INVESTIGATION OF COOPERATIVE LEARNING AND COLLABORATIVE TESTING IN GRADES 4-8

By

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INVESTIGATION OF COOPERATIVE LEARNING & COLLABORATIVE TESTING

ABSTRACT

Cooperative learning plays a paramount role in education, as it is one of the most widespread and fruitful areas of research and theory. Over the past several decades, cooperative learning has attracted growing interest due to the vast amount of research conducted in regular and special education contexts as well as in social and clinical settings. However, research is often limited in the junior/intermediate grade levels (4-8). In addition to studying cooperative learning, a new form of evaluation termed collaborative testing was also explored. Collaborative testing involves a group component in the test taking process. This allows the student’s to collaborate with their peers and engage in fruitful discussions to increase understanding of the topic. This research project was designed to uncover the perceptions and current strategies of teachers and administrators on cooperative learning and collaborative testing and how these methods are being implemented in the J/I grade levels. It was found that teacher’s engage in a form of student learning in their classroom but they do not spend the time required on developing the necessary skills to make cooperative learning an effective method. Teacher’s also expressed concern when it came to implementing collaborative testing. This was due to lack of knowledge and encouragement from their administration.
KEY WORDS

- Cooperative Learning
- Collaborative Testing
- Junior
- Intermediate
- Junior/Intermediate
- Grades 4-8
- Student-Centered Learning
- Group work
- Teaching Strategy
- Math
- Science
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TABLE OF CONTENTS

ABSTRACT .......................................................................................................................... 2
KEY WORDS ......................................................................................................................... 3
ACKNOWLEDGEMENTS ...................................................................................................... 4
TABLE OF CONTENTS ....................................................................................................... 5
LIST OF TABLES .................................................................................................................. 7
CHAPTER 1: INTRODUCTION ............................................................................................. 8
  1.1. Introduction to the Research Study ................................................................. 8
  1.2. Purpose of the Study ..................................................................................... 9
  1.3. Research Questions ................................................................................... 9
  1.4. Background of the Researcher ................................................................. 10
  1.5. Overview .................................................................................................... 11
CHAPTER 2: LITERATURE REVIEW ............................................................................. 12
  2.1. Cooperative Learning .............................................................................. 12
      2.1.1. Background Knowledge .................................................................. 12
      2.1.2. Social-Psychological Theories ....................................................... 14
      2.1.3. Four Major Theoretical Perspectives on Cooperative Learning and Achievement .... 15
            2.1.3.1. Motivational Perspectives ............................................... 15
            2.1.3.2. Social Cohesion Perspectives ......................................... 16
            2.1.3.3. Cognitive Perspectives ................................................ 16
            2.1.3.4. Cognitive Elaboration Perspectives .................................. 18
            2.1.3.4.1. Bloom’s Taxonomy .................................................. 18
  2.2. Collaborative Testing ................................................................................ 19
      2.2.1. Background Knowledge .................................................................. 19
  2.3. Literature Connections to this Research Study .................................... 20
CHAPTER 3: METHODOLOGY ..................................................................................... 21
  3.1. Introduction ................................................................................................ 21
  3.2. Procedure .................................................................................................. 21
  3.3. Participants ............................................................................................... 21
  3.4. Data Collection and Analysis .................................................................. 22
  3.5. Ethical Review Procedures ....................................................................... 22
  3.6. Limitations ............................................................................................... 23
  3.7. Research Questions .................................................................................. 23
CHAPTER 4: FINDINGS ................................................................................................. 25
  4.1. Introduction ................................................................................................ 25
      4.1.1. Participant Background .................................................................. 25
  4.2. Theoretical Perspectives on Cooperative Learning .................................. 26
  4.3. Cooperative Learning Teaching Strategies .............................................. 26
      4.3.1. Pre-Service Education ................................................................... 27
      4.3.2. Current Teaching Strategies ....................................................... 27
      4.3.3. Cooperative Learning Implementation ......................................... 28
            4.3.3.1. Five Basic Elements of Cooperative Learning ................. 29
            4.3.3.2 Learning Skills .................................................................... 30
      4.3.4. Cooperative Learning Modifications ........................................... 32
  4.4. Collaborative Testing ............................................................................... 32
      4.4.1. Case Study ................................................................................... 33
            4.4.1.1. Test Results ........................................................................ 35
            4.4.1.2. Student Feedback ............................................................. 36
      4.4.2. Teacher Perceptions ...................................................................... 38
4.5. Role of Administration ................................................................. 39
  4.5.1. Teacher Perspectives............................................................. 39
  4.5.2. Administration Perspectives................................................. 40

CHAPTER 5: DISCUSSION .................................................................. 41
  5.1. Overall Findings ...................................................................... 41
    5.1.1. Role of the Teacher ........................................................... 41
    5.1.2. Role of the Administrator ................................................. 42
    5.1.3. Role of the District School Board ...................................... 42
  5.2. Implications and Recommendations ....................................... 43
  5.3. Limitations ............................................................................ 46
  5.4. Further Study ......................................................................... 46

REFERENCES ................................................................................. 48

APPENDICES ................................................................................. 51
  Appendix A: Interview Questions.................................................. 51
  Appendix B: Letter of Consent for Interview.................................. 56
  Appendix C: Collaborative Testing Quizzes .................................... 57
  Appendix D: Collaborative Testing Questionnaire.......................... 63
LIST OF TABLES

CHAPTER 4 ......................................................................................................................... 25
Table 4.1: Five Basic Elements of Cooperative Learning ......................................................... 29
Table 4.2: Learning Skills ....................................................................................................... 31
Table 4.3: Collaborative Testing Results ................................................................................ 35
Table 4.4: Student Feedback on Collaborative Testing ............................................................ 37

CHAPTER 5 .......................................................................................................................... 41
Table 5.1: Role of the Teacher in Cooperative Learning ............................................................ 43
Table 5.2: Cooperative Learning vs. Traditional Learning Groups .......................................... 45
INVESTIGATION OF COOPERATIVE LEARNING & COLLABORATIVE TESTING

CHAPTER 1: INTRODUCTION

1.1 Introduction to the Research Study

The method of cooperative learning involves designing small groups in which students can work together to maximize their own and each other’s learning (Gillies and Ashman, 1996). Students are expected to help discuss and argue with each other, assess each other’s current knowledge and fill in any gaps in each other’s understanding (Gillies and Ashman, 1996). There are several strategies that have been designed to implement cooperative learning in the classroom, however, not all methods are deemed effective. Analyzing the current teaching strategies used by junior/intermediate level teachers will allow for a greater understanding of the current practices used and allow for the development of novel strategies to incorporate cooperative learning into these grade levels.

In conjunction with studying cooperative learning, the effectiveness of collaborative testing will also be analyzed. Collaborative testing involves distributing a test that was previously written individually, to a small group of students. The purpose of collaborative testing is to create an environment that promotes intellectual conversations within small groups. In order to submit the test, all group members must agree on a single answer therefore promoting discussion and structured argumentation. To determine the effectiveness of the group interaction, a similar test is redistributed individually to the students. The method is deemed effective when the student receives a higher grade on the
second individual test written when compared to the initial test written prior to the group interaction.

1.2 Purpose of the Study

The purpose of this study is to determine if collaborative testing can be used as an effective method to learn the Ontario curriculum at the junior/intermediate level and whether or not it will be beneficial or detrimental to student learning. In conjunction with this, the current teaching strategies for cooperative learning will be analyzed and evaluated for effectiveness.

This study will involve junior/intermediate teachers in the Toronto District School Board (TDSB), the Toronto Catholic District School Board (TCDSB) and the Hamilton-Wentworth Catholic District School Board (HWCDSB). Preferably, participants ranging from one year of experience to greater than ten years of experience will be utilized to uncover the wide range of teaching strategies and effectiveness of their current practices. This will allow for a greater understanding of the current methods used to implement cooperative learning in the classroom and therefore allow for a richer discussion on possible modifications to the current system.

1.3 Research Questions

The goals of my research study are to explore teachers’ and administrative perception of 1) the connection between student learning in Grades 4-8 and, the implementation of collaborative testing as well as 2) the effectiveness of various cooperative learning strategies.

- What are the J/I teachers’ perceptions on the effectiveness of collaborative testing to teach the Ontario curriculum as a strategy to improve student learning?
• What are the J/I teachers’ perceptions on the nature of the conversations between students engaged in collaborative testing groups?
• What strategies do J/I teachers report using to implement cooperative learning in their classroom?
• What modifications to their teaching strategies do J/I teachers propose to increase the effectiveness of cooperative learning?
• What knowledge does administrative staff have on cooperative learning and collaborative testing and are they implementing these strategies in their school?

1.4 Background of the Researcher

I have previous experience as a teaching assistant (TA) at the University level as well as research experience obtained from completing a Master of Science degree. The MSc degree combined the two things that I am most passionate about, research and teaching. I chose this particular research project to continue along the lines of my previous experiences and maintain that passion in combining research and teaching.

As a TA, I was in charge of teaching scientific material through laboratories and tutorials. To increase student learning and understanding of the material, cooperative learning and collaborative testing were often used. Based solely on my experiences, I would deem these methods as effective for use in higher-level education courses. With this knowledge in mind, I thought it would be interesting to determine whether or not the same conclusion can be drawn if these strategies were implemented in the junior/intermediate grade levels. In addition, collaborative testing is typically only associated with higher level education. My goal is to bridge the research gap and explore teachers’ and administration perceptions of the effectiveness of these strategies in the junior/intermediate grade levels.
1.5 Overview

This study is designed to increase the current knowledge surrounding research on cooperative learning and collaborative testing in the junior/intermediate levels. Chapter 1 of this study includes the background information required to understand the purpose and goals of the study including the particular research questions that will be explored. Chapter 2 presents a compilation of the current literature regarding cooperative learning and collaborative testing. Chapter 3 describes the methods that will be used to collect data that will be presented in Chapter 4. The discussion of the findings will be found in Chapter 5 followed by references and appendices.
CHAPTER 2: LITERATURE REVIEW

2.1 Cooperative Learning

2.1.1 Background Knowledge

Cooperative learning plays a paramount role in education, as it is one of the most widespread and fruitful areas of research and theory. Over the past several decades, cooperative learning has attracted growing interest due to the vast amount of research conducted in regular and special education contexts as well as in social and clinical settings (Foot et al. 1990). Research suggests that a successful outcome is not achieved when students are randomly placed in groups and advised to work together (Ashman & Gillies, 1997). In order for cooperative learning to be deemed effective, the students must perceive the importance of group goals and the role they must play to achieve them (Deutsch, 1949; Johnson & Johnson, 1985; Slavin, 1987). Along with this, researchers have identified several characteristics that contribute to successful cooperative groups including; positive interdependence, individual accountability for the achievement of the group goals, the use of relevant interpersonal and small-group skills, and regular monitoring of group processes (Hertz-Lazarowitz, 1990; Hertz-Lazarowitz et al., 1989; Sharan & Shaulov, 1990).

In addition to the characteristics mentioned above, researchers have attempted to identify the variables that mediate cooperation and lead to positive academic outcomes (Knight & Bohlmeyer, 1990). Most research addressed the areas, in which group members work together to achieve mutual goals, and the manner in which questions are asked, and answers are given (King, 1990; Sharan & Shachar, 1988; Webb et al., 1986). However, effective group processes and outcomes also rely on the ability and gender mix
of students (Ashman & Gillies, 1997). Surprisingly, the results indicate that students in groups in which all members are of the same ability level ask each other questions but receive no response almost four times as frequently as those in mixed ability groups (Peterson et al., 1981; Webb, 1984, 1985; Webb & Cullian, 1983). Gender composition was also similarly shown to play a significant role in group structure as it led to an increase positive effect on classroom behavior, attitudes and learning outcomes (Beatty & Troster, 1987; Lockheed, 1985; Riding & Boardman, 1983; Wilkinson & Calculator, 1982).

School classroom practices more often then not, foster competition and individualism rather than pro-social and cooperative work (Asham & Gillies, 1997). Additionally, classroom teachers are typically unaware of how to facilitate effective group work or provide valuable instruction or training to students in how to be cooperative and productive (Sharan, 1990). Teachers typically assign students to groups in which the mix of ability, gender and personality are not necessarily cohesive in conducting cooperative group work (Asham & Gillies, 1997). Furthermore, these classroom-based groups are often formed for short periods of time therefore limiting the potential for students to develop cooperative skills that can be used inside and outside the classroom. Along with this, teachers are typically more concerned with students’ completion of a task as opposed to the processes involved or the way in which the task was completed.

As mentioned previously, group formation and student training are important considerations for successful group outcomes. Several researchers have shown that academic achievement is far superior in students who have been previously trained in
interpersonal skills and small group dynamics compared to students that received no training (Ashman & Gillies, 1997). The additional training segment provides students with knowledge about how to listen and contribute to discussions, and expectations about the appropriate style of interaction. Through the work of Ashman and Gillies, 1997, it was found that students who received training showed a greater understanding of their unity through inclusive language, involvement, and participation with each other as well as preferring to use each other as resources as opposed to relying on their teacher for help.

With the current research in mind, the need to assist classroom teachers in creating a learning environment that is conducive to the development of students’ social and academic skills and general wellbeing is of paramount importance. It is essential for teachers to become trained in how to effectively introduce cooperative learning practices in their classroom since the implementation of cooperative learning techniques may very well help circumvent the development of student’s academic and adjustment difficulties.

2.1.2 Social- psychological Theories

Researchers in the psychological field, such as Vygotsky and Piaget, have outlined the importance of interaction between social, affective and cognitive states in development and learning leading to a theoretical rationale for use of groupings in instructional settings (Blatchford et al., 2003). These ideas have lead to a view in which children’s thinking is correlated to prior knowledge and the individual’s capacity to learn with help from either adults or peers (Rogoff, 1990; Wood, 1998). As a result, these views lead to an emphasis on the benefits of cooperative learning for cognitive development (Damon & Phelps, 1989; Light & Perret-Clement, 1991).
2.1.3 Four Major Theoretical Perspectives on Cooperative Learning and Achievement

2.1.3.1 Motivational Perspectives

Motivational perspectives on cooperative learning place an emphasis on the reward and/or goal structure of the learning environment (Slavin, 1995). For the goal to be achieved, the student must attend to the efforts of all group members and not just their own. This cooperative incentive structure encourages students to engage in behaviours that will benefit all members of the group since a reward will only be received if all group members learned from the task.

In a traditional classroom, competitive grading and informal reward systems are typically in place. This system, according to the motivational perspective, creates and maintains negative goal interdependence among students. The success of one student lessens the opportunity for other students to succeed therefore leading to situations in which students hope for their peers’ failure and in turn are discouraged from supporting each other’s efforts.

Motivational theorists at John Hopkins University (Slavin, 1995), study cooperative learning methods by incorporating criterion-based group rewards. Certificates and recognition is only achieved when the average score of all students within the group exceed the pre-established criterion. By distributing grades based on group performance and not on an individual basis, students will be encouraged to value the success of the group and will in turn be more willing to help one another achieve the goal.
2.1.3.2 Social Cohesion Perspectives

The social cohesion perspective is based on the work of Cohen in which it is believed that “if the task is challenging and interesting, and if students are sufficiently prepared for skills in group process, students will experience the process of group work itself as highly rewarding…never grade or evaluate students on their individual contributions to the group or product” (Cohen, 1994 pp. 69-70). In this theory, the achievement of cooperative learning is mediated by the cohesiveness of the group. Instead of implementing group incentives and accountability, team-building activities are used to prepare the students for cooperative learning.

The major purpose of this technique is to create positive interdependence and accountability within the group and in the classroom (Cohen, 1994). The Aronson Jigsaw method (1978) is one way to achieve this goal. In this method, students are required to study one of several topics distributed to the class. Students then meet in their expert groups to share information on their topic followed by relaying the important information to their initial team. Another technique requires each group to pick one topic from a unit and for the group to further subdivide this topic into individual components (Sharan & Sharan, 1992). The group as a whole will then present their findings to the class.

2.1.3.3 Cognitive Perspectives

Cognitive theorists place the value of cooperative learning in the interactions among students during group work. These interactions affect students’ mental processing of information to be learned rather than their motivation to learn the material. This perspective can be divided into researchers that focus primarily on the cognitive development of students or those that focus more generally on the cognitive processes.
Developmental theorists believe that children’s interactions around appropriate tasks increase their mastery of critical concepts. Vygotsky’s ‘zone of proximal development’ theory falls within this category. The zone of proximal development (ZPD) is, “the distance between the child’s actual developmental level as determined by independent problem solving, and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers” (Vygotsky, 1978 p. 86). According to this theory, collaborative activity among children will promote growth due to the fact that children of similar ages will function within each other’s ZPD therefore enhancing learning compared to performance on an individual basis.

Similarly, the Piagetian theory on social-arbitrary knowledge states that; language, values, rules, morality and symbol systems can only be learned through interaction with others (Piaget, 1926). Peer interaction is also essential to the logical and mathematical thought development in disequilibrating a child’s conceptions. For example, peer interaction increases the probability of a child gaining a more sophisticated understanding of a concept that was otherwise perceived incorrectly.

However, there is little evidence to support the notion that these cognitive methods, which restrict group rewards and individual accountability, actually produce higher achievement. Nonetheless, it does seem probable that the cognitive processes are responsible for the underlying effectiveness of cooperative learning and motivation is used to increase the quantity or quality of peer interaction which in turn leads to cognitive growth.
2.1.3.4 Cognitive Elaboration Perspective

It has long been known that if information is to be retained and engraved in memory, the learner must elaborate on the material and engage in cognitive restructuring. Along with this, an accepted method for accomplishing memorization is to explain the given material to another person. Noreen Webb (1989) found that students who participated in group discussion in which they elaborated on a given topic, gained the most from cooperative learning activities. Similar results were also obtained when investigated in a classroom setting.

2.1.3.4.1 Bloom’s Taxonomy

The cooperative task can be defined conceptually at two levels: low cooperative task and high cooperative task. In a low cooperative task, students may interact about means (use common material) or about product (combine answers to create one product). A high cooperative task requires the students to interact about the process of completing the task. This interactive process involves discussion about students’ planning, decision-making and division of labour.

The level of elaboration in a discussion depends on whether the students are engaged in cooperation about means, products or processes. In accordance, Bloom’s taxonomy (1976) was used to generate three levels of reasoning, (1) informative, which focuses on the “what”, (2) applicative, which focuses on the “how”, and (3) evaluative, which focuses on the “why”. To reap the benefits of cooperative learning, it is essential for the task to be designed in such a way that requires the students to work at the evaluative level ensuring that discussion is linked to the process of the task and not just the means and products.
2.2 Collaborative Testing

2.2.1 Background Knowledge

The assessment of a student’s progression is an essential component of our education system. Typically, quizzes and tests are the most common form of assessment used. There are several advantages for the use of quizzes including the ability to facilitate the assessment of learning in a large number of students over a short period of time and over an extensive field of knowledge (Rao et al., 2002). Additionally, quizzes can be used to determine the effectiveness and quality of the current teaching practice. On the other hand, quizzes also pose several disadvantages, including delayed and insufficient feedback and confusion among students as to what the correct answer is and what the adequate thought process behind it is (Rao et al., 2002).

The pedagogical value of a quiz is also reduced due to the fact that students usually complete it individually. In this situation, the student-to-student interaction is removed and the ability of students to provide emotional and intellectual support to their peers is lost (Silberman, 1996). Research has shown that students increase their understanding of the given material when collaboration is implemented in a test setting. In this situation, students have the opportunity to exchange ideas, disagree over answers and resolve the issue through group consensus and understanding the concept.

The completion of a quiz individually allows the student to question whether the answer is correct or not but it doesn’t allow the student to discuss their reasoning for an answer or receive immediate feedback as is the case in completing group quizzes (Rao et al., 2002). Additionally, group quizzes allow for the discussion of incorrect answers and bridging of gaps within knowledge. Overall, students have rated this format, in which a
group test is administered after individual completion followed by re-administration of the test individually several weeks later, superior to the traditional method. Specifically, students found that the group efforts promoted a greater understanding of the material as well as a way to improve their scores (Rao et al., 2002).

2.3 Literature Correlations to this Research Study

Cooperative learning has been vastly researched over the last several decades. Key factors, including teaching strategies and group composition have been established and revised to create the most efficient and effective form of cooperative learning. Collaborative testing, which is a form of cooperative learning, is becoming more prominent in higher level education practices and is now becoming the focus of many research studies. Even with all of the current research, there are several areas that still need to be addressed.

This research study is focused on the current strategies teachers use to implement cooperative learning into their classroom. Are teachers even implementing cooperative learning, and if so, are they keeping update with current research and modifying their practices to accommodate these changes to increase the learning of their students? Are teachers familiar with collaborative testing, and if so, how are they implementing it into their classroom and is it an effective method? In addition to these questions, this research study is also focused on the role the administrators play in teacher preparation and professional development. Are administrators placing an emphasis on cooperative learning or collaborative testing? Are they providing the teachers with the necessary tools to implement these strategies effectively?
CHAPTER 3: METHODS

3.1 Introduction

This research study was designed to uncover the current teaching strategies and beliefs that teachers have in regards to cooperative learning. In addition, a branch of cooperative learning, termed collaborative testing, was also explored. A series of interviews was conducted to determine the current knowledge junior/intermediate teachers have when it comes to cooperative learning and collaborative testing as well as the standpoint of administration (i.e. Principal, Vice-Principal) on cooperative learning and collaborative testing and what procedures they are implementing in their schools.

3.2 Procedure

The primary means of data collection was through interviews with teachers and school administration to gather information on their current knowledge and beliefs on cooperative learning and collaborative testing. A series of interview questions were designed to determine not only the current understanding and knowledge teachers and administration have when it comes to cooperative learning and collaborative testing but also if they are willing to modify their current teaching strategies to incorporate new aspects of learning into their classroom. The interview questions that were used for the data collection can be found in appendix A.

3.3 Participants

To obtain a wide range of data, three teachers ranging in teaching experience were interviewed for this research study. This allowed for a better sense of how prominent cooperative learning and collaborative testing is implemented in schools, the knowledge
INVESTIGATION OF COOPERATIVE LEARNING & COLLABORATIVE TESTING

teachers have (i.e. what they were taught in teachers college) and whether experienced teachers are willing to change their current teaching strategies to incorporate cooperative learning and collaborative testing into their classroom. One administrative staff was interviewed to obtain a better sense of how prominent cooperative learning and collaborative testing is used in their schools. Interviewing administrative staff also provided a better understanding of the value they place on cooperative learning and collaborative testing and whether they are encouraging their teachers to attend workshops or modify their current teaching strategies to better suit the needs of their students. All participants are members of the TDSB, TCDSB or HWCDSB and have a personal or working relationship with the researcher.

3.4 Data Collection and Analysis

The data collection was based on the answers obtained through the interview process and any discussion on the topic that resulted. All responses were thoroughly transcribed and read several times to allow common themes to be drawn within the responses given by the teachers and within the responses given by the administrator. The interview responses will also be analyzed to determine the current understanding and knowledge teachers and administrators have when it comes to cooperative learning and collaborative testing. Additional factors relating to this research study including, the capacity of cooperative learning and collaborative testing to be used effectively in the junior/intermediate grade levels was also analyzed.
3.5 Ethical Review Procedures

The ethical review process outlined by the Master of Teaching Program at the University of Toronto was followed. Prior to the interviews, the research participants were provided with a letter of informed consent in which they were required to read and sign before the interview took place (See Appendix B for consent form). One copy of the consent form was issued to the participant and one copy remained in the records for this research study. The participants were also thoroughly informed of the purpose of this research study as well as the nature of confidentiality to ensure they are comfortable and willing to partake in the interview process.

3.6 Limitations

The limitations of this research study involved using a small sample size to obtain data, interviewing participants that have limited or no experience with cooperative learning and/or collaborative testing and asking an insufficient number of questions to be able to draw sufficient conclusions from the findings.

3.7 Research Questions

The goals of my research study were to explore teachers’ and administrative perceptions of 1) the connection between student learning in Grades 4-8 and, the implementation of collaborative testing as well as 2) the effectiveness of various cooperative learning strategies.

- What are the J/I teachers’ perceptions on the effectiveness of collaborative testing to teach the Ontario curriculum as a strategy to improve student learning?
- What are the J/I teachers’ perceptions on the nature of the conversations between students engaged in collaborative testing groups?
- What strategies do J/I teachers report using to implement cooperative learning in their classroom?
INVESTIGATION OF COOPERATIVE LEARNING & COLLABORATIVE TESTING

- What modifications to their teaching strategies do J/I teachers propose to increase the effectiveness of cooperative learning?
- What knowledge does administrative staff have on cooperative learning and collaborative testing and are they implementing these strategies in their school?
CHAPTER 4: FINDINGS

4.1. Introduction

To investigate the current teaching strategies and perceptions teachers and administration have in regards to cooperative learning and collaborative testing at the junior/intermediate grade level, participants were interviewed and responses to open-ended questions were recorded and analyzed to determine overlying themes. In addition to the overlying themes, a case study describing the implementation of collaborative testing was explored.

4.1.1. Participant Background

All participants are currently members in good standing with the Ontario College of Teachers. Participant one works for the Toronto Catholic District School Board (TCDSB) and has been a full-time teacher for 1 year, a part-time teacher for 3 years and has taught all subjects (except French and music) from kindergarten to grade 8. Participant two works for the TCDSB and has been a full-time teacher for 4 years teaching all subjects (except French and music) in grades 7 and 8. Participant three works for the Hamilton Wentworth Catholic District School Board (HWCDSB) and has been a teacher for 18 years teaching all subjects (except French and music) from kindergarten to grade 8. Participants 1-3 are currently teaching a junior/intermediate grade level and their responses are based on previous and current experiences teaching grades 4-8. Participant four was an elementary school teacher in the TCDSB for 17 years prior to becoming a principal in which he has done so far for 13 years. Participant four states, “I have taught all subjects (except French and music) and grades from Kindergarten to grade 8 but spent the majority of my teaching career in the intermediate grade levels”.

25
4.2. Theoretical Perspectives on Cooperative Learning

There are four major theoretical perspectives on cooperative learning; motivational, social cohesion, cognitive and cognitive elaboration (refer to Section 2.1.3). Each participant was asked to review each perspective and select the one that best suited their teaching when implementing cooperative learning as a teaching strategy. Participant one was unable to select a theoretical perspective that best suited their teaching. Instead, she continually placed an emphasis on teaching with a variety of strategies and refrained from discussing the tools and strategies used when implementing cooperative learning. Participant one stated, “I like to incorporate many different strategies into my teaching so I can accommodate for the different learners in my classroom”. Participant two related to the cognitive perspective in the sense that she values the face-to-face interaction aspect of cooperative learning to help promote the student’s continued progress. Participant three teaches cooperative learning in a manner that is conducive to the cognitive and cognitive elaboration perspective. However, she states that, “We as teachers need to realize, not all students learn in the same format…so in essence, you might use all perspectives at some point”.

4.3. Cooperative Learning Teaching Strategies

The teaching strategies used to implement cooperative learning are critical for it’s success. To acquire an overall image of the participants teaching practice, questions relating to their pre-service education, current teaching strategies and cooperative learning implementation were asked.
4.3.1. Pre-Service Education

All participants hold a Bachelor of Education degree from either a University in Toronto, Ontario or Buffalo, New York. All participants, except for participant four remember cooperative learning being mentioned as one type of teaching strategy, but stated that it was not the main focus of learning throughout their degree. Participant four did not learn about cooperative learning, at that time, teaching was geared towards teacher centered learning and not student centered learning, “When I went to teachers college, cooperative learning was not a thing, teachers were the main focus and students were to stay in the background”.

4.3.2. Current Teaching Style

All participants described having a balanced teaching style to accommodate for the variety of ways student learn by providing differentiated instruction. However, participant one places a larger emphasis on direct instruction and independent learning while participant two and three incorporate student collaboration and exploration on a more regular basis. Participant four describes his teaching style as, “you first need to figure out what the student needs, and than you need to get them to that benchmark that is mutually convenient. You cannot set the bar too high, or else you will never get there and it generates disappointment on both ends”. Participant four also stressed the importance of teaching students how to work hard, regardless of the task. He discusses working hard as a skill that is transferable to everything in life and at any point during life.
4.3.3. Cooperative Learning Implementation

In addition to describing their current teaching styles, participants were asked several questions in regards to their current practice for implementing cooperative learning. All participants agreed on implementation but had different methods for doing so. Participant one stated, “I typically incorporate cooperative learning into a 3-part math lesson, literature circles and assignments” whereas participant two, “…arranges the classroom into groups of four and encourages the students to discuss the topic or assignment at hand regardless of the subject area”. Participant three designs interactive group activities and as a class, develop the success criteria. Participants 1-3 believe that cooperative learning works successfully only part of the time and that they are utilizing the strategy to its full potential, except for participant one who states, “I am not using cooperative learning to its full potential because I like to incorporate multiple strategies into my teaching”.

Participant four discussed the implementation of cooperative learning in their school. There are a small number of teachers that are imposing cooperative learning into their classroom while the majority of teachers are continuing to shy away from change. He states, “Cooperative learning is absolutely beneficial in the classroom. However, the challenge is in delivery. Most teachers are not willing to let go of the reigns”. The implementation of cooperative learning throughout the entire school is a slow process. He discusses that “the primary grades, especially junior and senior kindergarten, are moving towards the complete implementation of cooperative whereas in the junior/intermediate grades, it is minimally used or not at all”.


According to Johnson et al. 1990, cooperative learning consists of five basic elements to facilitate effective small group learning which ultimately become tools for solving problems associated with group work. In addition, a portion of the Ontario curriculum is devoted to teaching students, from a young age, learning skills and work habits that are needed to succeed in school and life. Since these aspects are essential for student success and for the effectiveness of cooperative learning, several questions were designed to uncover the participant’s perceptions and willingness to incorporate these elements into their teaching.

4.3.3.1. Five Basic Elements of Cooperative Learning

Table 4.1 describes the five basic elements of cooperative learning. Participant one and three and four have never heard of these five basic elements and participant two could only remember individual accountability.

Table 4.1: Five Basic Elements of Cooperative Learning. Facilitating effective small group learning means helping group members perceive the importance of working together and interacting in helpful ways. This can be accomplished by incorporating five basic elements into small group experiences.

<table>
<thead>
<tr>
<th>Positive Interdependence</th>
<th>When all members of a group feel connected to each other in the accomplishment of a common goal. All individuals must succeed for the group to succeed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual Accountability</td>
<td>Holding every member of the group responsible to demonstrate accomplishment of the learning.</td>
</tr>
<tr>
<td>Face-to-face Interaction</td>
<td>When group members are close in proximity to each other and dialogue with each other in ways that promote continued progress.</td>
</tr>
<tr>
<td>Social Skills</td>
<td>Human interaction skills that enable groups to function effectively (e.g. taking turns, encouraging, listening, giving help, checking understanding). Such skills enhance communication, trust, leadership, decision-making, and conflict management.</td>
</tr>
<tr>
<td>Processing</td>
<td>When group members assess their collaborative efforts and target improvements</td>
</tr>
</tbody>
</table>

Once these elements were described, all participants agreed that following these elements would be beneficial for the successful implementation of cooperative learning.

Participant three discusses the importance of introducing these elements in the primary grades, “For the younger grades, it will be a harder learning process, but once mastered, students will gain much confidence in their abilities and will have a greater opportunity for success”. All participants stated that they would try to incorporate these elements prior to implementing cooperative learning but fear that it would take too much class time to teach all components.

4.3.3.2. Learning Skills

Teachers are required to teach and evaluate the learning skills listed in Table 4.2. Ideally, the criteria for succeeding in each learning skills should be mapped out at the beginning of the year, regardless of the grade. As the student progresses from one grade to the next, the expectations for success should also increase and the students should have continual input on the success criteria.

Participant one and two briefly mention the learning skills at the beginning of the year and may periodically remind the students of the success criteria throughout the year. Evaluation is done strictly by observation and remembering what was seen when completing the report card. Participant one and two also assumed that since they are teaching the intermediate grades, the students should know the learning skills and therefore only a review is necessary. Participant one states, “Teaching grade 8 this year, I’m anticipating that it would be mostly review for many of them”. On the other hand, participant three designs the success criteria with her students at the beginning of the year
and reinforces the skills on a daily basis. Evaluation is done mainly through observation, creating anecdotal notes, but also through self-reflective pieces from the student.

**Table 4.2: Learning Skills.** The Ontario curriculum consists of six learning skills that teachers need to incorporate into their teaching practice to help students succeed in school and in life.

<table>
<thead>
<tr>
<th>Learning Skill</th>
<th>Sample Behaviour</th>
</tr>
</thead>
</table>
| **Responsibility** | • Fulfills responsibilities and commitments within the learning environment  
• Completes and submits class work, homework and assignments according to agreed upon timelines  
• Takes responsibility for an manages own behaviour |
| **Organization** | • Devises and follows a plan and process for completing work and tasks  
• Establishes priorities and manages time to complete tasks and achieve goals |
| **Independent Work** | • Independently monitors, assesses and revises plans to complete tasks and meet goals  
• Follows instructions with minimal supervision |
| **Collaboration** | • Accepts various roles and an equitable share of work in a group  
• Responds positively to the ideas, opinions, values and traditions of others  
• Works with others to resolve conflicts and build consensus to achieve group goals  
• Share information, resources and expertise and promotes critical thinking to solve problems and make decisions |
| **Initiative** | • Looks for and acts on new ideas and opportunities for learning  
• Demonstrates the capacity for innovation and a willingness to take risks  
• Recognizes and advocates appropriately for the rights of self and others |
| **Self-regulation** | • Sets own individual goals and monitors progress towards achieving them  
• Assesses and reflects critically on own strengths, needs and interests  
• Perseveres and makes an effort when responding to challenges |


Participant four states, “I discuss the learning skills with my teachers several times throughout the year during staff meetings. Currently, the main form of data
collection is through direct observations. I also place a strong emphasis on generating the success criteria for each learning skill with the students”.

4.3.4. Cooperative Learning Modifications

In general, all participants believe their current teaching style is sufficient for student learning. When it comes to cooperative learning, all participants agree that introducing the five basic elements and placing a larger emphasis on the learning skills will increase effectiveness. However, all participants did not seem entirely responsive to devoting an increased amount of class time to teach these elements. But instead, believe that changing the group dynamic will suffice in increasing effectiveness. Participant one also believes it could not work in every subject, “I don’t know if it would be useful in writing assessments but for math, I see better results”.

4.4. Collaborative Testing

Research has shown that students increase their understanding of the given material when collaboration is implemented in a test setting. In this situation, students have the opportunity to exchange ideas, disagree over answers and resolve the issue through group consensus and understanding the concept. Additionally, group quizzes allow for the discussion of incorrect answers and bridging of gaps within knowledge. Overall, students have rated this format, in which a group test is administered after individual completion followed by re-administration of the test individually several weeks later, superior to the traditional method.

All participants were able to define collaborative testing to some degree, however, participant one and two only became aware of the term due to implementation by myself
during a one month practicum in participant one’s grade 7/8 classroom. Participant three had knowledge of the term from reading educational research. Except for participant one during that one-month practicum term, collaborative testing was never utilized as a teaching strategy nor have they had a colleague implement this strategy. Participant four states, “I use to implement a variation of collaborative testing when I was a teacher but it was not the same version that is discussed in this research paper. I also do not have any teachers that are implementing collaborative testing in their classroom”. However, when the results of the case study listed below was described to him, he was pleasantly surprised and mentioned that he would discuss this teaching strategy with his staff at the next meeting.

4.4.1. Case Study

Collaborative testing was implemented in a grade 7-math unit on adding integers. The students were taught the section on adding integers through direct instruction and minimal cooperative learning opportunities. Students were assigned several practice questions from their textbook and workbook and an opportunity to ask for clarification on questions was imposed prior to the quiz. The students were made aware of what collaborative testing is, how it would work and the purpose of the strategy but due to lack of time no team building exercises or description of the 5 basic elements of cooperative learning was discussed. Each quiz was administered three days apart to ensure the students were not memorizing the answers but instead understanding the material.

The quiz consisted of 10 questions with 9 questions asking for a specific method, number line, counter method or zero principle, to be used to answer the questions followed by a word problem (refer to Appendix C). Since it was the student’s first time
INVESTIGATION OF COOPERATIVE LEARNING & COLLABORATIVE TESTING

trying this method, low-to-medium difficulty questions were chosen to ensure a fair amount of students succeeded. Based on the results of the quiz, groups of 4 were designed to incorporate either 1-2 students who received 80% or higher, 1-2 students who received 60-79% and 1-2 students who received 59% or lower. The dynamic of the group was also taken into consideration; however, a ‘perfect’ group could not always be achieved. Each group had one quiz that was of the same format as quiz #1 that they needed to complete together (refer to Appendix C). The students were told to discuss each question and explain the methods to those that did not understand. The groups were given approximately 30 minutes to complete the quiz but they could not hand it in until all members of the group agreed upon the answers and everyone said they understood the material. As the students were completing the quiz, the teacher was walking around the room to ensure all groups were staying on task and that no student was being left out.

To determine if the group test played a role in student understanding, an individual quiz was administered of the same format and difficulty as quiz #1 (refer to Appendix C). The group quiz was the last formal instruction on addition of integers since the students moved on to subtraction of integers. Therefore, it could be said that the results of the second individual quiz were based solely on the peer-interaction from the group quiz.

It is important to note that the collaborative testing results and student feedback were acquired through the interview process with participant one and through direct observation during that one-month practicum period. No information was obtained directly from students.
4.4.1.1. Test Results

Out of the 22 grade 7 students, 8 showed a significant improvement in test score from quiz #1 to quiz #2, 7 received a mark of 90% or higher which was comparable to their quiz #1 score and 7 received the same mark ranging from 65% to 80%. No students had decreased in test score on quiz #2 after the group quiz. In reference to table 4.3, the 3 students who received lower than 50% on quiz #1 showed a remarkable improvement after the group quiz. Participant one states, “Prior to quiz #1, I tried to help Student B, E and F as much as I could. They were really struggling with a few of the methods used in adding integers. When they didn’t pass the quiz, I realized I did not get through to them. I was amazed to see the progress they made after the group quiz. Their peers were able to explain the methods in ways I couldn’t”. Not only did students who did poorly on quiz #1 improve, students who did fairly well also showed improvement (refer to Table 4.3).

Based on these findings and the fact that these students had hours of teacher instruction time and additional one-on-one help with the teacher lays the foundational base to the idea that peer-to-peer interaction has an enormous impact on student learning and the effectiveness of collaborative testing.

Table 4.3: Collaborative Testing Results. Collaborative testing was implemented in a grade 7 math class. Out of 22 students, 8 students showed a significant improvement in test score.

<table>
<thead>
<tr>
<th></th>
<th>Quiz #1 (%)</th>
<th>Group Quiz (%)</th>
<th>Quiz #2 (%)</th>
<th>Improvement from Quiz #1 to Quiz #2 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student A</td>
<td>55</td>
<td>95</td>
<td>65</td>
<td>18</td>
</tr>
<tr>
<td>Student B</td>
<td>15</td>
<td>90</td>
<td>65</td>
<td>300</td>
</tr>
<tr>
<td>Student C</td>
<td>70</td>
<td>95</td>
<td>95</td>
<td>36</td>
</tr>
<tr>
<td>Student D</td>
<td>80</td>
<td>80</td>
<td>90</td>
<td>13</td>
</tr>
<tr>
<td>Student E</td>
<td>40</td>
<td>80</td>
<td>75</td>
<td>88</td>
</tr>
<tr>
<td>Student F</td>
<td>30</td>
<td>100</td>
<td>80</td>
<td>167</td>
</tr>
<tr>
<td>Student G</td>
<td>75</td>
<td>95</td>
<td>100</td>
<td>33</td>
</tr>
<tr>
<td>Student H</td>
<td>85</td>
<td>90</td>
<td>100</td>
<td>18</td>
</tr>
</tbody>
</table>
4.4.1.2. Student Feedback

Participant one distributed a questionnaire to the student’s after the group quiz to obtain feedback on their perspectives and the effectiveness of the collaborative testing activity (refer to Appendix D). Table 4.4 lists the responses of the 8 students who showed improvement to some of the questions.

Overall, all students said they enjoyed the activity, either because it was fun, they liked being with their friends or because they learned something. Students A-H said they found the activity useful because they learned something that they previously did not understand. It was interesting that the majority of students said they learned or found an easier way to use the zero principle when adding integers. For a teacher, this would be a great diagnostic tool to uncover what area the students are having the most difficulty with. When asked if all group members contributed to the discussion, all students said yes except for Student H who claims Student B did not contribute. This is contradictory to what Student B wrote on their questionnaire. In addition, when asked if they would like to do this activity again, all students said yes but a few had stipulations, such as changing the questions more, letting them choose their own group, or changing the members of their group, for example, Student H does not want to be put in a group with Student B. From this activity, it is clear that Student B and Student H do not get along and do not work well. But it is interesting that both students’ showed an improvement with Student B improving by 300% and Student H improving by 18% regardless of their differences. Participant one was asked to imagine how the results would change if these students received the proper introduction to collaborative testing, were following the 5 basic elements of cooperative learning and had success criteria for the learning skills.
Participant one stated, “…not only would Student B and Student H been able to work better together, but also Student B would have a greater opportunity to learn and show an even greater improvement. This would not only benefit those two students’ but the entire class since many students were unhappy with their group members. By teaching the students these necessary skills, they would be able to work with anyone in their class and in turn generate a grander intellectual conversation leading to a higher success rate”.

Table 4.4: Student Feedback on Collaborative Testing. A questionnaire was distributed to the students to determine the student’s perspectives on the collaborative testing activity and whether or not it was effective. Responses are from the 8 students who showed improvements in test score.

<table>
<thead>
<tr>
<th>Student</th>
<th>Q: Did you enjoy the group activity?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Yes because I did it with my friends</td>
</tr>
<tr>
<td></td>
<td>Q: Did you find the group activity useful?</td>
</tr>
<tr>
<td></td>
<td>Yes because it helped me understand</td>
</tr>
<tr>
<td></td>
<td>Q: Would you like to do it again?</td>
</tr>
<tr>
<td></td>
<td>Yes because it was interesting</td>
</tr>
<tr>
<td>B</td>
<td>Q: Did you enjoy the group activity?</td>
</tr>
<tr>
<td></td>
<td>Not really because some people wouldn’t explain to the whole group and took too long to explain</td>
</tr>
<tr>
<td></td>
<td>Q: Did you find the group activity useful?</td>
</tr>
<tr>
<td></td>
<td>Yes, because I learned the zero principle and number lines better</td>
</tr>
<tr>
<td>C</td>
<td>Q: Did you contribute to the group discussion?</td>
</tr>
<tr>
<td></td>
<td>Yes, I explained the last question and the counter method</td>
</tr>
<tr>
<td></td>
<td>Q: Is there anything you recommend changing?</td>
</tr>
<tr>
<td></td>
<td>Yes, I would like to pick the people in my group so we work better</td>
</tr>
<tr>
<td>D</td>
<td>Q: Did you enjoy the group activity?</td>
</tr>
<tr>
<td></td>
<td>Yes I did because if there was something I did not understand, everyone helped me</td>
</tr>
<tr>
<td></td>
<td>Q: Did you learn anything from the group activity?</td>
</tr>
<tr>
<td></td>
<td>Yes, I learned more about the zero principle</td>
</tr>
<tr>
<td></td>
<td>Q: Did everyone in the group contribute to the discussion?</td>
</tr>
<tr>
<td></td>
<td>Yes, everyone did a couple of questions</td>
</tr>
<tr>
<td></td>
<td>Q: Is there anything you recommend changing?</td>
</tr>
</tbody>
</table>
A: Maybe make designated questions for each person

Q: Did you enjoy the group activity
A: Yes

Q: Did you find the group activity useful?

Student E

A: Yes because my group member explained things I didn’t understand

Q: Did you learn anything from the group activity?
A: Yes, I learned the zero principle

Q: Would you like to do this activity again?
A: Yes I would

Q: Did you enjoy this group activity?
A: Yes, it was fun

Q: Did you find the group activity useful?

Student F

A: Yes, I learned things

Q: Did you learn anything from the group activity?
A: I learned more about the zero principle

Q: Would you like to do this activity again?
A: Yes

Q: Did you enjoy the group activity?
A: Yes because I found it fun to work with them

Student G

Q: Did you learn anything from the group activity?
A: Yes, I learned how to do the zero principle easier

Q: Did you find the group activity useful?
A: Yes because there was something that wasn’t clear and after this I got it

Q: Did you learn anything from the group activity?
A: Yes, I learned how to do the zero principle

Student H

Q: Did everyone in the group contribute to the discussion?
A: No, Student B did not

Q: Is there anything you would recommend changing?
A: Do not put Student B in the group

4.4.2. Teacher Perceptions

All participants said collaborative testing would work well in all subjects in grades 6-8 but were unsure of how effective it would be in grades 4 and 5. All participants agree students in grade 6-8 are mature enough to have the intellectual conversations required for collaborative testing to be a success. Participant three states, “It should be introduced and practiced frequently in grade 6 before fully implementing it in grades 7 and 8”. However, participant two is still unsure of how to implement it without ‘wasting’ too much class time.
When questioned about the cooperative testing case study mentioned above, participant one states, “I think it went really well. I was amazed to see how much some students improved. I do think group dynamic played a positive and negative role in this. Some groups functioned really well together while others did not get along. I definitely think it is important to teach them the basic skills necessary for collaborative work before implementing this. But overall, I am really happy with the results”.

4.5. Role of Administration

Participant one stated, “In order for cooperative learning and collaborative testing to be successfully implemented, the administrative team needs to be well versed and willing to provide opportunities for their teachers to attend workshops or professional development programs”. All participants were asked to evaluate the role their administration takes in providing them with these opportunities.

4.5.1. Teacher Perspectives

Participant one and two stated that their administration does not place an emphasis on implementing cooperative learning or collaborative testing in their classroom. Participant three stated, “…the HWCDSB is beginning to place to a stronger focus on collaborative inquiry, such as designing learning goals and success criteria, but not specifically on cooperative learning or collaborative testing”. All participants were also never provided with the opportunity to attend workshops or professional development programs but would like the opportunity to do so.
4.5.2. Administration Perspectives

Participant four places a strong emphasis on the implementation of cooperative learning in the classroom. However, he discusses “…the difficulty in changing the perspectives of his teachers to become more accepting to this idea. Even though I provide them with the opportunity to attend workshops or other various forms of professional development, the teachers are not responsive to change”. Since collaborative testing is a fairly new concept that is not seen in the elementary grades, he has yet to come across any workshops on this topic. However, he says he will look into this as he would like to start implementing this strategy into the junior/intermediate grades in his school.
CHAPTER 5: DISCUSSION

5.1. Overall Findings

5.1.1. Role of the Teacher

The teacher plays a paramount role in successfully implementing cooperative learning and collaborative testing into the classroom. It was found that although teachers incorporate some form of cooperative learning into the classroom, it is not as effective as it could be, however, this statement is based solely on observations seen within their classroom on a handful of occasions where students were not working together as a group, calling their peers names, and discussing subject matter that was off topic. The teachers interviewed in this study were unaware of some of the most important key factors involved such as explicitly teaching the learning skills as well as the 5 basic elements associated with cooperative learning. The participants believed it was sufficient to place their students in-group situations without teaching them the necessary skills to provide constructive feedback to their peers or take responsibility for their actions.

With respect to collaborative testing, this was a new concept that the participants were unaware of prior to this study. Participant one was the only participant in this study who had the opportunity to directly see the benefits of implementing collaborative testing into the classroom. All participants agreed collaborative testing would present some benefits however, they believed the procedure required some modifications, as it would be a time consuming endeavor.

In addition to the teacher roles listed above, it is suggested that teachers stay up to date with current educational research which will help aid in creating effective lessons and teaching strategies for student learning.
5.1.2. Role of the Administrator

Teachers rely on their administration to provide them with the opportunities to attend workshops and professional development events. All three-teacher participants noted that their administration placed little or no emphasis on cooperative learning and had never mentioned collaborative testing. Interestingly, participant four, the administrator, continually provided opportunities for his teachers to attend educational events on cooperative learning but received little to no interest from his teachers.

Several conclusions can be drawn from analyzing the role of the administrator. The first involves the possibility of teachers portraying a false image of interest in these two topics and in reality their administration has presented these opportunities to them. The second involves the administrator portraying a greater interest in these topics but in reality does not present his/her staff with the professional development opportunities. Third, the statements from the teachers and administrator cannot be directly correlated since they are not located within the same school or school board.

5.1.3. Role of District School Boards

Based on the interviews conducted in this study, it appears that the HWCDSB is further ahead in mandating and incorporating the necessary professional development opportunities for their teachers on cooperative learning. Additionally, the teachers in the HWCDSB are becoming more aware of the benefits of incorporating the teaching of the learning skills and 5 basic elements of cooperative learning prior to the full implementation of group work into the classroom. According to participant three, these practices are not currently mandated for teachers to include in their lessons but they are
on the up rise and teachers are continually becoming more aware and accepting of change.

The district school boards play the most important role in implementing change consistently throughout their schools. Without input from above, a select few teachers may incorporate these very important practices into their teaching but it will never generate enough importance or become widespread and therefore will not have an impact on student learning.

5.2. Implications and Recommendations

Overall, it is essential for teachers, administrators and the school board to work together to impose change and incorporate a more effective teaching strategy to increase student engagement and learning during cooperative learning opportunities. As a suggestive recommendation for teachers, table 5.1 shows the potential roles a teacher can undertake while implementing cooperative learning in their classroom.

Table 5.1: Role of the Teacher in Cooperative Learning. The teacher plays an essential role in the successful implementation of cooperative learning. The steps outlined in the table are one method that teachers could use to incorporate cooperative learning into their classroom.

<table>
<thead>
<tr>
<th>PART 1: Making Decisions Before the Lesson Begins</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A: Determining the Academic and Social Objectives</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>B: Determining the Appropriate Group Size</strong></td>
</tr>
<tr>
<td><strong>C: Assigning the Students to Groups</strong></td>
</tr>
<tr>
<td><strong>D: Arranging the Room</strong></td>
</tr>
<tr>
<td>E: Preparing the Materials</td>
</tr>
<tr>
<td>---------------------------</td>
</tr>
</tbody>
</table>

**PART II: Setting the Lesson**

<table>
<thead>
<tr>
<th>A: Structuring Positive Interdependence</th>
<th>Students are more likely to work together when they feel linked to one another and believe they need one another to accomplish the group’s task.</th>
</tr>
</thead>
<tbody>
<tr>
<td>B: Explaining the Academic Task</td>
<td>To ensure students understand what their group is trying to accomplish, the teacher needs to clearly explain, and, if required, provide a model for the academic task.</td>
</tr>
<tr>
<td>C: Explaining the Criteria for Success</td>
<td>Groups should know how their success will be measured or evaluated. Students and the teacher can generate this criteria jointly.</td>
</tr>
<tr>
<td>D: Structuring Individual Accountability</td>
<td>Individual accountability is built into a lesson when students know beforehand that there will be individual follow-up to the task and/or social skills. Structuring individual accountability by the teacher raises the students level of concern, and subsequently, their involvement.</td>
</tr>
<tr>
<td>E: Specifying Desired Social Behaviours</td>
<td>The teacher or students specify the behaviours that are both appropriate and expected during the lesson. The more specific the desirable behaviours are, the greater the likelihood that students will demonstrate those behaviours.</td>
</tr>
</tbody>
</table>

**PART III: Monitoring and Intervening During Group-work**

<table>
<thead>
<tr>
<th>A: Monitoring Students’ Behaviour</th>
<th>While teams are working, the teacher moves around the room to observe student progress. This promotes student accountability and enables the teacher to decide when intervention is appropriate.</th>
</tr>
</thead>
</table>
| B: Intervening During Group-Work | Teacher intervention may be needed to provide task assistance or to teach collaborative skills.  
  • Providing Task Assistance may include clarifying directions, reviewing procedures, teaching task skills, or asking and answering questions  
  • Teaching collaborative skills may be necessary when a group is not functioning cooperatively. |

**PART IV: Evaluating the Product and Process of Group-work**

<table>
<thead>
<tr>
<th>A: Providing Closure</th>
<th>Students need opportunities to summarize and reflect on their learning. The teacher’s role is to facilitate those opportunities. Closure provides a chance for both teacher and students to highlight major points, ask questions, or generate insights.</th>
</tr>
</thead>
</table>
|                      | Evaluating the Academic Objectives  
  • Involves an assessment of how well the students carried out and completed the assigned task and provision of subsequent feedback |
|                      | Evaluating the Social Objectives  
  • Involves processing how well the group functioned, and in particular, how successfully group members enacted the expected skill |
Currently, the term cooperative learning has a variety of meanings that are associated with many different teaching strategies. Table 5.2 was designed to help teachers differentiate and make the distinction between what the features of a traditional learning group are compared to the characteristics of a cooperative learning group. It is important to note that these are merely suggestions for teachers and are based solely on the viewpoint of the authors (Johnson et al. 1990).

### Table 5.2: Cooperative Learning vs. Traditional Learning Groups

Cooperative learning is group-work but not all group-work is cooperative learning.

<table>
<thead>
<tr>
<th>Cooperative Learning Groups</th>
<th>Traditional Learning Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Interdependence is structured</td>
<td>Positive Interdependence is not structured</td>
</tr>
<tr>
<td>Individuals demonstrate accountability for self and teammates</td>
<td>Individuals are accountable to self, not teammates</td>
</tr>
<tr>
<td>Team membership is heterogeneous</td>
<td>Team membership is homogeneous</td>
</tr>
<tr>
<td>Teambuilding activities promote trust, commitment and group cohesion</td>
<td>No teambuilding activities</td>
</tr>
<tr>
<td>Teammates share leadership responsibilities</td>
<td>One teammate is appointed leader</td>
</tr>
<tr>
<td>Social skills are taught, practiced and processed</td>
<td>Social skills are assumed (but are often lacking)</td>
</tr>
<tr>
<td>The teacher continually monitors group-work, documents observations, provides feedback on group functioning and intervenes when necessary</td>
<td>The teacher does not monitor group-work or provide feedback on group functioning</td>
</tr>
</tbody>
</table>


Cooperative learning can be viewed as ‘more’ than group work. It is an opportunity for students to truly connect with their peers and engage in intellectual conversations that stimulate critical thinking and inquiry based discussions. It is a way for students to interact with peers they typically do not associate with and it’s a way for students to take initiative and be accountable for their own learning. These elements of cooperative
learning will only be present if students are taught the 5 basic elements as well as the learning skills.

Collaborative testing is a new and upcoming field of research that has the potential to change the viewpoints of students on the testing process and allow them to become more comfortable in expressing their knowledge to their peers as well as being more comfortable in asking for help from their peers. The incorporation of collaborative testing into the teaching practice correlates nicely with student-centred learning and it provides ample opportunity for student reflection and peer assessment allowing for a deeper form of student learning.

5.3. Limitations

There are several limitations for this research study. Since a small sample size was used, the results cannot accurately represent the teacher population in Ontario or within a particular school board. Additionally, it is possible that the participants did not disclose all of their knowledge simply due to the fact that there was a time constraint placed on the interview and they were unable to prepare and think of a more thorough response ahead of time. Since collaborative testing was a new concept described to the participants and was only implemented into the classroom once for this research study, conclusions cannot be accurately drawn from the findings.

5.4. Further Study

To further investigate the successful implementation of cooperative learning and collaborative testing into the classroom of grade 4-8 teachers, a larger sample size needs
to be explored, more observations need to be made and the research needs to be conducted over a longer period of time.
REFERENCES


APPENDIX A

Interview Questions

Teacher Interview Questions

General Questions
1. How many years have you been a teacher?
2. What grade(s) have you taught?
3. What grade(s) do you teach now?
4. What subject(s) have you taught?
5. What subject(s) do you teach now?
6. How would you describe your current teaching strategy?

Cooperative Learning Questions
1. Can you define the term cooperative learning?
2. Did you learn about cooperative learning in teachers college?
   a. If Yes
      i. Was it a main focus?
      ii. Do you remember what you learned?
      iii. Did they discuss particular teaching strategies? If yes, what were
           they and do you use any of them?
3. Do you think cooperative learning would be beneficial in your classroom?
4. Do you promote cooperative learning in your classroom?
   a. If Yes
      i. How do you implement it?
      ii. Did you explain to the students what cooperative learning is and
          why you are doing it before implementing it?
      iii. Are you comfortable implementing it?
      iv. Does it work well?
      v. Have you tried different methods?
      vi. Do you find the students are benefiting from this teaching strategy?
      vii. Do you think you are using cooperative learning to its full
           potential?
   b. If No
      i. Why don’t you use it?
      ii. Would you be willing to try it in your classroom?
      iii. Would you be comfortable implementing it in your classroom?
      iv. Are you interested in learning more about cooperative learning?
5. Do you know what the five basic elements of cooperative learning are?
6. Would you be comfortable implementing these 5 basic elements into your
   teaching during the first few weeks of school?
7. What theoretical perspective describes your teaching when you implement
   cooperative learning? Is there another perspective that you think would work
   better? Explain.
   A. Motivational- an emphasis is placed on the reward and/or goal structure of the
INVESTIGATION OF COOPERATIVE LEARNING & COLLABORATIVE TESTING

learning environment
B. Social Cohesion- achievement of cooperative learning is mediated by the cohesiveness of the group. Team building exercises are used to prepare the students and they are never evaluated on their individual performance.
C. Cognitive- value of cooperative learning is placed on the interaction among students. The interactions affect students' mental processing of information to be learned rather than their motivation to learn the material.
D. Cognitive Elaboration- students participate in group discussion to elaborate on a given topic. This helps them retain and engrave the information into memory

8. How do you evaluate the students learning skills throughout the year? Did you discuss and describe the success criteria of each skill at the beginning of the year?

9. Based on your previous experiences and what you have learned from this interview (5 basic elements of cooperative learning and the different theoretical perspectives) would you modify your teaching strategy for cooperative learning in any way? How could you make it more effective? Explain.

10. Aside from teachers college, have you gone to workshops or presentations on cooperative learning?

11. Does your administration place an emphasis on implementing cooperative learning?

12. Do you think cooperative learning would work in every classroom? What are some limitations?

13. Would you modify your current teaching strategy to incorporate cooperative learning? Would you be willing to put in the time and effort it would take to implement this?

Collaborative Testing Questions
1. Have you heard of collaborative testing?
   a. If Yes
      i. What does it mean?
      ii. Where did you heard about it?
      iii. Did you learn about it in teachers college? If so, what did they teach you?
   b. If No
      i. Can you speculate to what it may mean?

2. Have you ever tried collaborative testing?
   a. If Yes
      i. What grade and subject was it?
      ii. How did you implement it?
      iii. How did it go?
      iv. Did the students enjoy it?
      v. Would you do it again?
      vi. Would you change anything?
   b. If No
      i. Do you think it would work well in the classroom?
      ii. Would you ever try to implement it? If no, why not?

3. Do you know someone that has tried collaborative testing? If yes, what are the details?
4. Do you think collaborative testing would be an effective strategy in the J/I grades? Why or why not? Would it work better in certain subjects?
5. Do you think students at the J/I level are capable of having the intellectual conversation required to make this an effective learning method?
6. Do you think the background of the student plays a factor in the effectiveness of collaborative testing?
7. Would you be interested in attending workshops on collaborative testing?
8. Has your administration ever mentioned or placed an emphasis on collaborative testing?
9. Would you be willing to implement collaborative testing in your classroom for the purpose of this study and report on your findings?

Administration Interview Questions

General Questions
1. How many years were you a teacher before becoming a Principal/ Vice-Principal?
2. How many years have you been a Principal/ Vice-Principal?
3. What grade(s) have you taught?
4. What subject(s) have you taught?
5. How would you describe your previous teaching strategy?

Cooperative Learning Questions
1. Can you define the term cooperative learning?
2. Did you learn about cooperative learning in teachers college?
   a. If Yes
      i. Was it a main focus?
      ii. Do you remember what you learned?
      iii. Did they discuss particular teaching strategies? If yes, what were they and do you use any of them?
3. Do you think cooperative learning would be beneficial in the classroom? What are some limitations?
4. Do you promote cooperative learning in your school?
   a. If Yes
      i. How do the teachers implement it?
      ii. Do they explain to the students what cooperative learning is and why they are doing it before implementing it?
      iii. Are the teachers comfortable implementing it?
      iv. Does it work well?
      v. Have the teachers tried different methods?
      vi. Are the students benefiting from this teaching strategy?
      vii. Do you think the teachers are using cooperative learning to its full potential?
   b. If No
      i. Why?
      ii. Are you interested in learning more about cooperative learning?
5. Do you know what the five basic elements of cooperative learning are?
6. How do your teachers evaluate the learning skills? Do you discuss success criteria for each grade at staff meetings?
7. Have you mentioned workshops or presentations to your teachers on cooperative learning? If yes, did any of them attend? Provide details.
8. Do you place an emphasis on implementing cooperative learning in your school?
9. Have you read any literature on cooperative learning? Do you know any statistics?
10. If I told you the research was very positive, would you consider placing an emphasis on cooperative learning for your teachers to implement?
11. Would you be willing to work with teachers if needed to implement these strategies?

Collaborative Testing Questions
1. Have you heard of collaborative testing?
   a. If Yes
      i. What does it mean?
      ii. Where did you heard about it?
      iii. Did you learn about it in teachers college? If so, what did they teach you?
   b. If No
      i. Can you speculate to what it may mean?
2. Have you ever tried collaborative testing?
   a. If Yes
      i. What grade and subject was it?
      ii. How did you implement it?
      iii. How did it go?
      iv. Did the students enjoy it?
      v. Would you do it again?
      vi. Would you change anything?
   b. If No
      i. Do you think it would work well in the classroom?
      ii. Would you ever try to implement it? If no, why not?
3. Have any of your teachers implemented it?
   a. If Yes
      i. What grade and subject was it?
      ii. How did they implement it?
      iii. How did it go?
      iv. Did the students enjoy it?
      v. Would they do it again?
      vi. Would they change anything?
4. Do you think collaborative testing would be an effective strategy in the J/I grades? Why or why not? Would it work better in certain subjects?
5. Do you think students at the J/I level are capable of having the intellectual conversation required to make this an effective learning method?
6. Do you think the background of the student plays a factor in the effectiveness of collaborative testing?
7. Have you heard of any workshops on collaborative testing? If yes, did any teachers attend?
8. Have you read any literature on collaborative? Do you know any statistics?
9. If I told you the research was very positive, would you consider placing an emphasis on collaborative testing for your teachers to implement?
10. Would you allow me to work with one or two teachers to implement collaborative testing for the purpose of this study?
APPENDIX B

Letter of Participation and Consent

Date: __________________________

Dear: __________________________

I am currently a graduate student enrolled in the Master of Teaching program, at OISE, University of Toronto. I am studying the role of cooperative learning and collaborative testing in the junior/intermediate grades and whether they are effective methods for teaching the Ontario curriculum.

This research study will involve conducting a 45-60-minute interview that will be tape recorded in which questions relating to current knowledge and understanding of cooperative learning and collaborative testing will be asked. Interviews will be conducted at a time and place that is most convenient to you.

The contents of this interview will be used solely for this research study in which a final paper and presentation will be completed. Your name and institution will not be used in the final paper or presentation. It is important to note that all information provided will be confidential and if you so choose to omit certain aspect of the interview, you will be accommodated.

If you agree to participate, please sign the form below. I greatly appreciate your participation in this research study.

Sincerely,

Michele Ferraro
m.ferraro@mail.utoronto.ca

I acknowledge that the content of this research study has been thoroughly explained to me and any questions have been answered. I understand that I can withdraw from this study at any time or request to omit certain aspects of the interview.

I have read the letter provided by Michele Ferraro and have agreed to participate in the interview process for the research study described.

Name (Printed): _______________________________

Signature: ______________________________________

Date: ________________________________________
GRADE 7 ADDING INTEGERS
QUIZ #1

Using a **Number Line**, answer the following questions.

1. \((-6) + (-9) =\)

2. \((+5) + (-3) =\)

Using the **Counter Method**, answer the following questions.

3. \((-2) + (+7) =\)

4. \((-5) + (-4) =\)

Using the **Zero Principle**, answer the following questions.

5. \((+4) + (-6) =\)

6. \((-1) + (+8) =\)
Using your method of choice, answer the following questions.

7. \((-12) + (-8) = \)

8. \((+20) + (-18) = \)

9. \((-3) + (-21) = \)

10. A submarine was situated 800 feet below sea level. If it ascends 250 feet, what is its new position?
GRADE 7 ADDING INTEGERS
GROUP QUIZ

Using a **Number Line**, answer the following questions.

1. \((-7) + (-10) =\)

2. \((+8) + (-3) =\)

Using the **Counter Method**, answer the following questions.

3. \((-5) + (+13) =\)

4. \((-6) + (-9) =\)

Using the **Zero Principle**, answer the following questions.

5. \((+9) + (-13) =\)

6. \((-8) + (+17) =\)
Using your method of choice, answer the following questions.

7. \((-14) + (-6) = \)

8. \((+21) + (-15) = \)

9. \((-7) + (-34) + (+14) + (+2) + (-1) = \)

10. In the Sahara Desert, on day 1 it was 136°F. On day 2 it was 15 degrees colder than day 1. And on day 3 it was 30 degrees warmer than day 2. What is the temperature on day 3?
GRADE 7 ADDING INTEGERS
QUIZ #2

Using a Number Line, answer the following questions.

1. \((-7) + (-10) = \)

2. \((+8) + (-3) = \)

Using the Counter Method, answer the following questions.

3. \((-5) + (+13) = \)

4. \((-6) + (-9) = \)

Using the Zero Principle, answer the following questions.

5. \((+9) + (-13) = \)

6. \((-8) + (+17) = \)
Using your method of choice, answer the following questions.

7. \((-14) + (-6) = \)

8. \((+21) + (-15) = \)

9. \((-5) + (-29) + (+17) + (+1) + (-7) = \)

10. In the Sahara Desert, on day 1 it was 150°F. On day 2 it was 21 degrees colder than day 1. And on day 3 it was 61 degrees warmer than day 2. What is the temperature on day 3?
APPENDIX D

Collaborative Testing Questionnaire

Did you enjoy the group activity? Yes or No. Explain.

Did you find the group activity useful? Yes or No. Explain.

Did you learn anything from the group activity? If yes explain what you learned. If no, explain why you didn’t learn anything.

Did you contribute to the group discussion? Yes or No.

Did everyone in the group contribute to the discussion? If no, explain the situation.

Would you like to do this activity again?

Is there anything you would recommend to change for next time?