12-2006

The Benefits of Cooperative Learning in the Middle School Science Classroom

Michael M. Pettibone
The College at Brockport

Follow this and additional works at: https://digitalcommons.brockport.edu/ehd_theses
Part of the Educational Methods Commons, and the Secondary Education Commons

To learn more about our programs visit: http://www.brockport.edu/ehd/

Repository Citation
https://digitalcommons.brockport.edu/ehd_theses/829

This Thesis is brought to you for free and open access by the Education and Human Development at Digital Commons @Brockport. It has been accepted for inclusion in Education and Human Development Master’s Theses by an authorized administrator of Digital Commons @Brockport. For more information, please contact kmyers@brockport.edu.
The Benefits of Cooperative Learning in the Middle School Science Classroom

by

Michael M. Pettibone
December 2006

A thesis submitted to the Department of Education and Human Development of the State University of New York College at Brockport in partial fulfillment of the requirements for the degree of Master of Science in Education.
The Benefits of Cooperative Learning in the Middle School Science Classroom

by

Michael M. Pettibone

APPROVED BY:

[Signature]
Advisor

[Signature]
Director, Graduate Programs

1/19/07
Date
Abstract

This study presents an overview of the academic, social and behavioral benefits of cooperative learning in a middle school science classroom. Students were assessed in the second marking period during a teacher centered lecture and then introduced to a cooperative learning environment. There was an 89.7% increase in academic averages in the third marking period. This study also showed an observable improvement in classroom behavior and increase in appropriate social interactions.
# Table of Contents

Chapter 1: Introduction ........................................................................................................ 5
- Problem Statement ........................................................................................................... 5
- Significance of the Problem ............................................................................................ 6
- Purpose ............................................................................................................................ 6
- Rationale .......................................................................................................................... 6
- Summary .......................................................................................................................... 7

Chapter 2: Literature Review ............................................................................................... 8
- Cooperative Learning in Science ..................................................................................... 9
- Cooperative Learning Strategies for a Middle School Science Classroom ..................... 18
- Evidence of Successful Implementation of Cooperative Learning in the Classroom .. 22
- Academic, Behavioral, and Social Benefits of Cooperative Learning ......................... 27

Chapter 3: Applications and Evaluation ............................................................................. 31
- Introduction ....................................................................................................................... 31
- Participants ....................................................................................................................... 31
- Procedures of Study ......................................................................................................... 32
- Instruments for Study ....................................................................................................... 33

Chapter 4: Results ............................................................................................................... 34

Chapter 5: Conclusions and Recommendations ............................................................... 38
- Discussion ......................................................................................................................... 38
- Action Plan ....................................................................................................................... 39
- Recommendations for Future Research ......................................................................... 40
- Conclusions ...................................................................................................................... 41

References .......................................................................................................................... 43

Appendix 1. Student Survey ............................................................................................... 49
Teaching in the twenty first century is filled with many challenges. As a teacher, you are expected to be a source of knowledge for students to excel academically. Students enter your classroom with a wide range of backgrounds such as ethnicity, learning styles, rates of learning, and differing prior knowledge bases. A teacher’s role is to balance each student’s needs. By creating this balanced playing field, it allows for the success of each student and ensures that no student is left behind. The science educator has an additional responsibility; to develop the skills of scientific inquiry and give them the basic building blocks so they can play an active role in the scientific community. Cooperative learning is one way to bring these students to that level of scientific thought.

*Problem Statement*

Throughout my experience as a science educator, I have found one of the largest concerns in the school community’s eyes to be student academic achievement. This concern usually appears when report cards are first mailed home. Parents assume that academic success can be reached in every student, but this is not always the case. There are many variables that need to be addressed in the classroom before success can be obtained. One of these variables is the varying learning styles of individual students which need to be addressed. Additionally, each teacher has their own style of delivery; teachers are as different as their students. The materials can be delivered through a multitude of ways including auditory, visual, and manipulated strategies. These variables again are dependent on the teacher’s style and how the student learns. Cooperative learning incorporates these learning styles to ensure all students can reach their academic potential.
Significance of the Problem

While listening to the concerns of the school community, especially parents, it became apparent that some students were not achieving their academic potential. Many placed blame for this lack of success on the teacher. My standard lesson consisted primarily of auditory deliverance of the material, but the students needed more. Many parents did not feel that their child needed to stay for extra help in science after school or during their free periods. This issue began to raise concerns with me and my administration.

Purpose

The parental concerns of children not reaching their full academic potential soon became a building-wide epidemic. I realized that I could not spend the rest of my teaching career dealing with similar issues. I needed to fix this issue. Cooperative learning promised that the learning styles of all children would be met.

Rationale

This study was conducted to increase the academic, behavioral, and social benefits in my middle school science classroom. As a consensus between administration, parents and myself, I needed to devise a system of teaching that could better the needs of my students. This study will have direct impact on meeting the academic, behavioral and social goals and help develop scientific literacy. Developing this scientific literacy is important so each and every one of my students can become an active participant in society.
Summary

Using my focus questions as a basis for my research, I wanted to find a way to hold the students accountable for their academic success while engaging them in the content materials. Cooperative learning not only addressed these goals, but promised growth as a student, classmate, and person. It also suggested the development of a diversified classroom, despite the population of students found within the class.

These three main questions that have been addressed will be measured by using students' academic grades to track performance, surveys to track feelings and attitudes, and researcher observations to track on task behaviors. I selected key areas that were of major concern. I developed three focus questions directed towards the student success: a) why use cooperative learning in science? b) why implement cooperative learning in a middle school science classroom? and c) what are the academic, behavioral, and social benefits of cooperative learning?
Cooperative learning has been introduced as a way for teachers to present material to students in a manner to more appropriately meet the needs of students in the twenty-first century. The traditional stand and deliver style of teaching no longer meets the needs of developing each student's critical thinking and problem-solving skills, and that it hinders natural creativity and inquiry. In the constructivist approach of teaching, the teacher acts as a guide and a facilitator of learning rather than as a dispenser of knowledge. Science is not only a collection of facts but it is a series of interdependent conversations between scientists, and between scientists and nature. There is a relationship between the knowledge that science accumulates and the intellectual tradition that contributes to this accumulation. Acquainting the students with science is actually done in order to help them become members of the pragmatic intellectual community that science teachers represent. This should be among the first priorities of college and university science education. Cooperative learning has four basic elements: interdependence among students seeking mutual goals through combining efforts, face-to-face interaction among students, individual accountability for mastery of the material covered, and appropriate use of interpersonal and small-group skills by students. Other critical concepts which are important include instructional objectives, appropriate student groups, tasks which must be explained to students, explanations of cooperative methods for achieving desired tasks monitoring of the process; intervening to provide assistance; and evaluating student achievement using student input. Lee (1999) noticed that cooperative learning helps improve student relationships amongst group members. Lee states:
They work better. They have become more responsible in a way, more responsible of their own selves. When you give them a group task previously, they would say they don’t want to do it and they have a lot of arguments but now they have learned these structures and the social skills that we taught them about encouraging one another and the other one, disagreeing agreeably. You find them sort of talking things out rather than just arguing (p. 9).

Slavin (1987) states that there are two critical elements in using cooperative learning: a) a group goal must be present and b) “individual accountability must be necessary, the success of the group must depend on the individual learning of all group members” (Blosser, 1996, p 6). In many districts, it is stressed heavily that the child who does the work is the learner. This philosophy must be carried through the cooperative learning process if you want to see consistent, positive results. When implementing cooperative learning, this philosophy must be taken and applied to show success.

**Cooperative Learning in Science**

To answer this question, look through the table of contents of scientific journals and focus on the number of authors. This illustrates the cooperative nature of scientific inquiry. In addition, observation in science classes in which hands-on activities are taking place will usually reveal students working in pairs or small groups. The collaborative nature of scientific and technological work should be strongly reinforced by frequent group activity in the classroom. Scientists and engineers work mostly in groups and less often as isolated investigators. Similarly, students should gain experience sharing
responsibility for learning with each other. In the process of coming to common understandings, students in a group must frequently inform each other about procedures and meanings, argue over findings, and assess how the task is progressing. In the context of team responsibility, feedback and communication become more realistic. They are also of a very different character from the usual individualistic textbook-homework-recitation approach. Science education, in particular, has traditionally used group work for practical activities and project-based learning. One of the recommendations for practice that has emerged from constructivist research is that small-group discussions should be used in science lessons as a means of helping students explore their ideas and move towards more scientific ideas and explanations. The drive for the inclusion of small group discussions in science lessons has come from the development of ideas about social constructivism (Driver et al., 1994). These authors, for example, report a study of the social construction of knowledge with a group of 13 year olds, who were invited to develop a model to explain the properties of ice, water and steam following activities relating to change of state. The effect of the discussion in groups was a significant success. The pupils brought together their knowledge that particles are in constant motion, and that this motion increases with temperature. The idea of the force between particles being present all the time was used to explain the apparent ‘making and breaking’ of bonds. It showed that pupils can bring ideas and past experiences together to take their thinking ahead, if motivated and given the opportunity. Barbosa (1996) investigated the influence of social interaction on the classroom learning of science, focusing specifically on the conservation of mass in chemical change. Her study involved 200 students aged 11–15 years from two countries, England and Brazil. The results reveal
that the social group outperformed the control groups, in relation to higher quality of understanding of the subject content. This suggests the potential for cooperative groups to promote learning of abstract content and that the very processes of group work can deliver much more than the sum of the individual parts. Similarly, Johnson and Johnson (1985, 2000) have claimed considerable evidence to show that cooperative learning experiences promote higher achievement than do competitive and individualistic learning experiences. Of their 26 studies, 21 studies demonstrated that cooperative learning promoted higher achievement, two studies had mixed results, and three studies found no differences. These US studies have included college students and students from the eighth grade (age 13). Moreover, they have included males and females, different social classes (upper, middle working, and low) and different student abilities (medium and low). Johnson and Johnson (1987) also conclude that the research data on cooperative learning show that its use leads to students learning more material, feeling more confident and motivated to learn, exhibiting higher achievement, having greater competence in critical thinking, possessing more positive attitudes toward the subject studied, exhibiting greater competence in collaborative activities, having greater psychological health, and accepting differences among their peers. Cooperative learning researchers and practitioners have shown that positive peer relationships are essential to success in college (Smith, 1996). Studies have shown that two major predictors of lack of success in college are failure to establish a social network of friends and failure to become academically involved in classes (Tinto, 1994).

Students find that working in groups of three to five students is less intimidating than raising their hands to ask questions or to participate in class discussions. In small
Cooperative Learning

groups, students can all participate and the teacher is then free to circulate among the groups as a "guide at the side" rather than a "sage on the stage" (Morgan, 1999, p. 4). Student to student interaction helps each student develop critical thinking and problem-solving skills while they begin the formation of small social groups. Students report that they feel more comfortable and relaxed in the class and are more likely to "take risks", to ask "stupid questions", and to say, "I don't know" or "I'm not sure" (Morgan, 1999, p. 5). They lower their defenses and are thus more open to real communication and learning. They also begin to see things from different viewpoints and start to appreciate others' points of view and ways of learning. Kagen (1994) suggests that balanced and heterogeneous groups with structure and guidance are the most effective as an educational tool that meets the diverse needs of learners. Cooperative learning provides an environment for students with different backgrounds and characteristics to work together, to get to know each other, and to work with each other as equals, which result in a multitude of different outcomes. This environment and cooperative learning structures greatly increases students' participation and interaction with each other, thus, creating an environment for productive learning. There has been a developing interest in the use of cooperative groups as effective learning contexts in classrooms. This interest has been fueled by the increasing realization of the link between learning and social interaction. Hertz-Lazarowitz and Miller (1992) raised an interesting comparison between 'traditional' and 'cooperative' classrooms in order to illustrate and clarify a model that motivates educators who are searching for a constructivist perspective as an alternative to staple classroom methodologies. Cooperative classrooms are more typical of a complex social system. The class functions as a set of small groups, or "groups of groups".
Learning tasks are of a divisible and/or investigative nature and deal with multifaceted problems rather than with unitary tasks that can be solved by a simple correct answer. In these classrooms, teachers offer guidance to develop the skills that pupils need as members of relatively autonomous groups. The teacher acts as a "learning facilitator" or resource rather than simply as a dispenser of information. Pupils must rely on and develop their social interactive and cognitive skills to carry out their learning tasks; pupils exchange information, generate ideas, and participate in active information gathering as well as in multilateral communication networks. Cooperative learning methods are effective as long as students are working together in a group small enough for everyone to be able to participate on a collective task that has been clearly assigned. Students are expected to carry out their task without direct and immediate supervision of the teacher. It is important that students have roles but critical that each student rotates their task within a group.

Even though students may prefer to select their roles initially in group work, roles must be rotated throughout the course, with monitoring to assure that each student fills each role for a variety of tasks. Studies from the engineering industry show problems when group rotations do not occur. If students are permitted to stay with the same group all semester, completing the same group roles, some group members will have missed out on developing skills and perspectives of the other member's roles in their group (Yager & Penick, 1986).

Cooperative instruction also draws from the principles of organizational theory to maximize student-student interaction, that element of group work most directly linked to learning. In organizations, managers delegate authority to workers to enhance lateral
Cooperative learning communication and increase effectiveness. Similarly, in classrooms, teachers refrain from directly supervising student behavior and progress during group work. Instead to increase student-student interaction, they delegate authority to the groups through the use of cooperative norms and procedural roles. Cooperative instruction applies the lens of status characteristics and expectation states theory to devise strategies to help equalize rates of interaction among students within cooperative work. According to expectation theory, an individual's access to materials, participation, and influence in a group is determined by his or her status. Examples of status characteristics that operate in classrooms include academic ability, gender, ethnicity, social class, and popularity. Students of high status expect and are expected to excel at the group task. They talk a great deal and their suggestions carry weight. In contrast, students of low status have limited access to group materials and discourse. Because they talk less than their high status counterparts, they learn less (Cohen, 1984).

Kutnick (1990) has argued that small group interaction, leading to cooperation, must take place in a situation that does not impose constraints on children, such as the domination or specific control of teachers or authoritarian peers. This concept has two major theoretical perspectives called "developmental" and "motivational". By putting emphasis on group rewards for individual learning, it motivates students to offer high-quality assistance and elaborate explanations to the rest of their group. The motivational perspective on cooperative learning arises from a different starting point from the developmental view. The developmental perspective is based on Piaget's (1926) and Vygotsky's (1978) theories. The basis of these studies is that "task-focused interaction
Cooperative Learning among students" (Noddings, 1989, p. 23) improves learning by producing cognitive conflicts and by exposing students to higher-quality thinking. The basic principle of the developmental perspective on cooperative learning is that interaction between children around appropriate tasks increases their control of critical concepts and skills. Noddings (1989) also argued that such theoretical differences are important because they suggest orderly ways of designing research to shed light on both the generation of theories and the group processes themselves. They highlight a systematic way to define the variables that researchers need to consider as they design their investigations. These conclusions are reinforced by Light and Littleton’s (1994) review of cognitive approaches to group work (based on the developmentalist perspective). This looked at historical and real-life case studies of children interacting with others, sharing and challenging perspectives among themselves, and conceptualizing this social experience as the basis for their cognitive development. The review confirmed evidence that learning is not at its highest degree when it is kept on an individualist basis. Cooperative learning in the education system and school learning has been beneficial throughout society since it has been implemented.

Some disadvantages of group work are that the collective knowledge constructed by the group itself could be lost or degraded. It is common in many teaching situations that the intended product of group activity is to enhance the learning of the individuals who are involved and, while individuals may prosper, it is the "collective knowledge-inaction" (Gillies and Ashman, 1996, p.73) that can disappear. However, when a member moves away from the group, or when the group disbands and disperses, the
organizational knowledge and the cohesive structures of the group knowledge that have been created are then often diluted and are irretrievable. Finally, it is rare for the teaching of groups to allocate the time and resources necessary to develop the knowledge, skills and understanding of the group members.

In topics that demand a higher level of competence (e.g. the formulation of hypotheses and the solution of problems), the developmental perspective based on Piaget's (Perret-Clermont, 1980) and Vygotsky's studies (Moll & Whitmore, 1993) proved to be more appropriate. Based on Perret-Clermont's (1980) suggestions, each group comprises a mixture of higher-level students and lower-level students, who are asked to discuss the subject until they reach a consensus. Work of this kind is more directed towards the study of the nature of the interactions and is suited to abstract topics that are difficult for the students to understand. The exchange of ideas can then facilitate the acceptance, rejection or restructuring of previous conceptions brought by the components of the group, which is extremely important. The formation of these groups implies that the teacher has previous knowledge of the level of competence achieved by each student in class activities or in previous disciplines. The sharing of ideas develops self confidence, cooperation and motivation, making them more participative. Each member can realize how essential they are for it to work. The failure of one component implies the poor working of the system as a whole.

The effectiveness of cooperative learning strategies in the secondary science classrooms have been supported by empirical evidence (Humphreys, Johnson, & Johnson, 1982; Lazarowitz, Hertz-Lazarowitz, & Baird, 1994; Okebukola & Ogguniyi,
Cooperative Learning 1984), the results of the current study did, to some degree, sustain this supposition. Besides, this study generated evidence to support the notion that the format of cooperative learning was more effective in enhancing the higher level of cognitive domain than more traditional teaching methods (Chang, Chun-Yen, Mao, & Song-Ling, 1999). This observation is consistent with previous studies, which reported improved science achievement among pupils at higher cognitive levels of Bloom's taxonomy when employing cooperative-learning related strategies in science classrooms (Chang & Barufaldi, 1999; Ertepinar & Geban, 1996).

Many earth science teachers and educators have tried to develop or implement cooperative-learning strategies at the college level. The Journal of Geo-science Education (previously Journal of Geological Education) even contributed an entire issue on cooperative-learning strategies in collegiate geoscience classrooms. For example, some teachers implemented cooperative-learning instruction such as “jigsaw” or other techniques in college geology classes. Others used cooperative learning in an earth systems workshop (Mayer, Former, & Hoyt, 1995). These studies demonstrated advantages of this type of instruction in college settings. Limited research on the effectiveness of cooperative-learning instruction has been conducted in secondary earth science classrooms. Because of its success at the college level, it becomes valuable to put cooperative-learning strategies into practice at the secondary school level and to explore their effectiveness on students' earth-science learning outcomes. The benefits to the teacher have meant that this approach has enabled effective work even with large classes because, on dividing a class of 50 students into 10 groups of five, this spreads teaching
time between the 10 groups, which is more personal than with a group of 50 and more manageable than with each student individually. On observing a member of the group encountering difficulties, the teacher asks those who have already absorbed the subject matter to help work with their classmate. Clearly, cooperation represents an alternative way for change in the classroom system, stimulating the engagement of the students, creating their interest in the subject and even possibly reducing anxiety. It appears that, when children work cooperatively, they develop an understanding of the unanimity of purpose of the group and of the need to help and support each other's learning. Gillies and Ashman (1996) found that, when children worked in cooperative groups, they were consistently more cooperative and helpful, used language that was more inclusive, and gave more explanations to assist understanding. Webb and Farivar (1994) suggested that children who need help can potentially benefit from these interactions because their peers are often more aware than their teachers of what other students do not understand, can focus on the relevant features of the problem, and give explanations in terms that can be easily understood.

Cooperative Learning Strategies for a Middle School Science Classroom

Nunes, et al. (2001) studied 69 science students that participated from two eighth-grade classes (age range 13–15 years) from a private school of Recife, Pernambuco, Brazil. One class used the Jigsaw method and the other carried out its work individually. At the end of the class, the students were given a sheet similar to that of the “Jigsaw group” (general questions), to be answered individually. The teacher then brought the answers to the questions together with the group. The teacher’s motivation for
undertaking that investigation was her concern for her students' lack of motivation, disinterest, and their difficulties in understanding chemistry concepts. She also observed their disregard for mutual cooperation and, more than this, their acceptance of values such as individuality, competition, and personal reward. She took the view that, where teachers are committed to a "transmission view" (Nunes et al., 2001, p. 46) of knowledge, one that considers students as "objects" (Nunes et al., 2001, p. 43) of the educational process (Freire, 1972), then this denies them opportunities to make their own decisions. Such a perspective moved her to question and reflect upon her pedagogical procedures and to look for means to introduce changes towards improving the "citizenship skills" (Nunes et al., 2001, p. 53) within her classes. Her investigation was, consequently, an attempt to use cooperative methods in the "Jigsaw" classroom, to rescue some ethical values, leading pupils to actively and collaboratively participate in the construction of their own knowledge. Individual tests were applied before and after these interventions to assess their learning of chemistry concepts. The topics developed were 'properties of the matter' and 'physical and chemical phenomena', in that the evaluation of the understanding of chemistry concepts improved in both classes, they point to the relevance of the Jigsaw method since, in this class, the students had the opportunity to teach and learn with one another, performing and explaining experiments to their classmates in a dynamic atmosphere with companionship, enjoyment and interaction. The motivation of the students in the cooperative class was clearly noticeable as the work proceeded. Students previously considered to be uninterested in other classes actively participated in the activities, as could be documented in video recordings. Conversely, in
the class in which the students worked individually and the teacher carried out the same activities, the students did not display the same motivation, interest or participation in the classes.

Mulryan (1995) studied 48 fifth and sixth graders' responses during cooperative learning exercises to determine the level of student participation and involvement in a mathematical classroom. Mulryan studied the time the students were on task and found that behaviors were better when students were learning cooperatively versus independently. She noted that the high achievers were responsive to directives, but lower achievers did not follow this chosen path. Passive girls appeared to gain the least from cooperative learning. Gillies and Ashman (2000) studied academic and social achievements made by 130 mainstreamed students and 22 inclusion students who were testing at least one grade level lower than their grade placement. They placed students in both structured and unstructured cooperative group situations. The unstructured group received no training in cooperation while the structured group received interpersonal and social skills that would promote positive interactions.

McManus and Gettinger (1996) wondered about students' reactions to cooperative learning. They studied 26 teachers from the same school district and 38 students enrolled in classrooms taught by two third grade teachers. During the six-week observation period, each classroom had four groups of four or five students each for the nearly daily, unspecified, cooperative exercises. Students in this study indicated to the authors that they learned cooperatively nearly every day that the cooperative activity chosen by their teacher was often in association with language arts. More students
indicated a preference for cooperative learning activities over individual activities but they admitted that sometimes their behavior declined. Numerous studies have been conducted on classes using a cooperative learning method. In an evaluation of four studies using different methods of cooperative learning, Slavin (1980) found that 83% of the studies showed that students in cooperative learning classes achieved significantly more than those who had been taught by traditional methods. Other positive outcomes of using cooperative learning are the increase of social relationship among students (Edwards & DeVeries, 1974; Gonzales, 1979; Ziegler, 1981) and an increase in self-esteem. Positive results could also be observed in the performance of the teacher, who had to take on the role of mediator in the teaching-learning process rather than that of mere transmitter of information. Also of significance was the teacher's testimonial that the group work provided, in addition to learning, the development of self confidence, socialization, motivation and enjoyment, observed in other activities following the research. The results of these two studies also suggest that cooperative learning seems to be very encouraging for science education, where a group approach to learning may help resolve problems in many pupils' minds that are left unresolved in the individual-learning environment. Webb (1977, 1980) and Webb and Cullian (1983) conducted three studies using the same model in order to compare students' ability and achievement in group versus individual setting. The results of all three studies have one thing in common, the higher achievement of the low-ability students in the mixed-ability groups, the higher the overall success of all students. In addition to the positive impact, cooperative learning improves students' attitude toward science (Johnson et al., 1985). Tlusty (1993) discussed
his attempts to use cooperative learning with two sections of a college chemistry course. He focused specifically on the attitudes and achievement of male and female students in the course. While cooperative learning did not produce differences in achievement along gender lines, there were discernible differences in attitudes and beliefs with regard to studying chemistry. A substantial and growing body of research indicates that cooperative learning can result in improved learning, more positive attitudes to science, improved thinking and social skills, and better attitudes toward peers who are members of other ethnic and socio-economic groups (Johnson et al., 1976). These arguments have led educators to the conclusion that “science has to be taught differently” to improve the attitude toward science of both boys and girls (Yager & Penick, 1986).

Holloway (1993) studied the perceptions that a fifth grade teacher and her students had about cooperation in her classroom with her cooperative learning teaching style. Throughout informal and formal assessment, Holloway discovered that the teacher thought that student learning is conducted from one concept linking to the next, but the students completely misunderstood this concept. Holloway’s student thought that their own cooperation caused their fellow peers to cooperate.

Evidence of Successful Implementation of Cooperative Learning in the Classroom

The current literature is full with research evidencing the facilitative effects of cooperative learning among students in a variety of academic settings. In particular, work has shown that cooperative learning strategies enhance college students' motivation, quality of learning experiences, and overall academic performance. Among elementary and secondary students, cooperative learning has also been shown to facilitate learning
and performance in social studies, reading vocabulary, comprehension and achievement, mathematics education, the physical sciences and physical education (Dyson, 2002). Indeed, cooperative learning consistently has been shown to produce significantly higher performance and motivational outcomes than do the more traditional classroom learning strategies. Some have also suggested that variation in students' performance under cooperative learning may be a function of the differential preferences held for collaborative versus other learning structures and strategies. Understanding the learning preferences of an ever-increasing, ethnically diverse student population may have important implications for teaching and learning in our society. This information may advance educators' understanding of how to restructure learning environments to maximize achievement outcomes (Chun-Yen & Song-Ling, 1999).

By restructuring the educational system, it may help to address the difficulties in academic success faced by many ethnic-minority children. Ellison and Boykin (1994) studied upper-elementary school students' preferences for learning strategies identified in the Social Interdependence Scales derived from the long-standing research of Johnson and Johnson (1991). They sampled White American and African American elementary school students from low-income backgrounds to discern variation in students' reported preferences while holding socioeconomic status constant. Ellison and Boykin expected participants to endorse cooperative learning significantly more than competitive and individual learning. They also expected an interaction effect between race and learning strategy whereby African American students would endorse cooperative learning significantly more than did White American students - but that the reverse would be true
Cooperative learning has potential to increase student achievement and social
skills development. Cooperative learning has been advocated for school reform. Prior to
such broad-based recommendations, however, Grossen (1996) identified a need for
research in real-life classrooms, as opposed to researcher-controlled classes. In response
to Grossen's recommendation, the author undertook the research reported here to
demonstrate that the implementation of cooperative learning in real-life classrooms is a
complex process, a point that despite the extensive previous research in cooperative
learning appeared to be lacking. The findings of this study are consistent with Cuban's
(1996) conclusion that teachers will adapt research-based models for use in their
classroom, but they contrast with results reported by Antil et. al (1998) in which research-based
models of cooperative learning was unrecognizable among practitioner approaches.
Siegel (2005) expanded Cuban's conclusion by identifying sets of factors that influenced
variations in teachers' implementation of cooperative learning. Interpreted within a
constructivist framework, results support the conclusions that in real life, the project
leader used personal techniques derived from prior knowledge and experience to
implement research-based models of cooperative learning and that use of these personal
techniques was influenced by his teaching context. Consistent with Cuban's (1996)
conclusion that, in practice, teachers' use of instructional innovations will vary, the
project leader's approach to cooperative learning demonstrated that he adapted the
Johnson and Johnson (1983) model for his classroom. A constructivist framework
suggests that one set of factors influencing a teacher's use of cooperative learning will be
his or her prior knowledge of teaching and experience as a teacher. The effect of the project leader's prior knowledge and experience was evident in his basic lesson plan. During his 20 years as a mathematics teacher, the project leader had developed a personal structure for executing his classes. For implementation purposes, the project leader used cooperative learning within his existing lesson plan format. A constructivist framework suggests that a second set of factors influencing a teacher's use of cooperative learning is his or her teaching context. The project leader's explanation of differences in implementation between his accelerated and general mathematics classes revealed that his use of cooperative learning was influenced by lesson content and perceived student ability. The results have implications for educators who are interested in school reform. Rather than making broad-based recommendations to use cooperative learning, proponents of this instructional initiative should consider designing professional development programs based on a constructivist framework. Specifically, in-service training should include activities that encourage teachers to describe their knowledge of teaching and their daily teaching practices, strategies that help teachers incorporate cooperative learning other instructional innovations into their daily practices, and opportunities for teachers to consider specific contextual variables that may influence their use of cooperative learning. A unique contribution of this study was that the project leader implemented a research-based model of cooperative learning without researcher supervision. This finding contrasts results reported by Antil et. al (1998) in which practitioner approaches differed significantly from research-based models. One possible explanation for discrepancy is that the research methodology and theoretical orientation
used in this study might have allowed for detection and explanation of a research-based model, which was not evident through the methods used by Antil et. al those researchers used interview and survey methods to obtain information about teachers' use cooperative-learning techniques. Although those methods yielded considerable information about implementation, the researchers reported that they were left to infer some things about their practice from illustrations of cooperative learning lessons that were described in earlier studies. The use of observations and follow-up interviews in the current study left little to researcher inference. Antil et. al evaluated practitioner approaches by using checklist of criteria derived from the research literature cooperative learning. In this study, Siegel (2005) used a theoretical framework that allowed for examination and explanation the relationship between a research-based model and practitioner's approach. There are several alternative explanations for the discrepant findings between this study and the Antil et. al research, each of which has implications for practice (Siegel, 2005).

First, in the Antil et al. study, practitioners were trained in several different research-based models of cooperative learning. In contrast, the Iroquois School District adopted one model of cooperative learning - the Johnson and Johnson (1983) model, the use of other models was not encouraged. Antil et. al hypothesized that when teachers are exposed to multiple methods of cooperative learning, they are likely to conclude that there is great latitude in what is considered cooperative learning. The results of this study suggest that fidelity of implementation can be increased when teacher attention is focused on one model.
The Study Team technique for learning from textbooks is easily adaptable to all secondary mathematics classes whatever the grade level but works best in mixed ability classes with a great number of low achievers and anxious students. The use of this type of instruction with Study Teams has several advantages: It can help motivate students because everyone is involved in discussing and learning the material, students are motivated to participate in meaningful reading and language experiences, to identify important concepts and to think about the meaning of these concepts, Study Team membership and peer tutoring give help to slow or disinterested students with poor mathematical backgrounds, bad experiences in mathematics, and bad attitudes who seldom receive classroom recognition. Students who know that they can depend on other group members to help and support do not feel the anxiety often experienced by those who do not understand the work. The classroom environment is less threatening, and anxiety is less likely to interfere with learning. Moreover, the student who helps others experiences gratification in giving. In addition, students through Study Teams form new friendships and learn to appreciate differences in ability, differences in personal characteristics and differences in opinion. The cooperative-learning attitude offers a secure environment for everyone to make a contribution. Each student feels responsible for his/her own team performance and is rewarded for his/her contribution. Students are taught to read mathematics textbooks critically with systematic note-taking, outlining the most important areas, making connections between pictures, examples and diagrams, using pencil and paper and trying to interpret what the author is describing with symbols.
Cooperative Learning

and words. This reading activity draws learners into the texts and encourages them to raise questions, make connections and, in general, actively work out meanings with the support of peers. Students also learn to use the text or their own summary as the source of facts and not to depend on the teacher for this information. They are expected to develop good study habits at their own level and prepared for future self-study (Tomasis, 2004).

When students work on complementary information, students access only one part of the information. Students are dependent their partners to research the rest of the information and share their information to the group. Learning can be reduced in the case of poor information transmission, but, the same time, this reliance on a partner enhances cooperation. Findings (Butera, Mugny, & Buchs, 2001) reported the social influence literature indicate that de-centering, or presenting knowledge as a coordination of complementary points of view, can enhance learning. An important benefit of working on complementary information is the involvement generated by this learning situation. First, given that they access certain information only via their partners, listeners have no way of guessing information and are likely to be more motivated to ask more thoughtful questions. Second, when students share complementary information, summarizers will be more involved in providing explanations and in caring about their partner’s learning, because they anticipate being in the complementary role (they will themselves later be listeners). Summarizing information (Spurlin, Dansereau, Larson, & Brooks, 1984) and giving explanations (Johnson, D. W., Johnson, R. T., Buckman, L. A., & Richards, P. S., Webb 1985, 1991) have been shown to be positively related to achievement. Each individual cares for their partner and protects listeners from the negative effect of not
receiving a response.

The great variety of results in the literature can support contrasting predictions regarding the effects of resource interdependence on interaction processes. On the one hand, working on identical information can create confrontations of points of view and give rise to the kind of socio-cognitive conflict supposedly beneficial to cognitive elaboration and learning. At the same time, however, working on identical information can also reinforce competence evaluation and competence threat, which can reduce the benefits of confrontations. Sharing complementary information can, in comparison, reduce the stress on competence evaluation, promote de-centering, and thereby favor learning. Moreover, working on complementary information can promote more involvement on the part of both partners (giving explanations, asking questions, providing answers), which could lead to better performance. However, when students are working on complementary information, they are dependent on their partner for access to information. The aim of Buchs and Butera's (2001) study was to examine the effect of resource interdependence on student interactions and performances, by contrasting two different cooperative methods, working on complementary versus identical information. An earlier study, reported by Buchs and Butera (2001), was designed to test the two alternative hypotheses regarding the effect of interdependence on performance; the superiority of working on identical information versus the superiority of working on complementary information. In this study, performance was measured by a multiple choice test (MCT) on the content of the texts. Results provided more support for the hypothesized superiority of working on identical information. It appeared that
performance was better overall when students discussed identical information than when they shared complementary information. However, the interaction between resource interdependence and roles played during discussion (summarizer versus listener) indicated that only listeners who had not read the text discussion showed a significant disadvantage. In other words, working on complementary information puts the listeners in a highly dependent position. Their performance can be reduced if, in the interaction with the summarizer, the information is not transmitted in an effective way. The studies reported here investigate the effect of resource interdependence on interaction processes, and the link between student interactions and performance.
Introduction

The literature review yielded many benefits of cooperative learning on the academic, behavioral and social aspects of my classroom. With this in mind, the study implemented jigsaw and think-pair-share instructional strategies in the cooperative learning process. Each of these strategies allowed for the sharing of information that would benefit each of the students' individual needs. Student surveys, academic grades, follow up calls to the parents and a reflection journal was used to evaluate these methods of instruction.

Participants

This study was conducted in a middle school classroom in central New York. The school district covers approximately 57 square miles and is suburban in nature. Most residents are employed in the Triple Cities area just outside of Albany. The population studied was one eighth grade accelerated earth science class and four eighth grade physical science classes. The earth science class consists of 25 students and the physical science classes consist of 26, 25, 19, and 22 students. Out of the 117 students that were sampled, 62 were girls and 55 were boys. Ninety-eight of the 117 students were Caucasian, three were Russian, seven Asian, and nine African Americans. Twenty-one of the 117 have Individualized Educational Plan’s (IEP’s) with specified needs, and 14 with 504 Plans (504 plans are designed to give students adaptations without being classified as an IEP student). I have been teaching for the past five years in New York State. I have taught 7th, 8th, 9th, and 10th grades in subjects including life science, physical science,
Cooperative Learning

earth science, and living environment. During these five years I was in a multitude of
different settings including urban, rural, and suburban.

Procedures of Study

Multiple cooperative teaching techniques were used to investigate cooperative
learning in a middle school science classroom, focusing on the academic, behavioral, and
social benefits. These techniques were implemented throughout the entire third marking
period (January-March). The first implemented method was the Jigsaw. This method was
conducted by dividing students into five, six person groups. The groups were put together
so they were all diverse in terms of gender, ethnicity, and ability. One student from each
group was appointed as the leader. Lessons were divided into five to six segments. Each
student was assigned to learn one segment. Students were then given time to read over
their segment at least twice and become familiar with it. Students were then allowed to
form expert groups (students with the same topic) and rehearse the presentations they
would make to their Jigsaw group. Students were asked to get back into their Jigsaw
groups. Each student presented his/her segment to the group. Other experts were
encouraged to ask questions for clarification. As a facilitator, I floated from group to
group, observing the process. If any group was having trouble (e.g. a member was
dominating or disruptive), I made an appropriate intervention. Leaders were trained by
whispering an instruction on how to intervene, until the leader felt comfortable. Class
time was also spent teaching students how to be an effective group leader, relieving the
need for the facilitator to intervene as a result of behavioral issues. A quiz on the material
was given to assess student learning.
Think-Pair-Share was another cooperative learning technique that was used. It involved a three step cooperative structure. During the first step, students thought silently about a teacher asked question. Individuals paired up with a partner during the second step and exchanged thoughts. In the third step, the pairs shared their responses with other pairs, other teams, or the entire group (this varied from lesson to lesson). This process occurred during the third marking period.

**Instruments for Study**

Data collection techniques that were used in this study were active teacher observations, student surveys, and academic grades. As an active observer I was able to collect data on student attitudes and behavior throughout the study. Participation, posture and willingness to work were noted. Student surveys were designed to show a clear triangulation in the study. As a participant observer, I formulated notes of student activities as the cooperative learning took place. Marking period grades were analyzed to see comparisons between second and third marking period averages. Finally, a 5-point Likert scale student survey was given to seek student opinions and reactions to cooperative learning on nine different levels (see Appendix 1). Each question was answered by a scale including 5 possible answers (strongly agree, agree undecided, disagree, strongly disagree). The nine different levels were as follows: developing teamwork, support and creating acceptance of differences, developing active/reflective listening, creating positive feedback among peers, building of self esteem and mutual respect, creating positive attitudes toward science and school, developing social skills, creating an environment where academic achievement can be reached, and implementing peer coaching.
Chapter 4: Results

The data collected clearly shows the response to the critical questions posted in this paper. My data collection and technique show a clear triangulation that verifies my results. Triangulation is important so results are not driven off one particular data collection technique and misrepresented.

When analyzing grades from the second marking period to the third marking period, an increase of 105 out of 118 students (see Figures 1-2) was shown. This calculated as an 89.7 percent increase. When analyzing the survey it showed that students felt-cooperative learning developed teamwork (strongly agree (45 of 104, 43%), agree (52 of 104, 50%)) (see Appendix 1). The survey also showed the following outcomes: a) cooperative learning supports and creates acceptance of differences (strongly agree (18 of 104, 17%), agree (54 of 104, 51%), b) cooperative learning develops active and reflective listening (strongly agree (43 of 104, 41%), agree (56 of 104, 53%)). The survey continues by showing that cooperative learning creates positive feedback among peers (strongly agree (23 of 104, 22%), agree (42 of 104, 40%)), d) cooperative learning helps build self esteem and mutual respect (strongly agree (25 of 104, 24%), agree (43 of 104, 41%)), e) cooperative learning creates positive attitude toward science and school (strongly agree (18 of 104, 17%), agree (40 of 104, 38%)), f) cooperative learning develops social skills (strongly agree (42 of 104, 40%), agree (40 of 104, 38%)). This study also confirms that cooperative learning helps create an environment where academic achievement can be reached (strongly agree (26 of 104, 25%), agree (57 of 104, 54%)), and h) cooperative learning implements peer coaching (strongly agree (17 of 104, 16%), agree (59 of 104, 56%)).
The three focus questions directed towards the student success were as follows: a) why use cooperative learning in science? b) why implement cooperative learning in a middle school science classroom? and c) what are the academic, behavioral, and social benefits of cooperative learning? To address the question of using cooperative learning in science I will mention the importance of laboratory exercises and group work. This cooperative learning strategy is the most useful when dealing with middle school students due to the fact that they want to play an active learning role versus coming in and note taking period after period. The academic benefits are astounding with 89.7 percent increase from the second to third marking periods. The behavioral and social benefits of this study increased considerably.
Data represents the population of 118 students in regards to their second marking period averages (%). The mean grade point average for this population is 84.3%. The median grade percent range falls in the 91-95 % category. The data is skewed to the right and does not represent a solid bell shaped curve. These grades are the basis from which the study was derived.
Data represents the population of 118 students in regards to their growth in grade point average from the second marking period to the third marking period. The mean grade point average for this population is 87.6%. The median grade percent range falls in the 91-95 and the 96-100% categories. The data is skewed to the right and shows an increase in the upper percentage categories. The most significant increase is located in the 96-100% range. Notice that after using the cooperative learning strategies, the lower categories of 50-55% and 56-60% were completely eliminated. This figure graphically shows the increase in grades after using cooperative learning techniques.
Discussion

A direct correlation can be made between the data in this study and the data reported in the literature review. Based on this study's research, there was an 89.7% increase in averages from the second to the third marking period. The literature review also reported a significant increase in grades when cooperative learning strategies were implemented in the classroom.

There was also an observable improvement in classroom behavior. Students spent more time on task and less time focusing on external distractions (e.g. having to go to the bathroom every period or having to sharpen a pencil every five minutes). There were no referrals for disciplinary action written in the third marking period compared with the two referrals written in the second marking period. There was also a significant decrease in inappropriate student interactions such as poking at each other when I was not looking.

An increase in appropriate social interactions was also observed. Students built solid working relationships with the other students that were not in their regular social circles. The more time spent working in cooperative groups showed a decrease in the amount of arguments over time. When the cooperative learning strategies were first implemented, there were students that would dominate groups and students that would let others do the work for them. By the third cooperative group activity, students were equally sharing work loads and contributing to the success of the group. It was also
observed that students would monitor the activities of others in the group to ensure on
task behaviors and timely completion of assignments.

Action Plan

I shared the results of my cooperative learning study with the interviewer and
administrative staff in the Western New York school district I will be teaching at for the
upcoming school year. There was much interest as to how I would continue this study in
the school given all of the differences in student population. Knowing that my new
administration wants to see results, I formulated a list of steps in which I will implement
cooperative learning into an urban middle school classroom.

My first step is to gather data on the student population. I have started doing this
through interviews with other teachers in the district and spending time with some of the
students that attend their summer school program. From these interactions, I have decided
that I will need to spend a great deal of time developing clear student expectations, social
skills, and appropriate behavioral interactions between students in my classroom in order
for the success of cooperative learning. I have developed a sound classroom management
plan based on high expectations and have also developed key lesson plans in which
student group roles will be taught and practiced.

The second step to my action plan is to develop a curriculum that is anchored in
cooperative learning while still upholding the NYS standards and district guidelines. I
have started this process by locating materials that are student ability appropriate and
meet the expectations I have set. This development process will be continued throughout
the year as I become well acquainted with my students and spend time evaluating and
assessing their learning styles and abilities.

The third step of my action plan is to continue data collection through the procedures and instruments described in this study. I have set up a timeline in which results will be reviewed. These reviews will occur once every marking period and will also include meetings with my administrator at the end of each semester and as needed. I will use these benchmarks in the timeline to assess the value and success of the cooperative learning strategies. I will use the time with my administrator to discuss the successes that I have had and troubleshoot areas that still need improvement.

The final step is to implement cooperative learning in my department, and eventually school wide. Once I am comfortable with the success rate of my classroom, I will share the procedures through building-based professional development.

Recommendations for Future Research

When analyzing the study I found excellent results but a continuous concern was to eliminate, if possible, uncontrollable outside factors. My area of focus will continue to be on academic, behavioral, and social benefits. In addition I will look at the effect of cooperative learning on gender, race and socioeconomic status (SES), as I move from this study’s high SES suburban district to a lower SES urban school district.

Cooperative learning appears to be more beneficial to females than males. The female students seem to be more social and look forward to working as a team and building their thoughts as a group. It also appears to help overcome the socially imposed stigma that girls do not or should not excel in the science world. Ethnlicity is another potential factor in studying cooperative learning. It should be reviewed from a different
Cooperative Learning

perspective. The Central New York school district has a diverse population due to its location near the University of Binghamton, but shows the vast majority of students from Caucasian and Asian decent. The Western New York school district does not have the same diversity. It contains primarily African American and Hispanic individuals, with approximately 5% of the student population being of Caucasian or Asian decent. A correlation between cooperative learning and socioeconomic status is another avenue for my study. Family support in a child's education is crucial to a student success. Research in this area has shown that urban areas have less parental support for a variety of reasons, but all related to available monetary resources (Vaughan, 2002). I am anticipating as many parental interactions from each school district, but with fewer proactive parental interactions and more reactive interactions.

Conclusions

From this study and the background from the literature review I have seen positive results not only in academics, but in behavioral and social benefits as well. As a teacher you encounter a new set of students each year and each year you need to adapt to fulfill their goals. Although I will not be teaching in the same school district for the 2006-2007 school year, as I have taken a job in an urban middle school in Western New York. I am not expecting to proceed with my study in the same way or to acquire the same results as I continue this study. There is a different level of student motivation, parental support and involvement, ethnic diversity, and socioeconomic standing of the populations between the districts, which I feel will affect the results of my study. However, I do feel that cooperative learning can be successfully implemented in my new district if steps are
Cooperative Learning

taken to ensure its success. I will continue to research different cooperative learning strategies to encompass an even wider range of student needs, implementing each strategy separately to ensure that the results are measurable and controlled. This study is the baseline for my implementation strategies and I find it critical to keep up on new and innovative strategies to ensure the success rate of my students. This is not a study that will end in the course of one or even two years, but a study that will continue throughout my teaching career.

As a participant observer, I documented no written referral forms during the third marking period compared to the two write ups that were documented during the second marking period. I noticed and documented the significant increase of on-task behavior and productivity level. The rate to which I taught the course material increased slightly and allowed more time for cooperative review sessions. Implementation of cooperative learning in a middle school science classroom is critical because the students are social and willing to try new and different techniques. The academic, behavioral, and social benefits of cooperative learning are sometimes underestimated as can be seen in the above data. Academically you can see the benefits with the increase in grades. Behavioral benefits can be seen in less off task behaviors, including appropriate behaviors in students that were considered problem cases in the previous marking periods. The social benefits can be seen through the student surveys. All of these benefits can be cross examined with all three forms of testing (grades, participate observer, and student surveys).
References


## Appendix 1. Student Survey

### Student Survey (Cooperative Learning)**

1) Cooperative learning develops teamwork:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Undecided</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
</tr>
</tbody>
</table>

2) Cooperative learning supports and creates acceptance of differences:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Undecided</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
</tr>
</tbody>
</table>

3) Cooperative learning develops active/reflective listening:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Undecided</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
</tr>
</tbody>
</table>

4) Cooperative learning creates positive feedback among peers:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Undecided</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
</tr>
</tbody>
</table>

5) Cooperative learning helps build self-esteem and mutual respect:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Undecided</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
</tr>
</tbody>
</table>

6) Cooperative learning creates a positive attitude toward science and school:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Undecided</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
</tr>
</tbody>
</table>

7) Cooperative learning develops social skills:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Undecided</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
</tr>
</tbody>
</table>

8) Cooperative learning helps create an environment where academic achievement can be reached:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Undecided</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
</tr>
</tbody>
</table>

9) Cooperative learning implements peer coaching:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Undecided</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
</tr>
</tbody>
</table>