The Inquiry Learning Method and its Effect on Student WASL Scores

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ABSTRACT

The No Child Left Behind Act was passed to make school districts more accountable. Administrators in the Sunnyside School District decided to adopt a new science curriculum, based on inquiry learning.

In this project the researcher compared two groups of students' Washington Assessment of Student Learning scores. The control group was taught using a textbook curriculum based on direct instruction. The treatment group was taught using a curriculum that was based on the inquiry method of learning.

There was not a significance increase between the scores of the two groups. The researcher was not able to say that the new curriculum made an improvement in the students' learning.

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CHAPTER 1

Introduction

Background for the Project

The government of the United States of America was worried about U.S. students falling behind students in other countries. They were also concerned with differences in local school district standards and how minorities were represented in the public school system. To counter this problem they set out to increase the accountability of the school system in each state. In 2001 Congress passed the No Child Left Behind Act (NCLB). One of the things NCLB required was that all states develop a basic skills test that all of their students had to take. These tests on basic skills were taken by the students at different grade levels.

Washington's answer to this government legislation was to develop and adopt the Washington Assessment of Student Learning (WASL). The WASL covered Reading, Math, Science, and Writing. The WASL was taken in the tenth grade and was required for graduation. The WASL was also administered in other grade levels to serve as

an assessment of the student's progress and ability to pass the WASL in high school.

To determine how well the school districts were doing the federal government used the term Adequate Yearly Progress (AYP). If a school or district's students were not performing to standards than the school had to show that they were making AYP. One criterion for meeting AYP was that 95 percent of the students were passing the WASL. If a school was not meeting AYP than that school had to go into school improvement. Schools that were in the school improvement process would then be monitored by the state.

Statement of the Problem

Students who graduated from high school in the year 2010 had to pass the science sections of the WASL. Students in Sunnyside did not do well on the science WASL. Less than twenty percent of the students in the eighth grade passed the science WASL. Science teachers and curriculum directors in the Sunnyside School District (SSD) researched and adopted a new science curriculum that taught science through the use of inquiry learning. They settled on Science and

Technology Concepts for Middle School (STC/MS) Science Kits.

In the SSD each content area was able to adopt a new or different curriculum every five years. This adoption was done before the allotted adoption period, so a proposal had to be presented to the school board. Three kits were going to be used in the seventh grade and three of the kits were going to be used in the eighth grade. The adoption was approved by the school board and the six different science kits were purchased by the school district. There was a large cost to the district to put all the needed materials into each classroom.

Purpose of the Study

The purpose of this study was to see if the science kits that were adopted as the science curriculum at the middle school level were doing what they were intended to do. The researcher and others in the SSD wondered if they had done what was best to help their students pass the WASL. They wanted to know if there was any change in the scores for students taking the science section of the WASL who were taught using the different curriculums.

Delimitations

This project included eighth grade students in the SSD. This project covered two different middle schools and two different school years, 2004-2005 and 2006-2007. For the year 2004-2005 the students were attending Harrison Middle School and when the new school opened the eighth grade was split between that school and Sierra Vista Middle School. The students' involved all had the same eighth grade teacher prior to taking the WASL in the eighth grade, the only difference was that in 2004-2005 the students were taught using mostly a textbook curriculum and in 2006-2007 the students were taught using the new science kit curriculum. The students' scores on the science WASL were used to show the effectiveness of the different curriculums.

Assumptions

It was assumed that the students had all tried their best on the science WASL sections that they took. It was also assumed that since the students' came from the same area that they were similar in regards ability and achievement levels. The students involved in this project were also in the same age range so the

maturation of the participants was not an issue. There was also the assumption that the students involved in this study worked hard and tried their best no matter which curriculum they were being taught. It was also assumed that the researcher had taught both types of curriculum the way he had been trained.

Hypothesis

Students who graduated in 2010 had to pass the Science sections of the WASL. The science WASL taken in the fifth and eighth grades was used as an indicator of their success on the science WASL they had to take in high school. The scores of the students who were taught using the inquiry learning method or science kits were higher than students who were taught using the old science textbook curriculum.

Null Hypothesis

Passing the WASL was a graduation requirement for students who graduated in 2010. The Science WASLs in the fifth and eighth grades were used as indicators of a student's success on the WASL in high school. There was no significant difference in eighth grade WASL scores between students who were taught with the STC/MS science kits, using the inquiry learning method, and

students who were taught with the old science curriculum. The significance was determined using the $p \geq 0.05$, 0.01, and 0.001.

Significance of the Project

The purpose of this project was to provide a factual base of information regarding the effectiveness of the new science curriculum, at the middle school level, for the SSD. The project was done see if the students were making significant progress in meeting AYP. Sierra Vista Middle School was not in state mandated school improvement, but many teachers in the Science department were concerned with the students' extremely low WASL scores in science. The researcher wanted to conclude if the new science curriculum, focused on the inquiry learning method, made any significant change in the WASL scores of the students in the researcher's classes.

Procedure

The researcher chose WASL scores for two different years. The scores for the 2004-2005 school year were students who had not been taught using inquiry learning. The scores for the 2006-2007 school year were students who had been taught using inquiry

learning through the STC/MS science kits. The students selected were students that had been taught by the researcher for the duration of eighth grade. The researcher applied a t-test to the scores from both years, to see if there was a significant increase in the students who were taught using inquiry learning.

Definition of Terms

For the purpose of this study, the following words were defined:

inquiry learning method. This was an idea of teaching, where students would work to solve problem and answer questions instead of being directly instructed by the teacher.

No Child Left Behind. This was a term used when people talked about the education reform act put into effect by Congress.

Acronyms

AYP. Adequate Yearly Progress

NCLB. No Child Left Behind

SSD. Sunnyside School District

STC/MS. Science and Technology Concepts for Middle Schools

NSRC. National Science Resources Center

WASL. Washington Assessment of Student Learning

CHAPTER 2

Review of Selected Literature

Introduction

This chapter has been organized around the following topics: (a) learning by inquiry, (b) teaching by inquiry (c) No Child Left Behind Act (NCLB), and (d) Science and Technology Concepts for Middle Schools (STC/MS) science kits. These subsets provided the researcher with information during the planning of the project. Inquiry learning was an idea that had gained a lot of focus, especially in the area of science. The inquiry learning method was broken down into two parts, the learning aspect and the teaching aspect of the inquiry model. No Child Left Behind was the driving force for educational reform in the United States during the first part of the twenty-first century. Science and Technology Concepts for Middle Schools science kits were a curriculum that was designed by the Curriculum Development Center of the National Science Resources Center (NSRC).

Learning by Inquiry

"Inquiry" is defined as "a seeking for truth, information, or knowledge -- seeking information by

questioning.” (Thirteen, 2004) There was an ancient Chinese Proverb that summed up inquiry learning for educators it said "Tell me and I’ll forget; show me and I may remember; involve me and I’ll understand." The focus of the new STC/MS science kits was to involve the students and therefore get them to understand. The old curriculum that had been in use at the middle school level of the Sunnyside School District (SSD) worked more like the tell me, (direct instruction) and show me (mastery learning) part of the saying.

Inquiry learning could be traced back to ancient Greece and Socrates, who led his students to discovery through questioning and more questioning. The modern day father of inquiry learning in the United States was John Dewey. In his book, The Child and the Curriculum, Dewey stated:

> Learning is active. It involves reaching out of the mind. It involves organic assimilation starting from within. Literally, we must take our stand with the child and our departure from him. It is he and not the subject-matter which determines both quality and quantity of learning. (Dewey, 1902)

The key for inquiry learning effectiveness was the students' curiosity. Curiosity was the basis on which most human knowledge was built. (Lenherr, 2001) In inquiry learning the students were the focus and the teacher would guide them in their search for answers. When students were curious about a subject they usually worked harder, spent more time, and did a better job on that assignment.

Appendix C showed a diagram (Technology and Inquiry Based Learning) that explained the inquiry method of learning as a continuous cycle that contained: questioning, researching, discussing, creating, and reflecting. Many times inquiry learning was also paired with students working in small collaborative groups. (Igo, Moore, Ramsey & Ricketts, 2008) In this model the students questioned, discussed, and reflected with their peers. When students were able to work together they could feed off of the curiosity and knowledge of their peers to increase content knowledge.

There were also shortcomings to the inquiry model of learning. One of the biggest was the fact that actual inquiry learning took more time than other

Approaches. The students needed time to come up with questions, identify prior knowledge that was applicable to the problem, research new information on the topic, and investigate their ideas. Students moved through these steps at different paces, which made lesson timing difficult.

Most teachers were trained to use direct instruction or mastery learning in their classrooms. Many teachers were not trained or had poor training on the use of the inquiry method of learning. This meant that some teachers who thought their students were learning using the inquiry method were not really being exposed to true inquiry. Many teachers were not in using collaborative groups which the STC/MS science kits use often throughout the modules.

Teaching by Inquiry

Most instruction that was done in the classroom setting was done using direct instruction and or mastery learning. Teaching using the inquiry method was not a strategy familiar to many teachers. The inquiry method was often not taught or not taught correctly in many science classes.

The curriculum that was taught by the researcher during the 2004-2005 school year mostly resembled the direct instruction learning method, with some aspects of mastery learning instruction included. The methods that the researcher used were different from the inquiry learning method and therefore required the researcher to use different skills.

The researcher administered pre tests to the students. The students would take the information they needed to learn from the researcher. This would happen in the form of readings and worksheets assigned by the instructor or presentations given by the instructor. The students' responsibility was to remember the information and restate it on the post test given by the researcher. Direct instruction was "rich in structure and drilling and content". (What the Data Really Show: Direct Instruction Really Works!)

A curriculum based on inquiry learning was much different from a curriculum based on direct instruction or other teaching methods. The National Science Resources Center (NSRC) based each kit on a four stage learning cycle.

First, students focus on what they already know about a topic.

Next, students explore a scientific phenomenon or concept, following a well-structured sequence of classroom investigations.

Third, students reflect on their observations, record them in science journals, draw conclusions, and share their findings with others.

Finally, students apply their learning to real-life situations and to other areas of the curriculum. (Carolina: Curriculum Programs for Science and Math)

The teacher had a much different role when they taught using the inquiry method. In direct instruction the teacher was not the source of information for the students. The teacher helped to guide the students in their search for the information. This did not mean that the teacher just sat back and let the students do anything that they wanted to do. This was where the STC/MS kits helped the teachers to instruct the students.

The teacher in the inquiry learning model also conducted classroom discussions with the students and

helped move them through the questioning, discussing and reflecting areas of the inquiry model. The teacher did this by asking open ended questions and not rejecting or discouraging student ideas. Other tasks the teacher in an inquiry learning model had were to encourage students to find their own solutions and collaborate with other students. The teacher also had to maintain high standards and develop inquiry-based assessments to monitor students' progress. (Science Inquiry: The Link to Accessing the General Education Curriculum)

While the direct instruction method was shown to be the best educational model for gains in math, reading, and language, (Sponsor Findings From Project Follow Through) there was no information that it was the best method of teaching science. The NSRC looked at a number of studies and state expectations and concluded that the inquiry model was the one best suited to teaching the concepts of the scientific method that the WASL required the students to understand. (Carolina: Curriculum Programs for Science and Math)

The inquiry learning model was a good match for teaching science. Appendix D showed how the steps of the scientific method corresponded directly to the steps involved in inquiry learning.

No Child Left Behind Act

The main reason for the switch to the STC/MS science kits was NCLB. No Child Left Behind was based on stronger accountability for results, more freedom for states and communities, proven education methods, and more choices for parents. (2004, July 1) The decision to switch science curriculum was based on the first two sections of NCLB. Student science scores on the Washington Assessment of Student Learning (WASL) had less than twenty percent of the students that met the standards. The freedom that NCLB gave to schools allowed the SSD to change the science curriculum to one that helped create understanding of concepts through inquiry.

The NCLB Act had many effects on public schools throughout the United States. In Washington one of the biggest effects was the development of the WASL. The WASL was implemented to satisfy the NCLB accountability piece. The results of the WASL let everyone know how

schools and students were doing. It was the way the state of Washington gauged the Adequate Yearly Progress (AYP) of each school.

Another big effect of NCLB was that schools and school districts were spending more time looking at data. (Jennings & Stark Rentner, 2006) Students were taking more tests and that provided schools with lots of new data to interpret. Schools used this data to track the progress and achievement of different groups of students that they didn't do in the past. Schools also used the data gathered from these tests to align curriculum and improve instruction. (Jennings & Stark Rentner, 2006)

Schools that were consistently low-performing and not meeting AYP were getting the attention that they needed. Those schools made intensive changes to improve curriculum. The number of these schools that needed improvement had been steady, but not growing. Only about ten percent of all schools were in need of improvement and not making AYP. (Jennings & Stark Rentner, 2006)

All of the effects of NCLB were not positive and helpful in increasing the learning of students. In

their study of the effects of NCLB on public schools Jack Jennings and Diane Stark Rentner found some effects that were not positive. In their list of ten effects there were two that didn't have completely positive results for students.

The first negative effect dealt with the fact since schools spent more time on reading and math they reduced the amount of time they spent on other subjects. The subject that they found was the most affected was social studies.

The other effect that they found, that may not have directly improved the quality of teaching and student improvement, was schools' attempt to demonstrate their teachers were considered highly qualified. The No Child Left Behind Act required that all teachers met certain academic qualifications. The report by Jennings and Stark Rentner stated that "districts expressed skepticism that this requirement will improve the quality of teaching." (2006)

Science and Technology Concepts for Middle Schools Science Kits

Science and Technology Concepts for Middle Schools science kits were a complete curriculum that included hands on activities focused on inquiry learning. These science kits were developed by the National Science Resources Center. The NSRC was established by the Smithsonian Institution and the National Academy of Sciences in 1985 (National Science Resources Center). The main focus of the NSRC was to improve the teaching of science to students around the world. The NSRC focused their concepts on inquiry learning. Their ideas were to get and keep students motivated to insure that they learned the curriculum.

The science kits that the students in the researcher's class were instructed with were Earth in Space and Properties of Matter. The Earth in Space kit was organized around Earth Science and the Solar System. The Properties of Matter kit taught the students concepts in Chemistry. These science kits were also aligned to the Washington State standards. (Carolina: Curriculum Programs for Science and Math)

Another unexpected issue that might have had an effect on the results of this project was training. When the SSD changed the science curriculum to the STC/MS science kits they also needed to get their teachers trained in facilitating inquiry learning when they used the kits. This extra training for science teachers would have increased the competency of the teacher and therefore provided better learning for the students. On the other side just because the researcher was trained did not mean they were competent in teaching using the inquiry learning method.

Summary

The focus of this chapter was to address the available evidence to the topics of (a) learning by inquiry, (b) teaching by inquiry (c) No Child Left Behind Act (NCLB), and (d) Science and Technology Concepts for Middle Schools (STC/MS) science kits. No Child Left Behind forced states to come up with a way to assess the learning of their students. In Washington State this resulted in the implementation of the WASL. To get the students in the SSD ready for the science sections of the WASL the district adopted the STC/MS science kits, created by the NSRC. The SSD also

trained their teachers to use the kits and the basics of the inquiry learning method.

Teachers did not conduct a classroom using the inquiry method of learning like they would most classrooms. The teacher's role in the inquiry method of learning was more as a guide to move the students through the inquiry method. Students needed to rely on themselves and their peers when they figured out the different scenarios. Teachers in the science department of the SSD used these science kits, which focused on the inquiry learning method, to get the students interested and keep them motivated about science concepts needed to pass the WASL.

CHAPTER 3

Methodology and Treatment of the Data

Introduction

This chapter has been organized around the following topics: (a) methodology, (b) participants, (c) instruments, (d) design, (e) procedure, and (f) treatment of data. The project was presented by the researcher to the other teachers who taught eighth grade science. This project was valuable to the researcher and colleges when they looked for data on their student's achievement.

Methodology

The researcher used an experimental design for this project. The first set of students that had data collected attended the researcher's science class during the 2004/2005 school year. They were taught using curriculum that used the adopted textbook as the main source of the student's learning. This was the control group. In the spring of that school year the students were given the Washington Assessment of Student Learning (WASL). The second group of students attended the researcher's science class during the 2006/2007 school year. They were taught using the

science kits designed by the Science and Technology Concepts for Middle Schools (STC/MS) program. These were the treatment group. This group was also administered the WASL during the spring of their eighth grade year. The data that the researcher used was the WASL scores of the two groups

Participants

The participants in this study were middle school students that had taken the researcher's eighth grade science class. The students were all about the same age when the data was collected, between 13 and 15 years old. The participant's demographics were also similar as they were enrolled in the same school district and randomly placed into the researcher's class. The Sunnyside School District (SSD) was 80 percent Hispanic and 12 percent White. Around 86 percent of the students qualified for free or reduced-price meals. These students also contained 12 percent Special Education and just over 24 percent Migrant students. The main difference between the two groups was that one group of students was taught using science curriculum that centered heavily on the use of a

textbook, and the other group was taught using the STC/MS science kits.

Instruments

The data used for the study was the student's WASL scores. The science portion of the WASL was administered to all of the students in the state on the same days. The researcher understood the students had given their best effort on their test. The science portion of the WASL was given to the students in two sessions, one taken each day. The students were not timed on the test and had as much time as they needed to finish each section. All students were given the same directions by the researcher, who had been trained in the proctoring of the WASL.

Design

The researcher decided on a quasi-experimental design for this project. This design allowed for two independent groups of data, which the researcher used a t-test on. This project also used a nonequivalent control group design. The data for the control group was the 2004/2005 WASL scores. The data for the treatment group was the 2006/2007 WASL scores.

Procedure

The researcher conducted this project over three year's time. The control group of students attended the researcher's eighth grade science class during the 2004/2005 school year. They were taught a science curriculum focusing on a textbook. The treatment group of students attended the researcher's eighth grade science class during the 2006/2007 school year. This group was taught using the inquiry method of teaching science using the STC/MS science kits. The students in both groups where then given the science section of the WASL in the spring of their eighth grade year. The researcher then took each group of the students' WASL scores and put them through statistical tests to establish any significant change in achievement.

Treatment of Data

The researcher got the student's scores for the science portion of the WASL from the Sunnyside School District (SSD) office. The data was taken by the researcher and entered into a calculator program called Statpak. The researcher used the Statpak program and performed a t-test on the data and got the t-value. The researcher then used Table A.4 on page 571 of

Educational Research Competencies for Analysis and Applications, by Gay, Mills and Airasian, to figure out if the scores were significantly changed. Significance was determined for $p \geq 0.05, 0.01, 0.001$.

Summary

The two groups of students in the researcher's classroom all took the science section of the WASL in the spring of their eighth grade year. The treatment group of the students was taught using the inquiry learning method provide by the STC/MS science kits and the control group was taught using a more conventional textbook curriculum. The WASL scores were then entered into the Statpak program, which performed a t-test on the data. The researcher then looked for significance of the data.

CHAPTER 4

Analysis of the Data

Introduction

Chapter 4 has been organized around the following topics: (a) description of environment, (b) hypothesis, (c) null hypothesis (d) results of the study, (e) findings, and (f) discussion. The researcher was looking for a way to conclude if there was any significant increase in achievement between the old curriculum use in the science department of the Sunnyside School District (SSD) and the new curriculum that they had adopted. The new curriculum consisted of the Science and Technology Concepts for Middle Schools (STC/MS) science kits that used inquiry learning as their main focus.

Description of the Environment

The researcher wanted to make the project as relevant as possible. The researcher used two groups of students that were as similar as possible. The students in both groups came from the same area, with all of them enrolled in the SSD. The groups were almost equal in terms of gender. The sample groups were chosen by convenience since all students attended

the researcher's science class. Students were placed into the researcher's class by the school counselors in a random fashion. The groups consisted of 86 percent Hispanic students and 12 percent White students. The groups also contained 24 percent Migrant students and 12 percent Special Education students. Both groups of students spent the same number of time studying the eighth grade curriculum presented to them before they took the Washington Assessment of Student Learning (WASL).

Hypothesis

Students who graduated in 2010 had to pass the Science sections of the WASL. The science WASL taken in the fifth and eighth grades was used as an indicator of their success on the science WASL they had to take in high school. The scores of the students who were taught using the inquiry learning method provided by the STC/MS science kits was higher than students who were taught using the old science textbook curriculum.

Null Hypothesis

The students' scores on the eighth grade science section of the WASL were used by educators as an indicator of the student's ability to pass the WASL in

the tenth grade. Passing the WASL was a graduation requirement for students who graduated in 2010. There was no significant difference in eighth grade WASL scores between students who were taught with the STC/MS science kits, using the inquiry learning method, and students who were taught with the textbook science curriculum. The significance of acceptance was figured to p> 0.5, 0.01, and 0.001.

Results of the Study

To find out if there was any significant change in the scores between the control group and the treatment group the researcher entered the two sets of WASL scores into the Statpak program. The Statpak program was a mathematical program that was used to perform the difficult calculations. Using the Statpak program to perform a t- test with independent samples, the researcher gathered a great deal of information about the two groups. Appendix A showed the WASL scores for 2004/2005 students, the control group. Appendix B showed the WASL scores for 2006/2007 students, the treatment group.

There were 104 scores for group Y, the control group. The sum of the scores for group Y was 38273.

The mean of group Y was 368.01. There were 109 scores for group X, the treatment group. The sum of the scores for group X was 40795. The mean of group X was 374.27. Other important information derived by the Statpak program was the t-value, which was 1.7. The degrees of freedom were also found to be 211. Table 1 showed the information gathered from the Statpak program.

Table 1.

Statpak Data

Statistic	Values
No. of Scores in Group Y	104
Sum of Scores in Group Y	38273.0000
Mean of Group Y	368.01
No of Scores in Group X	109
Sum of Scores in Group X	40795.0000
Mean of Group X	374.27
t-value	1.7
Degrees of Freedom	211

$$t = \frac{X_1 - X_2}{\frac{SS_1 + SS_2}{n_1 + n_2 - 2}\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}$$

$$t = \frac{374.27 - 368.01}{\frac{72671.28 + 79136.99}{109 + 104 - 2}\left(\frac{1}{109} + \frac{1}{104}\right)}$$

$$t = 1.7$$

The researcher used the test for significance and found that the hypothesis was not supported at any level. That meant that the null hypothesis was accepted at all levels. The researcher concluded that there was no significant increase in WASL to support the hypothesis that the inquiry learning method and STC/MS kits had a positive impact on the students' achievement. The null hypothesis that the inquiry learning method had no positive effect on the students' WASL scores was accepted.

To test for significance the researcher used the t-value, the degrees of freedom and Table A.4 from Educational Research Competencies for Analysis and Application by Gay, Mills, and Airasian. The researcher figured the significance to values of 0.05, 0.01, and 0.001. Table 2 showed the researcher's test for significance using the t-value.

Table 2.

Distribution of t

	p		
df	0.05	0.01	0.001
211	1.96	2.576	3.291

Findings

The researcher's hypothesis that the STC/MS science kits, Earth in Space and Properties of Matter would have had a positive impact on student's WASL scores was not supported at any level. The researcher's hypothesis was that the STC/MS science kits would not have a significant increase on student's WASL scores was accepted at every level. The researcher tested the data to a significance of $p>$ 0.05, 0.01, and 0.001. Although the treatment group had a higher sum and a higher mean than the control group the increase was not significant enough to support the hypothesis.

Discussion

At first look there was a change in the scores, with the treatment group having had higher scores and a higher mean than the control group. There was a difference, but for the researcher's hypothesis to be supported the difference had to be significant. The researcher thought this might happen given the small number of scores for each group.

Summary

This chapter was designed to analyze the data and identify the findings. The scores of the students who were taught using the inquiry learning method or science kits were higher than students who were taught using the old science textbook curriculum. Based on the data, the null hypothesis was accepted and the hypothesis was not supported. The researcher used the t-value and the degrees of freedom to test for significance of the data. The researcher saw an improvement in the WASL scores of the treatment group, but the change was not significant enough to support the hypothesis.

CHAPTER 5

Summary, Conclusions and Recommendations

Introduction

This chapter has been organized around the following topics: (a) introduction, (b) summary, (c) conclusions, and (d) recommendations. The researcher concluded this study on the effects of the inquiry learning method on students' eighth grade scores on the Washington Assessment of Student Learning (WASL).

Summary

The researcher took data from student's in the researcher's science classes to determine which type of curriculum increased the students' achievement on the WASL. The control group attended the researcher's classes during the 2004/2005 school year. These students were taught using the science textbook that had been adopted seven years earlier. The treatment group attended the researcher's classes during the 2006/2007 school year. These students were taught using the inquiry learning method in the form of Science and Technology Concepts for Middle Schools (STC/MS) science kits.

The students were taught the entire year using these two methods. During the fourth quarter of the year the students in both groups were administered the science sections of the WASL. The researcher took the scores from each group of students and using the Statpak program performed a t-test to determine if there was any improvement of the treatment group from the control group.

While the mean score of the treatment group was higher than the mean score of the control group, the researcher found the increase to not be significant. The researcher used the significant values of 0.05, 0.01, and 0.001 and found that using the 211 degrees of freedom the t-value was less than the values found in the education research text (Gay 2006). This meant that the researcher's null hypothesis was accepted at every level and therefore the hypothesis was not supported at any level. The null hypothesis that the inquiry learning method that was used did not lead to a significant increase in the students' scores was accepted.

Conclusions

The researcher concluded that the null hypothesis was accepted for this project. The null hypothesis was that the students in the researcher's class who were instructed using the inquiry method of learning had no significant increase in WASL scores, compared to students who were instructed using a textbook focused curriculum. Table 2 showed the researcher's test for significance. This led the researcher to accept the null hypothesis. The researcher found that the STC/MS science kits failed to make any significant increase in the students' WASL scores.

Recommendations

While there was no significant increase in WASL scores there was also no significant decrease in students' scores either. The fact that there was some growth was encouraging to the researcher. Since the materials were already purchased by the SSD another change in curriculum does not seem financially prudent to switch science curriculums at this time. The researcher recommends that the current inquiry method curriculum, including the STC/MS kits continue to be used in the eighth grade science classes for the

students in the Sunnyside School District (SSD). The researcher also recommends a more complete study using all eighth grade students in the SSD. The students in the SSD have been taught using the inquiry learning method starting in the sixth grade since the 2006/2007 school year. A new project including students who have been instructed since the sixth grade in inquiry learning and the control group that had not experienced inquiry learning would give the researcher more complete data on the effect of inquiry learning.

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APPENDIX A

2004/2005 WASL Scores

Control Group

Student	WASL	Student	WASL
1	448	53	408
2	350	54	330
3	375	55	375
4	370	56	358
5	356	57	395
6	337	58	344
7	370	59	341
8	423	60	375
9	397	61	350
10	383	62	363
11	370	63	307
12	379	64	393
13	279	65	370
14	387	66	385
15	379	67	393
16	347	68	317
17	370	69	330
18	363	70	395
19	353	71	383
20	401	72	379
21	302	73	368
22	391	74	379
23	334	75	334
24	393	76	399

25	381	77	361
26	368	78	344
27	326	79	381
28	372	80	370
29	344	81	397
30	358	82	353
31	341	83	391
32	358	84	387
33	366	85	420
34	372	86	350
35	356	87	366
36	353	88	418
37	368	89	350
38	361	90	334
39	389	91	391
40	377	92	363
41	408	93	397
42	410	94	385
43	377	95	385
44	391	96	353
45	383	97	372
46	344	98	356
47	358	99	368
48	361	100	387
49	375	101	307
50	326	102	334
51	413	103	372
52	334	104	383

APPENDIX B

2006/2007 WASL Scores

Treatment Group

	WASL	Student	WASL
1	414	55	327
2	405	56	384
3	332	57	388
4	375	58	409
5	382	59	414
6	409	60	355
7	373	61	384
8	332	62	345
9	400	63	345
10	362	64	375
11	390	65	390
12	403	66	377
13	370	67	332
14	392	68	355
15	367	69	355
16	370	70	409
17	373	71	370
18	401	72	370
19	400	73	355
20	367	74	380
21	345	75	367
22	355	76	409
23	377	77	370
24	380	78	375
25	370	79	405

26	443	80	365
27	427	81	345
28	382	82	384
29	341	83	397
30	373	84	388
31	345	85	377
32	377	86	355
33	359	87	407
34	373	88	417
35	432	89	375
36	316	90	327
37	427	91	352
38	414	92	384
39	365	93	380
40	322	94	362
41	359	95	365
42	365	96	365
43	373	97	365
44	414	98	316
45	392	99	341
46	365	100	355
47	375	101	359
48	341	102	386
49	409	103	365
50	373	104	392
51	384	105	388
52	375	106	365
53	394	107	365
54	345	108	327
		109	377

APPENDIX C

Diagram of Inquiry Learning

(Technology and Inquiry Based Learning, 2009)

Appendix D

Scientific Method and Inquiry Process

(Science Inquiry: The Link to Accessing the General Education Curriculum)

Scientific Method	Inquiry Process
Question or problem	Inquiry phase (inquiry or problem)
Hypothesis	Data gathering phase I (hypothesis)
Experiment Record Data analysis	Data gathering phase II (data collection & analysis)
Conclusion	Implementation phase (conclusion & explanations)

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