THE EFFECTS OF STUDENT SELF ASSESSMENT IN SCIENCE

by

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STATEMENT OF PERMISSION TO USE

In presenting this professional paper in partial fulfillment of the requirements for a master's degree at Montana State University, I agree that the MSSE Program shall make it available to borrowers under the rules of the program.

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ABSTRACT

The investigation involved implementing various self-assessment practices and evaluated the impacts on student achievement, self-confidence and mastery of science concepts. The study included 30 eighth grade students with academic abilities ranging from below to above grade level. This research was conducted at Washington Middle School in Missoula, Montana. The treatment was implemented over the course of four physical science units spanning from November through February. Student achievement was assessed by analyzing class participation, unit test scores and Assignment and Effort Tracking Sheets. Student attitudes were evaluated through the pre and post-treatment data from the Student Attitude Inventory and Course-Related Self-Confidence Survey.

INTRODUCTION AND BACKGROUND

Montana is a state comprising a vast area of land that is home to a relatively small population of just over a million people (www.city-data.com, 2011). The city of Missoula is located in northwestern Montana and is the economic and cultural hub of five smaller western Montana counties. In 2010, the city of Missoula had a population of 68,876 people with a median annual income of $37,000. Washington Middle School is centrally located in a mixed residential and commercial area of Missoula and serves just over 600 students in sixth through eighth grade. Our middle school focuses on small teaming, where students see only three or four teachers over the course of a day. The school serves a diverse population including higher socio-economic areas of Pattee Canyon, the Rattlesnake area, and the South Hills, as well as some lower socio-economic areas including University of Montana student housing and East Missoula. Statistics for our school district are reported by the Superintendent's Office and are updated annually (P. Johnson, personal communication, September 20, 2010).

During the time of this study I taught four sections of eighth grade science to a total of 120 students. Our eighth grade science curriculum focused on an introduction to physical and chemical sciences. The science class I selected to include in the treatment was one of varied abilities. Out of 26 students, six had an Individualized Education Program, seven received additional support through our Response to Intervention program, and six were part of our Gifted Education program (Zangle, 2011).

Students in this study worked through various physical science units addressing topics of density, motion, forces, machines, work and energy. Prior to the study

treatment, students had been receiving student learning targets for each unit and were encouraged to use them as a study tool, but little direct instruction had been given on strategies for effectively using the targets. Student learning targets were intended to guide students to know what it was they were expected to be able to do over the course of a learning unit. They were organized by chapter and section and had been used as a checklist for students to assess whether or not they were mastering the content taught.

More pressure has been put on educators to be responsible for student learning since No Child Left Behind (NCLB) was implemented, and with so much focus on content, many students were not learning how to self-assess their own learning and had not been held accountable for their own role in their learning and education. The problem concerned students and getting them actively involved and responsible for their own learning. The intervention administered in this study helped students learn how to better track and assess their own learning as well as helped the teacher understand how students learn and how to better teach students. Despite several studies linked to small groups of students being asked to self-assess and focus on metacognitive strategies while learning, there was little research about specific instruments being implemented to help teach students how to self-assess and very little data to support how this skill affects overall student success and confidence in learning (Sheffield & Walker, 2010). In this study, students engaged in several self-monitoring assessment activities and strategies that were explicitly taught. During the study, data were collected related to changes in student work completion, effort put forth during work completion, self-confidence, and content mastery. The purpose of this study was to investigate how increased levels of

student ownership and self-monitoring of learning relates to academic success, participation, and self-confidence in learning science.

CONCEPTUAL FRAMEWORK

Assessment has a variety of formats and purposes. As an assessment is designed, implemented, and reflected upon there is a need to consider the purpose and use of each assessment. Quality assessments should be based on the learning objectives for students and guide teacher instruction. Assessment can be organized into two basic categories: summative assessment and formative assessment. Summative assessment is generally implemented at the end of a learning cycle to measure what student learning has occurred. Summative assessment is often implemented in the context of final exams, end of unit tests, and standardized testing (Stiggins, Arter, & Chappuis, 2005).

In contrast, formative assessment is designed to occur during a cycle of learning. Its purpose is to provide insights to guide teachers in supporting student learning and to help students guide their own learning. Assessment is considered formative when it helps teachers adjust instruction to better meet the learning needs of students. It is necessary to remember that assessment information is not only useful for guiding teachers' instruction, but it is also important that students are able to interpret and use their own assessment data to improve strategies for their own learning (O'Brian, Nocon, & Sands, 2010).

O'Brian (2010) describes the process of formative assessment as gathering information about student learning, analyzing the gathered information, and then using the information to improve student learning. In order for teachers to practice formative assessment techniques effectively, they need to consider how they will share the criteria

used for evaluating student learning, implement descriptive feedback procedures, engage students in self-assessment practices, and participate in classroom questioning techniques that facilitate gathering information about learning.

Implementing formative assessment techniques also provides students the opportunity to track their progress so that they can help guide their own learning process. When students have clear learning objectives they can monitor their mastery of content; learning targets provide a road map for the direction of their learning. Formative assessment is viewed as a continuous loop of reflection and adjustment in both student and teacher roles. It also sets clear expectations for learning that help change the thinking of both the student and teacher as learning occurs. Formative assessment transforms the act of assessment from a teacher implemented high stakes activity into a student-centered activity that can be used to help students take charge of their own learning. The goal is for the student to see that learning is achievable regardless of their current level of academic success (Fluckiger, Vigil, Pasco, & Danielson, 2009).

A key component of formative assessment is student self-assessment. Lee and Gavine (2003) define self-assessment as a process where the learner is given the information needed to help make decisions about their progress towards learning goals. Self-assessment requires students to set goals, assess, and reflect on their progress during a learning cycle, and create a plan for readjusting and improving their learning. Self-assessment allows teachers and students to work together and collaborate to help students take ownership and responsibility for their learning (Sheffield & Waller, 2010).

In order for students to adequately engage in self-assessment, they must know how to learn. Metacognition, as defined by Novak (1990), is the ability to have an understanding about one's own thinking and self-regulate activities to achieve learning goals. Additional studies support that learners who possess strong self-assessment and regulation abilities are the most successful learners (Lee & Gavine, 2003). It is essential to involve students in the learning process and to help them gain the skills necessary to self-regulate, self-assess, set targets, and increase understanding of their own learning strategies (Farias, Farias & Fairfield, 2010).

Self-assessment puts an emphasis on student responsibility for learning which requires metacognitive skills. It creates a focus on students' need to assess their progress, reflect on their learning, and determine what actions can be taken to improve their learning. Current student-centered pedagogical philosophies state that students need to do more than memorize content knowledge and instead must have the ability to know how to learn. This concept supports that learning is an active process that demands students think about their own thinking (Wilson, 2010). Metacognition is not just an understanding of learning, but also the ability to apply strategies that will effectively improve one's learning. Teachers need to create a learning environment where students can implement metacognitive activities and reflect on their thinking and learning processes.

Student self-assessment has been used to address a variety of behaviors including student engagement in learning, study skills, and homework completion. Waller and Sheffield (2010) indicated that self-monitoring and regulation have proven to have a positive effect on student behavior. By including students in their learning, teachers have

more time to focus on content delivery as well as more information to help guide the strategies used for learning. Although research supports the positive benefits of self-assessment, it is clear that this strategy tends to be underused by educators and more data needs to be collected to clearly show any correlation between students' academic progress, confidence and engagement due to self-assessment activities. Many studies have collected data only in single case study settings, which is often inefficient for generalizing results to a larger population of students in a general education setting. Techniques that can be applied in larger class settings are needed to see if data supports these activities on a larger scale (Sheffield & Walker, 2010.)

Self-assessment has been shown to increase students' intrinsic motivation and encourages them to focus on the learning process instead of simply memorizing information for testing purposes (Lee & Gavine, 2003). Studies also supported the notion that children's motivation to complete work and the effort they put forth in the work they did complete increased as they continued to use metacognitive strategies to self-regulate and assess their work over the course of a unit. In addition to increased motivation and effort, Lee and Gavine also reported a significant rise in student test scores among students engaging in self-assessment, with the greatest gains occurring among students who showed lower academic abilities before self-assessment strategies were implemented.

Students who engage in self-assessment also become less concerned about grades and more focused on the process of learning (Farias et al., 2010). Self-assessment opens the door for a dialogue between teacher and student to occur about how to reach the outlined learning targets. Feedback is an important component of self-assessment and

allows students to see that their capability for success is directly related to their ability to understand strategies for learning and to monitor their current level of understanding (Fluckiger et al., 2009).

As schools and teachers prepare students for the rapidly changing world, a twenty-first century approach to learning must be implemented. Teachers are being asked to restructure their assessment and feedback techniques so that they include the views and needs of students in new ways (Lee & Gavine, 2003). This process will require students to be more engaged in activities that were traditionally considered roles of the teacher. Taking student views into account during the assessment process has been effective in changing assessment procedures and improving student success.

Self-assessment and regulation through metacognitive strategies gives students the ability to know how to learn. Students need to be taught about various self-assessment strategies, how to use them, and when to use them (Wilson, 2010). Research indicates that students who have strong metacognitive skills and self-assessment abilities are successful in school. Helping students have success in school and empowering them with the ability to know how to learn opens the door for lifelong learning and gives students skills they can use and apply outside of the classroom.

METHODOLOGY

The treatment for this study consisted of introducing a group of students to the use of self-assessment tools and strategies. The purpose of this study was to investigate how student self-assessment techniques affected students' mastery of science concepts. Secondary considerations included how self-assessment affected student work

completion rates, overall effort, and confidence in science. This study began at Washington Middle School in Missoula, Montana during the fall of 2011. Twenty-five eighth grade students in one science class section were randomly selected for the treatment. The class section, included students who were identified as working below, at, and above the eighth grade level. The diversity of academic levels allowed the treatment's effectiveness to be analyzed for all students in a general education setting. 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.

The treatment and data collection occurred over the course of five physical science units. Initial baseline data was collected by having students complete the Course Related Self-Confidence Survey (Appendix A) and the Student Attitude Inventory (Appendix B). Both of these data collection instruments were also implemented at the end of the treatment and pre and post data were compared. In addition, pre-treatment data were collected on class participation rates, homework completion rates, and test scores through teacher observations and a field journal. The last technique used to collect baseline data was Student Interviews (Appendix C). Five students were randomly selected and interviewed before the treatment and at the end of the treatment. Students were asked a set of questions related to their current academic confidence and the factors that affected their confidence and success at school.

The Student Attitude Inventory included questions related to students' current effort and attitudes in science class covering a variety of categories including: homework completion, study habits, in class work, use of learning targets, and class participation.

Students responded by selecting *strongly agree, agree, disagree,* or *strongly disagree* or selecting the frequency with which they participated by selecting *never, once in a while*, or *several times*. The Course-Related Self-Confidence Survey included questions about students' confidence related to science content, completing science labs, working in lab groups, science tests, the use of learning targets and their ability to ask for help as needed. Students participated in the Course-Related Self-Confidence Survey by selecting *very confident, somewhat confident* or *not confident* for each of the questions. The data from these two instruments were analyzed by calculating the percentage of students who selected each category and comparing pre and post percentages for categories.

During the treatment, data were collected on student work completion rates, class participation, and test scores. Students received an Assignment and Effort Tracking Log (Appendix D), which they completed daily. Students completed the tracking sheet at the beginning of class when homework was self-corrected and reviewed as a class. Students were required to record the assignment, whether they completed it on time, and how well they did on the assignment by putting the number of problems correct over the number of possible points. In addition, they rated the effort they put forth in completing the assignment with a one indicating little to no effort and a five indicating maximum effort. Ten students were randomly selected over the course of the treatment and an average of their self-reported effort was calculated for each unit.

The percentages of on time work completion and total work completion were recorded each unit, as well as the percentage of students who volunteered answers during whole class discussions. Test scores were used to compare student progress over the course of the treatment period by calculating the average class test scores for each unit.

Students' quarter one and quarter two grades were also compared to see what percentage of students had overall improvement in science content mastery.

Students also received a list of Student Learning Targets (Appendix E) in a rubric format to track their confidence and mastery of the science concepts learned. Each learning target was assessed on the summative assessment for each unit. At the beginning of each unit students checked one of three areas for each learning target: *don't know it at all*, *getting it*, or *got it*. Students filled in and assessed their learning progress using the targets twice a week. Students' answers on the assessment were then compared to the confidence they indicated on the Student Learning Targets rubric. The percentage of questions for which students accurately self-assessed their mastery was calculated over the course of each of the five units.

All instruments were implemented and used to collect data to inform the focus questions as outlined in the Data Triangulation Matrix (Table 1).

Table 1
Data Triangulation Matrix

Research Questions	Data Source		
	1	2	3
1. How will engaging students in self-assessment activities affect their mastery of science concepts?	Student Test Scores	Quarter Grades	Student Interviews
2. How will student self-assessment affect student work completion and attitudes towards homework?	Class Work Completion Records	Assignment & Effort Tracking Sheets	Student Attitude Inventory
3. How will student self-assessment affect student effort on assignments?	Student Attitude Inventory	Student Interviews	Assignment & Effort Tracking Sheets
4. How will engaging students in self-assessment activities affect their ability to accurately monitor their progress?	Student Learning Targets Rubric	Student Interviews	Student Attitude Inventory
5. How will student self-assessment affect student self-confidence in science content?	Class Participation Tracking	Course-Related Self Confidence Survey	Student Attitude Inventory

DATA AND ANALYSIS

Three sources of data were analyzed to determine if engaging students in

metacognitive learning activities affected their mastery of science concepts as measuring

using test scores, quarter grades and student interviews. Over the course of the treatment,

average summative test scores for the class were recorded each unit, including one

baseline unit and five treatment units. There was a five percent increase in average class

test scores from the baseline test average to the final unit test average in the treatment

group (Figure 1). There was a five percent increase between the second and third

treatment tests, but then a decrease of two percent occurred over the final two treatment tests. One student reported, "I was surprised to see my test scores go up each test. At first I didn't think all the targets helped, but when I used them I did better."
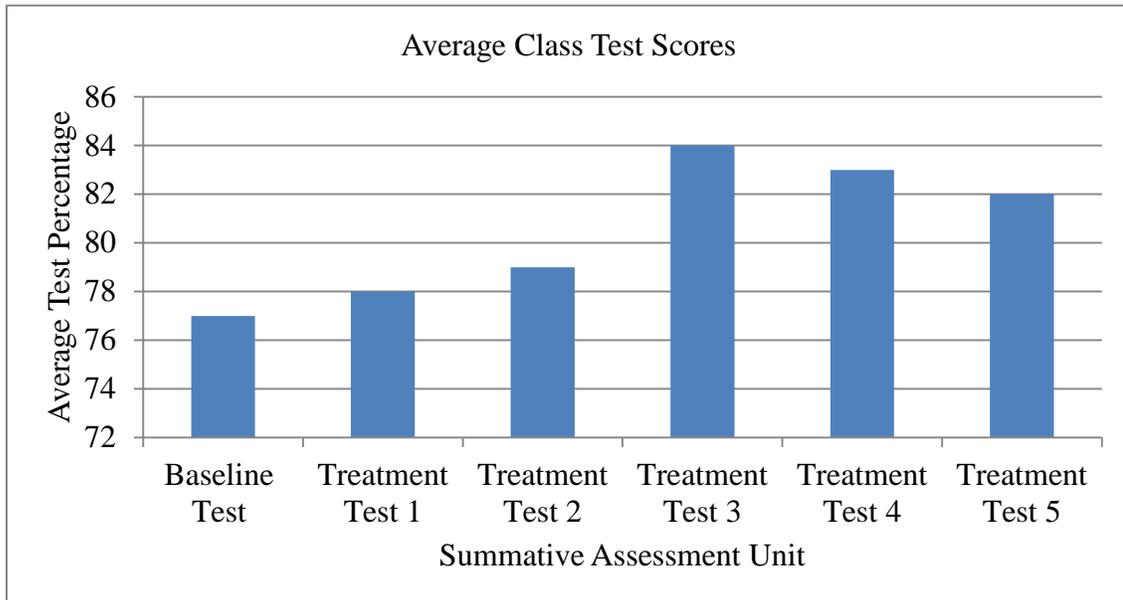

Figure 1. Average Class Test Scores, (*N*=25).

The baseline unit was taught at the end of the first quarter and all five treatment units were implemented during quarter two. Students' quarter grades for quarter one and quarter two were compared. Sixty-four percent of students' quarter grades went up from quarter one to quarter two, twenty-eight percent stayed the same and eight percent of students' quarter grades went down. Thirty-two percent of students' grades that went up from quarter one to quarter two increased by ten percent or more. One student reported, "When I have to think about how well I know the material, sometimes I realize I don't know it that well and then I try to find ways to figure it out."

Several types of data were also analyzed to see how student self-assessment affected student work completion rates. On time and total homework completion rates were tracked daily and averaged for each unit. There was a six percent increase of on

time homework completion and an fourteen percent increase in total homework completion over the course of the treatment period (Figure 2). During the baseline unit, an additional four percent of homework was turned in after the deadline, which increased to an additional eight percent of homework turned in during the final treatment unit. The overall rate of homework completion (including both on time and late homework) was higher during the treatment unit. The overall rate of homework completion increased at a small but fairly steady rate over the course of the five treatment units. One student stated, "Filling out the Assignment and Effort tracking sheet helped me see how much work I was turning in and how much of it I was turning in on time." A second student conveyed that, "It really bothered me when I could look at my tracking sheet and see that I hadn't turned in homework and it reminded me to get it done."
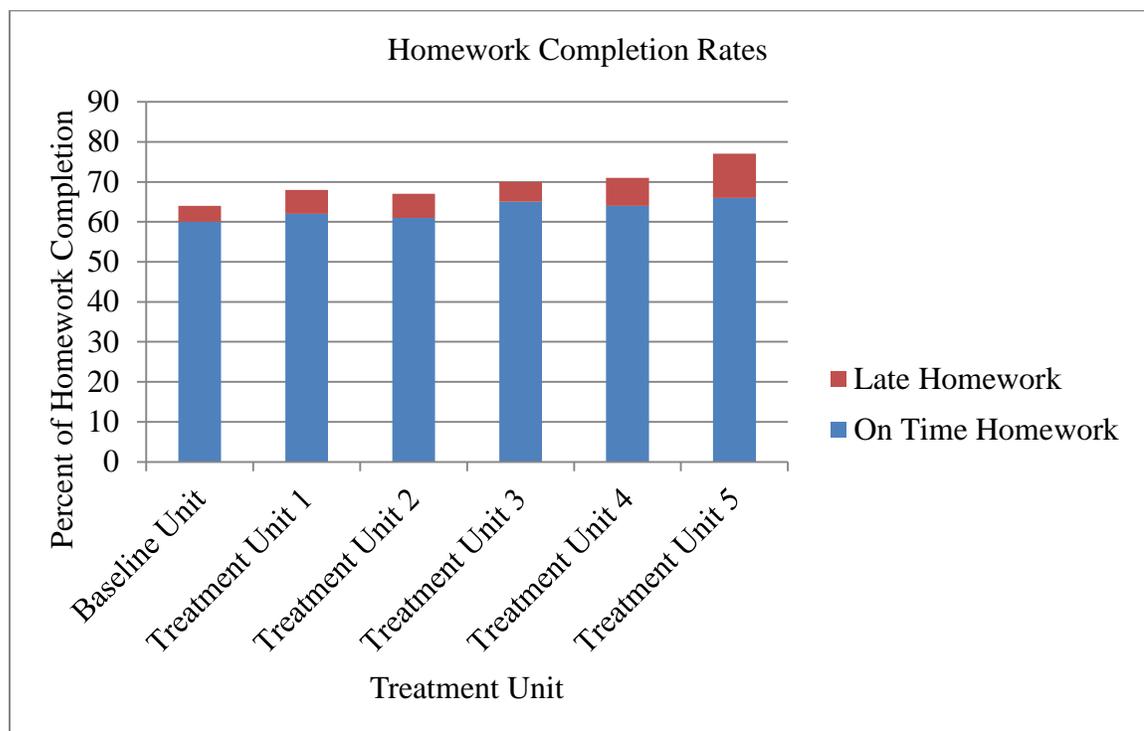

Figure 2. Homework Completion Rates, (*N*=25).

Students' attitudes about the importance of homework completion were analyzed using the Student Attitude Inventory. Pre and post survey results were compared. Students showed a 12% increase in selecting *strongly agree* or *agree* when asked if homework helps them better understand science concepts (Figure 3). There was no increase in students' views about homework being an important part of school and learning, but in post survey results, four percent more students reported using their homework after it was corrected to see what they were understanding. In addition, there was a six percent increase of students who *strongly agreed* or *agreed* that completing homework on time helped them identify what they understood.
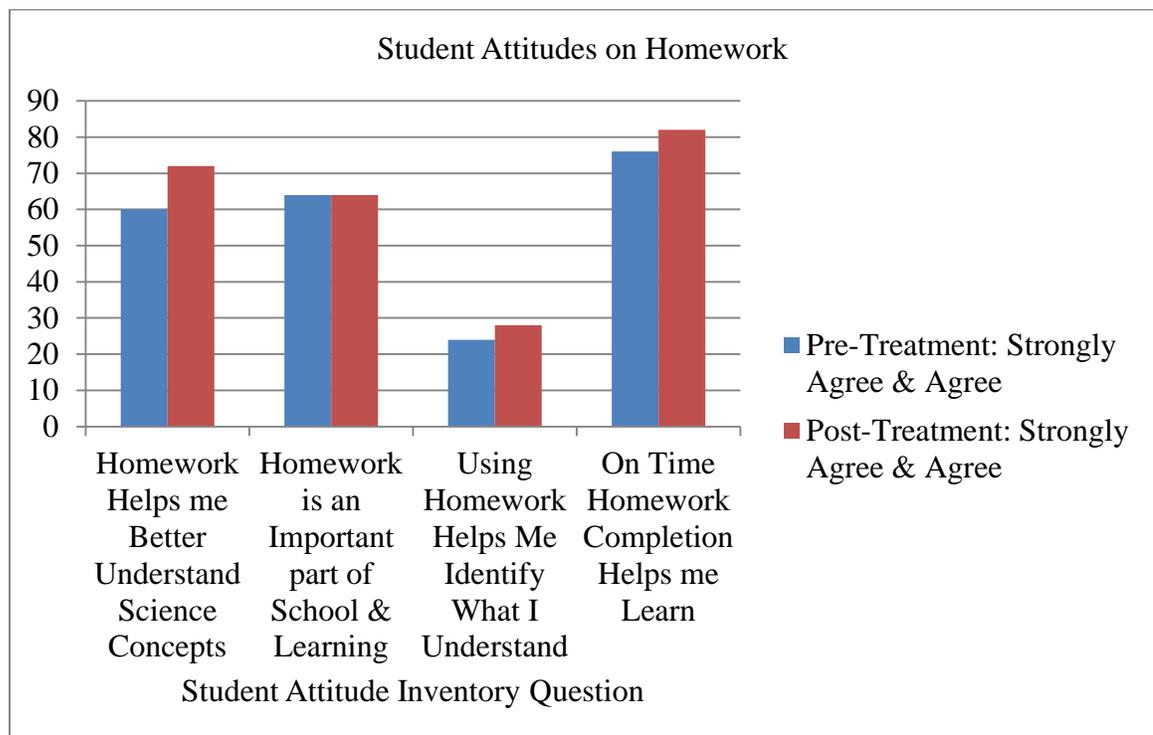

Figure 3. Student Attitudes on Homework, (*N*=25).

Pre and post treatment data were also collected concerning how often students used corrected homework to review science concepts and to study and complete additional practice for science content mastery. This data was used to assess effort

students put forth in learning the content material. There was no change in the percentage

of students who reported *never* using homework as a self-assessment tool, but there was a

16% decrease in students who used homework *once in a while* and a 16% increase from

the pre to post survey in students who reported using homework *several times* over the

course of a unit (Figure 4).
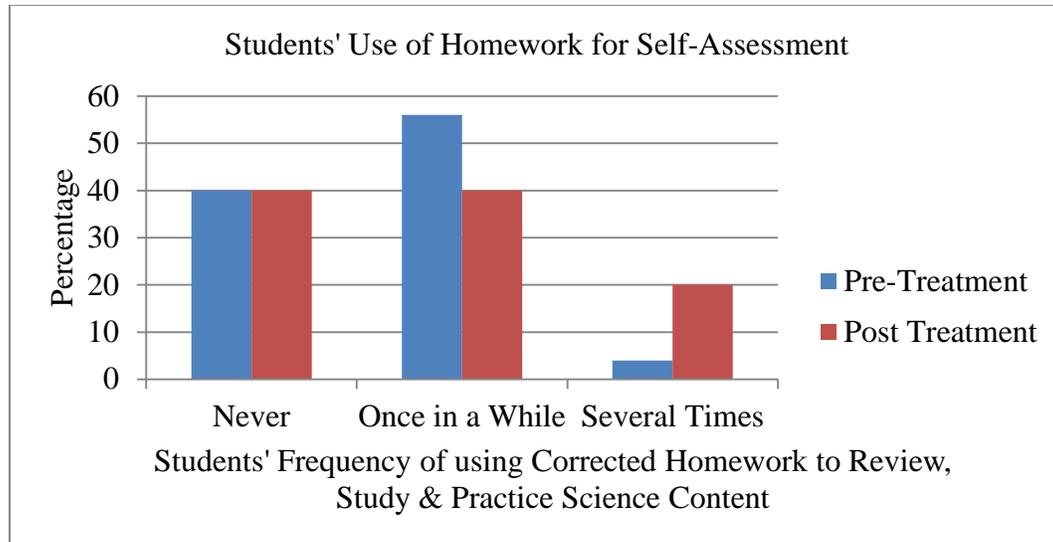
Figure 4. Students' Use of Homework for Self-Assessment, (*N*=25).

The impact of student self-assessment on students' effort was also analyzed

through various data and instruments. The pre-treatment Student Attitude Inventory

indicated that 56% of students *strongly agreed* or *agreed* that they study regularly for

tests. The post-treatment Student Attitude Inventory showed a 12% increase in students

who indicated they study regularly for tests (Figure 5). In addition, 23% fewer students

reported *never* studying their classwork to prepare for tests on the post survey, 33% more

students indicated studying *once in a while* using classwork, and the percentage of

students who study *several* times for a test stayed the same (Figure 6). One student

acknowledged that, "When I have to track how much effort I give and how well I did on

classwork, it makes me want to go back and look at it afterwards to see why I got stuff

wrong."

Figure 5. Students Indicating they Regularly Study for Tests, (*N*=25).

Figure 6. Frequency Students Use Classwork to Study, (*N*=25).

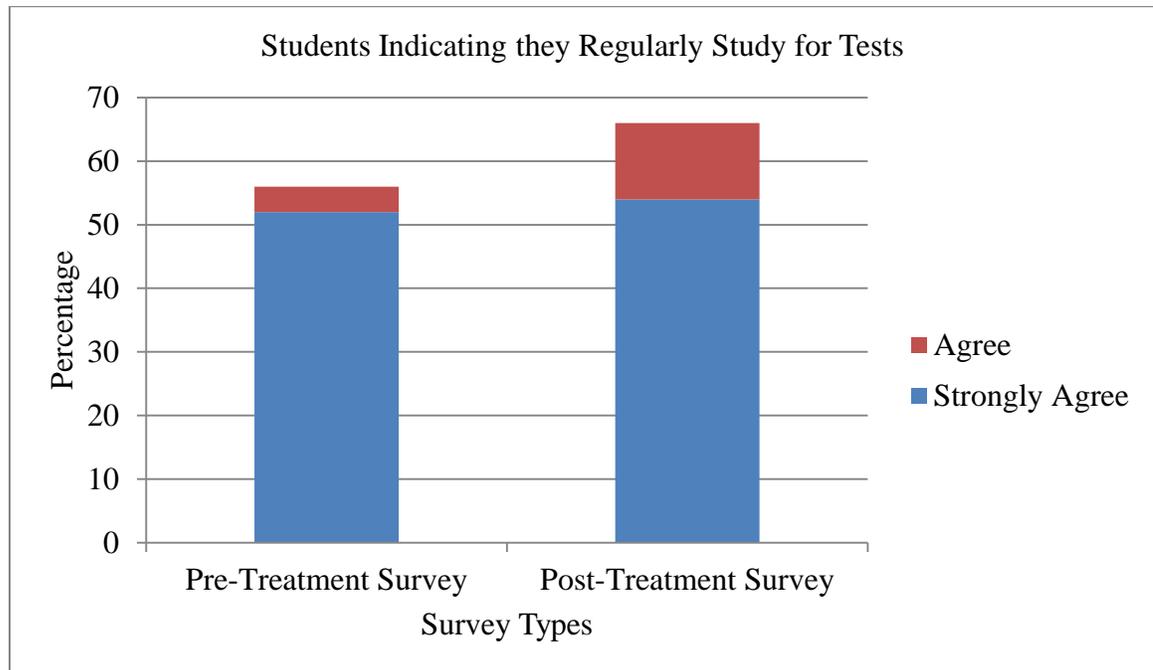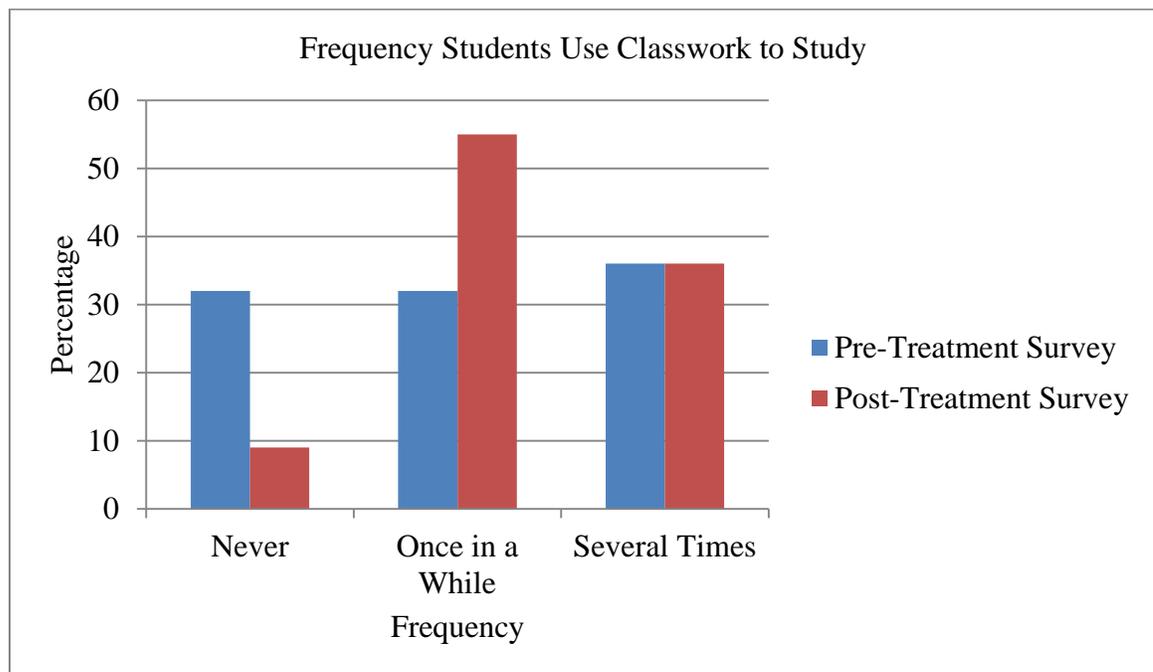The data collected from the Assignment and Effort Tracking sheets showed an increase of two points, on a five point scale, for student self-reported effort on daily homework assignments. That shows a 20% overall increase in how students felt their effort was given on work over the course of the treatment. During interviews, one student indicated that, "I really don't like it when I have to put down a one or two on my effort for an assignment. It makes me think more about how hard I'm trying when I do my homework."

In addition to analyzing how students perform academically in science, complete homework and exert effort, the ability of students to accurately monitor their learning progress was also analyzed. A total of fifteen students, five students of low, five of medium and five of high academic achievement were randomly selected. The accuracy of their ability to report how well they knew material was determined by comparing student self-reports of knowledge on the Student Learning Targets Rubric with teacher-graded performances on the summative assessment for various test questions at the end of each treatment unit. The accuracy for each of the low, medium and high academic groups of students was averaged for each summative assessment over the course of the five treatment units. There was an increase of 15% in accuracy for students in the lower academic group, an 8% increase for students in the average academic group and a 5% increase for students in the highest academic group (Figure 7).
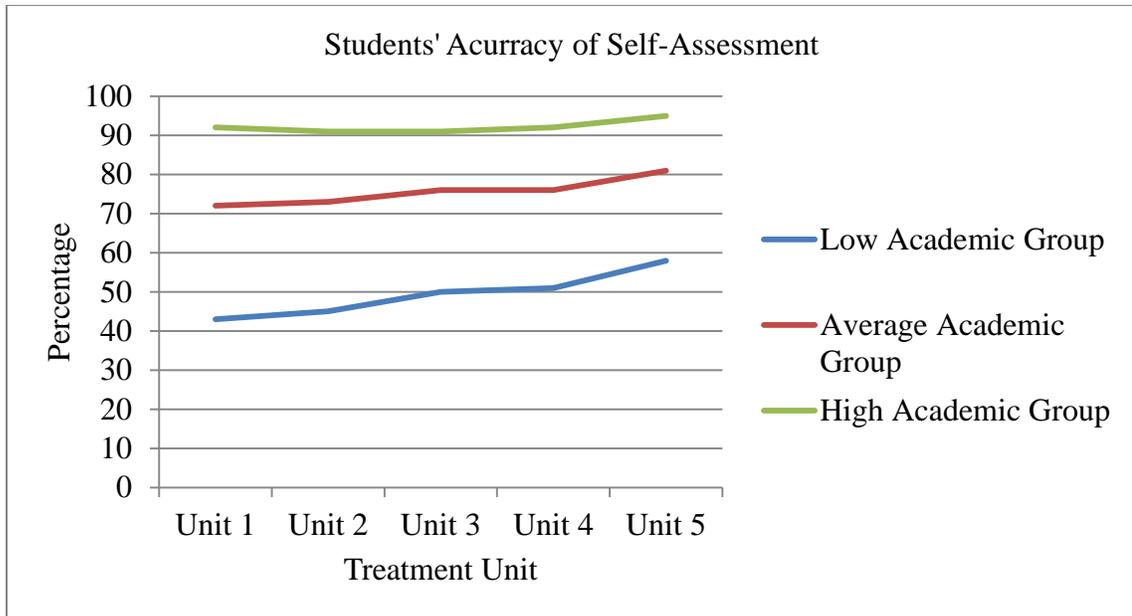
Figure 7. Students' Accuracy of Self-Assessment, (*N*=15).

The Student Attitude Inventory shows a 36% increase for students who *strongly agreed* or *agreed* that learning targets were a useful tool in helping them accurately monitor how well they understand specific learning targets. There was a 32% decrease in the percent of students who felt that learning targets where *never* helpful in predicting their mastery of science content and a 32% increase for students who felt that learning targets where frequently helpful in predicting their mastery. One student stated that, "It's more helpful for me to have three choices for how well I know the material instead of just trying to say yes or no." Another student indicated, "I'm getting better at looking back at my work to really see how well I know something. I feel like I'm getting better at predicting whether I'll do well on a test" (Figure 8).
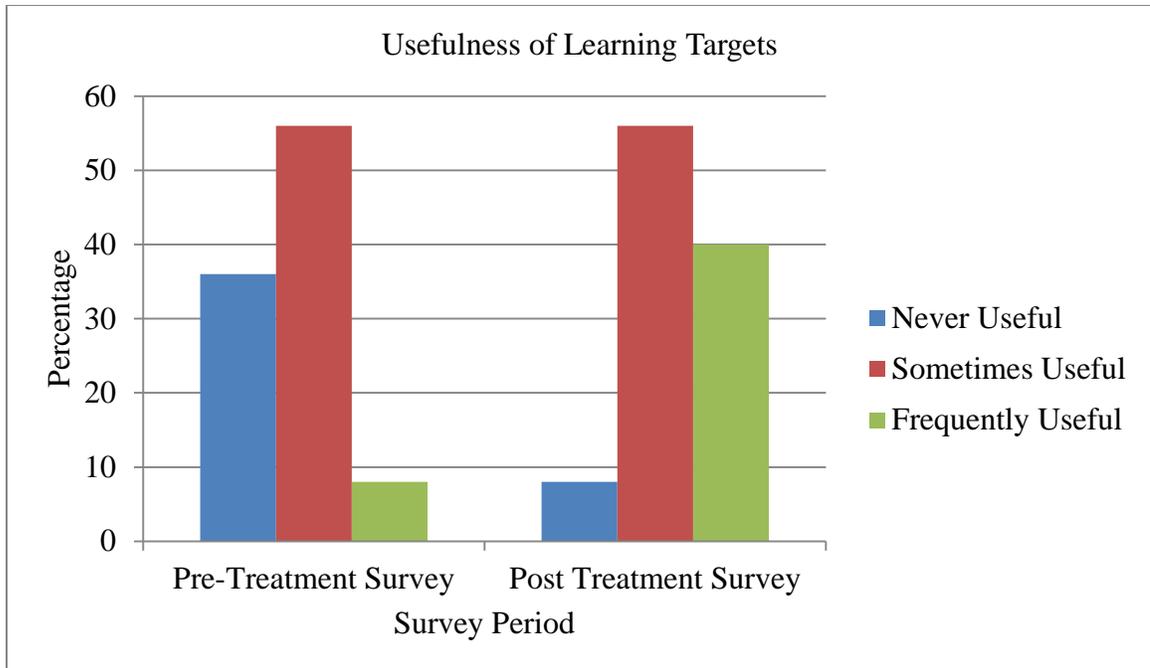
Figure 8. Usefulness of Learning Targets, (*N*=25).

To analyze how self-assessment affected students' overall confidence in science, their voluntary class participation was tracked. Students also answered questions related to their class participation on the pre and post Attitude Inventory. There was an increase of 7% in students who volunteered during class discussions, and a 16% increase in students who *strongly agreed* or *agreed* that participating in class discussions was an important part of learning. There was also an eight percent increase in the percentage of students who felt that participation during in class work and small group discussions were important.

Students also responded to questions related to the frequency they volunteer answers in class, participate in small group discussions and ask for help. There was a 20% increase in the number of students who regularly volunteer answers in class and a 12% increase in students who participate in small group discussions and ask for help when needed (Figure 9).
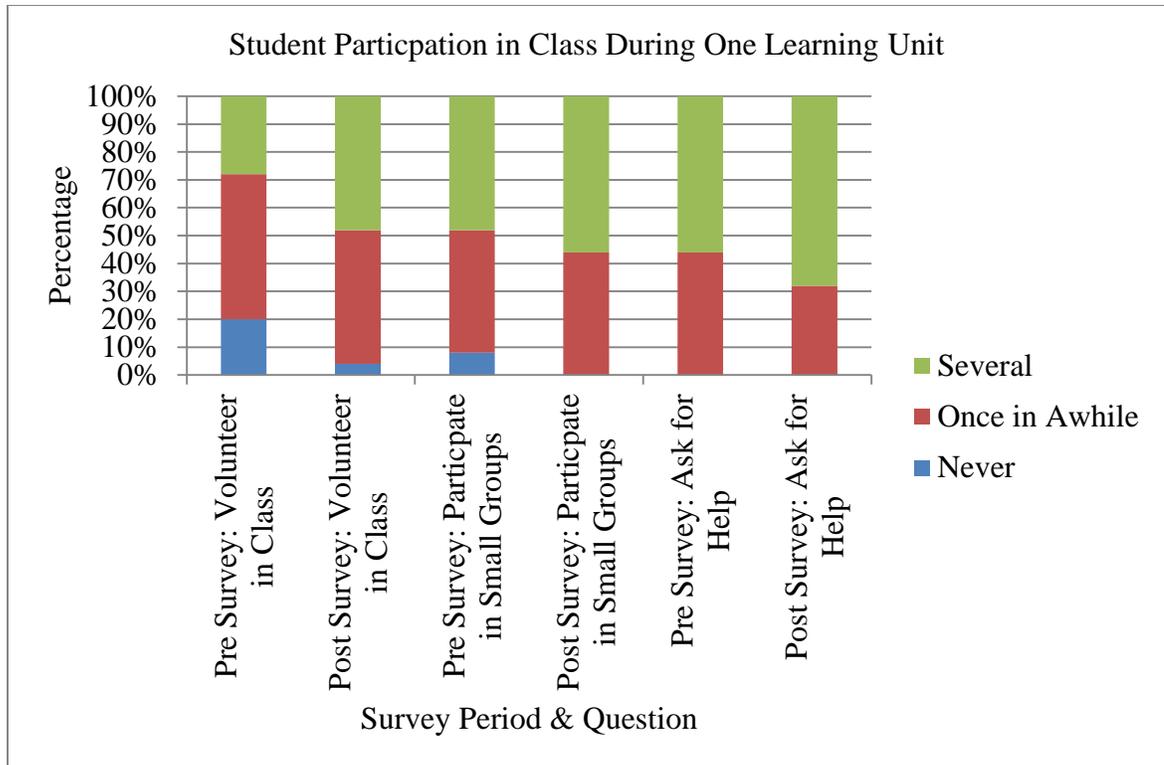
Figure 9. Student Participation in Class During One Learning Unit, (*N*=25).

The pre and post Course-Related Self Confidence Survey results were also analyzed to examine changes in student self-confidence. There was a 24% increase in students who were *very confident* discussing their ideas with the class (Figure 10). The percentage of students who were *very confident* discussing ideas with the teacher went up from 48% to 68%, and the percentage of students who were also *very confident* asking the teacher questions went up 12% over the course of the treatment period. One student indicated that, "The targets help me feel confident when I go to take the test. I know what I should know and don't feel so anxious." Another student shared that, "The learning targets help me review what we've covered. Sometimes I still get stuck trying to figure out the ones I don't understand, but at least I know where I am for the test."

Students also indicated their confidence in their ability to understand science and ability to earn a good grade in science. There was a 16% increase in the number of

students who were *very confident* in understanding science and a 24% increase in the number of students who were *very confident* they could earn a good grade in science. In the post Course-Related Self Confidence Survey, zero percent of students felt *not confident* in their ability to understand science and earn a good grade.
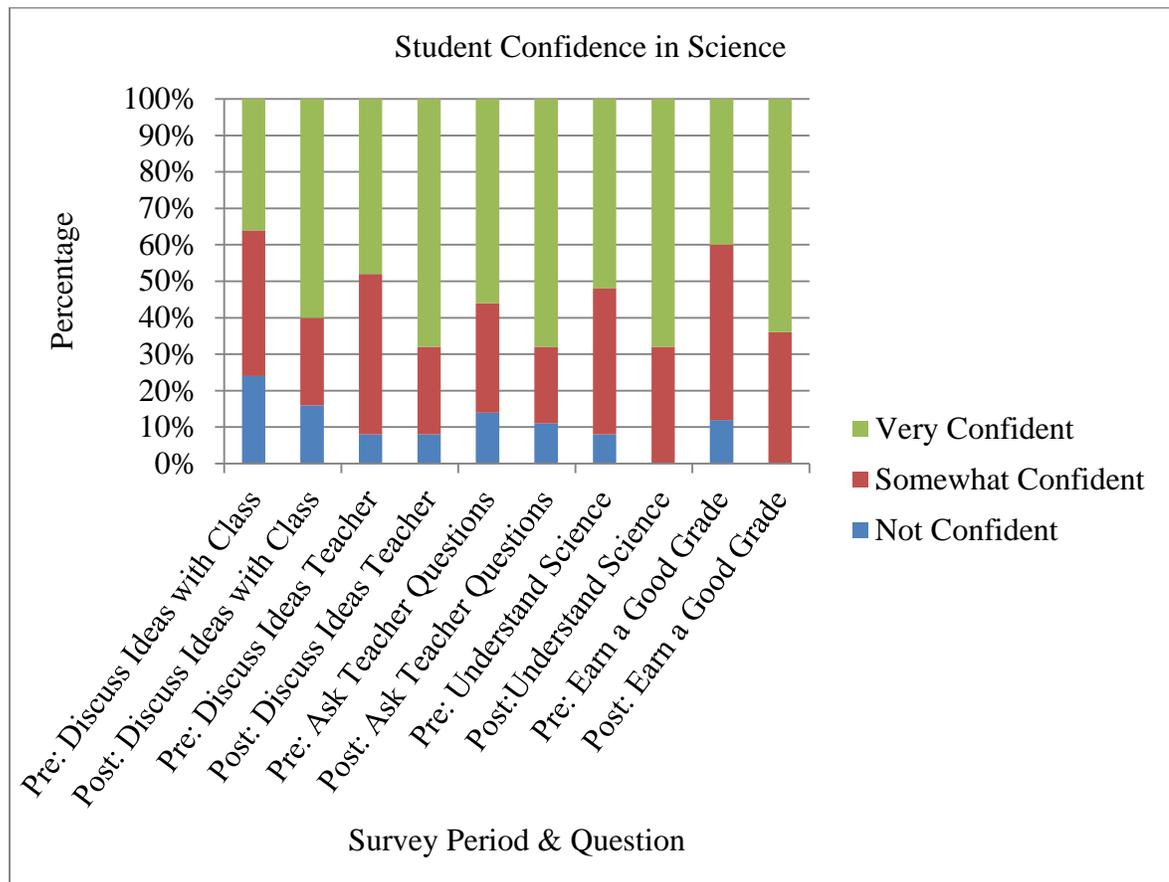
Figure 10. Student Confidence in Science, (*N*=25).

On the pre and post Course-Related Self Confidence Survey students also ranked their confidence in school and science on a five point scale, with five being the most confident. In the pre survey 44% of students ranked their confidence in science as a three or lower and during the post survey 24% of students ranked themselves as a three or lower. Also in the post survey, 52% of students did not rank their confidence in school and science the same. Of those students, 84% indicated they were more confident in

science than in school. One student reported that, "I feel more confident in science than other subjects because the targets help me know what I should be learning and I have to think about how well I'm learning each of the targets."

INTERPRETATION AND CONCLUSION

Although there was a only a 5% increase in the overall class test averages, the number of students failing tests significantly decreased and the data showed 64% of students' quarter grades went up which indicated that self-assessment had a positive impact on their science content mastery. Students who were interviewed also indicated that they were significantly more confident in their ability to perform on science assessments and they also reported a 20% increase in their effort on science work.

The data also showed that lower achieving students struggle to accurately assess their progress, with this group of students starting with less than a 60% average for accuracy. However, this group of students also showed the greatest gains after the treatment with an increase of 15% in their accuracy to self-monitor their learning. The data also showed that higher achieving students already possess a strong self-assessment skill which supports the hypothesis that strengthening these skills will help all students become more academically successful.

The greatest gains in students can be seen in their confidence levels. The post survey showed 16% more students were very confident in their ability to understand science and almost a quarter more of them were very confident in their ability to earn a good grade in science. This exemplifies the question of how much bolstering students' confidence alone can improve their want to exert effort and perform well academically.

Considering the limited length of the study, a relatively small sample size, and that much of the data were based on students' ability to honestly and accurately report ideas, this study supports the continued investigation of how students' self-assessment and metacognitive abilities can positively influence their academic effort, achievement and success in an educational setting. I would like to see if the growth in each of these areas will continue over a longer treatment period. This study also indicates that the next steps should include investigating how to help students find ways to pursue finding the answers to the content in which they are not confident.

VALUE

Over the course of the treatment, my observations indicated that students were really beginning to see the value in self-assessing their learning. Students seemed more interested in their success and seemed to connect their success with their ability to monitor their own learning progress. Lower achieving students began to see that they were capable of being successful and understanding science content and higher achieving students seemed less anxious about summative assessments.

My observations also revealed that students put forth more energy when they had to rate their own effort on assignments. As a class, I began to see students work more diligently together to answer the targets and discuss their findings with one another so that they could report they were understanding the science content. I saw students engage more frequently in small and whole class discussions and take more pride in the work they completed.

As a teacher, it was empowering to see students take control over their learning. One of the biggest frustrations as a teacher is trying to get students to see their success is

linked to their effort and ability to know when to ask for help and for students to be able to identify where help is needed. This action research project showed me that the time it takes to help students learn how to self-assess their progress is time well spent. I would like to continue my research with learning targets and focus on helping students learn specific strategies to continue self-assessing their academic progress, as well as to directly help students who may be struggling with content, to learn specific skills for seeking information.

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APPENDICES

APPENDIX A

COURSE-RELATED SELF-CONFIDENCE SURVEY

Course-Related Self-Confidence Survey

Participation in this research is voluntary and participation or non-participation will not affect your grades or class standing in any way. The purpose of this survey is to best see how you learn and how that affects how confident you are in school. Please answer each question honestly. Please circle the response that *best* indicates your confidence in each area. Your answers will be anonymous.

1. Completing daily homework in science:

    Very Confident   Somewhat Confident   Not Confident

2. Studying for a science test:

    Very Confident   Somewhat Confident   Not Confident

3. Discussing your ideas with your classmates:

    Very Confident   Somewhat Confident   Not Confident

4. Discussing your ideas with your teacher:

    Very Confident   Somewhat Confident   Not Confident

5. Asking the teacher questions:

    Very Confident   Somewhat Confident   Not Confident

6. Volunteering an answer in class:

    Very Confident   Somewhat Confident   Not Confident

7. Using learning targets to study science:

    Very Confident   Somewhat Confident   Not Confident

8. Working with classmates in a small group to complete a lab activity:

    Very Confident   Somewhat Confident   Not Confident

9. Ability to understand science:

    Very Confident   Somewhat Confident   Not Confident

10. Ability to get a good grade in science:

    Very Confident   Somewhat Confident   Not Confident

11. Rate your overall confidence in school between with a 1 and 5, one being not confident at all and five being very confident:_____

12. Rate your overall confidence in science between a 1 and 5, one being not confident at all and five being very confident: _____

<u>APPENDIX B</u>

STUDENT ATTITUDE INVENTORY

Student Attitude Inventory

Participation in this research is voluntary and participation or non-participation will not affect your grades or class standing in any way. Please answer each question as honestly and the best that you can. The purpose of this inventory is to help gather data about you as a student and how you best learn. Your responses will be anonymous.

1. Coming to school on a regular basis is important to me.

   Strongly agree   Agree   Disagree   Strongly Disagree

2. I enjoy learning new things.

   Strongly agree   Agree   Disagree   Strongly Disagree

3. Completing homework helps me understand ideas.

   Strongly agree   Agree   Disagree   Strongly Disagree

4. Completing homework is an important part of school and learning.

   Strongly agree   Agree   Disagree   Strongly Disagree

5. I study regularly for tests.

   Strongly agree   Agree   Disagree   Strongly Disagree

6. Learning targets are a useful tool for studying for tests.

   Strongly agree   Agree   Disagree   Strongly Disagree

7. I use my homework after it is corrected as a tool to see what I understand.

   Strongly agree   Agree   Disagree   Strongly Disagree

8. Participating in class discussions is an important part of helping me learn.

   Strongly agree   Agree   Disagree   Strongly Disagree

9. Completing in class work and discussing it with the class helps me learn.

   Strongly agree   Agree   Disagree   Strongly Disagree

10. Completing homework on time and using it helps me to know what I understand is important.

    Strongly agree   Agree   Disagree   Strongly Disagree

For the following questions, circle the answer that best describes how often you do each of the activities over the course of *one science unit*.

11. I use learning targets to review what I know and to study.

           Never   Once in a While   Several Times

12. I look over my corrected homework to review and study ideas I need to practice more.

           Never   Once in a While   Several Times

13. I study my notes, labs, and classwork to help me prepare for a test.

           Never   Once in a While   Several Times

14. I volunteer answers and participate in class discussions.

           Never   Once in a While   Several Times

15. I participate and share my ideas in small group discussions in class.

           Never   Once in a While   Several Times

16. I ask my classmates and/or the teacher when I have a question about something.

           Never   Once in a While   Several Times

17. I review homework, targets, and activities to see what I still need to study.

           Never   Once in a While   Several Times

Please give a short response to each of the questions below to help further explain your thoughts about how you best learn.

18. What strategies do you use to study?

19. How do you use learning targets?

20. How does homework help you learn?

<u>APPENDIX C</u>

STUDENT INTERVIEW QUESTIONS

1. What types of activities do you engage in to help you study science material?

2. How do you use learning targets?

3. What factors affect how much effort you put forth on assignments?

4. What factors affect whether you complete in class and homework?

5. What other thoughts do you have about what affects how well you do as a

   student?

APPENDIX D

ASSIGNMENT AND EFFORT TRACKING SHEET

ASSIGNMENT & EFFORT TRACKING SHEET

Chapter:_____

Each day, complete the following chart for every homework assignment. Include what the assignment is, check if you turned it on time, record the number of problems you got correct out of the number possible, and record how much effort you feel you put forth in completing the assignment. A one indicates little to no effort up to a five which indicates your full effort. Also make comments and notes about how you did on the assignment that will help you review for the test and/or ask questions.

Assignment	On Time	Grade (#right/#possible)	Effort (1 - 5)	Comments/Notes

APPENDIX E

STUDENT LEARNING TARGET RUBRIC

STUDENT LEARNING TARGETS

Chapter:_____

At least twice a week we will spend time reviewing the learning targets for the unit. As we cover material you will be checking one of the three boxes next to each learning target. The goal is to have checked "Got It" for all the learning targets before the final test over the unit.

Lesson #. Target #	Target	Don't Know It	Getting It	Got It