerpt 4), it helps to come up with ideas to enhance the lesson and use it again. Teacher C also indicated an effort she could implement as a way to mediate the challenge of one student completing the task for the group was to assign a role to every student in the group to hold every student accountable.

This effort would target the elements of positive interdependence and individual accountability. The Johnson and Johnson elements of promotive interaction and appropriate use of social skills were found to be the most challenging elements for teachers. Interestingly, promotive interaction and appropriate use of social skills were given the least amount of effort by the teachers.

Efforts and Challenges Regarding the Social Interdependence Theory

When teachers plan and modify their cooperative learning activity, the foundation for a high effort to achieve is initiated by the teacher when they, the teacher, considers the class dynamics and modify their planned lesson to fit the needs of the students best. When teachers consider the needs of the students and modify the planned lesson based on those needs, it sets the groundwork for those students to have higher efforts to achieve and builds psychological health since modifications have been made for their needs. In his Excerpt 1, Teacher D explains how he modifies his planned lesson depending on the class dynamics (special populations) in his classroom (E.PA.MT). Teacher C's Excerpt 2 demonstrates how she modifies her planned lesson by extending the time when unexpected occurrences happen at her campus (E.PA.MT). When teachers modify their planned lesson by extending the time students need to complete an activity, it provides the students with the time they need to build high efforts to achieve. It can also be implied to build positive relationships (by providing the students ample time to work together) and creates psychological health in the form of higher self-esteem and confidence in one's abilities when students are provided the time needed to complete the activity.

Assigning roles was an effort teachers incorporated to support cooperation. Positive interdependence is directly addressed by helping students understand their goal (completing the activity) cannot be reached if not all students contribute. Promotive interaction would be implied

as students discuss and work together in achieving their assigned roles within the activity. Because students are given a role, they would have a sense of purpose (psychological health) while working within a group setting (positive relationships) to complete the group activity (higher efforts to achieve). Teacher F demonstrates in her Excerpt 1 how assigning roles (specific color markers) helps students understand the success of the group depends on every member's contribution (E.C.AR). Since students are working cooperatively, one student is not reaching their goal on the failure of another student (negative interdependence), nor is one student discouraging or obstructing the efforts of another student (oppositional interaction), which are aspects of competing.

Explaining or modeling to students the group expectations or group norms when working cooperatively in groups is building positive interdependence and promotive interaction. Positive interdependence is implied when the teacher explains to the students how groups should function and work cooperatively to reach a common goal. Teacher D, in his Excerpt 2, provides students with real-life examples of his personal experiences in the military to demonstrate to students how a group should function (E.C.EM). Promotive interaction is addressed when the teacher models to her students and leads by example how students should interact with one another within the groups. Teacher C, in her Excerpt 4 models to her students how to support and encourage one another (E.C.EM). When students are shown how to properly function in a group setting (positive relationships), where support and encouragement are given to all students (psychological health), it leads students to accomplish the group activity (higher efforts to achieve). Because none of the students are working against one another (negative interdependence) or keeping each other from reaching the common goal (oppositional interaction), students are not in competition.

However, the challenges teachers stated they encountered indicate some aspects of competition still occurring during their cooperative learning lessons. For example, the challenge teachers expressed of one student completing the activity demonstrated negative interdependence. In her Excerpt 7, Teacher C explains how she sees one student completing all the work and the rest of the group members accepting this student to complete the work as a challenge (C.C.OS). The student completing the work is reaching their goal of learning the targeted content information of the lesson, on the failure of the other group members not learning the targeted content information. The student completing the work also expresses oppositional interaction when they (the student) exclude the other group members from participating. In other words, the student completing the work obstructs the efforts of the remaining students in the group. This challenge can also show some of the outcomes associated with competition. Low effort to achieve is shown when the remaining group members accept one group member completing the work for the entire group. Psychological illness can be implied when the students left out of working within the group can develop feelings of inadequacies or isolation.

When students do not want to work cooperatively with their group members, it is not affirming that there is competition. Instead, when students do not want to work cooperatively with their group members, it indicates being individualistic since there is no interdependence or interaction between the students. Teacher D demonstrates this challenge in his Excerpt 6 when he states students lack the social skills needed to communicate and work appropriately with one another (C.C.AS).

The challenges teachers encountered within their intended and enacted curricula do not directly relate to having a negative interdependence or oppositional interaction. Rather, it can produce the outcomes of low efforts to achieve and psychological illness. Low efforts to achieve

and psychological illness can be produced when teachers do not adequately plan or present the lesson for the students to reach their targeted content information at the student's individual level. Teachers must have time to plan and modify based on certain students' individual needs (such as IEPs or 504 accommodations).

Implications of Cooperative Learning in High School Mathematics

Cooperative learning has been shown to be an effective way to increase student scores, help with social skills, and help positively change the student's perception of the subject of mathematics at the high school level. After analyzing the data, teachers appear to have the buy-in and are willing to try implementing cooperative learning in their high school math classrooms. Yet, they are met with challenges that negatively affect the teacher's cooperative learning lesson results. At the high school level, if students have not learned the social skills needed to effectively work together in small groups, then trying to change the habits of teenagers is a huge challenge for teachers.

In addition, if high school teachers are not adequately trained on how to effectively implement cooperative learning and were not shown hints/tricks to help divert common issues that may arise when planning and implementing a cooperative learning lesson, then teachers are at a disadvantage. Teachers are not given adequate time to plan and revise their cooperative learning teaching skills.

For example, as stated earlier, the school district where this study took place is moving towards a blended learning model incorporating direct teaching, online learning, and cooperative learning. Although teachers are given training on how to plan for and use the blended learning model, it does not properly train teachers on how to effectively implement the cooperation aspect

in this teaching method. However, if all teachers were trained on a particular way of effectively implementing the basic elements of cooperation and given time to plan, ask questions, and have a trained cooperating learning instructor come into their classroom to model this technique in a live manner, it would help the teachers in adopting the cooperative aspect of the blended learning model.

Summary

The scope of this study is a mere scratch on the surface of the monstrous topic of cooperative learning. I wanted to focus on cooperative learning at the secondary level, more specifically, at the high school math level. I chose this specific focus group because it is the level of math that I have taught for the last 15 years and have a great interest in.

A possible future direction this study can head towards is to continue with a study including more teachers within the same district. The study can also be conducted with the same group of teachers, but for an extended period of time after proper cooperative learning trainings have been attended. The new study conducted can then be compared to this original study to see if any changes arise (if any) in efforts and the challenges encountered. I believe all of these are within reason and can be further explored.

The study area can be expanded to include neighboring school districts, states, or countries. However, the more you add variables to the study, you risk doing a study that goes beyond the scope of what the study was initially meant to examine. This study only originally included six teacher interviews, with four being chosen. If you were to narrow the focus group to just one or two teachers, it might dilute the findings compared to the original study. You could

also narrow this study down to age groups, a specific race of students, specific student populations, or etcetera, but run the risk of going beyond the scope of this study.

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APPENDIX A

APPENDIX A

Interview Questions

1. When you were planning a group work activity, did you do any type of planning geared towards how the students would be grouped, the number of kids per group, the kind of activities you were going to use?
2. When you plan a cooperative learning lesson what makes it difficult to transfer information you obtained from outside resources into your lesson plan.
3. What do you believe makes it difficult for the transfer of your content information to follow your planned lesson, based on the interaction and feedback information you received from your students? In other words, what challenges did you encounter when presenting your lesson to your students?
4. Did you have to modify your planned lesson at any time, and if so, what modifications did you make and for what reasons?
5. When allowing students to work cooperatively together in small groups, please explain what challenges you have encountered.
6. What strategies have you implemented within your classroom to help students understand...
 - a. the success of the group depends on every group member's contribution?
 - b. they are accountable for their own learning and involvements in the group?
 - c. they should support and encourage others member in their group to learn?
 - d. the importance of building trust within the group to solve conflicts and communicate appropriately?
 - e. the benefit of self and group reflection after the task has been completed?

APPENDIX B

APPENDIX B

Survey Questions

Q1 Hello, my name is Jaime Gomez and I appreciate you taking some time to open this survey. If you would like to participate in the survey, please take a moment to read the consent form. Please click on the file below.

[Cooperative Learning Survey Consent Form](#)

Q2 What is your gender?

- Male
- Female
- Other or prefer not to say

Q3 Please state your majors/minors for your degrees. (e.g., Engineering in BS, School Counseling in MEd, Accountancy in BBA, etc.)

Q4 How many years of full-time teaching experience do you have?

Q5 Please list the classes you are currently teaching.

Q6 Cooperative learning is a teaching strategy that allows students to work cooperatively in small groups to reach a shared goal.

With this in mind, please describe (in a few sentences) your teaching experience with cooperative learning.

Q7 In a few sentences, please describe how you plan a math teaching lesson using cooperative learning.

Q8 In a few sentences, please describe how you prepare for the implementation of cooperative learning.

For example, do you pre-assign students into groups, arrange student seating in a certain way, or etc.

Q9 In a few sentences, please describe how you find yourself actually implementing cooperative learning in your classes.

Did the lesson go as planned? Or were modifications made during the implementation of the lesson?

Q10 In a few sentences, please explain what you know or believe about the effectiveness of cooperative learning.

Q11 Which of the following resources have you found available to learn about the effectiveness of cooperative learning or to gain information on cooperative learning? (Mark all that apply)

- Cooperative Learning Professional Development Training
- Self-Study (Reading articles or books on Cooperative Learning)
- Learning experience in a cooperative learning setting
- Discussion about cooperative learning in college courses
- Recommendations from national/regional standards (NCTM, TEKS, or your school district)
- Other (Please state what other resources you have found _____)
- I have found no resources to learn about cooperative learning

Q12 In a few sentences, please explain how the resources you selected in the previous question, have been useful to learning about or effectively implementing cooperative learning?

Q13 In the planning of cooperative learning, rate to what extent you believe each element should be included in your cooperative learning lesson:

	Strongly Disagree (1)	Somewhat disagree (2)	Neither agree nor disagree (3)	Somewhat agree (4)	Strongly agree (5)
Include team building, where every member of the group understands that they sink or swim together. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Incorporate individual responsibility, where every member in the group understands they are responsible for contributing to the success of the group. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Implement team building skills, where every member communicates, manages conflicts, trust each other, and make decisions as a team. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Incorporate academic and personal group support where every member of the group supports one another's learning. (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Implement group analyzing, where every member of the group discusses what worked as a group and what can be added to improve the success of the group. (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q14 Thinking back to a prior cooperative learning lesson you have implemented in your classroom, please explain in a few sentences how you feel the transfer of content information to your students went, comparing what you had originally planned and what actually occurred in our class, based on the interaction, feedback, and information you received from your students in class.

Q15 Thinking back to a prior cooperative learning lesson you have implemented in your classroom, rate to what extent you believe each element was actually incorporated into your cooperative learning lesson:

	Strongly disagree (1)	Somewhat disagree (2)	Neither agree nor disagree (3)	Somewhat agree (4)	Strongly agree (5)
I incorporated team building, where every member of the group understands that they sink or swim together. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I implemented individual responsibility, where every member in the group understands they are responsible for contributing to the success of the group. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I incorporated team building skills, where every member communicates, manages conflicts, trusts each other, and make decisions as a team. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I implemented academic and personal group support where every member of the group supports one another's learning. (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I incorporated group analyzing, where every member of the group discusses what worked as a group and what can be added to improve the success of the group. (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

APPENDIX C

APPENDIX C

IRB Approval Letter



Jaime Gomez, Principal Investigator
Department: College of Sciences
Via Electronic Routing System

Dear Principal Investigator:

RE: EXEMPT DETERMINATION FOR IRB IRB-21-0467, "*Cooperative Learning - Gomez*"

The study in reference has been determined 'Exempt' under the Basic HHS Policy for Protection of Human Research Subjects, 45 CFR 46.104(d). The determination is effective as of the date of this letter within the exempt category of:

"(1) Research, conducted in established or commonly accepted educational settings, that specifically involves normal educational practices that are not likely to adversely impact students' opportunity to learn required educational content or the assessment of educators who provide instruction. This includes most research on regular and special education instructional strategies, and research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods."

Research that is determined to be 'Exempt' under the Basic HHS Policy for Protection of Human Research Subjects is not exempt from ensuring protection of human subjects. The Principal Investigator (PI) is responsible for the following through the conduct of the research study:

1. Assuring that all investigators and co-principal investigators are trained in the ethical principles, relevant federal regulations, and institutional policies governing human subjects' research.
2. Disclosing to the subjects that the activities involve research, and that participation is voluntary during the informed consent process.
3. Providing subjects with pertinent information (e.g., risks and benefits, contact information for investigators, and IRB/ORC) and ensuring that human subjects will voluntarily consent to participate in the research when appropriate (e.g., surveys, interviews).
4. Assuring the subjects will be selected equitably, so that the risks and benefits of the research are justly distributed.
5. Assuring that the privacy of subjects and confidentiality of the research data will be maintained appropriately to ensure minimal risk to subjects.

Exempt research is subject to the ethical principles articulated in The Belmont Report, found at the Office of Human Research Protections (OHRP) Website:

www.hhs.gov/ohrp/humansubjects/guidance/belmont.html

Unanticipated Problems: Any unanticipated problems or complaints must be reported to the IRB promptly. Further information concerning unanticipated problems can be found in the IRB procedures manual.

Continuing Review: research deemed 'Exempt' is not subject to annual review by the IRB.

Modifications: Any change to your protocol requires a Modification Request (Amendment) for review and approval prior to implementation. The IRB may review the 'Exempt' status at that time and request an application for approval as non-Exempt research.

Closure: Please notify the IRB when your study is complete through submission of a final report. Upon notification, we will close our files pertaining to your study.

If you have any questions, please contact the Human Subjects Protection Program/IRB by phone at (956) 665-3598 or via email at irb@utrgv.edu.

Sincerely,

Institutional Review Board
for the Protection of Human Subjects
in Research

orc/cr

BIOGRAPHICAL SKETCH

The author, Jaime Gomez was born on the 14th of August year 1984 in San Benito, Texas. He is the youngest of four and the son of Jose and Leonor C. Gomez. The author attended Rio Hondo High School and graduated in 2002. He attended the University of Texas – Pan American (UTPA) and graduated with a Bachelor of Science in Mathematics in 2007. He then began working as a high school math teacher and recently completed 15 years in the same district. He attended the University of St. Thomas in Houston and received his Master of Education in School Counseling in 2016. He attended the University of Texas – Rio Grande Valley (UTRGV) and received his Master of Science in Mathematics in 2022. He currently resides at:

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