Can a Team of Teachers Use Data to Target a Specific Skill Area and Then Create a Program That Raises Student Performance in That Area?

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GMST 640
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Dedication

I would like to dedicate this study to Alexandria Balta, Andrea Dysart, and Carrie St. Pierre. They worked very hard and went above and beyond the call of duty while participating in this study. Without them this study would not have been possible.

I would also like to give special thanks to my advisor Dr. Lucia Guarino, who supported and guided me through this endeavor.
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Chapter 1 - Introduction

At the heart of every school resides educators who actively seek new and effective instructional practices. "Active learning communities use action research as an organizational model and a methodological strategy to conceptualize, implement, and evaluate promising practices" (Sax & Fisher, 2001). In this study a community of teachers at the fourth grade level will be engaging in action research. This action research will consist of teachers working as a team to examine results from the New York State Science Program Evaluation Exam. They will use this exam to target a specific skill in which their program is falling below the state minimum standard. They will then create a series of instructional strategies designed to raise student performance above the minimum state achievement level.

As a fourth grade teacher in New York State, every year my students take a series of standardized tests. These tests assess student achievement in the areas of English language arts, math, and science. In addition to proctoring these exams I also participate in the scoring of all three. My duties include facilitating the scoring of the math test and single handedly scoring the science test for the entire fourth grade in my building. These tests provide us with a large amount of data pertaining to the strengths and weaknesses of the students as well as our school's educational program. At present much of this data is not actively being used. This action research study will allow a team of teachers, including me, to use this data to target a specific skill and then create a program that raises student performance in that area. This program will then serve as a model for all teachers in our district to engage in action research that raises student performance in targeted areas.
Chapter 2 - Literature Review

Introduction

This literature review will examine research pertaining to the four main aspects of this study. It will detail the significance and power of Action Research as a tool for educators to improve both themselves and the educational community in which they work, identify the strengths and weaknesses of learning standards, conduct an in-depth review of the pros and cons of standardized testing, and describe how collegial circles provide an avenue for successful teacher collaboration.

There are many different kinds of schools ranging from public to private, magnet schools to charter schools, and various religious institutions. Although these schools may educate students in different ways; they are all constantly facing the same challenge. How do I improve student learning and meet the needs of my students? Just as there are many different types of schools, there are a variety of methods that can be used to tackle this always-growing question. However, one method has been slowly separating itself from the rest as a means to increase student learning, meet the needs of a diverse student population, and provide targeted research based on a school's own students. All the while providing teacher training and deriving increased job satisfaction. This method is known as action research.

Action Research

Action research is a form of research where the teacher or researcher plays an active role in the study. The goal of action research is to educate teachers in the classroom by building upon what they already know and do. This varies from traditional research, which works from the outside to educate teachers who work inside the
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classroom (Buschman, 2001). Action research follows a constructivist approach whereby teachers actively pursue their own questions, build upon their teaching repertoire, and engage in research that pertains to their own class's specific needs (Rock & Levin, 2002). The constructivist approach states that the learners construct their own knowledge and accommodate it with their pre-existing experiences. By engaging in research that follows a constructivist approach teachers are able to improve upon their own teaching skills, while directly influencing the learning that takes place in their classroom.

When performing action research educators focus on a specific problem or area that they would like to improve upon. They then ask questions about the problem, gather data, and carefully analyze the data that they have collected to formulate and institute a plan for resolving the problem (Tillotson, 2000). This process engages the teacher in an in-depth study of his or her own practice and content areas.

"A more formal definition of action research is continual disciplined inquiry conducted to inform and improve our practice as educators" (Calhoun, 2002). At the heart of action research lays the concept of inquiry. Inquiry is the process of posing questions and seeking answers. "The development of inquiring communities is what distinguishes action research from school improvement approaches that focus on the implementation of specific initiatives, such as a new curriculum or a new mode of assessment" (Calhoun, 2002).

Once inquiring communities have been established the process of school wide action research can begin. Although there are a variety of methods for engaging in action research, all of them share a same general process. The process involves 5 collaborative steps: (a) identification of a question to be researched, (b) formation of a plan to answer
question, (c) a collection of data in various forms to study the effects of the plan, (d) reflection upon the results from the plan, and (e) the creation of new action steps to be taken based on what was learned from the study (Rock & Levin, 2002). This process creates an ever narrowing spiral of problem posing and solving, whereby, the practitioner explores a problem, engages in a study, and determines if the actions taken have changed anything (Blakley-Reid, 2001). This cycle then begins again as the researchers seek to fine tune or make improvements based on previous results.

One of the key components of action research involves the collection of classroom or school based data. Action research enables teachers to use their own observations and information in which to base their research and studies. "...the key to becoming a teacher-researcher and gaining autonomy in the teaching profession is related to using the daily informal observations with systematic and intentional inquiry about teaching and learning carried out by teachers in their own school and classroom" (Vaidya, 2001). Because action research involves using field notes, surveys, tests, and interviews from the classroom or school in which the teacher works; the questions that are posed and answers that are obtained take on an unrivaled significance (Blakley-Reid, 2001). The "action" in action research gets its name from taking these teacher created classroom observations, plans, and solutions and using them to improve student learning and teaching practices. It is this immediate application of research findings that enables teachers to engage in initiatives that when generated from inside the school reflect the true needs of the learners (Vaidya, 2001). Action research clearly provides a professional development model that has a direct impact on student learning and teacher training.
Action research also enables teachers and educators to take an active role in the leadership of the school. When learning communities are formed and teachers are engaging in action research the teachers begin to take an active role in the improvement and growth of their school. This enables novice teachers to get a clearer perspective as to what is expected in the planning, evaluating, and managing of the learning environment, while the veteran teachers gain fresh perspectives and are given the opportunity to reflect and validate their own teaching practices (Woods & Weasmer, 2002). In schools where action research is the norm, teachers regularly conduct research and discuss data, while actively pursuing school improvement and change. "Put succinctly, schools that have become learning communities are places where two of the most crucial norms identified as essential for effective schooling- collegiality and experimentation- are alive, well, and being actively nurtured (Sagor, 1997).

Clearly action research has a great number of benefits for teachers, as well as, the schools and students in which they work. "It has become popular to think of successful schools as learning organizations... because the research has overwhelming supported the findings that schools with organizational cultures that support inquiry, learning, and data-based decision making are not only more satisfying workplaces, but also more productive organizations" (Sagor, 1997). Action research at its core, involves inquiry-based learning based off of information and data collected by the teachers. This method of inquiry-based learning, which has long been a model way for students to learn, is quickly becoming a model way for teachers to learn. This inquiry style of professional development creates a culture where teachers feel free to explore new innovations, while conducting research based off their own teaching and students' needs (Senese, 2002).
Action research allows the school system to enter a state of change that is generated through the study of the effects of various programs and methods of teaching (Calhoun, 2002). In schools where action research is an integral part of staff development, the teachers are empowered to take on the role of school leadership.

In addition to the powerful effect action research has on the growth of a school as a whole, action research has many dynamic positive effects on teachers as individuals. When teachers become active researchers, they also take on the role of reflective learners who think about their teaching methods and witness first hand the effectiveness of their innovations and hard work (Senese, 2002). Action research enables the teacher to take control of his or her own professional development and build a sense of satisfaction. This teacher satisfaction in turn reduces attribution, increases job performance, promotes teacher collaboration, and has a positive impact on student learning (Woods & Weasmer, 2002).

Truly one of the greatest benefits of action research is that it is based in the classroom and all of its data, findings, and innovations directly led to increased student learning. Because the research takes place in the classroom teachers often feel more secure about trying new ideas and challenging existing paradigms (Senese, 2002). Another positive effect of conducting research in one's own classroom is the opportunity to engage in student interviews as part of the data collection process. Teachers can directly benefit from this interview process as they gain more complete and accurate information on the knowledge and needs of their students (Buschman, 2001). This knowledge enables them to differentiate their instruction to further meet the needs of
Improving Student Performance

Clearly action research is a powerful tool to improve student, teacher, and school performance.

**Learning Standards**

Another learning tool that has been advantageous to the success of students is the creation of learning standards, particularly in the field of science. Learning standards provide the criteria for which "...to judge progress toward a national vision of learning and teaching science in a system that promotes excellence, and provides a banner around which reformers can rally" (National Research Council, 1996). These standards provide a reference for which districts can make decisions regarding curriculum, staff development, and instructional policies. Standards enable schools, students, teachers, and parents to know exactly what is expected for students to be able to know and do. They provide the criteria for students that can be monitored and assessed enabling instruction to be modified to reflect skills and knowledge that is consistent with schools throughout the country (Thurlow, 2002).

The push for standards based reform came during the 1980's when reports were written stating that the United States was falling behind other countries in academic performance. This quickly led to a debate as to what students needed to know and how could we best educate them. As this movement gained momentum during the 1990's national educational standards were created in all major subject areas. In Science the National Resource Council (NRC) created a document titled the National Science Education Standards. This document created a set of science standards to help school districts across the country improve science education. The goals that undermine the
National Science Education Standards (National Research Council, 1996) are that all students will be able to

- experience the richness and excitement of knowing about and understanding the natural world;
- use appropriate scientific processes and principles in making personal decisions;
- engage intelligently in public discourse and debate about matters of scientific and technological concern; and
- increase their economic productivity through the use of knowledge, understanding, and skills of the scientifically literate person in their careers.

The National Science Education Standards (National Research Council, 1996) are divided into six main sections. These sections are the science teaching standards, standards for professional development for teachers of science, assessment in science education, science content standards, science education program standards, and the science education system standards. Each of these sections focuses around the concept of learning through inquiry as a means for learning science.

During the 1990's New York state, along with many other states, adopted state standards in each of its main curriculum areas. The Math, Science, and Technology (MST) Standards of New York are closely modeled after the national science and math standards. At the center of New York's MST standards is the concept of learning through inquiry. These standards provide a concrete set of criteria for students to achieve.

Despite the success of the standard based-reform there still remains a large group of people who oppose the creation of national or state standards. One complaint against the concept of national standards is that it forces all students to learn the same things and
eliminates the local districts power to decide what needs to be taught to their students (Caron, 2002). Another concern over the implementation of national standards is that many schools have now made their primary focus on the teaching of math and the language arts, at the expense of science (Finneran, 1995). Some schools that face heavy public scrutiny in the areas of language arts and mathematics have drastically cut time and resources on the teaching of science. The credibility of whether a set of national standards really does improve learning and student performance has also been brought into question. Researchers (Bracey, 1999) who studied the Third International Mathematics and Science Study (TIMSS) found that there was no correlation between having national standards and higher achievement. Their finding stated that of the 29 countries with national standards, 7 performed higher than the U.S., 10 scored the same, and 12 scored lower. Similar results were found when comparing nations that did not have national standards with the United States. Of the 11 countries with no national standards, 2 performed better than the U.S., six scored the same, and 3 scored lower.

Another concern over the use of national standards is the idea that there should be a way to measure whether not the students are reaching the standards through the use of standardized tests (Thurlow, 2002). These standards have led to a return to the concept of high stakes testing.

**Standardized Testing**

"High stakes" testing is a term used to describe assessment tools that have a variety of consequences ranging from a letter warning to severe state or national sanctions (DeCesare, 2002). These high stakes tests that are designed to assess student mastering of state or national standards have led to a variety of concerns. One such
Improving Student Performance

Concern is that many schools have dropped important parts of their curriculum in order to give more time to areas that are heavily covered in the tests (Nagourney, 2002). In some school systems the amount of time spend on preparing students to take the state tests exceeds 20 percent (Jorgenson & Vanosdall, 2002). Another problem that rises from this is the concept of teaching to the test; where lesson plans are modified to heavily reflect the format and skills that are being tested (Cole, 2001). By concentrating lessons heavily on standardized tests, which typically involve large sections of multiple-choice questions, the freedom to engage in inquiry based and authentic real world activities disappears. The types of lessons that are typically created to teach toward the test often fall under the concept of "drill, drill, drill" where memorization and skills taught in isolation are the primary focus (Merrow, 2001). "The focus on testing, therefore, narrows the curriculum and encourages rote learning" (Rotberg, 2001).

These standardized tests often create a high level of anxiety for both educators and teachers alike. Schools that routinely perform low are often put into a state of probationary status. This probationary status puts increased pressure on teachers, who often quit teaching or request a position change to a grade level that is not tested (Rotberg, 2001). Students also face the same pressure that is faced by educators. This has led high stakes testing to take its toll on young kids who often feel sickness that can range from stomachaches to insomnia and depression (Cole, 2001). This raises the question, are high stakes test worth all of the stress that they seem to cause?

What makes this question, even more concerning is that many people question the reliability and validity of these tests. A child's score may vary from day to day depending on how the child felt, whether they read or understood the directions, how many
questions they guessed on, and whether or not the test proctor properly gave the test (Dobbins, 2001). Another problem that can cause the test to be unreliable is that they may not adequately reflect the standards or manner in which the students were instructed. As a result these test may undermine the standards in which they were created to assess (Merrow, 2001).

There are, however, strategies that educators can undergo to help eliminate these problems and assure that standardized tests are reliable and of great benefit. Often times children struggle on standardized test not because they don't know the content, but because they have misconceptions about how the test should be taking (Taylor & Walton, 1999-a). There are a variety of strategies that can help students to perform at their highest level when taking tests. Children should be encouraged to look back and re-read the questions and reading passages, when ever possible (Taylor & Walton, 1999-a). Teachers that primarily engage in cooperative learning activities should give students time to participate in independent work (Taylor & Walton, 1999-b). Research conducted by Taylor (Taylor & Walton, 1999-b) suggests the following five strategies that will help children more accurately demonstrate their knowledge on standardized tests:

1. Identify the type of literary format present in the test and teach the students to learn how to read the tests.

2. Provide opportunities for students to discuss test-taking strategies.

3. Allow children to view example test questions and formats.

4. Help children with stress reduction strategies that alleviate problems associated with the pressure of taking high stakes tests.
5. Teach students problem solving strategies that will help them prepare and to take the tests.

These strategies help students to succeed with tests that may differ in format from their everyday learning.

The best way to deal with the problems that are often associated with standardized test are the creation of tests that clearly match instructional practices, assess higher order thinking skills, and contain authentic performance tasks. Today's high quality tests contain open-ended questions, ask students to explore complex problems and explain solutions, critically examine literary techniques, and engage in writing samples that accurately demonstrate what they know (Gerstner, 2001). These standardized tests provide reliable and valid information pertaining to the students' mastery of skills and standards.

These tests provide vital information about the strengths and weaknesses of the students taking them, which in turn helps schools see how well they are doing (Schmoker, 2000). These results help to hold the educators accountable for teaching or learning and focus them on the curriculum and meeting the needs of the students. Accountability follows responsibility, and good standardized tests help assure that students will be receiving the best education possible (Schmoker, 2000). This helps provide urgency to schools as they rush to meet the individual needs of their students.

The data from authentic performance tests, like New York State's standardized 4th and 8th grade science test the Elementary Science Program Evaluation Test (ESPET), provides educators with a wealth of information about their students, teachers, and educational programs. This data becomes a powerful tool for teachers when they
receive it in the form of detailed item-by-item results of each student, as well as, whole class reports (Ackley, 2001). However, teachers need to receive proper training, so that they can apply the results and reports generated from state tests to the maximum benefit of their students. This is because "...constructive data analysis incorporates more than just merely looking at test scores, teachers need training on different methods to assess their students' progress toward mastering standards" (Ackley, 2001). This training should focus on two different types of analysis, summative and formative. Summative analysis is the collection of data that states the effectiveness of an activity. This type of analysis usually occurs at the end of an activity or test. Formative analysis is the ongoing monitoring of student achievement in an effort to modify lessons and activities to improve student achievement.

Collegial Circles

An excellent method for training teachers to accomplish this data analysis is through the use of collegial circles. Collegial circles are groups of teachers that band together to engage in dialogue to discuss their beliefs, practices, goals, concerns, and successes in education (Mycue, 2001). The formation of these circles helps eliminate the feeling that teachers are working in isolation and enables them to form a team working together with a common goal of achieving student performance. This type of professional development allows teachers to examine their existing practices, invent new ones, and share their thoughts and ideas with others (Vukelich & Wrenn, 1999).

However, in order for collegial circles to be successful teachers must feel safe and secure about sharing ideas, as well as giving and taking criticism from others. These interactions must be planned and well structured to enable teachers to identify and
discuss topics in a relevant and non-threatening manner (Koehler, 1996). Although some resistance may come from teachers when first participating in collegial circles, because it requires them to play new roles and makes everyone more accountable; the benefits of these circles clearly warrants the effort (Hoerr, 1996). Schools that develop collegial circles are transformed into communities in which self-renewal and improvement through collaborative networks supports instructional improvement (Manourchehri, 2001). These collaborative networks develop a passion for learning, provide an opportunity for teachers to challenge themselves, and empower teachers to take responsibility in their professional development (Carr, 1997).

Another positive effect of collegial circles is that it reduces stress, helps eliminate the feeling of teacher isolation, promotes a willingness to take chances, and creates more opportunity for self-analysis, reflection, and personal growth (Mycue, 2001). When put together as a whole, the use of collegial circles to engage in action research pertaining to the analysis of state standardized tests results, provides an excellent means for schools to bring their students to a level of mastery of state established learning standards.
Chapter 3 - Methodology

Introduction

In this study a group of four teachers will be engaging in action research. The purpose of this action research will be for the teachers to work together in a collegial circle analyzing the results from the previous year's standardized state exam in science known as the ESPET. These teachers will target an area where the students are not meeting the New York State's minimum required achievement level. The teachers will then create a series of parallel tasks that will target the students' weaknesses and enable them to succeed on the present year's ESPET. The first task that the teachers will face after selecting a target area will be to create and administer a pre-assessment to assess the knowledge level of the students in the target area.

Setting

This study will take place at Freewill Elementary School in the Wayne Central School District (CSD). Wayne CSD is constructed of students from the towns of Walworth and Ontario, with Freewill consisting of students primarily from Walworth. Walworth is a small middle class town in Wayne County, New York. It has a population of approximately 7,000 with a median household income of $55,000 and an average home price of $125,000. Wayne CSD has an enrollment of 2,900 students of which 97% are Caucasian. Freewill Elementary School is a K-5 school with an enrollment of approximately 500 students. Freewill has a 97% attendance rate, 0% suspension rate, and 8% of its students qualify for the free lunch program. During the years 2000 to 2002 Freewill Elementary, as well as the school district as a whole, displayed improvement from one year to the next on each of the fourth grade state assessments in ELA, math, and
science. Freewill is also performing well above the average passing rates for other
teachers in the state. Table 1 displays the growth for the math and ELA exams during
these years.

Subjects

There will be four teachers along with their classes that will be participating in
this study. All four of the teachers, Carrie, Andrea, Alex and I teach 4th grade at Freewill
Elementary School. Carrie is in her seventh year of teaching, although this is her first
year teaching at Freewill. She transferred from another district this year. She previously
spent the last four years teaching 4th grade and the previous two years at the second grade
level. She has a masters degree in reading. Andrea is in her 8th year of teaching at
Freewill. She is in her fourth year teaching 4th grade and spent the first four years of her
career teaching in the gifted and talented program. Before getting her masters degree in
elementary education, she previously worked in the graphics design industry. Alex is in
her third year of teaching, all of which have been at Freewill. She has a masters degree in
reading. This year she is teaching in a blended classroom. This classroom contains a
mixture of both third and fourth grade students of which approximately 50 percent are
special education classified. I am in my third year of teaching fourth grade at Freewill. I
previously taught high school math part time for two years in another district. As part of
my duties working at Freewill Elementary School, I am responsible for the
implementation and scoring of the 4th grade ESPET test. I also facilitate the scoring of
the New York State's 4th grade standardized math test for Freewill, as well as, score the
ELA Test.
Although the primary focus of this study will revolve around the four teachers participating, the students involved will also play a key role. All of the students in the four teachers' classes will engage in any parallel tasks or assessments created during this study. All four of the classes participating in this study were created the previous year based on the following criteria. Each class will contain an equal number of students, 22; each class will have an equal balance of boys and girls; each class will contain an equal balance of students who have been identified as being high, medium, or low in the areas of reading, writing, and mathematics. Alex's blended class was created under the same procedure; however, her room has all of the special education classified students. Therefore, each of the teachers has a class that is highly similar to the classes of the other three teachers.

Procedure and Design

The teacher participants in this study will participate in five meeting sessions. During these meeting sessions the teachers will review the New York State science learning standards (Appendix A) along with their correlation to the New York State ESPET (Appendix D). They will then examine the results from their school on the previous two years ESPET tests. Using these results they will target an area in which their school is not meeting the state minimum requirements. They will then create and implement three parallel tasks and a final assessment task relating to the area that they have targeted. During their final meeting they will reflect back on their participation in this study.

In the first meeting the teachers will examine the results from the New York State ESPET tests that were given to the students of Freewill in May of 2001 (Appendix B) and
2002 (Appendix C). Their goal is to identify areas of weakness and target a skill or performance task in which Freewill students are routinely not meeting the state minimum requirement. At the end of this meeting they will have selected a performance task that will be the targeted focus of this study. They will complete Meeting Worksheet #1 (Appendix E) during this meeting.

During the second meeting the teachers will review the parallel tasks found in the book, *Collection of Alternative Assessment Tasks* (Reynolds, Doran, Allers, & Agruso, 1996). They will then pick a parallel task that focuses on the skill area that they targeted in their first meeting. This task will serve as their final assessment for this unit, since it will be closely related to the actual performance task given on the ESPET. The teachers will then create a parallel task of their own and then implement it in their classrooms. They will complete Meeting Worksheet #2 (Appendix E) during this meeting.

The third meeting will consist of the teachers reviewing and discussing their students' performance on the first parallel task that they created. They will use these results to identify a skill in which their students still need improvement. They will then create a second parallel task that will target these needs. The teachers will complete Meeting Worksheet #3 (Appendix E) during this meeting.

In the fourth meeting the teachers will watch video footage of 6 of their students engaging in the second parallel task. These students will be selected based on their performance in the first task. There will be 2 students each that are viewed as low, medium, and high performing. The teachers will complete Meeting Worksheet #4 (Appendix E) during this meeting.
For the fifth meeting the teachers will review the results from the second parallel task that they created. They will then create a final parallel task. This task will be interdisciplinary, so that it will include concepts from at least one other curriculum area. During this meeting the teachers will also set a date for the final parallel task assessment that they will give. This final task will be given after they have implemented the third parallel task that they created. The teachers will complete Meeting Worksheet #5 Page 1 (Appendix E) during this meeting. After the fifth meeting has taking place the teachers will complete page 2 of this worksheet.

Data Collection and Analysis

This study will contain six different types of data that will be collected and analyzed. These six different forms of data will include results from the previous two years ESPET test; meeting worksheets along with the lessons plans created during these meetings; the students' results from all of the parallel tasks that were created; video footage of the students engaging in the first parallel task; and the students' results from the final parallel task assessment.

The main focus of the teachers participating in this study will be improving the scores for their school on the New York State ESPET. The ESPET test contains two parts with each part being giving on a different day during the month of May. The first part of this test consists of 45 multiple-choice questions. These multiple-choice questions correspond to the science content areas of the living environment and the physical environment as specified in the New York State Learning Standards (Appendix A). The second part of this test consists of five performance tasks as illustrated in Table 2. These
performance tasks have the students engaging in the process of inquiry as they manipulate, observe, and draw conclusions based on the hands on performance tasks.

The first set of data that will be analyzed by the teachers during this study will be the results from Freewill's 2001 (Appendix B) and 2002 (Appendix C) ESPET exams. The teachers will use these results to target a skill area in which the students of Freewill are not meeting the minimum required achievement level. This target skill area will become their focus for the entire study.

The second set of data that will be examined are the meeting worksheets (Appendix E) and parallel tasks that are created by the teachers. The meeting worksheets contain a wealth of data pertaining to the teachers' thought process while they were engaging in this study. The parallel tasks that were created will be used to demonstrate the teachers' knowledge of the learning standards and ability to create lessons that promote student learning and curiosity. The results from these parallel tasks created by the teachers will also be closely examined. These results demonstrate the growth of the students as a whole as they strove to master the targeted skill(s). Both the teachers and the researcher of this study will use the final assessment performance task to assess whether or not the teachers were able to accomplish their goal of meeting the minimum required student achievement level.

Finally, throughout the course of this study the researcher will record his thoughts, feelings, and reflections in a journal while engaging in this study. This journal will enable me to look back and view what I was thinking and see my reactions to any events that occurred while undergoing this study.
Chapter 4 - Results and Analysis

Introduction

In this study a team of teachers was charged with the task of working together to target a skill in which the school has not been meeting the state minimum standard, and to create and implement a series of instructional strategies designed to raise student performance in this area. The skills that were selected by the teachers were sorting and classifying, which pertains to Station 2 of the New York State ESPET. These teachers were asked at the start of this study to create 3 parallel tasks designed to accomplish this goal. As a result of their work they were able to successfully raise the average student score from 73 percent on the first parallel task to 95 percent on the final assessment as shown in Table 3.

During the course of this study the teachers met five times formally and engaged in numerous informal meetings, which included one-on-one conversations and other discussions between the teachers. During these meetings the teachers created an introduction lesson on properties, four parallel tasks, and a final assessment. They also analyzed the students' performance on these tasks and made modifications to their instructional strategies as required.

First Formal Meeting

The teachers were introduced to the task in the first meeting that was held. This meeting had two goals; the identification of Freewill's strengths and weaknesses on the ESPET using the results from the previous 2 years (Appendix A), and the targeting of a skill and task in which the school was not meeting the minimum state standard using the New York State Item maps (Appendix D). Each of the four teachers started off
Improving Student Performance

Independently by examining the results from previous years and recording their thoughts on Meeting #1 Worksheet (Appendix E). Carrie identified Station 3, Station 4, and the first question of Station 1 as the students' strengths on the ESPET test. She identified Station 1 and 2 as the school's weakness. Alex identified Station 3 and 5 as the school's strengths and Station 1 and 2 as the areas of weakness. Andrea identified parts of Stations 1, 3, 4, and 5 as the strengths and Station 1 and 2 as the weaknesses. Jason selected Station 3 and 5 as the school's strengths and Station 1 and 2 as the school's area of weakness. After each of the teachers completed their independent analysis they then discussed their findings as a group.

As a result of this discussion the teachers came to a consensus that Station 1 and 2 were the largest area of weakness for the school. This triggered a discussion pertaining to which one showed the highest level of weakness and therefore should be targeted. Although, the students struggled on the first station, they typically understand the overarching concept on measuring. "Our students know how to measure, but lose points because they do not properly label their measurement," stated Alex. It was decided by the team that they would target the second station of the ESPET test, since the students displayed the least amount of understanding related to its concepts of sorting and classifying.

After selecting Station 2 as the task to target and its targeted skills of sorting and classifying, the teachers then began to make preparations for their next meeting. During the next meeting the teachers would begin to create parallel tasks. Since sorting and classifying tasks would require a number of materials in which to be sorted, the teachers concluded this meeting by brainstorming a list of objects that they would gather and bring
to the next meeting. Carrie pointed out, "The students should sort unlike objects and not just all one type of objects like candy." Alex added, "The students should start off sorting like items and build to sorting unlike items." Jason pointed out that the team had a large supply of assorted buttons, which could be used for the "like" sort. The teachers concluded the meeting by agreeing that they would sort buttons for the first task and use an assortment of objects for the second task.

Second Formal Meeting

In the second meeting the teachers set out to create tasks parallel to Station 2 of the ESPET. The teachers first reviewed what they discussed in the previous meeting and began to think of ideas for the first parallel task, which was to involve the sorting of buttons. However, Carrie pointed out, "You guys know what we should do before these sorts. I have a packet that would help the students with sorting." The other teachers in the group quickly agreed and Carrie retrieved the packet from her classroom. The packet was titled What Super Scientists Call Things That Hide?, which is an acronym for weight, size, color, shape, smell, color, texture, temperature, and hardness. Alex and Andrea both stated that it would be a good idea to use this packet as an introduction to the unit on sorting and classifying. The teachers agreed to use this packet as an introduction lesson on the various properties that objects have. Each of the teachers also talked about similar activities that they had used in previously years. Carrie described an activity where her students reached into a box and touched an object that they could not see. They then described the properties of the objects that they touched. Andrea described a similar activity in which her students reached into a paper bag. Jason brought up an activity that he used in which students were divided up into groups and given a secret
object to describe. The groups then presented their list of properties to the other groups in the class who then tried to guess what the object was. Each of the teachers agreed to present an introduction lesson on properties of objects.

In the second half of this meeting the teachers created the first parallel task, which involved the sorting of “like” objects. The like objects to be used in this sort were a set of 8 buttons (Appendix F). The first step that the teachers engaged in creating their parallel task was designing the chart or “sort organizer” that the students would use. They designed a chart (Appendix G) that could be used in the first couple tasks. During this process Carrie pointed out that, “…the most confusing thing for kids is using the mats (charts) the kids just don’t know what to do.” This became a common focus during the creation of this chart. The final product was a chart that was similar to the one used on the ESPET test and used arrows and labels to provide a clear logical format. After completing the chart the teachers begin to create the worksheet for their first parallel task.

This process began with the writing of the directions for their worksheet (Appendix H). The directions start by telling the students to remove the 8 objects from the bag and place them in the appropriate place on the chart. Jason pointed out that on the state test the first part of the task gives an example of how to sort. This became the second part of the task as it tells the students to separate the buttons into two groups, with group 1 containing “big” buttons and group 2 containing “small” buttons. The number of buttons in each group is also listed. The rest of the task engages the students in sorting the buttons in groups 1 and 2 into another sub category of groups. The students are also required to record the number of buttons in each group. The final section of the task requires the students to list the “combined properties of the first and second sort,” as
stated by Andrea. At the end of the meeting the teachers all agreed on a date in which to have the first sort completed by their students, so the results could be discussed in the next meeting. The teachers then administered the first parallel task to their students.

**Third Formal Meeting**

The third formal meeting started with the teachers discussing their reactions to the students' performance on the first parallel task. On the first parallel task the average student score was 72 percent. “On the first day the students were very confused,” stated Carrie. The teachers came to the conclusion that many students lost points because they did not understand the directions. To deal with this problem each of the teachers agreed to take the time to go over the first task with their students and model what was expected before administering the second task. Another problem that was observed by the teachers was that the students did not sort their objects into logical groupings. For example one student divided their buttons into two groups, yellow buttons and four-holed buttons. The problem with this type of grouping as pointed out by Alex, “A button can be both yellow and contain four-holes.” Jason then pointed out the strategy of using two different sorts in which he called “not” and “opposite”. “I am going to tell my kids that one strategy is to use a “not” sort, for example blue and not blue. Another strategy is to use the “opposite” sort, for example big and small,” stated Jason. The other teachers quickly adopted this as a strategy that they would implement in their class.

In the second phase of this meeting the teachers began to create the second parallel task. The second parallel task involved the students in the sorting of 8 “unlike” or miscellaneous objects. However, the teachers decided to make this into the third parallel task and to create a second parallel task where the students sorted different, but
similar objects. The different but similar objects selected by the teachers related to food and were thus classified by them as 8 food objects (Appendix F). The rationale for this as stated by Carrie was, "I don't think that the students are quite yet ready to make the leap to entirely different objects and should first practice the not and opposite strategies." The other teachers agreed that the students could use some more additional practice and a chance to implement their new strategies. The teachers decided to give the miscellaneous objects (Appendix F) as a third sort. Alex pointed out how this would allow them to scaffold and model the instructional strategies. The teachers also decided to use the same worksheet for the second and third task that was used in the first task. However, it was modified with the word buttons being replaced by the word objects and the students were no longer given the properties for groups 1 and 2 (Appendix F). The teachers concluded the meeting by agreeing to give the second and third parallel task before their next meeting.

Fourth Formal Meeting

In the fourth meeting three of the four teachers Andrea, Carrie, and Jason met to watch video footage of 6 different students engaging in the third task. Alex did not attend this meeting due to prior commitments. This meeting took place after the students had participated in the third parallel task, but before they had a chance to review the results from these tasks.

The first video observed was of Brooke. Brooke struggled on this task and received a score of 62 percent. Carrie noted that Brooke doesn't use properties that are related to each other. On one of the groupings Brooke classified objects as having holes versus things that people can eat. Jason pointed out that in the one grouping that Brooke
did attempt to use opposite properties she stated soft versus hard. This caused her some problems since she had one object, a Q-tip, which was both soft and hard. Andrea suggested that some students still need more reinforcement on the strategy of using the “not” or “opposite” groupings.

The second video observed was of Kyle, who received a perfect score on this task. Each of the teachers noted how much time Kyle spent on thinking about how to sort the objects. “I’m really surprised by the amount of time the students are spending thinking about how to sort. Maybe I just didn’t notice this because I was administering it to the whole class at once... but they are really deeply thinking about how to group these objects,” observed Carrie. Another thing that the teachers pointed out about Kyle was that in group 5 he classified the objects as “something found outside”, but then on the final section of the task classified and referred to the same group as “something you’d find in nature”. Although he still received credit for both of these responses, there was a variation in what he recorded. The teachers attributed this to him not looking back at his previous work and just going by the memory of his answers in the last section of the task.

The teachers then sought out to find an example of a model student.

After watching several more students the teachers finally settled on Samantha’s performance as being an exemplar one. In addition to Samantha receiving a perfect score, she looked back and checked her work. On the final section of the task she both looked back to find the previous properties on her paper and confirmed her results by observing the objects that she had placed on her chart. Carrie stated, “This is unbelievable, how good of a job she does at looking back and checking her work.” The teachers concluded
this meeting by agreeing to discuss with their class these properties that make up an exemplar performance.

**Fifth Formal Meeting**

In the fifth formal meeting the teachers discussed the results of the second and third tasks. In the second and third tasks the students received scores of 80 and 87 percent respectively. The second major goal of this meeting was to create the fourth parallel task, which was to be interdisciplinary, and make any last minute adjustments to the final assessment.

The teachers began this meeting by reviewing the results from the second and third parallel tasks. Carrie started the discussion by noting that the students seemed to be confused on the first task, but made significant progress and did not seem as flustered on the second and third tasks. Jason pointed out how helpful giving the students the sorting strategies of “not” and “opposite” sorts. All four teachers agreed that by the third task the vast majority of students had now grasped the concept of sorting and classifying. The teachers also noted that they were very curious to see how the students would perform when applying these skills in a different setting.

Next the team began the process of creating the interdisciplinary fourth parallel task. The teachers started off the process by brainstorming some possible ideas. These ideas included classifying explorers of the New World and events of the Revolutionary War in social studies and various geometric terms in math. The idea of sorting vocabulary terms in math triggered an idea from Carrie, who suggested that the students sort words in an English language arts ELA setting. The teachers decided to use this ELA concept and then proceeded to create the both the fourth parallel task chart (Appendix G)
and accompanying worksheet (Appendix H). During the creation of this worksheet the teachers decided to use words that were related to six of the properties (color, size, temperature, texture, shape, and weight) that they had discussed in their introduction lesson. Altogether they created a list of 16 words, three for each property (Appendix F). The teachers also agreed to model this task with the class using a different set of words before having the students engage in the task. The teachers concluded this meeting by agreeing to give the fourth and final task during the next three days.

Results and Teacher Reflections

The data indicates overwhelming success on the fourth parallel task and final assessment, with the student average at 92 and 93 percent respectively. Through the use of parallel tasks, mini-lessons, and various learning strategies the team of teachers was able to raise student performance 21 percentage points from the first parallel task to the final assessment as shown in Table 1. The final assignment that the teachers engaged in was the completion of a reflection questionnaire, titled Meeting #5 Worksheet (Appendix E).

The teachers' responses to the questions on this worksheet clearly demonstrate the success of their hard work. One of the questions on the worksheet asked if the parallel tasks served as adequate practice for the final assessment. Andrea responded, "Yes, this was adequate practice... because of the variety of tasks involved, plus the tasks challenged the students more than they will be on the ESPET." When asked how successful the unit was, Carrie simply responded, "Extremely Successful." Alex responded, "Very successful, because it lead to many great discussions around the properties and it exposed them to a variety of different sorting activities." When asked
how would you change this process if you were to engage in it again, Alex responded that she would spread the tasks out over a longer period of time. Carrie added that she would challenge the students even more by having them record the names of the objects sorted in the appropriate box for all of the tasks.

Clearly the teachers rose up to the challenge of targeting a skill, sorting and classifying, and then creating and implementing instruction designed to help the student reach the state minimum standards. The state minimum standard for the second task, titled “Grouping Objects” is a student average of 75 percent. On the both the 2001 and 2002 ESPET Freewill Elementary had a student average of 59 percent. On the first parallel task of this mini-unit on sorting and classifying the student average was 72 percent, once again lower than the state minimum standard. After participating in this study and engaging in all of the parallel tasks and other sorting and classifying lessons, the students achieved an average score of 93 percent on the final assessment. This score not only meets the state minimum standard, but also exceeds it by 18 percentage points.
Chapter 5 - Discussion

Introduction

This study has provided a wealth of information about teachers, students, and the action research process. The teachers in this study were successfully able to target a skill, sorting and classifying, and develop instructional strategies that led to their students performing significantly above the state minimum standard for that skill. The success of these teachers can clearly be attributed to their willingness and effort in working as a collaborative team. In addition to the teachers improving their students’ knowledge base, they also significantly built upon their own teaching repertoire. This “action research” that was undertaken by the team of teachers led them through a process of constantly refining their own teaching practices with the end result being shown through the success of their students.

During the course of this study the teachers met five times formally and on numerous occasions informally, through conversations and dialogues that they consistently engaged in. In their first formal meeting the teachers analyzed the data from the previous two years and selected a target area based on the weaknesses that they interpreted their school had. The area that they selected was the second performance task of the ESPET titled, “Grouping Objects”. The skill that they selected to target was sorting and classifying. It was evident during this meeting that the teachers were highly motivated in their endeavor to improve their students performance. This determination would last throughout the entire study. In the second formal meeting the teachers created their first parallel task and an introduction lesson to their unit. This introduction lesson would provide the backbone to their unit as the students built upon their knowledge base
of the properties that objects have. In the third formal meeting the teachers demonstrated their ability to be flexible and meet the changing needs of their students. During this meeting the teachers decided to design an additional parallel task, so that they could scaffold the learning process. In the fourth formal meeting the teachers watched a video of their students engaging in the parallel tasks. These students spoke aloud all of their thoughts as they were going through the task. The teachers were able to gain insight into the thought process of their students, which they used to further design their parallel tasks and modify their lessons to meet the needs of their students. In the fifth and final formal meeting the teachers created their final parallel task. The teachers created an interdisciplinary task that combined the skills that they were learning in science with their ELA curriculum. As a result of their hard work the teachers were able to raise their students performance from 73 percent on the first task to 95 percent on the final task.

This study clearly demonstrated the success that can be obtained when teachers work together with a common goal of improving instruction and student performance.

**Collaborative Effort**

Perhaps the biggest attribute that led to the overwhelming success of the team of teachers in this study was the high level of collaborative collegial effort that was put forth by them. In this study the teachers were charged with the task of meeting five times. During those meetings they were to review data from the previous years, select and target an area in which to improve student performance, develop three parallel tasks, and engage their students in the tasks that they created. Not only did the teachers accomplish all of these tasks, but also they routinely went above and beyond what was asked of them.
This point was clearly illustrated in the very first formal meeting that they had. The meeting was originally scheduled for 20 minutes in which time they were to analyze the previous years’ data and select a target skill area. In addition to completing this task the teachers used their entire planning time of 50 minutes to engage in an in-depth discussion on their students performance on the ESPET. They also began to discuss what materials they would use and what the main objectives would be for their unit.

Their hard work and effort continued in their second formal meeting. During this meeting their goal was to create the first parallel task. Not only did they create the first task, but also they decided to extend their unit by adding an introduction lesson on the properties of objects. This lesson helped to provide necessary background information for the students on vocabulary and descriptive properties that objects have. In the third formal meeting the teachers continued to go above and beyond what was required of them by deciding to make an additional parallel task. This parallel task, which was the second task that was giving to their students, helped to further refine their students’ understanding of sorting and classifying. The reason behind the creation of this task was to scaffold the sorting and classifying process, by having the students move from “like” objects, to “different/ but similar” objects, and finish with “unlike” miscellaneous objects. This clearly demonstrates the teachers’ ability to react to the performance of their students and make adjustments and modifications to their instruction to increase student learning.

Although this unit ended with the students achieving an average score of 95 percent on the final assessment, all of the teachers agreed that they wanted to continue to expand and build upon this unit. Alex will be creating sorting centers that engage her
students in the sorting and classifying of objects in other content areas. Another factor that will affect the teachers continuing development of this unit is the actual ESPET test that will be given in May of 2003, which is one and a half months after the teachers completed this unit. Due to time restrictions this study was finished before the students got to participate in the actual ESPET. The final assessment for this study was a parallel task that was created, by the writers of the ESPET. Each of the teachers has stated that they would like to further develop interdisciplinary tasks for their students to engage in during the couple of weeks before the ESPET is given. This will serve as a review and an opportunity for the teachers to further refine their students sorting and classifying skills.

The overall success of these teachers is a direct result of their willingness to work together as a team and reflect upon their own teacher paradigm. The teachers routinely challenged their own understanding and knowledge base, as well as, their students'.

One can only conclude that their determination to work together as a team in a collaborative effort, will lead to future successes in their endeavor to improve student learning and raise all of their students above the state minimum requirements.

Implications

At present the students of Freewill Elementary School and the district of Wayne Central perform well on the standardized state tests, which are given at the fourth and eight grade level. However, the superintendent of the district has set a goal stating that 90 percent of the students in the district will pass the ELA and math test by the year 2004. During the most recent year in which data is available, 2002, the fourth grade students of Wayne Central had a 74 and 78 percent passing rates on the ELA and math
assessment respectively (Table 1). Clearly there is a long way to go in raising the students' scores above this target goal of 90 percent passing.

The success of the teachers in this study demonstrates a solid approach toward accomplishing this goal. The teachers were able to analyze the data from previous state assessments and use this information to target a skill and make significant improvements in that area. As a teacher you cannot just make a general statement that I am going to improve my students' scores on next years tests and expect to be successful. In order to reach passing rates of 90 percent it will be necessary for teachers to analyze all of the state tests to determine where are the districts strengths and weaknesses. Once the teachers have accomplished this, they can then begin to target individual skills in which their students' and possibly their instructional delivery are in need improvement. By targeting one or two skills at a time the teachers will be able to better manage the tremendous goal of raising the passing rates from the mid to upper 70's to 90 percent.

In order for the district to be successful in achieving this passing rate goal, teachers at other grade levels and curriculum areas must also begin this process of targeting areas of weaknesses and making improvement in their instruction. This brings out another important product from the success of the teachers in this study. Their work can now serve as a model and as a successful example of how a team of teachers can come together to form a learning community that can make a significant difference in the performance of their students. By working together collaboratively and not in isolation the team of teachers has unquestionably set an example of how to make a significant difference in the scores of their students on state assessments, one skill at a time. Their
work sets a tone establishing the success that can be achieved when teachers work together to achieve a goal.

Future Considerations

This study has raised several questions that will lead me to further study. These questions include: how easily can this process be applied to other curriculum areas; can other grade levels that do not have a state test as a data source also readily select target areas for improvement; how much training in parallel tasks is required for teachers to be successful; and how much is the students' performance affected by not being familiar with the test format?

Although this process was highly successful in targeting and improving a skill in the area of science, how easily can it be applied to the other curriculum areas? In addition to the fourth grade students in New York State having to take the ESPET, they must also take a state assessment in the areas of math and ELA. At the start of fifth grade they take the state assessment in social studies that is based on Document Based Questions (DBQ). Just like in the ESPET, the students have various strengths and weaknesses in all of these tests. Clearly there is a need for teachers to be targeting skills and making improvements in those areas. I believe that it is pretty clear from the ideas that were generated by the teachers pertaining to the creation of the interdisciplinary parallel task, that the teachers could apply this process to any curriculum area.

In this study the interdisciplinary task that the team of teachers created was related to ELA, and involved the sorting of words. However, during their meetings they also came up with several other excellent ideas that combined the concepts of sorting with other curriculum areas. Alex suggested that they create a parallel task that involved
the students in sorting and classifying geometric objects in a math-based task. Carrie and Andrea suggested an idea that the students sort and classify battles and events of the American Revolution and I suggested a task where the students sorted and classified the explorers of the New World. This ability to take any concept or skill in one area and develop tasks that use these skills in another area should enable teachers to apply this process to any curriculum area.

Teachers should also be able to apply this process at other grade levels, in particular grade levels that do not have mandated standardized tests. Although the state tests given by New York give a large wealth of information pertaining to the students' strengths and weaknesses in a variety of skill areas; teachers could also create their own assessments to determine their students knowledge and ability in any skill or content area. They should then be able to use this data to target a specific skill and undergo the same process that was successfully engaged in by the team of teachers in this study.

Perhaps one of the greatest reasons for the success of the teachers in this study was their vast knowledge and experience in creating parallel tasks. All four of the teachers had previously created numerous parallel tasks for all four state assessments, ELA, math, ESPET, and social studies. This knowledge was clearly evident in the ease in which they were able to create the required parallel tasks for this study. Therefore, this knowledge of parallel tasks seems to be a precursor for success in implementing this process. In order for other teachers to undergo this process it may be necessary for them to obtain the training in the creation of parallel tasks.

Although this study focused around the teachers and their engagement in action research, this study has raised several questions pertaining to the students and their
performance. The first question that comes to mind is how much is the students’ performance affected by not being familiar with the test format? It was pretty clear that the students definitely learned a great deal about sorting and classifying objects as they improved their scores from 73 percent on the first task to 95 percent on the final task. However, all four teachers during the study also pointed out that the students had trouble figuring out what was asked of them. Once they understood what was expected they had an easier time completing the tasks. During the first meeting when the teachers were analyzing Freewill strengths and weaknesses they attributed their students’ weakness on the first task to not understanding how the state expected to label a unit. This brings up an interesting question: what percentages of the students’ scores are based on their understanding or not understanding of the format of the test?

Conclusion

The overwhelming success of the teachers in this study has provided a wide range of positive results that will benefit the students, teachers, and district of Wayne Central. At the student level, the students were able to significantly improve their understanding of the concepts of sorting and classifying. The 95 percent average score that was achieved by these students clearly demonstrates their mastery of these skills. The teachers who participated in this study walked away with significant gains and accomplishments in several areas. First is the awe-inspiring sense of accomplishment that they each felt upon viewing their students’ results on the final assessment. The teachers also gained significant knowledge in developing a process of instructional strategies designed to increase student performance. They also refined their teaching practices and knowledge of creating parallel tasks. This study also has the potential to
have a significant impact at the district level as it provides a successful model for which other teachers can use to improve the performance of their students.

On a more personal level, I have walked away from this action research study with several insights pertaining to the use of action research and collaborative teams to increase student performance and build upon my existing teaching paradigms. I am looking forward to working with the other teachers in my team to target more skills in which we seek to make improvements. I will also be applying this philosophy of improving student learning by targeting specific goals and developing a course of action not only to the state tests, but also to my everyday instructional objectives and practices. This study clearly demonstrated the value of action research not only as a means to increase a teacher's instructional knowledge, but also as a means for teachers to come together and work collaboratively to take on a challenge and succeed.
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Appendices

Appendix A: Standard 4 - Elementary Science

Standard 4—Science

Elementary

Physical Setting

1. The Earth and celestial phenomena can be described by principles of relative motion and perspective.

Students:
• describe patterns of daily, monthly, and seasonal changes in their environment.

This is evident, for example, when students:
• conduct a long-term weather investigation, such as running a weather station or collecting weather data.
• keep a journal of the phases of the moon over a one-month period. This information is collected for several different one-month periods and compared.

2. Many of the phenomena that we observe on Earth involve interactions among components of air, water, and land.

Students:
• describe the relationships among air, water, and land on Earth.

This is evident, for example, when students:
• observe a puddle of water outdoors after a rainstorm. On a return visit after the puddle has disappeared, students describe where the water came from and possible locations for it now.
• assemble rock and mineral collections based on characteristics such as erosional features or crystal size features.

3. Matter is made up of particles whose properties determine the observable characteristics of matter and its reactivity.

Students:
• observe and describe properties of materials using appropriate tools.
• describe chemical and physical changes, including changes in states of matter.

This is evident, for example, when students:
• compare the appearance of materials when seen with and without the aid of a magnifying glass.
• investigate simple physical and chemical reactions and the chemistry of household products, e.g., freezing, melting, and evaporating; a comparison of new and rusty nails; the role of baking soda in cooking.

4. Energy exists in many forms, and when these forms change energy is conserved.

Students:
• describe a variety of forms of energy (e.g., heat, chemical, light) and the changes that occur in objects when they interact with those forms of energy.
• observe the way one form of energy can be transformed into another form of energy present in common situations (e.g., mechanical to heat energy, mechanical to electrical energy, chemical to heat energy).

This is evident, for example, when students:
• investigate the interactions of liquids and powders that result in chemical reactions (e.g., vinegar and baking soda) compared to interactions that do not (e.g., water and sugar).
• in order to demonstrate the transformation of chemical to electrical energy, construct electrical cells from objects, such as lemons or potatoes, using pennies and aluminum foil inserted in slits at each end of fruits or vegetables; the penny and aluminum are attached by wires to a milliammeter. Students can compare the success of a variety of these electrical cells.

5. Energy and matter interact through forces that result in changes in motion.

Students:
• describe the effects of common forces (pushes and pulls) on objects, such as those caused by gravity, magnetism, and mechanical forces.
• describe how forces can operate across distances.

This is evident, for example, when students:
• investigate simple machines and use them to perform tasks.
**The Living Environment**

1. Living things are both similar to and different from each other and nonliving things.
   - Students: describe the characteristics of and variations between living and nonliving things.
   - Students: describe the life processes common to all living things.
   - This is evident, for example, when students:
     - grow a plant or observe a pet, investigating what it requires to stay alive, including evaluating the relative importance and necessity of each item.
     - investigate differences in personal body characteristics, such as temperature, pulse, heart rate, blood pressure, and reaction time.

2. Organisms inherit genetic information in a variety of ways that result in continuity of structure and function between parents and offspring.
   - Students: recognize that traits of living things are both inherited and acquired or learned.
   - Students: recognize that for humans and other living things there is genetic continuity between generations.
   - This is evident, for example, when students:
     - interact with a classroom pet, observe its behaviors, and record what they are able to teach the animal, such as navigation of a maze or performance of tricks, compared to that which remains constant, such as eye color, or number of digits on an appendage.
     - use breeding records and photographs of racing horses or pedigreed animals to recognize that variations exist from generation to generation but "like begets like."

3. Individual organisms and species change over time.
   - Students: describe how the structures of plants and animals complement the environment of the plant or animal.
   - Students: observe that differences within a species may give individuals an advantage in surviving and reproducing.
   - This is evident, for example, when students:
     - relate physical characteristics of organisms to habitat characteristics (e.g., long hair and fur color change for mammals living in cold climates).
     - visit a farm or a zoo and make a written or pictorial comparison of members of a litter and identify characteristics that may provide an advantage.

4. The continuity of life is sustained through reproduction and development.
   - Students: describe the major stages in the life cycles of selected plants and animals.
   - Students: describe evidence of growth, repair, and maintenance, such as nails, hair, and bone, and the healing of cuts and bruises.
   - This is evident, for example, when students:
     - grow bean plants or butterflies; record and describe stages of development.

5. Organisms maintain a dynamic equilibrium that sustains life.
   - Students: describe basic life functions of common living specimens (guppy, mealworm, gerbil).
   - Students: describe some survival behaviors of common living specimens.
   - Students: describe the factors that help promote good health and growth in humans.
   - This is evident, for example, when students:
     - observe a single organism over a period of weeks and describe such life functions as moving, eating, resting, and eliminating.
     - observe and demonstrate reflexes such as pupil dilation and contraction and relate such reflexes to improved survival.
     - analyze the extent to which diet and exercise habits meet cardiovascular, energy, and nutrient requirements.

6. Plants and animals depend on each other and their physical environment.
   - Students: describe how plants and animals, including humans, depend upon each other and the nonliving environment.
   - Students: describe the relationship of the sun as an energy source for living and nonliving cycles.
   - This is evident, for example, when students:
     - investigate how humans depend on their environment (neighborhood), by observing, recording, and discussing the interactions that occur in carrying out their everyday lives.
     - observe the effects of sunlight on growth for a garden vegetable.

7. Human decisions and activities have had a profound impact on the physical and living environment.
   - Students: identify ways in which humans have changed their environment and the effects of those changes.
   - This is evident, for example, when students:
     - give examples of how inventions and innovations have changed the environment; describe benefits and burdens of those changes.
Appendix B: Freewill Elementary 2001 Science Test Results

Freewill Elementary

2001

ESPET Test Results
<table>
<thead>
<tr>
<th>Test Section</th>
<th>School</th>
<th>Possible</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective</td>
<td>34.7</td>
<td>45</td>
<td>77%</td>
</tr>
<tr>
<td>Station 1</td>
<td>6.4</td>
<td>12</td>
<td>53%</td>
</tr>
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Appendix C: Freewill Elementary 2002 Science Test Results

Freewill Elementary

2002

ESPET Test Results
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- **Satisfies State Requirement**
- **Doesn't Meet State Minimum Requirement**
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Satisfies State Requirement

Doesn't Meet State Minimum Requirement
### Appendix D: ESPET Item Map

**Item Map**

*New York State Elementary Science Program Evaluation Test*

Reference to *Elementary Science Core Curriculum*

_(pg 1 of 3)_

<table>
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<th>Performance Test, Form Z**</th>
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<tr>
<td><strong>Key Idea 1</strong></td>
<td>1.1 Use special mathematical notation and symbolism to communicate in mathematics and to compare and describe quantities, express relationships, and relate mathematics to their immediate environment.</td>
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<td><strong>Key Idea 2</strong></td>
<td>2.1 Use simple, logical reasoning to develop conclusions, recognizing that patterns and relationships present in the environment assist them in reaching conclusions.</td>
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<td><strong>Key Idea 3</strong></td>
<td>3.1 Explore and solve problems generated from school, home, and community situations, using concrete objects or manipulative materials when possible.</td>
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* For each item on the objective test, if the item addresses all or part of a performance indicator, the item number appears in that row.
** For each station on the performance test requires the student to perform several activities. These activities are numbered within each station. For each station, if a task addresses all or part of a performance indicator, the task number appears in that row.
### Item Map

**New York State Elementary Science Program Evaluation Test**

**Reference to *Elementary Science Core Curriculum***

(pg 2 of 3)

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<td><strong>Key Idea 1</strong></td>
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<tr>
<td>The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing, creative process</td>
<td>1.1 Ask &quot;why&quot; questions in attempts to seek greater understanding concerning objects and events they have observed and heard about.</td>
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<td></td>
<td>1.2 Question the explanations they hear from others and read about, seeking clarification and comparing them with their own observations and understandings.</td>
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<td></td>
<td>1.3 Develop relationships among observations to construct descriptions of objects and events and to form their own tentative explanations of what they have observed.</td>
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<td><strong>Key Idea 2</strong></td>
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<tr>
<td>Beyond the use of reasoning and consensus, scientific inquiry involves the testing of proposed explanations involving the use of conventional techniques and procedures and usually requiring considerable ingenuity</td>
<td>2.1 Develop written plans for exploring phenomena or for evaluating explanations guided by questions or proposed observations they have helped formulate.</td>
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<td>2.2 Share their research plans with others and revise them based on their suggestions.</td>
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<td>2.3 Carry out their plans for exploring phenomena through direct observation and through the use of simple instruments that permit measurements of quantities (e.g., length, mass, volume, temperature, and time).</td>
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<tr>
<td><strong>Key Idea 3</strong></td>
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<tr>
<td>The observations made while testing proposed explanations, when analyzed using conventional and invented methods, provide new insights into phenomena.</td>
<td>3.1 Organize observations and measurements of objects and events through classification and the preparation of simple charts and tables.</td>
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<td>3.2 Interpret organized observations and measurements, recognizing simple patterns, sequences, and relationships.</td>
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<td>3.3 Share their findings with others and actively seek their interpretation and ideas.</td>
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<td>3.4 Adjust their explanations and understandings of objects and events based on their findings and new ideas.</td>
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### Item Map

**New York State Elementary Science Program Evaluation Test**

Referenced to *Elementary Science Core Curriculum* (pg 3 of 3)

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<td>The Earth and celestial phenomena can be described by principles of relative motion and perspective.</td>
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<td><strong>Key Idea 2 – Physical Setting</strong></td>
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<td>Many of the phenomena that we observe on Earth involve interactions among components of air, water, and land.</td>
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<td><strong>Key Idea 5 – Physical Setting</strong></td>
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<td>Energy and matter interact through forces that result in changes in motion</td>
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<td>Living things are both similar to and different from each other and nonliving things.</td>
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<td>Organisms inherit genetic information in a variety of ways that result in continuity of structure and function between parents and offspring.</td>
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<tr>
<td><strong>Key Idea 3 – Living Environment</strong></td>
<td>33</td>
<td></td>
</tr>
<tr>
<td>Individual organisms and species change over time</td>
<td>34</td>
<td></td>
</tr>
<tr>
<td><strong>Key Idea 4 – Living Environment</strong></td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>The continuity of life is sustained through reproduction and development.</td>
<td>36</td>
<td></td>
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<tr>
<td><strong>Key Idea 5 – Living Environment</strong></td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>Organisms maintain a dynamic equilibrium that sustains life.</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td><strong>Key Idea 6 – Living Environment</strong></td>
<td>39</td>
<td></td>
</tr>
<tr>
<td>Plants and animals depend on each other and their physical environment</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td><strong>Key Idea 7 – Living Environment</strong></td>
<td>41</td>
<td></td>
</tr>
<tr>
<td>Human decisions and activities have had a profound impact on the physical and living environment</td>
<td>42</td>
<td></td>
</tr>
</tbody>
</table>
Appendix E: Meeting Forms

Meeting #1 Worksheet

In this meeting you will examine the results from the New York State ESPET test that was given to the students of Freewill in May of 2001 and 2002. Your goal is to identify areas of weakness and target a skill or performance task in which Freewill students are routinely not meeting the state minimum requirement.

Activity 1
Take 15 minutes to look over the 2001 ESPET Test Results and 2002 ESPET Test Results Packets.

What are Freewill's strengths?

What areas does Freewill need to make improvements?

Activity 2
Now that you have identified Freewill's strengths and weaknesses, take some time to review the ESPET Item Map packet along with the New York State MST Learning Standards packet. Use these standards and your responses from above to select one area in which you would like to target and then create a series of parallel tasks and assessments in order to improve Freewill's scores.

Record the performance task that you have selected below along with the specific skills and or standards that you will be targeting.
In this meeting you will review the parallel tasks found in the book, *Collection of Alternative Assessment Tasks* and select the one that is related to the skill area that you have targeted. This will serve as your final assessment, since the parallel tasks created in this book are from the makers of the ESPET test. Once you have selected a parallel task you will then create a parallel task of your own.

**Activity 1**
Review the parallel tasks and select one to use as a final assessment.

What is the name of the Parallel task that you have selected to use as your final assessment for this unit?

**Activity 2**
Use the space below to brainstorm ideas for the first parallel task that you are to create. Staple the completed parallel task lesson plan along with any required worksheets to this document when you have finished.

Objectives:

Procedures:

Materials Required:
In this meeting you will review and discuss the results from the parallel task that you created and gave to your students. You will then create a second parallel task that you will give to your students.

Activity 1
Review the results from the first parallel task that you created.
How do you think your students performed on this task?

In what skills or areas do you think your students still need improvement?

Activity 2
Use the space below to brainstorm ideas for the second parallel task that you are to create. Your second parallel task should focus on the areas or skills in which your students displayed weaknesses based off of the first task that you created. Staple the completed parallel task lesson plan along with any required worksheets to this document when you have finished.

Objectives:

Procedures:

Materials Required:
Name: ________________________________ Meeting #4 Worksheet

In this meeting you will be watching video footage of your students engaging in their parallel tasks. Record your observations of these students below.

Student 1

Student 2

Student 3

Student 4

Student 5
In this meeting you will review and discuss the results from the second parallel task that you created and gave to your students. You will then create a third parallel task that you will give to your students. This third parallel task will incorporate concepts from another curriculum or subject area. You will also set a date in which to give the final assessment. This final assessment will be given after the your students complete the task you create today, but before the fifth and final meeting.

Activity 1
Review the results from the second parallel task that you created.
How do you think your students performed on this task?

In what skills or areas do you think your students still need improvement?

Activity 2
Use the space below to brainstorm ideas for the third parallel task that you are to create. Your third parallel task should focus on the areas or skills in which your students displayed weaknesses based off of the second task that you created. You will also incorporate concepts form at least one other subject area, so that this activity will be interdisciplinary. Staple the completed parallel task lesson plan along with any required worksheets to this document when you have finished.

Objectives:

Procedures:

Materials Required:

Activity 3
Date for final parallel task assessment: ________________

Name:__________________________
How did your students perform on the third parallel task that you created?

Do you feel that this served as an adequate practice for the final assessment?

How did your students perform on the final assessment task?

Overall, how successful do you feel this unit was?

What would you change or do differently if you were to engage in this process again?
Appendix F: Sorting Objects

Parallel Task 1

8 Buttons (3 “big” and 5 “small”)

Parallel Task 2

8 Food Objects (dog bone, walnut, pecan, jelly-bean, gum-ball, lima bean, seed)

Parallel Task 3

8 Misc. Objects (balloon, shell, screw, rock, eraser, hair-band, Q-tip, metal washer)

Parallel Task 4

16 Words

Final Assessment

9 Candy Objects (Gummy Bears, Jelly Beans, Peanut Butter Cups, Caramel, M&Ms, Twix, Jolly Ranchers, Lollipops, and Hard Candy)
Appendix G: Sorting Charts

Parallel Tasks (1-3)

Parallel Task 4

Final Assessment
Appendix H: Parallel Tasks

Parallel Task 1: Button Task

Name: __________________________

Sorting Objects

Directions: In this experiment you will be sorting and classifying a set of buttons. Once you have used a property, you may not use it to sort again.

1) Take the 8 buttons out of the bag and place them into the box titled "Objects to be sorted". You will be dividing these 8 buttons into 2 groups. The buttons in group 1 are classified as "big" buttons and the buttons in group 2 are "small" buttons.

2) Place the "big" buttons into group 1 and the "small" buttons into group 2. There are "3" big buttons and "5" small buttons.

(The chart below has been filled out for you.)

Properties of groups

Group 1: Big __________________ Number of buttons: ___3____

Group 2: Small _________________ Number of buttons: ___4____

3) Sort the buttons in group 1 into groups 3 and 4. Record the properties of these buttons and the number in each group in the space below.

Properties of groups

Group 3: ______________________ Number of buttons: _______

Group 4: ______________________ Number of buttons: _______
4) Sort the buttons in group 2 into groups 5 and 6. Record the properties of these buttons and the number in each group in the space below.

Properties of groups

Group 5: ___________________ Number of buttons: ______

Group 6: ___________________ Number of buttons: ______

5) Classify the buttons in groups 3-6 in the space below. Use the same properties that you sorted above to write your classifications. Group 3 has been started for you. Finish classifying group 3 and then complete the rest.

Group 3: _________________________________

Group 4: ________________________________

Group 5: ________________________________

Group 6: ________________________________
Parallel Task 2 & 3: Food/ Misc. Objects

Name: _________________________  

Sorting Objects

Directions: In this experiment you will be sorting and classifying a set of objects. Once you have used a property, you may not use it to sort again.

1) Take the 8 objects out of the bag and place them into the box titled “Objects to be sorted”. You will be dividing these 8 objects into 2 groups. You will need to pick a property for the objects in group 1 and group 2. (For example you could sort “big” in group 1 and “small” in group 2. You may not use this example of big and small for your sort.)

2) Place your 8 objects into the 2 groups below and label the properties of these 2 groups.

Properties of groups
Group 1: _________________________  Number of objects: _______

Group 2: _________________________  Number of objects: _______

3) Sort the objects in group 1 into groups 3 and 4. Record the properties of these objects and the number in each group in the space below.

Properties of groups
Group 3: _________________________  Number of objects: _______

Group 4: _________________________  Number of objects: _______
4) Sort the objects in group 2 into groups 5 and 6. Record the properties of these objects and the number in each group in the space below.

Properties of groups

Group 5: ___________________________ Number of objects: _______

Group 6: ___________________________ Number of objects: _______

5) Classify the objects in groups 3-6 in the space below. Use the same properties that you sorted above to write your classifications.

Group 3: ____________________________

Group 4: ____________________________

Group 5: ____________________________

Group 6: ____________________________
Parallel Task 4: Word Sort

Classifying Candy
Task: At this station you will be putting candy into groups

Materials:
- Candy bag
- Test card

Directions:
A. Place all of the candy on the test card in the box labeled Place Candy Here.

B. Using the test card as your guide, divide all the candies into (2) groups, group 1 and group 2.

C. All of the candies in group 1 must have the same property and all of the candies in group 2 must have the same property.

D. Use all the candy.

Questions:
1) What property does the candy in group 1 have?

List the candies that you have placed in group 1.


2) What property does the candy in group 2 have?

List the candies that you have placed in group 2.


Directions:
E. Next, using the test card as your guide, divide group 1 into two (2) groups, A and B, so that all of the candy in each of the new groups has the same property.
F. Use all of the candy in group 1.

Questions:
3) What property does the candy in Group A have?

List the candies that you have placed in Group A.

4) What property does the candy in group B have?

List the candies that you have placed in Group B.

Directions:
G. Next go back to group 2. Using the test card as your guide, divide group 2 into two (2) groups, C and D, so that all of the candy in each of the new groups has the same property.

H. Use all of the candy in group 2.

Questions:
5) What property does the candy in Group C have?

List the candies that you have placed in Group C.

6) What property does the candy in group D have?

List the candies that you have placed in Group D.
Tables (1-3)

Table 1

Freewill's ELA and math test results
### Table 2

**Description of performance tasks**

<table>
<thead>
<tr>
<th>Station #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Liquids - Students use measuring equipment and their observation skills to determine the physical properties of objects, make inferences about discrepant events, and formulate new questions based on data collected.</td>
</tr>
<tr>
<td>2</td>
<td>Grouping Objects - Students sort a set of eight objects into appropriate groups and then create their own classification system by forming subgroups for the objects.</td>
</tr>
<tr>
<td>3</td>
<td>Ball and Ramp Game - Two students work together cooperatively at this task, which uses a ball and ramp &quot;game&quot;. The students gather data about problems associated with the development of the game. Students measure distance and make inferences and predictions based on the data they collect. Each student completes an answer sheet and makes predictions about how to modify the game.</td>
</tr>
<tr>
<td>4</td>
<td>Magnetic and Electrical Testing - Students use a magnet and electrical tester to collect data about a set of eight objects. They record their findings and use the data they collect to make inferences and generalizations about the magnetic and electrical properties of the set of objects.</td>
</tr>
<tr>
<td>5</td>
<td>Unknown Object - Students are given an unknown object and are asked to describe it in a letter so that a scientist might be able to identify it. Students must use observations skills and nonstandard measurement to describe the object, communicate this information in writing, and ask additional questions of the scientist to further their investigation.</td>
</tr>
</tbody>
</table>
Table 3

Student results

Average Student Score

Parallel Tasks

Task 1  Task 2  Task 3  Task 4  Final

Score 60 70 75 80 85 90 95

Parallel Tasks

Task 1  Task 2  Task 3  Task 4  Final

Score 60 70 75 80 85 90 95

Table 3

Student results