

EFFECTS OF DATA-DRIVEN INSTRUCTION AND GOAL SETTING ON SCIENCE
LEARNING AND TEST
SCORES

by

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ABSTRACT

Data-driven instruction and goal setting are by no means new to the field of education. This study examined how data-driven instruction combined with student goal setting affected test scores and student engagement as well as how it affected my teaching practices. Analysis of surveys, test scores, journals, interviews and observation protocols indicate that while there was no significant improvement in student engagement in science as observed by teachers and self-reported by students, test scores did increase and students enjoyed the goal setting process and felt that it helped their learning.

INTRODUCTION AND BACKGROUND

Background

Since 2008, I have been teaching at St. Labre Indian Catholic School in Ashland, Montana. I teach eighth grade math and science to 29 students. Every year, the fifth-eighth grades are divided into two homeroom classes based primarily on math scores from the previous year. However, other factors are considered, including teacher recommendations. This study focused on all of the eighth grade students. This class represents a mixture of new students who had transferred from Busby, Lame Deer, and Hardin as well as students who have attended St Labre for years. Students use a McDougal Littell text book series and a new book and topic were introduced every quarter. The first through fourth quarters, respectively, cover Earth's Atmosphere, Life Over Time, Motion and Forces, and Chemical Interactions. The study presented here was conducted during the first quarter Earth science unit and relates to Earth's atmosphere.

School Demographics

St. Labre serves 394 students from pre-school through 12th grade. I currently teach in the St. Labre Middle School Academy, which serves 112 students in grades five through eight. Ninety-seven percent of the students enrolled at St Labre are Native American, primarily from the Northern Cheyenne and Crow Indian Reservations (NCEA Data Bank, 2009-2010). Eighty percent of students enrolled receive free or reduced breakfast and lunch and 44% of students receive Title 1 services (NCEA Data Bank, 2009-2010). In 2010, St. Labre Academy had an average of 82% of students who scored "proficient" or "advanced" on the Criterion Referenced Test (CRT) reading test whereas

an average of 50% of students were proficient or advanced on the CRT math the same year. Currently, St. Labre is training the middle school math teachers in *Strength in Number*, a program designed to identify students' misconceptions and gaps in math and provide targeted math intervention. They have also switched to *Everyday Math*, a more inquiry style math curriculum for kindergarten through sixth grade.

The Academy Program, also implemented at St. Labre, emphasizes academic excellence and discipline. Students are required to wear academy polo shirts to school and professional attire on days that we have mass. One requirement of the academy students is to greet adults and professionals appropriately and respond in the same manner. Teachers routinely greet students with, "Good morning Johnny." Students are expected to respond, "Good morning Mrs. Small." The academy is very culturally active with cultural fashion shows, and Indian club, drum group, pow-wows, cultural language classes, and traditional beading classes.

St. Labre began using the *Measures of Academic Progress* (MAP) test in the winter of 2008. The MAP comes from the Northwest Evaluation Association (NWEA), which is a not-for-profit organization that devised a formative testing system that responds dynamically to each child. The MAP test provides students with engaging, age-appropriate content that adjusts up or down in difficulty depending on how a student responds to questions. St. Labre gives the MAP test in the fall, winter, and spring.

The rationale behind MAP was to provide more immediate instructional feedback for teachers. The IOWA Test of Basic Skills, previously used at St. Labre, provided data only after the school year was already over. Administrators at St. Labre have found the

most valuable aspect of the MAP test is the way it measures growth, not the immediate feedback that it provides as originally thought. This study hopes to increase awareness of the immediate feedback the test provides teachers and use of that data to drive instruction. Currently, the immense amount of data provided by the MAP test is not used for immediate feedback to help guide teaching practices. Lack of use of the MAP data by teachers may stem from the lack of familiarity with simple strategies for applying the data to benefit individuals or groups of students, lack of time to analyze and discuss possible strategies with fellow teachers, or a lack of direction from the school regarding expectations for data use by teachers.

Focus of Study

I became interested in using the MAP data to inform instructional practices because I wanted more out of it than just a Rasch Unit (RIT) score. RIT is a unit of measure that uses individual item difficulty to estimate student achievement. A RIT scale is used to measure how “tall” a student is on the curriculum scale and scores can be compared in order to tell how much growth a student has achieved. The Northwest Evaluation Association (NWEA) placed all students’ test items on the RIT scale according to their difficulty. As a student takes a MAP test, s/he is presented with items of varying levels of difficulty. Once the MAP system determines the difficulty level at which the student is able to perform and the system collects enough data to report a student’s abilities, the test ends and the student is given an overall RIT score.

My observations suggested that teachers only looked at the RIT score from test to test in order to determine if students had improved and if they were at the appropriate

grade level. Teachers were not looking at the more specific data based on the RIT scores or using the data to inform their instructional practices. I also considered the following: how much stock did the students put into this test? Did they really know what the test was used for and was any information shared with them? I also wanted to know how using the data to inform my instructional practices would affect students' learning and would sharing this information with students and setting goals affect their engagement in the learning process and their MAP scores.

Focus Questions

The purpose of this study is to implement a dual approach to improve teaching and learning through more systematic use of state-aligned computer-based science testing data. First, the test results will be used on an ongoing basis to guide and redirect instruction. Second, in response to student requests during pre-study interviews, I will involve students in using the test results to set learning goals during one-on-one student-teacher conferences.

Focus questions:

1. How can standardized test data in science be used effectively to guide instruction?
 - 1a. How does the use of standardized test data change instructional practices in science?
2. How will informing students about their specific objectives affect their engagement in science class?
 - 2a. Does informing students of their specific strengths and weaknesses, as indicated from the performance data, increase their engagement in the learning process?

2b. Will informing students of their specific strengths and weaknesses, as indicated from the performance data, increase students' diagnostic test results in science?

2c. What impact does setting goals with students regarding their performance data, have on student learning and future MAP scores?

CONCEPTUAL FRAMEWORK

Introduction

Data-driven instruction is not a new idea in education; however, it is once again receiving more attention due to accountability issues that schools are facing. This literature review focuses on how *No Child Left Behind* (NCLB) and high-stakes testing affects schools, the challenges that data-driven instruction faces, the role of teachers in the process of data-driven instruction, the essential elements of data-driven instruction, the use of goal setting with students, the gaps seen in student achievement and data use, and schools that are effectively using data. This literature review will address 1) how NCLB and high-stakes testing affects schools, 2) challenges & obstacles of data-driven instructional processes, 3) the role of teachers, 4) the essential elements, 5) goal setting, 6) gaps in how data is used, 7) schools effectively using data.

NCLB and High-Stakes Testing

Since the implementation of *No Child Left Behind* (NCLB) in 2001, the administrators in the United States have become more focused on academic achievement because the legislation mandates that students be tested and schools held accountable. *No Child Left Behind* impacts schools in two very distinct ways: first, it made the use of data

to improve student achievement imperative and second, it increased the need for constant school improvement (Courneen, 2008). There has been a cultural shift in the last 20 years from using data generated from high-stakes tests solely for compliance with NCLB to using the data for improving student performance in the classroom (Marshall, 2009). Marshall (2009) noted that teachers' interest levels remain low and resentment high because these assessments were designed on an expedient and not necessarily pedagogical basis. NCLB requires that schools assess students on a regular basis in order to mark progress and pinpoint weaknesses in core academic subjects; therefore, it is necessary for schools to review and use the data in an effective manner. The *NCLB* requires accountability from states, districts and schools for student achievement and regular assessments. These assessments must be reported in the aggregate as well as disaggregated form by individual subgroups of students (NCLB, 2004). Districts must therefore use the data to meet these requirements. Using the data for reasons beyond just meeting these basic requirements, such as to inform teaching, seems to be a logical follow up to help districts meet the requirements of adequate yearly progress (AYP).

Measurement-driven instruction occurs when a high-stakes test influences the instructional program that prepares students for the test (Popham, 1987). Data-driven decision-making (DDDM) is about getting better information into the hands of teachers and using it to make better decisions. DDDM in education refers to teachers, principals, and administrators systematically collecting and analyzing various types of data, i.e., input, process, outcome, and satisfaction data, to guide a range of decisions for improving students and school success (Marsh, Pane, & Hamilton, 2006). NCLB is about accountability of the states to the federal government for the funds they receive. The

terms *data-driven decision-making* and *measurement-driven instruction* are to a great degree interchangeable in that they address the same issue of how schools handle the accountability issue (Isaacs, 2003; Mandinach, Honey, & Light, 2006; Popham, 1987).

Historically, teachers used testing only when the instruction was completed. However, due to NCLB, educators have begun to shift their thinking and use the data generated by high-stakes tests to drive instruction and assess student learning, rather than just obtaining a score for grading purposes. Prior to NCLB, state and teachers' assessments were adopted or developed to maintain ongoing assessment measurements; to this day, there is a struggle to balance the use of summative and formative assessment in the classroom and at other levels. While teachers' assessments are both formative and summative, district and state assessments are generally summative. There is no requirement that district and state assessment must be solely summative, rather it is just a matter of people deciding to use them for formative purposes. In this time of greater accountability, schools must show statistically supported evidence that their approach is working and that students are learning (Courneen, 2008). Benchmarks established in Montana, among other states, require 100% student proficiency in tested subject areas by the 2013-2014 school year. Schools, however, are still struggling to meet these criteria. Making decisions based on data, therefore, has become more prevalent due to the pressures that states are under to meet criteria (Klein, 2011).

In March of 2011, lawmakers came together to begin revising the current version of NCLB. They called for revision to the accountability system so that it focuses on student growth rather than comparing different groups of students to one another (Klein, 2011). They also wanted to assess various systems for measuring the effectiveness of

teachers, including student outcome data. This push for change to the NCLB law will put even more emphasis on data to guide educational practices and instruction.

Challenges & Obstacles of Data-Driven Instructional Processes

There are several challenges or obstacles that go along with the successful implementation of data-driven decision making schools must consider if they are going to succeed. One of the biggest factors is the extensive training that is required in order to successfully adopt data-driven approaches. Because they are not trained in data analysis, teachers tend to think of their students on a case-by-case basis rather than patterns of student achievement. The decision-making strategies that teachers often employ do not have the systematic focus to look for bigger patterns from year to year or class to class. Their decisions are often unintentionally biased, due to a lack of training about how to look at concepts such as distribution, variation, and reliability (Mandinach et al., 2006). Teachers may feel that they are not really teaching, as much as they are constantly preparing students for testing; further, they may feel that due to NCLB mandates their classroom routines and practices are being changed (Mandinach et al., 2006).

Time is another factor to consider for successful implementation of data driven decision-making, or more accurately, lack of time. Data analysis is very time consuming due to the way data are stored electronically with few people having access to it. There are few educators who are prepared and adequately trained to make efficient use of all the data they acquire. The vast majority of educators need professional support to help them turn the collected data into successful classroom practices (Wayman & Stringfield, 2006). Teachers also need time to meet and collaborate with professionals as well as fellow

educators to analyze and evaluate data so they can effect classroom change. An effective system of data driven decision-making will allow for frequent analysis and adjustments of instructional practice.

Role of Teachers

Teachers play possibly the most important role in this process due to the fact that they are the ones “in the trenches.” Educators have a responsibility to provide meaningful opportunities for students to learn the material that will be tested. This requires examining data the test-results data and making informed decisions about what needs to be taught in order to effectively prepare students. Ultimately, teachers are held responsible for preparing their students for what they will be accountable for knowing (AERA, 2000). Studies show that the more teachers learn about the data, the more they use it to make informed decisions about classroom practices (Wayman & Stringfield, 2006). Effective teachers use data on a daily basis to inform their decisions. Research also shows that teachers who use student test data as an indicator to guide their teaching are more effective than teachers who do not use that information (NCLB, 2004).

Teachers are often wary of only using one data source and prefer to use multiple resources to inform their thinking and decisions. This is exactly what researchers do in order to reduce the likelihood that one perspective will skew the results. The more informed a teacher becomes by the data, the more instructional validity the decisions will have (Mandinach, Honey, & Light, 2006). It is not only important to focus on the collection of data, but also what is done with the information that is collected (Garrison & Ehringhaus, 2007). As mentioned earlier, teachers need time for collaboration so they

can have data-based discussions about students' progress and create plans to adjust their classroom strategies if necessary. There is a need to identify patterns of effective practices from formative assessments and talk about what the data indicates. When educators analyze and evaluate their results on a regular basis and implement plausible interventions when needed, it seems likely that student learning will improve.

With appropriate training, teachers will learn how to pinpoint specific areas where students need extra help and even remediation. They will learn how to analyze data and talk with various staff members and support staff to improve the overall student-learning environment (Gamble-Risley, 2006).

Essential Elements

According to Popham (1987), by meeting the following criteria, schools using measurement driven (also known as data-driven) instruction will almost certainly guarantee that the program will have a beneficial effect. The criteria include 1) clear criteria-referenced tests, 2) defensible content, 3) manageable number of goals, and 4) instructional illumination. Others identify three key elements for successful implementation of data-driven instruction. These elements include purposeful collection of data and data analysis, designated resources such as time, and strategies for communicating about the whole process (MCREL 2005-2006). There are many variations of the fundamentals of data-driven instruction, but there is commonality within the research. Teachers must be able to collaborate about this process in order to ensure successful implementation of data-driven instruction. Generating data is not enough, as teachers must have the opportunity to obtain, discuss, and analyze the data so that they

may identify solutions and develop meaningful and effective plans of action (Courneene, 2008).

In order for the data to be useful for instructional planning, data must be current, accurate, and in the hands of trained and knowledgeable educators who are making the implementations. The issue of training is critical if teachers are expected to make appropriate and knowledgeable decisions and implement them successfully. Teachers need the ability to examine data distribution as a whole, rather than focusing on individual students. They must understand what constitutes an important difference within the group, and know how to interpret interactions (Mandinach, Honey, & Light, 2006). Ultimately, it is how the teachers use the data, how well they are trained, the time they have to allot to the process, and how they use the data to make appropriate action plans that determines the success. By following a model of purposeful data collection, time allotment, communication and analysis of data, identifying solutions, and creating plans of action schools can meet the essential elements and experience success.

Goal Setting

There are several reasons for using goal setting with students. Setting goals with students can be beneficial when using data driven instruction as well as for teachers as they are analyzing data and implementing action plans. Goals are motivating when learners view them as challenging, but attainable (Schunk, 2003). As teachers are involved in the process of analyzing data in order to instruct change in the classroom, they become more knowledgeable about their students' academic standing and their potential, and therefore the process of goal setting becomes easier.

According to Ames (1992), who studies how middle school students' perceptions of their classroom's goal orientation affects their actions, mastery goals orient students toward developing new skills, understanding their work, improving their level of confidence, and achieving a sense of mastery. She states further that increased use of mastery goals with students will increase the amount of time students spend on learning tasks as well as their persistence in the face of difficulty. Effective learning and problem-solving strategies characterize active engagement of students. However, low-achieving students may to a large extent, lack knowledge of these strategies (Ames, 1992).

SMART (specific, measurable, attainable, realistic, and timely) goals use specific base-line data to set measurable year-end goals. They must have a measureable baseline and target, a specific time frame, specificity as to what is being assessed and method of assessment, and focus areas that guide future action to reach the learning target. A goal that is realistic and relevant to the student will result in improvement of the task at hand (Doran, 1981). Attainability is another aspect of a SMART goal. Setting specific performance objectives that track progress toward the goal can help one see movement toward the goal even if the goal seems to be difficult to obtain (Doran, 1981).

Quality goal setting with students may engage them in instruction and the learning process because it creates clear expectations (Garrison & Ehringhaus, 2007). In order to be successful, students must understand and know the learning goal/target and how to reach it (Garrison & Ehringhaus, 2007). In the face of NCLB and school accountability, teachers need to consider the use of goal setting as well as data driven decision making to improve students' learning.

Gaps

There is an increasing gap between how data is used to satisfy administrative demands and how data is used in concert with other sources, to aid instructional decision-making (Mandinach, Honey, & Light, 2006). Educators, both in the classroom and in administrative positions, must communicate and collaborate so that successful implementation of data-driven decision-making may occur. Narrowing this gap will require time and training for both groups but is necessary to help increase student learning and to create more effective teachers and administrators (Courneene, 2008; Garrison & Ehringhaus, 2007; Mandinach, Honey, & Light, 2006).

Educators need to be aware of where gaps occur and by examining the data can provide that insight. The more information about students that is in the hands of educators, the clearer picture we will have about achievement or where gaps occur. We can then analyze and evaluate data to pinpoint why these gaps are occurring and implement effective action plans (Garrison & Ehringhaus, 2007).

Effective Schools – Using Data

Effective schools are using data to gauge student progress throughout the school year. They then use the information gained from the data to customize curriculum and instructional practices. The data provided schools with information about when and where interventions are needed. It is a continuous process as mentioned earlier. Schools that are experiencing success have strong help and support from their district (Gamble-Risley, 2006). For example, there is strong district support in the Elk Grove Unified School District of Elk Grove California.

In the EGUSD there is strong district support in the form of available staff to work with teachers in areas such as data analysis, helping teachers identify areas of concern, and applying strategies based on data analysis to improve learning. If an Elk Grove teacher has tried existing tactics and programs and still experiences below-basic test scores, the district provides a support team. The support teams consist of various members of the district and they customize programs to each school and teacher's need. Part of that support involves professional coaching (Gamble-Risley, 2006). EGUSD has approximately 62,000 students across 64 schools, compared to St. Labre with 394 students across three schools. I believe that even though EGUSD may have greater ability to implement these support teams than St. Labre due to the size and resources, it is also true that change is sometimes easier to initiate in smaller school systems with fewer layers of bureaucracy.

Conceptual Framework Conclusion

In this day and age of higher accountability and high-stakes testing, the use of data to inform instructional practices is critical. It is no longer adequate to just teach the standards and objectives. Schools are becoming inundated with data from the state tests and smaller more localized testing. Now the question is what we do with the acquired data. Research has shown that using data to drive instruction is an effective way of increasing test scores and student learning. With the added aspect of setting goals and sharing information with students, we as teachers can increase student engagement as well.

METHODOLOGY

The treatment for this study was implemented from November 2011 to January 2012. The treatment class consisted of 33 eighth grade students. Student performance ranged from on or above grade level to five years behind grade level. Students had a diverse range of abilities and exposure to science. The 8th grade class was divided into two homerooms based primarily on their varying math levels. One class consisted of 12 students with higher-level math skills and these students used a pre-algebra textbook. This class also had students who scored higher on the science MAP test. The other homeroom class consisted of 21 students, 3 of whom transferred in around second quarter. This class had lower-ability students, used a general math textbook, and scored lower on average, than the other class. There were also more behavior issues in this larger class that were not necessarily due to the larger class size. By the end of the treatment, the class had changed even more. Six students transferred to other schools, two students changed to another homeroom, and two new students had enrolled. 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 first part of my treatment dealt with how talking with students and setting goals with them affected their knowledge of specific content and their science MAP scores as well as how it affected their engagement in class. The second aspect of treatment involved my teaching practices. I wanted to assess whether the use of standardized test data in science changed my science instructional practices. Students took the MAP test the last week of September 2011 and then met with me, setting an

initial long-term goal and their first short-term goal the first week in November. During this initial conference, students were shown the data provided from the MAP test and shown how to use the data to help them set weekly short-term goals. At the end of every week, students were given a prompt (Appendix A) to help them reflect on their weekly goal and set a new weekly goal for the next week. They wrote their reflections in a journal, which was also used to keep notes and work relating to specific content goals they may have set. Earth's atmosphere and some life science concepts regarding Earth's formation were emphasized during the treatment period.

Pre-Study Interview

My pre-study student interview took place in September of 2011 and questions (Appendix B) focused on how aware students were of the purpose of the MAP test and determining to what extent the data was previously shared with them. This interview involved 10 students selected randomly to be representative of the students in my treatment class.

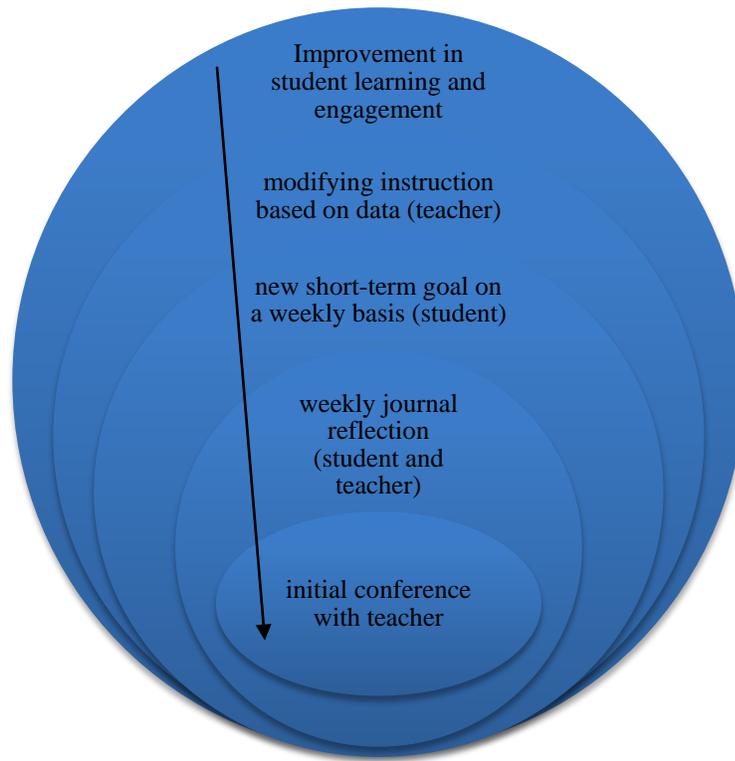
Treatment

Figure 1. Treatment Process and Logic Model.

I began talking with students about their MAP scores beginning the first week of November, which was also the beginning of the second quarter. When I met with a student we looked at the MAP score for each in the general science category and the science concepts and processes category, as each is scored separately. Using goal setting sheets to keep a detailed record of our conference, we began to set goals. We looked at the specific DesCartes data provided from the MAP test and used the student's RIT score to focus on the areas to introduce, reinforce, or to enhance for the student, as well as any vocabulary that the test identified the student should know. The student was then asked to set long and short-term goals regarding the MAP test and their science learning. The

long-term goals were focused on the upcoming MAP test in January, and the short-term goals were weekly goals the student set and then reflected upon in a weekly journal entry. One student reflected, “I don’t know if I met my goal or not.” Another student said, “I am frustrated because I can’t find my goal and I don’t have enough time.” Students used the charts with their appropriate RIT range to help them set new weekly goals. Students met with me briefly about their new goal as well. I also kept a journal to reflect on the action research process throughout the treatment. As I read the student reflections, I used that information to guide the process and tried to make it more effective for our class.

After students set both long-term and short-term goals we referred to data provided by the MAP test and used the DesCartes data to help direct the focus of each student in specific areas in earth and life science. Students were given a weekly prompt to reflect on the short-term goal they had set for the week and how they felt about their progress toward their long-term goal. The journal prompt is provided in Appendix A.

I examined the DesCartes data regarding the nature of science and the concepts and processes of conducting science and what each student needed. I tried to gear my instruction to the types of learning that the data indicated the students needed. Teachers need to make informed decisions about what is taught and how it should be taught and have data available to them from many sources. My goal was to do just that and use the valuable data for more than just a RIT score that informs us only of the student’s level of academic achievement. I also thought it critical to share the data with students and posted the data on charts around my classroom so that students could use the data as much as I could. Figure 1 above shows the process of my treatment.

Data Collection Methods

Data collection techniques consisted of several components (Table 1). To assess engagement in the learning process, students were given a Student Engagement Survey on a weekly basis in the form of a Likert scale (Appendix C). I completed the Teacher Observed Engagement Survey on a weekly basis (Appendix D). Two teachers from the middle school also observed my class and completed a Teacher Observed Engagement Survey (Appendix D) in my classroom two times during the treatment. This was done voluntarily as they felt they had time to come into my classroom during my science classes. Their available time was limited due to scheduling conflicts. I completed the Instructional Practices Pre/Post Survey (Appendix E) at the beginning and end of the treatment. On a daily basis, I completed the Instructional Practices Log (Appendix F) in order to track my teaching practices and to assess whether my practices changed or evolved over the course of the treatment.

During the nine-week treatment that began in November of 2011 and ended in January of 2012, the data collected was reflected upon and data collection methods adjusted as needed in order to gather more valid results. I added the Student Engagement Class Observation Sweep (Appendix G) to replace the Weekly Observation Checklist that I had originally planned to use to monitor student engagement. This sweep was done on a semi-daily basis and individual students were selected randomly and observed throughout the treatment. I also added a question to my Weekly Journal Prompt because I felt the need to have students tell me what could be done to improve the goal setting process and how to use the journals more effectively. All data collection techniques used in this treatment are listed in the table below.

Table 1
Data Triangulation Matrix

Research Questions	Data Source 1	Data Source 2	Data Source 3
How does the use of standardized test data in science change instructional practices in science?	*Instructional Practices Pre survey for Teachers (before Fall 2011 MAP test) *Instructional practices Post survey for teachers	*Teacher Generated Instructional Practices Log (completed weekly from Fall 2011 MAP test until Winter 2012 MAP test)	*Daily journal reflection of teaching practices
Does informing students of their specific strengths and weaknesses, as indicated from the DesCartes data, increase their engagement in the learning process?	*Student engagement/Likert scale survey (weekly from Nov 1 st – Winter 2012 MAP test))	*Teacher Observed Engagement Survey (weekly from Nov 1 st – Winter 2012 MAP test)	*Student Engagement Class Observation Sweep
Will informing students of their specific strengths and weaknesses, as indicated by the DesCartes data, increase students' science MAPS scores?	*MAP RIT scores from Fall 2010, Winter 2011, Spring 2011 (Growth/percentile change)	*MAP RIT scores from Fall 2011, Winter 2012, (Growth/percentile gain)	
What impact does setting goals with students regarding the DesCartes data have on student learning and future MAP scores?	*MAP RIT scores from Fall 2011, Winter 2012, (Growth/percentile change)	*weekly student journal reflections	* Chapter pre and post tests with specific science content

Students' MAP scores were analyzed by examining fall 2011 scores, as compared to the winter 2012 scores, in order to assess growth or percentile change. Similar

comparisons were made in order to analyze how setting goals with MAP data impacts student learning and future MAP scores. A pre and posttest for each chapter of the *Earth's Atmosphere* unit and the *Life Over Time* unit were given to students to help determine if the specific science content for the unit was mastered. This was necessary because the MAP test was more general and would not pinpoint one particular concept such as whether or not a student understands what the Coriolis effect is or what type of weather is associated with a low-pressure system. Students' journals were analyzed by creating a chart with categories for emerging themes that I recognized and by examining the patterns of common or repetitive themes.

Student Engagement and Teacher Observed Engagement Surveys

The first data collection instrument implemented was the "Student Engagement Survey" (Appendix C). Student Engagement and Teacher Observed Engagement Surveys developed for this study were based on the *Student Engagement Teacher Handbook*, published by the International Center for Leadership in Education in 2009. This handbook discusses obtaining student feedback through the use of specific questions as discussed below. The Student Engagement Survey (Appendix C) assessed how students felt about their level of engagement for the week. The Teacher Observed Student Engagement Survey (Appendix D) was completed by the teacher on the basis of their observations of the students' engagement.

The research question addressed by these instruments is, "Does informing students of their specific strengths and weaknesses, as indicated from the DesCartes data, increase their engagement in the learning process?" The *Student Engagement Teacher*

Handbook discusses obtaining feedback about the level of engagement from students in a quick and informal way. This may be accomplished by assessing their answers to the following statements: The work is interesting and challenging, I am inspired to do high-quality work, I understand why and what I am learning, and time seems to pass quickly.

To analyze the results of the Student Engagement Survey, data was entered weekly on an Excel spreadsheet. I examined the most frequent responses as well as the least frequent responses when analyzing this data. I created bar graphs for a visual display of responses as well.

This survey was given on a weekly basis, beginning in November of 2011. I attempted to have prolonged participation and persistent observation to ensure more accurate results. I walked students through this question-by-question rather than just handing it to them and saying, “fill it out.” I believe that prolonged and persistent observation, reading the survey aloud to the students, encouraging them go through it systematically and thoroughly produced more accurate and thus more valid results.

The Teacher Observed Engagement Survey (Appendix D) was designed to be answered by the teacher based on observations of students’ engagement. The research question that this instrument addresses is, “Does informing students of their specific strengths and weaknesses, as indicated from the DesCartes data, increase their engagement in the learning process?”

The *Student Engagement Teacher Handbook* (see above) discusses five statements to obtain quick and informal feedback about the level of student engagement. I used these five statements and the rating scale from this handbook to create a survey that

I can use as a reflective tool to examine my teaching and the level of student engagement in my classroom. The first part of this survey is based on direct observation and focuses on the criteria of positive body language, consistent focus, verbal participation, student confidence, and fun and excitement. The second part requires talking to the students to establish their mental engagement. The statements for this part include attention to individual needs, clarity of learning, meaningfulness of work, rigorous thinking, and performance orientation.

It is often difficult for teachers to evaluate themselves and accurately determine the level of student engagement in the classroom. Therefore two of my fellow teachers periodically observed my class and completed this survey. In addition I also completed the Teacher Observed Engagement Survey on a weekly basis.

For analysis, data collected in the survey was entered on an Excel spreadsheet. I analyzed the frequency of student responses when analyzing this data and created bar graphs for a visual display of responses.

Student Engagement Classroom Observation Sweep

The Student Engagement Classroom Observation Sweep was based on the Student Engagement Tool produced by the Center For School Transformation. I needed a tool to observe individual students engagement randomly for short periods of time in order to help see if my treatment was affecting their engagement levels. I randomly selected 4 to 5 students a day to observe. I made a note of their engagement levels every five minutes for periods of twenty to thirty-five minutes. An entry of N1, N2, N3, N4, or N5 indicated on task behaviors such as listening/watching, writing, speaking, reading, or

hands-on activity respectively. In contrast, F1, F2, F3, F4, and F5 displayed off task behaviors such as passive engagement, doing work for another class, listening to others, disturbing others, and playing, respectively. Individual students' scores were added together for a net value for the observed time.

Journals

Students were required to reflect on the goal-setting process in journals on a weekly basis. I provided a standard journal prompt (Appendix A) for all students to follow. Students wrote their goals in the journals and were asked to show their work as evidence of them reaching their goal. Some students commented that an incentive such as a jawbreaker or a root bear float for reaching their goals would encourage and motivate them; therefore I started keeping track of students meeting their goals on a chart in the classroom. The class and I decided that every 10 goals successfully met would earn an incentive such as a root bear float or an extra recess. I also kept a journal to record my thoughts during the treatment. I made daily entries on things that were going well and those things that presented a challenge. I felt this would be a valuable resource as I began analyzing data and reflecting on my results.

Instructional Practices Pre/Post Survey and Log

The Instructional Practices Pre/Post survey was designed to help gauge whether or not my teaching practices changed as I used data from the MAP test to drive my instruction. The survey was taken prior to and at the end of the treatment, providing an indicator of the percentage of time I spent of each style of teaching. The Instructional

Practices Log was a method of actually tracking my teaching practices on a daily basis. I simply recorded what particular teaching methods were used each day.

Chapter Pre/Post Tests

The chapter pre- and post-tests were short, ten-question tests based on those provided by the textbook and used in my classroom. They were designed to assess whether the students improved after being exposed to the content in class and using the MAP data to set goals. Because the MAP test targets more general science topics, these tests focused on more specific content.

Validity, Reliability, and Trustworthiness

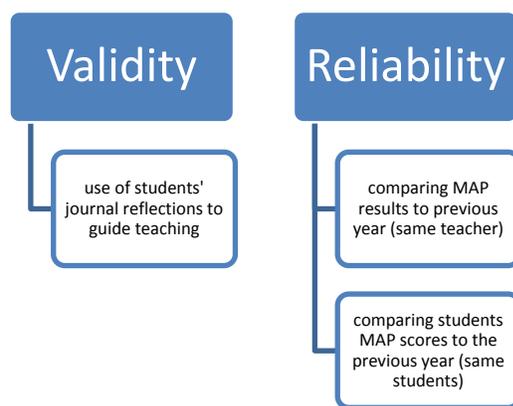
Throughout this process, I have attempted to address the issues of validity and reliability. Reliability focuses on whether the test is reliable from one test administration to the next. The Northwest Evaluation Association (NWEA), which created the MAP test, uses a more rigorous standard of reliability than is commonly used. NWEA uses test-retest reliability across a span of seven to twelve months rather than the typical two to three week time frame. The second test is not the same test but is comparable in its content and structure and differs only in its difficulty level. Results showed that reliability dipped below .80 twice at the second grade level and the other coefficients are in the mid-.80's to the low .90's.

Regarding validity, how well a test measures what it intends to measure; NWEA carefully maps the current content standard from a district into a test blueprint. Test items are selected based on their match to the content standards and on the difficulty level

of the test being created. Tests are administrated two to three weeks apart and NWEA selects items with uniform distribution difficulties.

Comparing the results of the treatment class to a previous class with the same teacher and comparing results to the same students in a previous year with a different teacher helped to avoid bias and not reflect my desire to see improvement. I continued to use the students' reflections and the data provided by the MAP test to guide my teaching and my own learning. Even after the treatment period was over, I attempted to improve upon the goal setting process and try to implement new strategies that motivated students and increased their learning. In the table below, I have listed a few of the methods I used to address the issue of validity and reliability. The discussions with my co-worker and the repeated use of students' journal reflections to guide my teaching attempted to add validity. Using a variety of comparisons within the MAP data addressed the reliability of the data.

Table 2
Validity and Reliability



This process has changed the way I teach primarily by making me a more reflective teacher and more aware of my students desires to have more choice and control

in their own learning. I feel that I have been able to use this process to continue to reflect and improve upon the use of the goal setting and journal reflections and plan to continue using this technique. While my treatment may not have answered all of my questions, it has put me on a path in which I am discovering how to address specific issues such as student engagement and data within my classroom.

DATA AND ANALYSIS

I began my data analysis before the actual treatment began. I used the results of my pre-treatment interview to help form my treatment. Both student and teacher engagement surveys were completed in order to obtain the students' and teachers' perspectives on engagement. Students kept a journal in which they wrote their goals and a weekly reflection about their goal-setting process. MAP gain scores for the treatment class as well as gain scores for other classes for comparison are included in this section. Post interview results follow the MAP gain scores.

Pre-treatment Interview

Eighty percent of students interviewed believed the MAP test was used to determine readiness for the next grade and 28% thought that it was used to measure progress. Their responses were accurate, as those were the primary uses of the test at the time, yet less than one-third of the students recognized the second function, to measure progress. Students had limited responses about other possible uses for the MAP test. This is the reason I focused on using the DesCartes data for instructional insights; in addition, I wanted to share that data with students. Responses to questions regarding goal setting indicated that students liked to set goals and had limited opportunity to do so in

school. All students interviewed indicated that they believed that setting goals helped them in their academic progress.

Engagement Surveys

The purpose of the student engagement survey was to obtain data on a weekly basis regarding the level of engagement from the students' perspective. I wanted to know how students felt about class for the week so that I could see if there was a relationship between teaching styles and student engagement levels. The design was based on a survey from the *Student Engagement Handbook* published by the International Center for Leadership in Education (2009).

I walked the students through the first survey by reading it aloud, explaining what it was designed for, the importance of taking it seriously, and that they would take it on a weekly basis. Over the course of the treatment, this survey was given to students seven times.

The first prompt on the Student Engagement Survey was, "work is interesting and challenging." Responses varied with average scores ranging from 3.68 to 4.0 on a 5 point scale. The second prompt on the survey was, "I am inspired to do high quality work." Responses varied from 3.67 to a 4.0. The third prompt on this survey was, "I understand why and what I am learning." Responses varied from 3.7 to 4.07. The scores on each of the four prompts varied from an average response score of 3.67 to 4.07. The fourth and final prompt of the Student Engagement Survey was, "Time seems to pass quickly." Responses varied from 3.8 to a 4.13. The prompt with the highest average

scores was, “I understand why and what I am learning.” There was no steady increase or decrease observed within any of the four prompts.

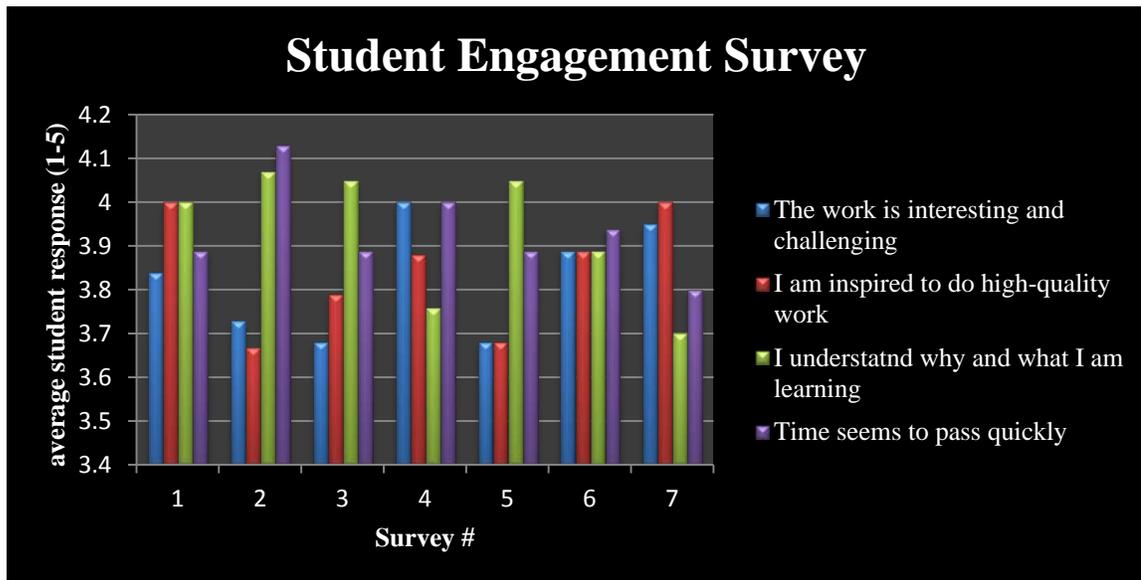


Figure 2. Student Engagement Survey, (N=22).

Student Journals

The purpose of student journals was to gather qualitative data regarding students' progress toward their goals, the quality of their goals, and frustration levels. I wanted students to reflect on their goals on a weekly basis; in addition, I wanted to be able to read the journals so that I could make changes or modifications as I noticed areas of weakness. I analyzed the seven journal entries from the treatment period. I wanted to see if students were setting content specific goals based on the Des Cartes data as I was instructing them, if they were meeting their goals, and what their frustration levels were.

This data helped answer the question, “What impact does setting goals with students regarding the Des Cartes data have on student learning and future MAP scores?” I first looked at the strength of each student’s content specific goal and coded him or her as weak, moderate, or strong. An example of a weak goal is, “To not get one detention this week and to learn what hibernation is.” An example of a moderate goal is “My goal for the week is to find out what a nebula and anemometer is.” An example of a strong goal is “My new goal is to see what the difference between weathering and erosion is.” Emphasis on strong content-specific goals challenged students and we devoted a significant amount of time to learning what a content-specific goal looked like. The number of “weak” goals did decrease over the course of the treatment. The number of “moderate” goals increased throughout the treatment and then decreased with the last journal entry. The number of “strong” goals increased and then decreased with the last two journal entries (Figure 3).

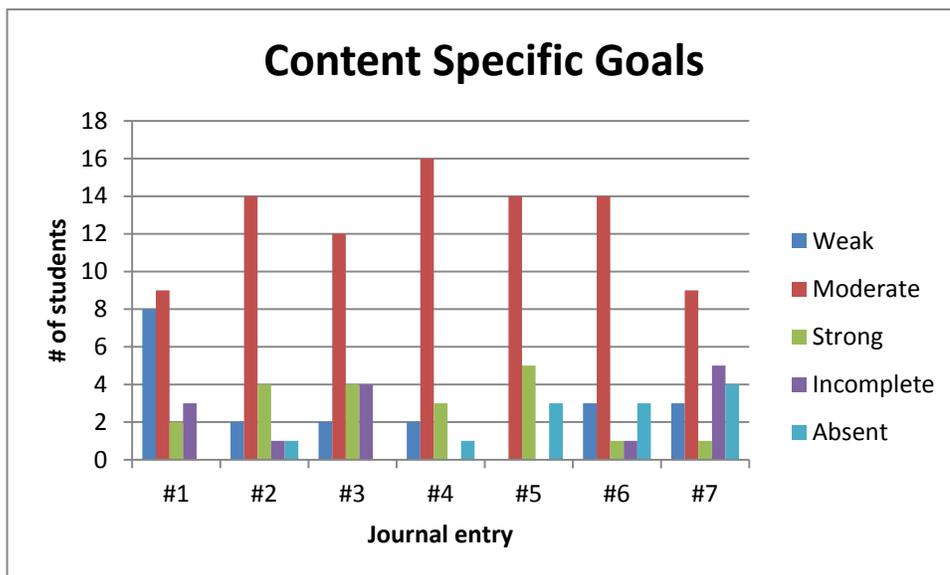


Figure 3. Content Specific Goals, (N=22).

I also looked at whether or not students were meeting their goals. In order for me to determine this, I needed to see diagrams, examples, or brief written summaries of what the students learned in their journals. I told students that I needed evidence that their goals had been met and I would not accept their word that they had met their goal for the week. I collected all student journals at the end of every week and looked at their goal for the week. I looked for two main criteria; a definition or description and either a diagram or a real life application or use. Six students met their goal the first week, seven students met their goal the second week, 12 students met their goal the third week, nine students met their goal the fourth week, 10 students met their goal the fifth week, eight students met their goal the sixth week, and seven students met their goal the seventh and final week. The number of students who did not meet their goal decreased throughout the treatment. In the first two weeks of the treatment, there were 12 students who did not meet their goals. Weeks three through seven saw a smaller number of students not meeting their goal. I included the number of students who were absent and who had incomplete journal entries. The number of incomplete journal entries varied throughout the treatment from zero to four incomplete entries. The number of absences increased throughout the treatment from zero absences to five absences (Figure 4).

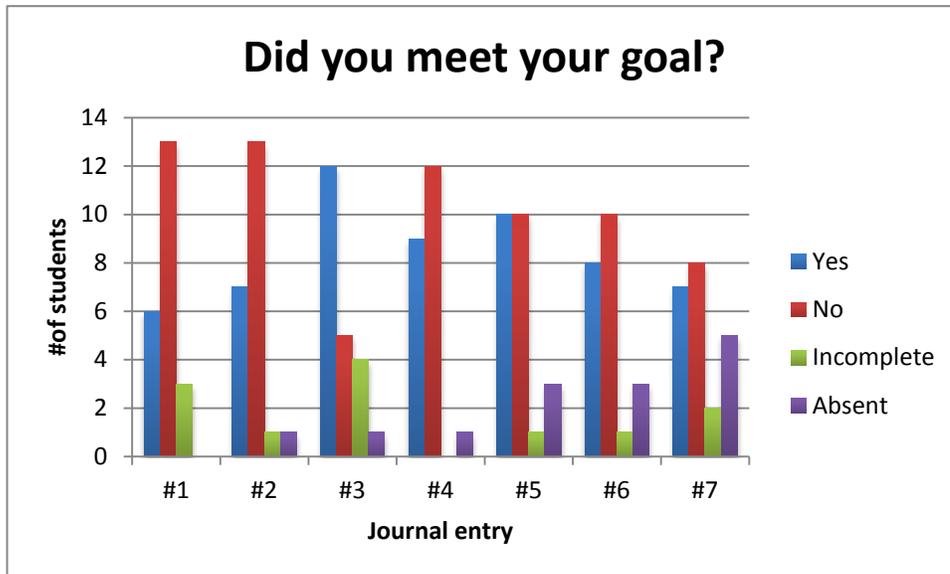


Figure 4. Did you meet your goal? ($N=22$).

I then looked at the students' frustration levels, which they categorized, as low, moderate, or high. The number of "low" responses increased in the third, fourth, fifth, and seventh journal entries. The number of "medium" responses decreased over the course of the treatment. The number of "high" responses increased from one to six, then decreased again to one. This decrease may have been due to students not feeling that these journal entries were worth their time since they didn't contribute to their grades and not having enough of a motivational factor such as tracking their progress toward the incentive clearly posted in the classroom. Then in the fourth entry there were three "high" responses, the fifth entry had only one "high" response, the sixth entry increased to four "high" responses, and the seventh entry had zero "high" responses (Figure 5).

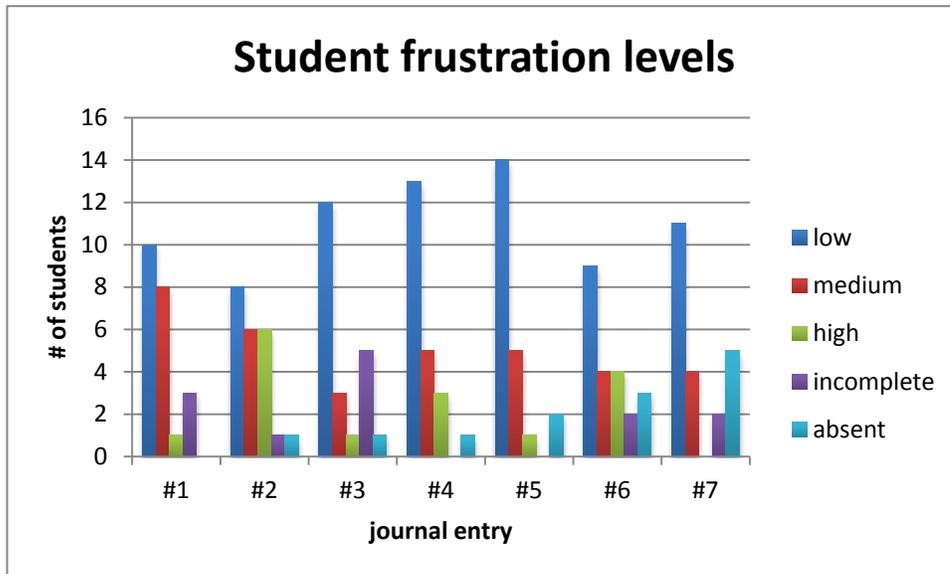


Figure 5. Student frustration levels, ($N=22$).

MAP Results

The Measures of Academic Progress (MAP) test was given to the students in September of 2011 and again in January of 2012. The purpose of analyzing the MAP data was to gather quantitative data regarding students' percentile gains. This data helped answer the question, "What impact does setting goals with students regarding their performance data have on student learning and future MAP scores?" I analyzed this data by looking at students' percentile in the September test compared to their percentile in the January test. The science portion of the MAP test is broken into two categories; "General Science" and "Concepts and Processes." I began with the "General Science" category.

Twelve out of the twenty-two students' scores showed growth on their January test results. These twelve students showed an increase from the seventh to sixty-third percentile. Ten out of the 22 students showed a decrease in their percentile score, ranging from 1 to a 30 point decrease (Figure 6).

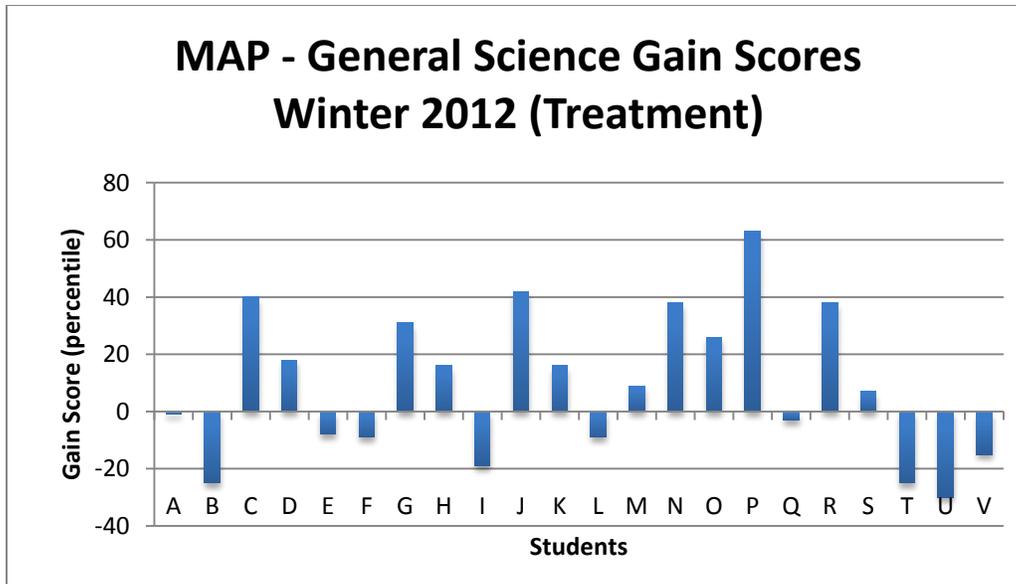


Figure 6. MAP – General Science Gain Scores, ($N=22$).

I also compared student scores to the previous year. Sixteen of the twenty-two students from my treatment were enrolled at St. Labre and took the fall 2010 and Winter 2011 general science MAP test. When comparing those sixteen students' results from the 2010-2011 school year to the current year, I found that eleven out of the sixteen maintained or improved their percentile score. Only five students (B, D, T, U, and V) showed more gain or less loss last year (Figure 7).

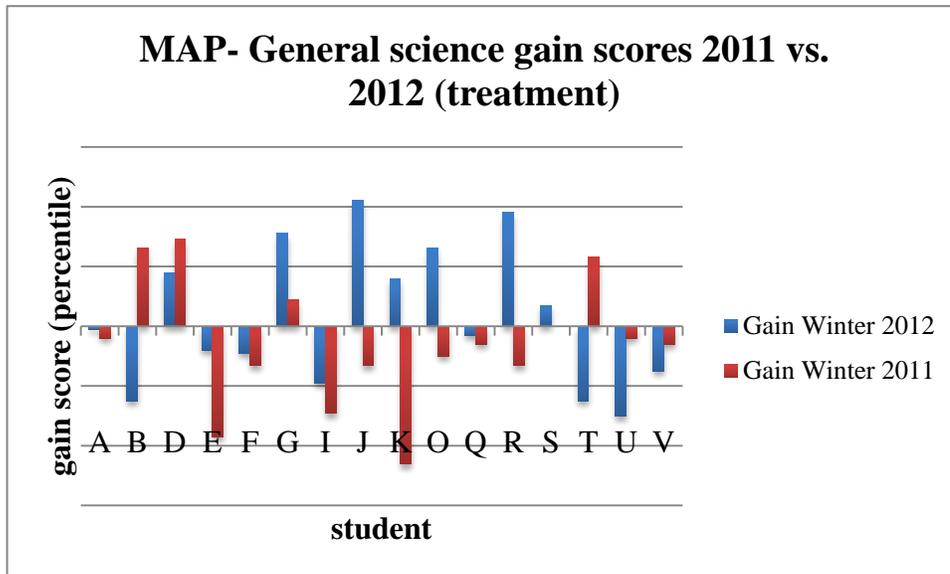


Figure 7. MAP- General science gain score comparison 2011-2012, (N=16).

I also compared this year's class, who participated in the treatment, with my class from the previous year. I felt that because I compared the same students with different teachers, it was important to also compare two different classes with the same teacher. I randomly selected 22 students who took both the September 2010 and January 2011 general science MAP test and compared their test results to 22 students from the treatment class. Of the 22 students sampled from the class of 2011, 13 of them showed a decrease and 9 showed an increase in their percentile score. Their percentile score changes ranged from a 60 point decrease to a 31 point increase, whereas fluctuations in percentile scores for the class of 2012 ranged from a 30 point decrease to a 63 point increase (Figure 8).

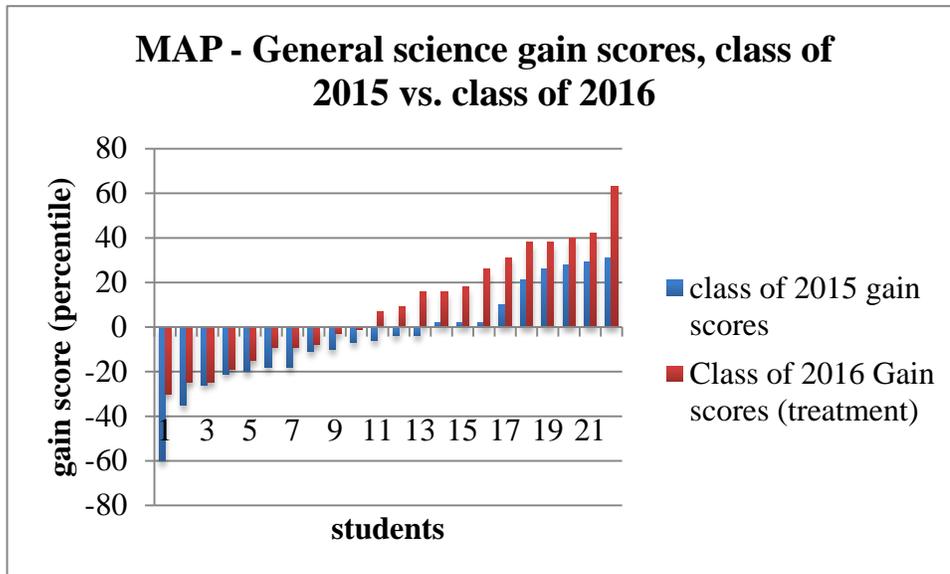


Figure 8. MAP – General Science scores class of 2015, ($N=22$) vs. class of 2016, ($N=22$).

I analyzed the “Concepts and Processes” category following the same format. I first examined the gain and loss scores from September of 2011 to January of 2012, then compared those scores to those of the sixteen students who took the test in September of 2010 and January of 2011. Lastly, I compared scores from September of 2011 to January of 2012 to the gain scores of twenty-two randomly selected students from September of 2010 to January of 2011.

The change in scores from September of 2010 to January of 2011 ranged from negative 33 to positive 28. From September of 2011 to January of 2012, scores ranged from negative 26 to positive 55. Five out of 16 students increased their percentile score in 2011 and 13 of those 16 students raised their percentile score in 2012 (Figure 9).

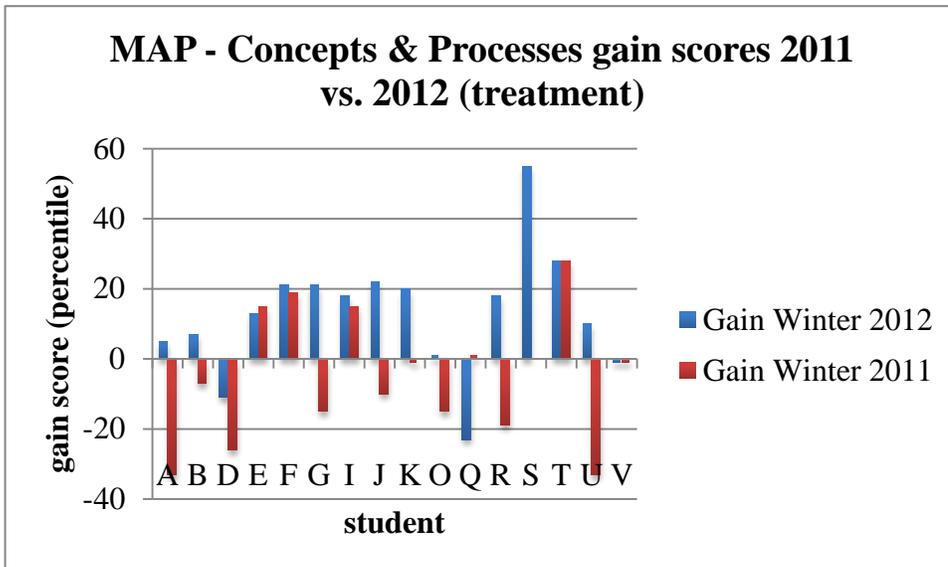


Figure 9. MAP – C&P gain scores 2011, ($N=16$) vs. 2012, ($N=16$).

I again examined the same 22 students who took both the September 2010 and January 2011 general science MAP test and compared them to the 22 students from the treatment class. Of the 22 students sampled from the class of 2011, 13 showed a decrease and 9 increased their percentile score. Their percentile scores ranged from a 73-point decrease to a 38-point increase. For the class of 2012, which experienced the treatment, only 6 students showed a decrease and 16 showed an increase in their percentile score. The score changes for members of the class of 2012 ranged from a 26-point decrease to a 55-point increase (Figure 10).

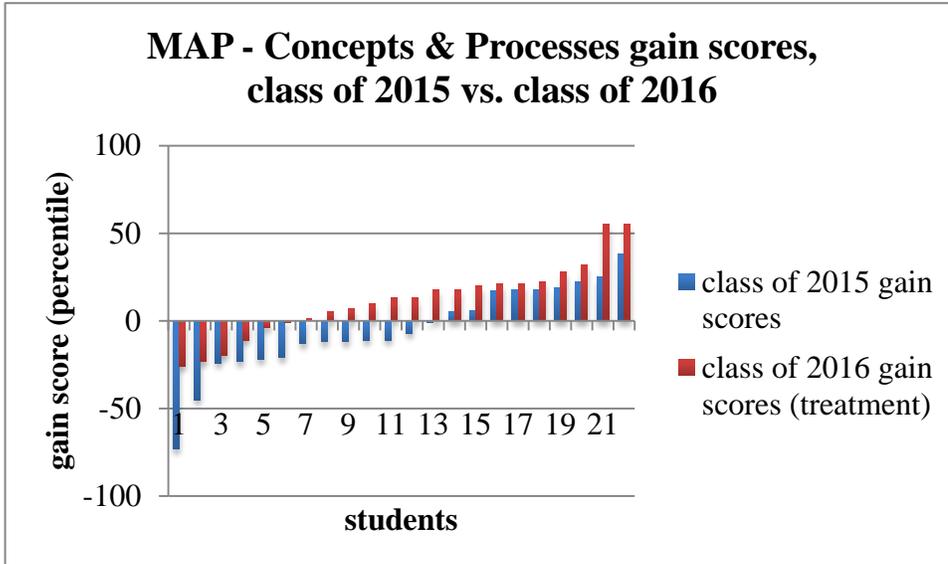


Figure 10. MAP – C & P gain scores, class of 2015, ($N=22$) vs. class of 2016, ($N=22$).

Post Interview

I conducted a post treatment interview in order to access the students' opinions about the effectiveness of the journal and to determine how they felt about continuing to use the journals. The first question on the post interview (Appendix K) was, "Do you think the journals were helpful?" Sixteen out of twenty-two students said yes, one student said no, and five said they kind of felt the journals were helpful (Figure 11).

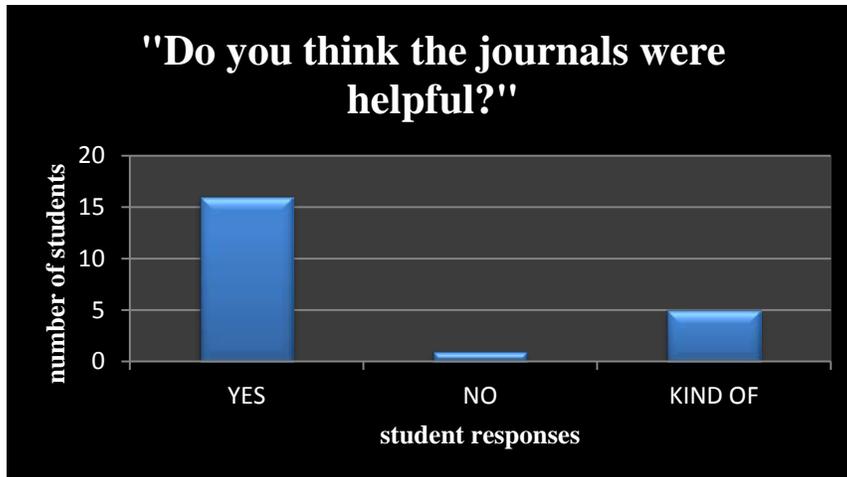


Figure 11. Post interview question 1, (N=22).

The second question was, “Where there vocabulary words on the MAP test that you learned by using your journal?” Seven students said yes, eight students said no, three students said kind of, and four students said they didn’t know. The third question was, “Was there any specific content on the MAP test you knew because you had learned it from a goal you set in your journal?” Eleven students said yes, nine students said no, and two students said they didn’t know. The fourth question in the post interview was, “Would you like to continue using the journals to set goals?” Seventeen students said yes, one student said no and four students said they didn’t care (Figure 12).

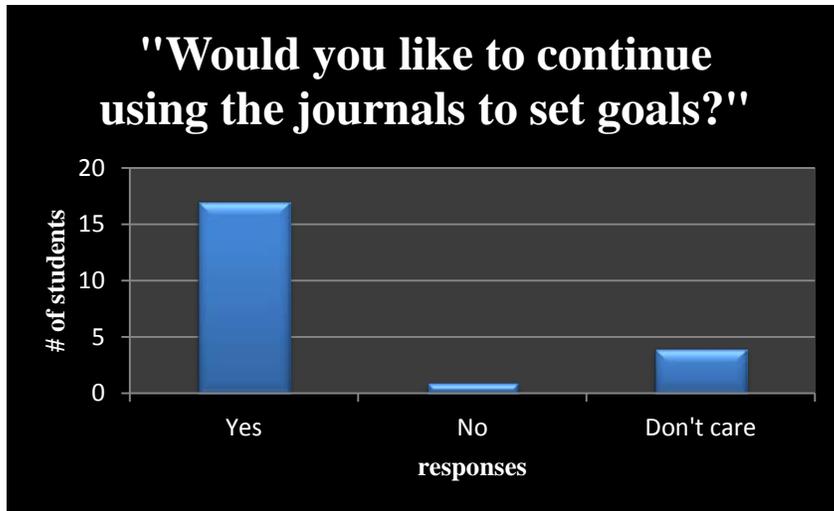


Figure 12. Post interview question 4, (N=22).

Conclusion

My data from four different sources, (Student Engagement Survey, student journals, MAP results, and the post interview), indicate that student engagement, frustration levels, quality of student goals, and success in setting good quality content-specific goals, and meeting those goals fluctuated throughout the study. The MAP data showed that students in the treatment class achieved greater gains in percentile scores when compared to the previous class. The data also indicated that students favored continued use of the journals for setting goals because the journals were helpful in their experience.

INTERPRETATION AND CONCLUSION

Throughout this process of data collection and analysis I found it very difficult to determine students' level of engagement. The data indicated that students were most engaged in the area of understanding why and what they were learning, although all

scores, as indicated on the Student Engagement Survey (Appendix H), were very close. Based on this data, I feel that I need to make sure that I am challenging all students. There are so many variables that determine a students' engagement from day to day and I struggled with my ability to satisfactorily track the level of engagement within my classroom. The data on student engagement was inconclusive and engagement levels fluctuated throughout the treatment.

In regard to the goal-setting portion of the treatment, again student frustration levels, quality of goals, and student success in meeting their goals fluctuated. I believe that some of the increase in students' frustration levels was due to my increased expectations. I think that with high expectations and new learning requirements, frustration levels will naturally increase. As we all become more familiar with this process, I hope to see frustration levels decrease. I believe the decrease in students' detailed responses was due to a lack of clear expectations. I realized that I did not let students know what I expected in regard to their responses and I needed to model the journal reflections and the goal-setting process. I believe that as a class, students have a better understanding of how to set goals and use the data but that was not necessarily evident in the data I was surprised that all but one student said that they would like to continue to use the journals and set goals. Despite there being no conclusive evidence that using these goal-setting journals increased student engagement, a majority of students felt that the journals helped them perform better on the MAP test. I believe that this in itself makes the goal-setting journals a valuable tool to use in my classroom.

The data provided from the MAP test was interesting. As I began comparing the gain scores from the treatment class to my class from last year I noticed that the treatment

class had higher gain scores. Even the students who did decrease in scores didn't have as much of a decrease as last year's class. I then compared sixteen students from the treatment class to their scores last year. Of those sixteen students, eleven of them did better this year with the treatment than they did last year. The gains scores were higher and the students that showed a decrease in scores didn't decrease as much as in the previous year. Due to the short length of the treatment, and the fact that this was a new process for me as well, I did not expect to see any significant increase. I don't feel that I have enough evidence to say that using the data to set goals and journaling is the reason students performed better, but I do think that the treatment allowed for students to feel empowered and a more positive learning environment was created. I believe that the students took control of their learning and performed better as a result.

Implications for Teachers

This study can be of use to teachers interested in empowering their students. Teachers constantly have to find ways to help students become self-empowered and motivated. If assessments that take place in schools can be used not only to help teachers teach their students more effectively but to help students take control of their own learning. Allowing students access to the data is important as well whether it is posted on charts or in a binder that students have access to. Students need the opportunity to use the data just as teachers do. This may very well create a culture of learning in which students will become more engaged and increase their performance scores in the process. Data-driven instruction is not a new concept and since NCLB, teachers and students have higher demands placed on them. We need to find a variety of tools to help us increase

our own effectiveness and to help students take ownership of their learning. I believe that through this study, I have found one way of doing just that.

VALUE

During this project I was constantly evolving and improving upon my original ideas for my treatment and what my beliefs about data-driven decision-making and goal setting were all about. As students began writing goals and reflections in their journals, it became evident just how little experience they had with setting goals and actually being reflective about their learning. I constantly modeled my expectations either by providing examples on the board or by providing individual feedback in the journals, and helped many students who are not very self-motivated, to meet those expectations. Most students began to feel more comfortable with the process and with my expectations as time went on.

I knew going in to this treatment period that limited time was going to be a factor. Teachers are often faced with limited time to cover curriculum, to analyze data that they have collected, and to collaborate. I touched upon this very issue in the conceptual framework earlier. I found myself dealing with the lack of time in several different ways. Due to the timing of my treatment, which began before Christmas break and ended shortly after, there were many interruptions in my scheduling and I feel that this limited my time spent teaching. I also feel that if I do another treatment at a later date, I would make my treatment longer. In order to gain more valid results, I think that I need to begin using the journals right after the fall MAP testing and continue throughout the first semester, until we MAP test again in the winter. Another aspect of the limited time was

not having as much time as I would have liked to spend looking at the data provided by the MAP test in order to use it to inform my teaching. Again, if I were to do this study again, I would devote a more substantial amount of time to analyze more effective ways to use the data to inform my teaching practices.

One of the most surprising things about this treatment was the overwhelming number of students who wanted to continue using the journals. I really felt like students believed that using the journals helped them perform better on the MAP test and they had an increased sense of ownership in the learning process. I hadn't expected that students would like choosing the goals they were going to work on for the week and researching them as much as they appeared to. Responsibility for choosing their own goals and having a sense of ownership in the process seemed to create a culture of learning and of confidence among students.

I attempted to observe and record students' level of engagement and although I feel that I had a couple of methods to do this, I need more time to effectively track students' levels of engagement. The methods I used might have been more effective had I had a longer time for the treatment. As it was, I do not feel that I had enough information to conclusively say that this treatment had any effect one way or the other on students' level of engagement. I would also like to improve upon my data collection methods to monitor and characterize engagement.

As a teacher, I feel that this process made me a more reflective teacher and more aware of the importance of students being responsible for their own learning. I am more aware of the material and vocabulary that my students will be tested on because I spent

time actually looking at the data as I never had before. Both the students and I are more aware of the expectations. This process did not make me feel like I was “teaching to the test” as I had thought it might. Instead it was a process that increased student confidence, made students more reflective, gave them ownership in their own learning, and it was something they enjoyed doing. We continue to use the journals and the process is constantly evolving.

I will continue this process and hope to see more positive student attitude, engagement, and MAP scores after an entire year of using the journals to set goals. Involving more teachers in this process of using the MAP data to drive our instruction is another area of interest I would like to pursue. I would like to explore the use of professional learning communities so that teachers in my school could find the time to share their ideas and help students perform better and learn more in the area of science.

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APPENDICES

APPENDIX A

WEEKLY GOAL-SETTING JOURNAL PROMPT

Weekly Goal – Setting Journal Prompt

1. How would you characterize your frustration level regarding your short-term goal?

Low, Moderate, or High

2. If you are frustrated, please explain what specifically is frustrating to you.

3. What is going well?

4. What is not going well?

5. Have you met your short-term goal for the week?

6. What would make the goal setting process more valuable to you?

7. Please write your next short-term goal. This may be modified a little or may be a new goal.

APPENDIX B

INTERVIEW QUESTIONS

Interview Questions

1. How do you feel about the MAP test? Why?
2. What do you think the MAP test is used for?
3. Has a teacher ever talked to you about the MAP test and your results? If so, what information did they share with you?
4. Has any teacher ever set goals with you for your MAPS test?
5. How do you feel about setting goals? Why?
6. Do you think setting goals helps you with your learning?

APPENDIX C

STUDENT ENGAGEMENT SURVEY

Student engagement survey

Name _____

Date _____

Please circle the number that represents your feelings about class this week

strongly agree	agree	neutral	disagree	strongly disagree
5	4	3	2	1

The work is interesting and challenging	5	4	3	2	1
You are inspired to do high-quality work	5	4	3	2	1
You understand why and what you are learning	5	4	3	2	1
Time seems to pass quickly	5	4	3	2	1

APPENDIX D

TEACHER OBSERVED ENGAGEMENT SURVEY

Teacher Observed Engagement Survey

Observations	Very high	High	Medium	Low	Very Low
Positive body language					

Student exhibits body postures that indicate they are paying attention to the teacher and/or other students

Observations	Very high	High	Medium	Low	Very Low
Consistent focus					

All students are focused on the learning activity with minimum disruptions

Observations	Very high	High	Medium	Low	Very Low
Verbal participation					

Students express thoughtful ideas, reflective answers, and questions relevant or appropriate to learning

Observations	Very high	High	Medium	Low	Very Low
Student confidence					

Students exhibit confidence and can initiate and complete a task with limited coaching and can work in a group

Observations	Very high	High	Medium	Low	Very Low
Fun and excitement					

Students exhibit interest and enthusiasm and use positive humor

Perceptions	Very high	High	Medium	Low	Very Low
Individual attention					

Students feel comfortable seeking help and asking questions

Questions to ask: What do you do in this class if you need extra help?

Perceptions	Very high	High	Medium	Low	Very Low
Clarity of learning					

Students can describe the purpose of the lesson or unit. This is not the same as being able to describe the activity being done during class.

Questions to ask: What are you working on? What are you learning from your work?

Perceptions	Very high	High	Medium	Low	Very Low
Meaningfulness of work					

Students find the work interesting, challenging, and connected to learning.

Questions to ask: What are you learning? Is this work interesting to you? Do you know why you are learning this?

Perceptions	Very high	High	Medium	Low	Very Low
Rigorous thinking					

Students work on complex problems, create original solutions, and reflect on the quality of their work.

Questions to ask: How challenging is this work? In what ways do you have the opportunity to be creative?

Perceptions	Very high	High	Medium	Low	Very Low
Performance orientation					

Students understand what quality work is and how it will be assessed. They can also describe the criteria by which their work will be evaluated.

Questions to ask: How do you know you have done good work? What are some elements of quality work?

Perceptions	Very high = 5	High = 4	Medium = 3	Low = 2	Very Low = 1
Overall level of engagement					

Rating scale:

1 = low level of engagement. Class was boring, time moved slowly.

2 = low to moderate level of engagement. Class was okay.

3 = moderate level of engagement overall or high level for a short time. Class was good.

4 = High level of engagement for a major portion of the class period. Class was very good.

5 = high level of engagement for the entire class period. Wish we had more time.

APPENDIX E

INSTRUCTIONAL PRACTICES PRE/POST SURVEY

Instructional Practices - Pre/Post Survey

Please indicate the percentage of instructional time spent on the following instructional approaches. They should total 100 when added together.

_____ Lecture

_____ Reading

_____ Audio-visual

_____ Demonstration

_____ Discussion group

_____ Practice by doing

_____ Teach others

APPENDIX F

INSTRUCTIONAL PRACTICES LOG

Instructional Practices Log

Week of _____

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
LECTURE					
READING					
AUDIO-VISUAL					
DEMONSTRATION					
DISCUSSION GROUP					
PRACTICE BY DOING					
TEACH OTHERS					

APPENDIX G

STUDENT ENGAGEMENT CLASS OBSERVATION SWEEP

Student Engagement Class Observation Sweep

Date _____

Date _____

Day of the week

Day of the week

Time					
:					
:					
:					
:					
:					
:					
:					
:					
:					
Total					

Time					
:					
:					
:					
:					
:					
:					
:					
:					
:					
Total					

ON TASK

- N1 – on task: listening/watching
- N2 – on task: writing
- N3 – on task: speaking
- N4 – on task: reading
- N5 – on task: hands-on activity

OFF TASK

- F1 – off task: passive
- F2 – off task: doing work for another class
- F3 – off task: listening to others
- F4 – off task: disturbing others
- F5 – off task: playing

APPENDIX H

TIMELINE

Timeline

September 2011

- Student engagement/Likert scale pre survey
- Teacher completed Student engagement pre survey (before Fall 2011 MAP test)
- Teaching practices Pre survey for teachers
- MAP test (school determines date)
- Teacher made instructional practices log (completed weekly from Fall 2011 MAP test until Winter 2012 MAP test)
- weekly student engagement survey (likert)
- daily journal reflection of teaching practices
- weekly student journal reflections

October 2011

- Teacher made instructional practices log (completed weekly from Fall 2011 MAP test until Winter 2012 MAP test)
- weekly student engagement survey (likert)
- daily journal reflection of teaching practices
- Chapter pre and post tests (science content)
- Weekly student journal reflections

November 2011

- Teacher made instructional practices log (completed weekly from Fall 2011 MAP test until Winter 2012 MAP test)
- weekly student engagement survey (likert)
- student engagement class observation sweep
- daily journal reflection of teaching practices
- Weekly student journal reflections

- Chapter pre and post tests (science content)

December 2011

- Teacher made instructional practices log (completed weekly from Fall 2011 MAP test until Winter 2012 MAP test)
- weekly student engagement survey (likert)
- daily journal reflection of teaching practices
- student engagement class observation sweep
- Chapter pre and post tests (science content)

January 2012

- MAP test (school determines date)
- Instructional practices Post survey for teachers (before Fall 2011 MAP test)
- Student engagement/Likert scale post survey (after Winter 2012 MAP test)
- weekly student engagement survey (likert)
- daily journal reflection of teaching practices
- student engagement class observation sweep
- Teacher completed Student engagement post survey (after Winter 2012 MAP test)
- Chapter pre and post tests (science content)

APPENDIX I

CHAPTER 2 PRE/POST TEST

Earth's Atmosphere Pre/Post-Test Chapter 2

Chapter 2 Pre/Post Test

1. Density is
 - a. The mass of an object divided by its volume
 - b. The volume of an object divided by its mass
 - c. The mass of an object plus its volume
 - d. The volume of an object minus its mass
2. The Coriolis effect
 - a. Causes winds to turn to the right in the Northern Hemisphere
 - b. Causes wind to turn to the left in the Northern Hemisphere
 - c. Causes wind to speed up
 - d. Causes wind to slow down
3. What happens to air when the ground warms it?
 - a. The warm air becomes more dense and is pushed upward
 - b. The warm air becomes more dense and sinks
 - c. The warm air becomes less dense and is pushed upward
 - d. The warm air becomes less dense and sinks
4. Over short distances, air moves
 - a. From low pressure to high pressure
 - b. From high pressure to low pressure
 - c. Only between areas of low pressure
 - d. Only between areas of high pressure
5. What causes wind?
 - a. The Coriolis effect
 - b. The greenhouse effect?
 - c. Equal air pressure in different places
 - d. Uneven heating of Earth's surface
6. As you rise in the troposphere,
 - a. Air pressure increases
 - b. Air density increases
 - c. Temperature decreases
 - d. Altitude decreases

7. Global winds
- Blow in belts that circle Earth
 - Change with the weather
 - Always blow from the west
 - Cause the Coriolis effect
8. Which activity increases your altitude
- Walking east along a hallway
 - Going lower in an elevator
 - Climbing a flight of stairs
 - Circling a room clockwise
9. How do clouds form?
- Air sinks, expands, and cools
 - Air rises, expands, and cools
 - Air sinks, warms, and spreads
 - Air rises, contracts, and warms
10. How does energy move from place to place?
- Radiation, convection, conduction
 - Expansion, contraction, convection
 - Convection, radiation, expansion
 - Expansion, contraction, radiation
11. Air cools as it moves to a higher altitude. What will likely happen to the water vapor in the air?
- It will evaporate
 - It will change to a gas
 - It will change to a liquid
 - It will remain water vapor
12. What happens when cloudy air gets warmer?
- Solid changes into gas
 - Liquid changes into gas
 - Gas changes into a liquid
 - Gas changes into another gas
13. Relative humidity is how close air is to
- Saturation
 - Humidity
 - Precipitation
 - Cloud formation

APPENDIX J

CHAPTER 3 PRE/POST TEST

Chapter 3 pre/post test

1. What two things define an air mass?
 - a. temperature and altitude
 - b. altitude and air pressure
 - c. temperature and moisture
 - d. air pressure and precipitation
2. A continental tropical air mass is dry and warm because it forms over
 - a. land near the pole
 - b. land near the equator
 - c. water near the pole
 - d. water near the equator
3. What type of front forms when a warm air mass pushes a cold air mass?
 - a. warm front
 - b. cold front
 - c. polar front
 - d. stationary front
4. What type of weather does a low-pressure system bring?
 - a. stormy weather
 - b. clear weather
 - c. cold weather
 - d. warm weather
5. Where does a hurricane form?
 - a. over cold land
 - b. over warm land
 - c. over cold water
 - d. over warm water

6. Which of the following is an effect of a storm surge?
 - a. strong wind
 - b. heavy rain
 - c. flooding
 - d. dense clouds

7. Which of the following would happen often in a southern state on the ocean such as Florida?
 - a. ice storm
 - b. lake effect snow
 - c. thunderstorm
 - d. blizzard

8. How does a thunderstorm begin?
 - a. moist air rises
 - b. dry air sinks
 - c. moist air sinks
 - d. dry air rises

9. Which of these is usually a source of danger in both thunderstorms and winter storms?
 - a. ice
 - b. precipitation
 - c. lightning
 - d. tornadoes

10. Which of these would be most useful for studying cloud cover?
 - a. surface weather map with isobars
 - b. satellite images
 - c. data charts of air temperatures
 - d. an informational map that shows pollution

APPENDIX K

POST INTERVIEW

POST INTERVIEW

Now that you have taken the science MAP test again, do you think the journals were helpful? What specifically helped for the MAP test, if anything?

Were there vocabulary words on the MAP test you learned by using your journal?

Was there any specific content on the MAP test that you knew because you had learned it from one of your goals in your journal?

Would you like to continue using the journals to set goals?

Do you have any ideas about what would make using the journals better or more helpful?