THE EFFECTS ON STUDENT MOTIVATION IN THE CLASSROOM WHEN WORKING IN GROUPS, PAIRS, OR ALONE

by

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

The research project was determining the effects on motivation in the science classroom when working in groups, with a partner, or alone. My 8th grade Earth science class worked on three chapters during the project. During the chapter on atmosphere the students did all assignments alone. During the chapter on meteorology the students did all of their assignments with a randomly selected partner. During the chapter on climate the students did all of their assignments with a randomly selected group of four.

The data from surveys given to the students showed that they preferred to work with a partner or in a group. However, data from cumulative class GPAs taken before the project started and compared to cumulative class GPAs from each chapter showed GPAs going down. The largest decline was during the pair work chapter on meteorology, followed by the group work chapter on climate, and finally the individual work chapter on atmosphere.

In conclusion, the students preferred to work with a partner or in a group, however, their cumulative class GPAs showed that they did better work on their assignments when they worked on them alone.

INTRODUCTION AND BACKGROUND

For the past 12 years I have been teaching eighth grade Earth science and seventh grade life science at Shelby High School in Shelby, Montana. Shelby High School is a seventh to twelfth grade combined high/middle school that serves the community of Shelby. The current population of the seventh and eighth grades is 60 students 97% of whom are Caucasian. There is one Hispanic student and one Native American student. Shelby is a rural community in north central Montana with a strong farming and ranching background and a 2011 population of 3390 (City Data, n.d.). The estimated 2009 median household income in Shelby was $39,830 (City Data, n.d.). In the seventh and eighth grades, 30% of the students receive free and/or reduced lunch (D. Stirling, personal communication, May 16, 2013).

The students I am working with are my seventh period eighth grade Earth science class. There are 16 students in the class, seven boys and nine girls. Fifteen of the students are Caucasian, while one student is Hispanic.

I have always noticed that most middle school students love working with partners or in groups. At this age kids enjoy socializing and being around their friends. When they are given the opportunity, they almost always prefer to work on assignments with someone rather than alone. As a teacher I have noticed the positive and negative aspects of middle school students working in groups or with partners. Collaboration can produce great work, yet it can also lead to classroom problems if not managed properly. Some students choose to work with their friends and are not capable of staying on task. Other students take advantage of the collaborative process by sitting passively and letting other students do most of the work. Some students thrive working with others. They work

great with their peers, are willing to help other members of the group, and truly make collaboration a fun and educational process. These thoughts are what brought me to my primary focus question: *What are the effects on student motivation when working in groups, pairs, or alone? Which scenario -- groups, pairs, or alone -- motivated students to do better in school.*

CONCEPTUAL FRAMEWORK

Cooperative learning research started in the early 1970s. Since then, cooperative learning has become a popular technique for teachers in schools around the world. Students were responding better to cooperative learning in the classroom as compared to the traditional competition model, which is when students compete for answers or grades. This has been found to produce a lack of motivation in some students who lose faith in themselves and their ability to succeed. Cooperative learning can help alleviate competition in the classroom. It can also promote higher self esteem, increase motivation among students, and even help to create friendships in school (Slavin, 1982).

Cooperative learning is based on several important principles. The first two that are integral to this learning process are group goals and individual accountability. Group goals are when students work together toward common goals. Individual accountability is when each member of the group must contribute in specific ways. No one is left out and there is no traditional competition for grades or rewards. Each group member brings something to contribute to help the group accomplish their goals as a whole (Slavin, 1982).

Another principle that is important in the cooperative learning model is equal opportunities for success. This means that students contribute to their teams by improving

over their own past performances. Also, there are team rewards and team success. The cooperative learning team works together to earn classroom awards as compared to working alone to earn points or grades in the competition model (Slavin, 1996).

At least three methods of cooperative learning have been developed. They are referred to as *Student Team Learning* methods. These methods are based on the above-mentioned principles of group goals, individual accountability, and equal opportunities for success. These methods are: Student Teams-Achievement Divisions, Teams-Games-Tournament, and Cooperative Integrated Reading and Composition (Slavin, 1999).

The Student Teams-Achievement Divisions method involves a teacher placing mixed groups of students into groups of four. The teacher presents a lesson and then the groups are required to work together to make sure that everyone in the group has mastered the material. Afterwards, the students take quizzes individually to assess mastery. The individual scores are then averaged to give the team a score. This promotes individual accountability to the team and ensures each member is working toward the team goal or goals (Slavin, 1999).

The Teams-Games-Tournament method is when individuals of a team compete against individuals of another team. Team members earn points for their team by answering questions correctly. These points go toward the team's total and the team with the most points wins the competition. This again promotes individual accountability and attaining team goals (Slavin, 1999).

The third method is Cooperative Integrated Reading and Composition. It is predominantly used in reading and writing classes. Students work in groups on reading and writing activities while the teacher goes to each group to work with them. They work

collaboratively to attain common goals. These learning techniques and methods have shown to have many positive effects in the classroom. The first one shown is that students will begin to work toward common goals. They develop common values and begin to want to work together to succeed. Secondly, working cooperatively in groups develops more and better ideas than working alone (Slavin, 1999).

Cooperative learning also promotes problem-solving behavior and students learn to like one another. When working in groups, problem-solving skills are enhanced and the camaraderie of working together to reach a common goal promotes friendship and intergroup relations. “In essence, cooperation reinforces the point that two (or more) heads are better than one” (Hendrix, 1996, p. 1).

Cooperative learning also benefits students' self esteem. Cooperative learning models promote students working together to achieve a common goal and reward as opposed to the competition model where students are working against each other for grades or teacher approval. It takes away the fear of failure for the student. This has been shown to also lead to an increase in the enjoyment of school. If students know that they can succeed and the fear of failure has been removed from the classroom, it is logical that school will become a friendlier, safe place where students can enjoy the learning process (Hendrix, 1996).

Research has shown cooperative learning offers benefits for at-risk learners, especially with middle school students who perceive school as not being cool and are concerned with what their peers think. Cooperative learning can change the perception of the fear of failure or the perception that being smart is not socially acceptable. Cooperative learning groups help at-risk students by including them in the learning

process and helping change their perspective from learning being socially unacceptable to being part of the group and learning is the norm. Competition and fear of failure is no longer a threat to these at-risk learners and they can safely take part in the learning process without fear of social stigmas (Hendrix, 1996).

Cooperative learning helps students in school with responsibility roles. The scenario of the teacher in front of the class with students sat down and passively absorbing information is gone. Students now must take control of their learning and use and develop responsibility. Slavin goes as far as to say, “Adolescents crave responsibility and abhor playing a passive role" (Slavin, 1996, p. 1).

There are even more benefits to cooperative learning. Willis (2007), a neurologist and teacher at a middle school in California, has found that cooperative learning improves brain function. Working cooperatively with other students diminishes the fear of competition and failure. Working in a group allays those fears, allows students to concentrate on achieving group goals and rewards and in the end the students can have a positive learning experience. This is the part that helps students develop a positive image and like of school and learning and then those learning experience become positive as well. “When students participate in engaging learning activities in well-designed, supportive cooperative groups, their brain scans show facilitated passage of information from the intake areas into the memory storage regions of the brain" (Willis, 2007, p. 5). When students are having fun and enjoying learning, they retain more information. Some research has also gone so far as to say that cooperative learning increases collaborative skills for students, increases the retention of material and helps develop higher level thinking skills (Conrad, 1994).

There are also several disadvantages to cooperative learning. One disadvantage is with gifted students or higher achieving students. Some suggest that cooperative learning has the opposite effect on gifted students than it does for the average or at risk students. Some claim that these gifted students are usually the ones who end up doing all the work while other students sit back and contribute nothing. It is the gifted student who gets saddled with the workload. Another weakness of cooperative learning is the basic premise of cooperative learning: members of the group are responsible for each other's teaching (Randall, 1999).

Another disadvantage mirrors the two drawbacks previously mentioned. This drawback is the mixture of the group containing different levels of students. It suggests that the higher-level student will grasp material quicker than others and then be responsible for helping the others students in the group, some of whom are not even participating. This leads to feelings of unfairness for those higher-level students (Randall, 1999).

METHODOLOGY

The treatment for this project took place during the Atmosphere Unit in my eighth grade Earth science class. The unit consisted of three chapters, one chapter each on the atmosphere, meteorology, and climate. During the atmosphere chapter, the students completed the required daily assignments, readings, labs, and test individually. During the meteorology chapter, the students were divided randomly into pairs and completed the entire chapter's daily assignments, readings, labs, and test with a partner. During the climate chapter, the students were randomly put into groups of three and completed the chapter's daily assignments, readings, lab and test with their group. During group and pair

work, students collaborated with their group or partner, but were required to turn in their own paper work. The treatment groups were designated Individuals, Pairs and Groups. The research methodology for this project received an exemption by Montana State University's Institutional Review Board and compliance for working with human subjects was maintained.

Before the treatment, the students completed the Lee Self-confidence Survey (Appendix A). The survey consisted of 11 questions asking how the students felt about working on assignments in class while in groups, pairs, or alone. The data were broken down into percentages of the number of students and their feelings about working on assignments alone, in pairs, or in a group. The students also completed the Lee Working Preferences Survey (Appendix B). This survey of six questions based on a five-point Likert Scale (1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, 5 = strongly agree) questioned students on how they felt when working in groups, pairs, or alone. The data were also broken down into percentages and compared to see how the majority of the students preferred to work on their assignments. The Lee Self-assessment of Ways of Learning Survey was also completed before the treatment (Appendix C). This assessment gave the students a choice between three imaginary students and their different learning styles. The students were asked to choose which of the three most closely resembled their own learning style. The data were broken down into percentages and analyzed to see who the students were most like in the survey.

After each section of the treatment the students completed an evaluation. The Lee Individual Work Evaluation was completed after the chapter on atmosphere (Appendix D). The evaluation asked students about their experiences working alone. The data were

broken down into percentages to analyze how students felt about working alone. The Lee Pair Work Evaluation was completed after the chapter on meteorology (Appendix E). This evaluation asked students questions about their experience working with a partner. The data were broken down into percentages and analyzed to see how well students felt about working with a partner. The Lee Group Work Evaluation was completed after the chapter on climate (Appendix F). This evaluation asked students questions about their experience working in a group. The data from the survey were broken down into percentages and analyzed to see how well the students did or did not like working in a group. Following the treatment, the students were again administered the Lee Self Confidence Survey and the Lee Working Preferences Survey. The data were broken down into percentages of how the students preferred to work on assignments and then compared to the original survey given before the treatment began. During the treatment I also kept a journal on the observations I made while the students worked. Observations were made on how the students worked with each other, how they worked alone, how much socialization took place in pairs and groups, and general morale of the students. Students' grades were averaged at the end of the treatment and compared against their average class grade prior to the beginning of the treatment (Table 1).

Table 1
Data Triangulation Matrix

Secondary Focus Questions	Data Source 1	Data Source 2	Data Source 3
Are students motivated to do better in class when working in groups?	Lee Self-confidence Survey, Lee Working Preferences Survey, Lee Self-assessment Ways of Learning Survey	Lee Group-work Evaluation, teacher passive observation and journal.	Lee Self-confidence Survey, Lee Working Preferences Survey, attendance, % work turned in, average grade
Are students motivated to do better in class when working in pairs?	Lee Self-confidence Survey, Lee Working Preferences Survey, Lee Self-assessment Ways of Learning Survey	Lee Pair-work Evaluation, teacher passive observation and journal.	Lee Self-confidence Survey, Lee Working Preferences Survey, attendance, % work turned in, average grade
Are students motivated to do better in class when working alone?	Lee Self-confidence Survey, Lee Working Preferences Survey, Lee Self-assessment Ways of Learning Survey	Lee Individual-work Evaluation, teacher passive observation and journal.	Lee Self-confidence Survey, Lee Working Preferences Survey, attendance, % work turned in, average grade

DATA AND ANALYSIS

The Lee Self-Assessment of Ways of Learning Survey administered pre-treatment showed that 56% of the students identified with the student who liked to work with a partner and 31% identified with the student who liked to work in a group. Students were asked in the survey which student they most resembled in the way they preferred to work on assignments. The survey was based on three hypothetical students, Curt, Nellie, and Dave. Curt worked well in groups, Nellie with a partner and Dave preferred to work on assignments alone.

The Lee Individual Work Survey showed that 63% of the students were *neutral* when asked if they were more comfortable working alone and 44% *disagreed* and 44% *strongly disagreed* when asked if they were more excited to come to class when they knew they would be working alone (Figure 1). When asked to give one specific example of why they didn't like working alone one student commented, "If you don't understand something you can't really get a lot of help."

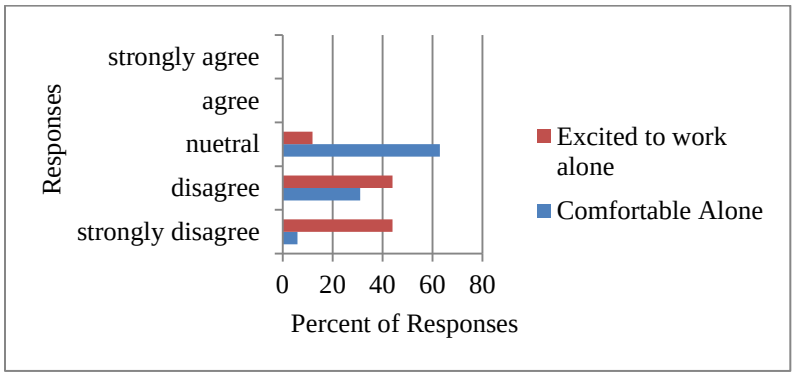

Figure 1. Lee Individual Work Evaluation, percent of students who were excited and comfortable working alone (questions 1 and 3), (*N* = 16).

The Lee Pair Work Evaluation revealed that 69% of the students felt they effectively worked well with a partner (Figure 2). Seventy five percent indicated that their partner was prepared and participated *always* (Figure 3). When asked to list specific benefits to working with a partner one student replied, "Being able to discuss the problem and work it out together."

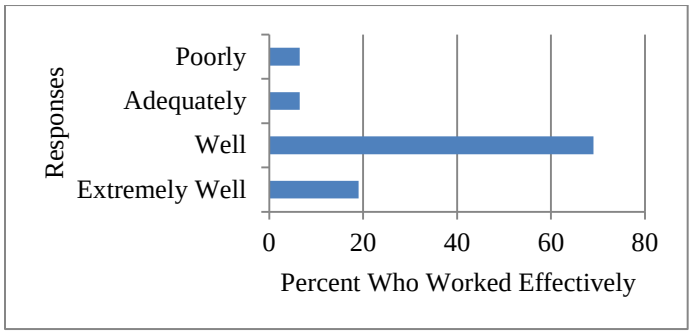

Figure 2. Lee Pair Work Evaluation, percent of students who felt working with a partner was effective (question 1), (*N* = 16).

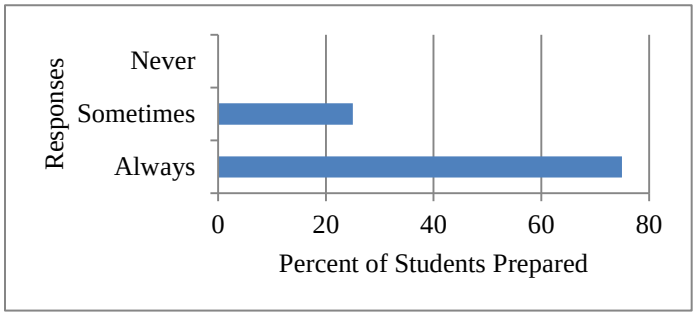

Figure 3. Lee Pair Work Evaluation, percent of students who were prepared when working with a partner (question 3), (*N* = 16).

The Lee Group Work Evaluation indicated that 44% of the students felt *well* and 44% felt *extremely well* when asked how effectively their group worked together (Figure 4). Comments that were mirrored repeatedly by students when asked what they didn't like about working in a group included, "some people didn't do anything" and "too much talking."

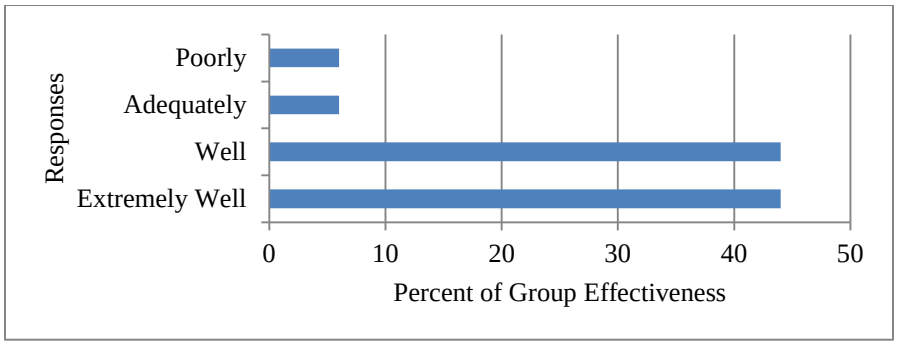

Figure 4. Lee Group Work Evaluation, percent of students who felt their group worked effectively together (question 1), (*N* = 16).

The results of the Lee Self-Confidence Survey administered pre-treatment indicated that 44% of the students *enjoyed* working on assignments with a partner while 31% enjoyed working in a group (*N* = 16), (Figure 5). When the survey was administered again after the treatment the number who enjoyed working with a partner decreased slightly to 38% and those that enjoyed working in a group rose to 62% (Figure 5). Fifty six percent felt they did better work on assignments when working with a partner while 19% felt they did better work in a group (Figure 6). These numbers changed after the second survey with 25% feeling they did better work with a partner and 69% feeling better in a group (Figure 6). When asked how it makes them feel when they knew they were going to work in a group or with a partner one student commented, "it makes me feel confident."

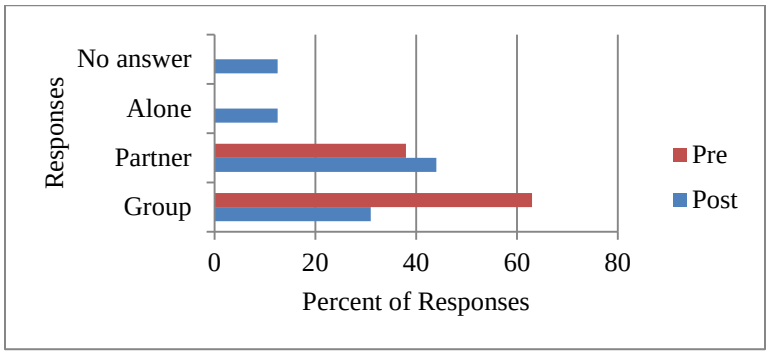

Figure 5. Lee Self-confidence Survey, percent of students who enjoy working in a group, with a partner or alone (question 1), (*N* = 16).

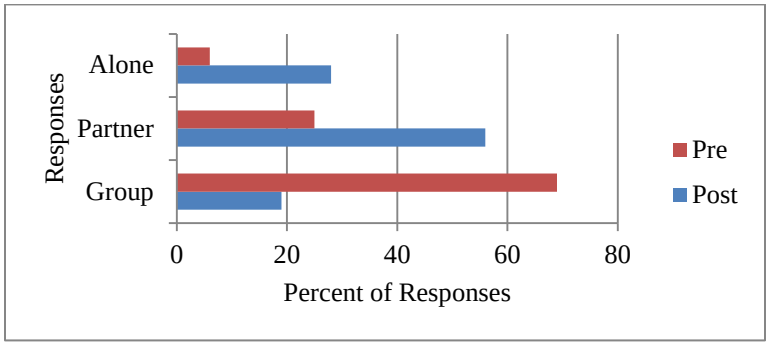

Figure 6. Lee Self-confidence Survey, percent of students who felt they did better work alone, with a partner, or in a group (question 2), (*N* = 16).

The Lee Working Preferences Survey given pre-treatment showed that 56% *agreed* they *preferred* and 25% *strongly agreed* they *preferred* to work with a partner. Those that *agreed* fell to 44% and those that *strongly agreed* remained at 25% after the post-treatment survey (Figure 7). The data from the survey given pre-treatment also show that 38% of the students *agreed* they *preferred* to work in a group while 25% showed they *strongly agreed*. Those that *agreed* fell to 25% and those that *strongly* agreed rose to 50% after the post-treatment survey (Figure 8).

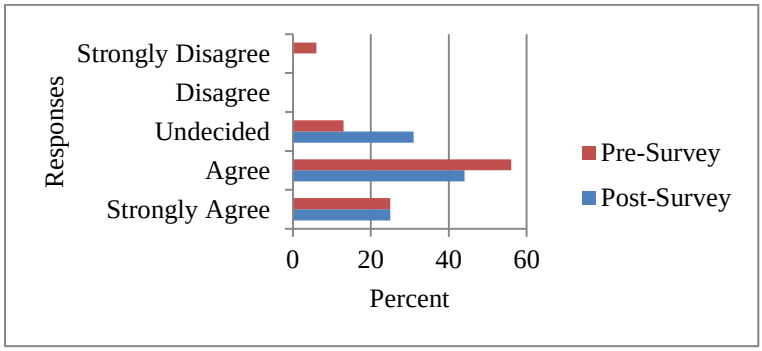

Figure 7. Lee Working Preferences Survey, percent of students who prefer to work with a partner (question 2), (*N* = 16).

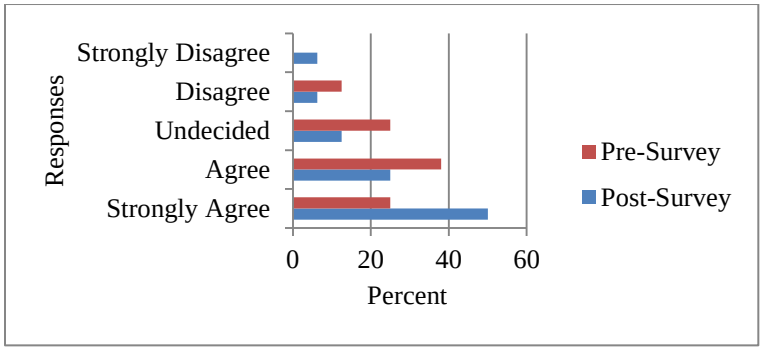

Figure 8. Lee Working Preferences Survey, percent of students who prefer to work in a group (questions 3), (*N* = 16).

Grade point averages for each student taken after each section of the treatment showed a decline when compared to GPAs taken pre-treatment (*N* =15). The cumulative class GPA started at 91.4%. During the individual work portion of the treatment the cumulative class GPA fell to 90%. During the pair work portion the cumulative class GPA fell to 81% and during the group work portion the cumulative GPA fell to 84%.

INTERPRETATION AND CONCLUSION

The greatest transformation occurred with responses to the Lee Self-Assessment of Ways of Learning Survey, the Lee-Self Confidence Survey and the Lee Working Preferences Survey. The data supported by the Lee Self-Assessment of Ways of Learning Survey showed that most students identified with the hypothetical student in the survey

who preferred to work in pairs. This was also supported in the Lee-Self Confidence Survey and the Lee Working Preferences Survey. When the latter two surveys were taken pre-treatment the trend showed that most students preferred to work on assignments with a partner. However, after the surveys were administered post-treatment this changed to a majority of students preferring to work in groups. I have found this to be true in my classroom and it was quite interesting to observe it during my treatment. Most middle school students love to work with a partner for a myriad of reasons. In my experience they especially like to work in groups for the socialization. I observed this directly during my treatment, my students would prefer to work in a group even if it were detrimental to their grades.

The second major transformation the data shows is that of cumulative class GPA. The initial cumulative class GPA before treatment started was 91.4%. This fell to 90% during the individual work, 81% during the pair work, and 84% during the group work section of the treatment.

VALUE

I believe the quality of my research is good. However, I would make one important change the next time. I believe the disparity between the initial cumulative class GPA and the subsequent GPAs is due to what we had done in class before the start of treatment. We had just finished our month long science fair project and I was lucky enough to have students this year who thrived on such projects. The entire class produced excellent science fair projects. As a result, the cumulative class GPA was high. One change I would make would be to start the treatment after regular class assignments and not at the end of our annual science fair.

I believe the greatest value of the study is what the students learned about themselves and their motivation in class. Most of the students prefer to work with partners or within a group; however, they equate this to doing better in class. They are more motivated to work together, however, they also saw that they did not stay on task as well. That we were able to see this first hand as a class in our data really helped the students to understand the differences of working alone, with a partner and in a group. The students were interested to see that although a majority of them were more motivated to work with a partner or in a group, the class GPA also decreased. The highest cumulative class GPA occurred when the students worked alone.

The study also helped me immensely as a teacher. Whereas my students were highly motivated to work with a partner or in a group, I realized that partner or group work has to be highly structured so as to help the students remain on task and get the more out of the activity or assignment. If allowed to their own devices, a lot of socialization was accomplished and not much else. Observing this behavior helped me to design or tweak my activities. I observed that I cannot randomly put students into groups and expect success because their motivation will be higher. Each student in a group contributes in his or her own unique way and some don't contribute at all. Some students pair up with others well and different pairing can result in mutiny. Making these observations has helped me to grow as a teacher. I learned the pair or group dynamic is extremely important. I don't normally let students work with their best friends because in my experience at the middle school level their emphasis is not in doing good work, but socializing. Now I really take a hard look at who is working with who and/or the dynamic of a group. It's not as simple as just putting students into random groups. I realized that I

have to take into account each unique student, how they learn, how they work with others, and what their work ethic is like. My process of putting students in pairs or groups is now much more thought intensive.

Throughout the entire process of me being a graduate student in the MSSE program I feel I have changed considerably. I know I have a much better content knowledge now than I did when I started. I have taken some excellent classes that I thoroughly enjoyed and learned a lot in. I also took classes that helped me to be more effective in the classroom, to get information across to my students better, and probably most important, to recognize when I am not or that they are faltering.

Another aspect of the program that is important to me are the connections I have made with my fellow classmates. I feel like I have a great network of other teachers who I can bounce ideas off of and go to for help. Developing these relationships and knowing that I'm not alone in my classroom has been very beneficial to my science teaching.

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APPENDICES

APPENDIX A

LEE SELF CONFIDENCE SURVEY

Lee Self Confidence Survey

Participation is voluntary, and you can choose to not answer any question that you do not want to answer, and you can stop at anytime. Your participation or non-participation will not affect your grade or class standing.

1. Do you enjoy working on an assignment in a group, with a partner, or alone?
2. Do you feel you do better work on assignments when you work in a group? With a partner? Alone?
3. How does it make you feel when you know you are going to have to work in a group or with a partner?
4. How do you feel when your teacher selects the groups or your partner for you?
5. Would you prefer to select your own partner(s) or have your teacher select them?
6. If you could choose your own group or partner would you choose your friends or students who you know are going to work hard and get the assignment done?
7. Do you get more work done when you work alone or with a partner or in a group?
8. What don't you like about working in a group or with a partner?
9. What do you like about working in a group or with a partner?
10. What don't you like about working alone?
11. What do you like about working alone?

APPENDIX B

LEE WORKING PREFERENCES SURVEY

Lee Working Preferences Survey

Participation is voluntary, and you can choose to not answer any question that you do not want to answer, and you can stop at anytime. Your participation or non-participation will not affect your grade or class standing.

1. I prefer to work alone on assignments in class.

Strongly Disagree Disagree Undecided Agree Strongly Agree

2. I prefer to work with a partner on assignments in class.

Strongly Disagree Disagree Undecided Agree Strongly Agree

3. I prefer to work in a group on assignments in class.

Strongly Disagree Disagree Undecided Agree Strongly Agree

4. I prefer when my teacher picks partners or groups for me.

Strongly Disagree Disagree Undecided Agree Strongly Agree

5. I do my best work, get better grades, and understand the material better when I work with other students.

Strongly Disagree Disagree Undecided Agree Strongly Agree

6. I do my best work, get better grades, and understand the material better when I work alone.

Strongly Disagree Disagree Undecided Agree Strongly Agree

APPENDIX C

LEE SELF-ASSESSMENT OF WAYS OF LEARNING SURVEY

Lee Self-Assessment of Ways of Learning Survey

Participation is voluntary, and you can choose to not answer any question that you do not want to answer, and you can stop at anytime. Your participation or non-participation will not affect your grade or class standing.

Here are three imaginary middle school students;
Curto is an 8th grader and when he is in science class Curto loves to work with other people, especially in groups of more than two. He enjoys the camaraderie of working with his peers and friends. He likes sharing his ideas with others and listening to their ideas as well. He is very good at motivating other students and helping people in his group.
Nellie is also an 8th grader. When she works in class she prefers not to work in groups but she does like working with a partner. She likes working with a partner better than groups. She feels groups have too many people and sometimes not everybody in the group pulls their own weight and she ends up doing more work than others which she doesn't think is fair. When she works with a partner she feels there is less goofing off and she gets more work done.
Dave is an 8th grader in the same class as Curto and Nellie. When he works on assignments he likes to work by himself. He is not comfortable in groups or pairs. He likes it when the classroom is quiet and he can concentrate. He likes not having to rely on other people and being the only one responsible for the work he completes.
Answer the following questions;
1. Which one of the three students most resembles the way you like to work in science class? Curto Nellie Dave (circle one)
2. Which student is least like you?
Curto Nellie Dave (circle one)

APPENDIX D

LEE INDIVIDUAL WORK EVALUATION*

** Based on Angelo & Cross, 1993, pg. 350*

Lee Individual Work Evaluation

Participation is voluntary, and you can choose to not answer any question that you do not want to answer, and you can stop at anytime. Your participation or non-participation will not affect your grade or class standing.

1. Were you more comfortable working alone?
   strongly agree agree neutral disagree strongly disagree
2. Was the class work that you completed of higher quality when you worked alone?
   strongly agree agree neutral disagree strongly disagree
3. Were you more excited to come to class when you knew you would be working alone?
   strongly agree agree neutral disagree strongly disagree
4. Give one specific example of a benefit of working alone.

5. Give on specific example of why you don't like working alone.

APPENDIX E

LEE PAIR WORK EVALUATION*

** Based on Angelo & Cross, 1993, pg. 350*

Pair Work Evaluation

Participation is voluntary, and you can choose to not answer any question that you do not want to answer, and you can stop at anytime. Your participation or non-participation will not affect your grade or class standing.

1. Overall, how effectively did you and your partner work together during the chapter?
   Poorly Adequately Well Extremely Well
2. Was your partner prepared daily and did your partner participate actively most of the time? Never Sometimes Always
3. Were you prepared daily and did you participate actively most of the time?
   Never Sometimes Always
4. Give one specific example of a benefit to working with a partner.

5. Give one specific example of why you didn't like working with a partner.

APPENDIX F

LEE GROUP WORK EVALUATION*

** Based on Angelo & Cross, 1993, pg. 350*

Group Work Evaluation

Participation is voluntary, and you can choose to not answer any question that you do not want to answer, and you can stop at anytime. Your participation or non-participation will not affect your grade or class standing.

1. Overall, how effectively did your group work together during the chapter?
   Poorly Adequately Well Extremely Well
2. Out of the three group members, how many participated actively most of the time?
   None One Two Three
3. Out of the three group members, how many were fully prepared for the activity?
   None One Two Three
4. Give one specific example of a benefit of working in a group of three.
5. Give one specific example of what you didn't like about working in a group of three.
6. Suggest one change the group could make to improve its performance.