

FACULTY APPROVAL

School Sports and the Washington Assessment of Student Learning

A Master's Special Project

By

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ABSTRACT

Title

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This research addresses the needed importance of increasing mathematics scores in Washington State and the United States of America. Major reform is at work in our country and schools are changing.

The purpose of the study was to research the value of athletics in relationship to academics. A review of literature suggested a positive relationship with athletics and academic performance. Students were surveyed to see if they recognized academic value in their participation. The researcher then examined WASL scores and athletic participation.

The data collected showed that there was a signification relationship at the levels identified. The researcher suggests further investigation of similar schools and related literature.

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CHAPTER 1

Introduction

Background for the project

A major reason for school reformation since passing the 2002 No Child Left Behind Act (NCLB) had been mathematics instruction and learning. Coupled with Washington State Essential Academic Learning Requirements (EALR), NCLB and changing public education standards at the local level had resulted in increased pressure on districts to improve standardized test scores within the mathematics subject-content area. In 2006, Washington State Governor Chris Gregoire and Washington State Office of Superintendent of Public Instruction (OSPI) Superintendent, Dr. Terry Bergeson, pushed back Washington State NCLB-driven high stakes graduation requirements citing “a problem when it comes to math”. (OSPI 2006) Supported by the state results on the Washington Assessment of Student Learning (WASL) that revealed just over 50% of Washington State students passing the mathematics portion of the standardized tests, Gregoire and Bergeson moved to postpone the passing requirement of the mathematics portion of the WASL from the 2008 graduation class to the graduating class of 2011. Since that time Washington State had focused its efforts to include changing a system whose “poor performance says as much about the system as it does about any particular student,” said Gregoire. “Fundamental changes are needed; it's time to re-evaluate how math is taught in the state”. (McGain, Blanchard p. 1)

Improvement in mathematics had been at the forefront of the federal administration’s thinking as well. On April 18, 2006, President Bush created the National

Mathematics Advisory Panel to report to the President and Secretary of Education Margaret Spellings on the best uses of scientifically based research in teaching and learning mathematics.

In Washington State, in 2006-2007, the focus of OSPI was to improve mathematics scores on the WASL. As a result, local school districts, including Toledo School District (TSD), set out to meet the directives and instituted hiring instructional mathematics coaches and curriculum directors to meet the goals set forth by the state. Math curriculum coaches around the state were offered salaries in the vicinity of \$85,000 per annum. For rural districts, including TSD, the hires were an expense that needed careful analysis and budgeting.

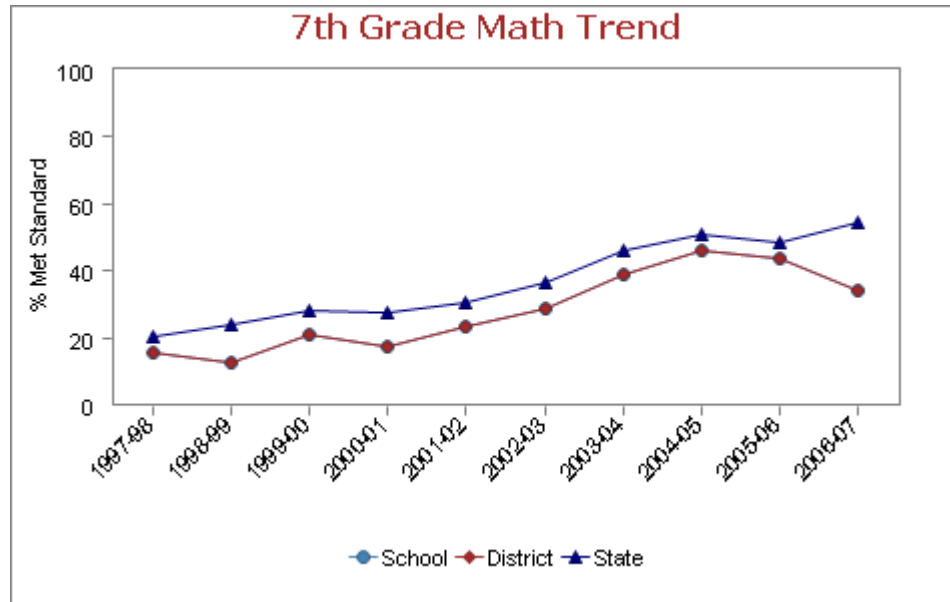
Students at TMS had taken the mathematics WASL test since 1997. Those results on average increased yearly since the test was first administered, with the exception of the years 2004-2005 and 2005-2006 when the state average in mathematics dropped as a whole.

Statement of the Problem

Students in Washington State were showing difficulties meeting mathematics standards on the WASL. Students at TMS were below the state average in mathematics. Toledo and other schools in Washington State were required to improve in mathematics in order to meet Adequate Yearly Progress (AYP) as determined by the state of Washington.

Toledo Middle School closely followed the same trend as the rest of the state's middle schools, but had consistently scored lower on average on the mathematics portion of the WASL. In 2001-2005, TMS had been within eight percentage points of the state average. Toledo Middle School needed to continue its progression in mathematics

education and raise mathematics scores on the WASL in order to keep up with or to better the state average.



Toledo Middle School

Table 1: Washington State and Toledo Middle School Math WASL Trend 1998-2007 (www.k12.wa.us)

Toledo School District had passed levies but not always on first attempts and had enforced district wide spending freezes. In order to keep up with area schools and have the money to spend on research, methods, and curriculum adoptions, the district proactively adjusted budgets to fund the successful programs and maintain adequate staffing to meet I-728 legislation and assist students in meeting mathematics standards.

If TSD and TMS did not meet the expectations of the state, the consequences may have begun a downward spiral that similar schools in the region have faced – school closure. Toledo enrollment was reliant on parent choice from the surrounding rural areas. Because of the positive reputation of TSD, many parents did choose to have their children attend TMS instead of choosing one of the surrounding districts. However students could have easily attended the following schools within a 15-mile radius: Winlock to the East, Toutle to the West, Onalaska or Napavine to the North and Castle Rock to the South.

The local newspapers, The Chronicle, Centralia, Washington and The Daily News located in Longview, Washington, published the results from the WASL and there was much discussion among residents regarding the results of neighboring schools on a competitive basis. It was highly possible that if Toledo were to take on a negative public perception about its academic programming, that student enrollment would drop – making it difficult to pass school district levies that were necessary to maintain operations. In the end TSD could have been faced with a similar fate of its sister school, the Vader School District, which closed its doors in 2007.

In addition to the public opinion, Toledo was required to meet AYP as defined by

the state of Washington. TSD was required to meet AYP so that it would not be required to send out information to the public and informing parents of the school's inability to meet standards. Under state law, schools that do not meet AYP were required to give families the choice to have students attend another school at the district's expense.

Purpose of the Project

The purpose of this study was to determine whether participation in athletics, had a positive effect on student learning as measured by the mathematics WASL scores of students attending Toledo Middle School. The results of the project and the project methods were meant to be used as a tool to assist the local school administration and community stakeholders in informed decision making when determining funding and resources in midst of state-wide school reform.

Delimitations

The project was delimited by the 74 students in the 7th grade class chosen to be the class of study. In addition, the 43 students in the experimental group were those students who had chosen to turn out for an athletic program offered by Toledo Middle School, which included Football, Volleyball, Basketball, and Track, during their 7th grade at TMS. At TMS all students that wished to turn out were allowed to participate, and there were no cuts to any of the rosters. The requirements were that students participating in a sport maintained passing grades in six of seven courses, abided by the athletic code as stated in the TMS student handbook and signed an agreement so as to state that fact. Students were to have a signed doctor's physical release form and parent permission forms. The physical and the agreement both were valid for one year.

The control group was all 7th grade students, class of 2010, not participating in athletics at TMS. Some students opted out of the WASL assessment and received a zero score; those students were not included in the mean score of the control group or the experimental group but were averaged into the Washington State report card for TMS. Students enrolled at TMS later in the school year, which did not participate in athletics and were given the WASL received a score and were averaged with the control group.

The city of Toledo, Washington, recorded an average population of 653 during the 2000 census. As a rural area of Lewis County, the district drew its student population from an area equal in size to 15 square miles to include a population closer to 1400. Many people in this community commuted to work north to the cities of Chehalis, Centralia, and Olympia, and south to the cities of Kelso and Longview via Interstate 5. The Toledo community shared strong views about the positive benefits of extra-curricular athletics programs, and basketball was a large focus of many families living within the district. Toledo had successful basketball programs at the high school level in recent years and had sent student-athletes from the community to play NCAA Division I basketball.

The researcher had recognized considerable amounts of time and money that was being spent by parents within the TSD to take students to participate in athletic tournaments throughout Washington and Oregon. In Toledo, basketball was the focus of many conversations that led to public involvement within the school district. The researcher surveyed the opinions of the community that made up TSD and measured responses to questions relating to feelings about academics and academics in particular.

Assumptions

It was assumed that students at Toledo Middle School (TMS) were similar to prior students that have taken the WASL at TMS. The population of Toledo had remained constant since the WASL was used in the school, and there had been no significant changes in economy or demographics in the area since the start of WASL testing at TMS. Therefore the economic strategy and political views of the region were comparable to the years in which the researcher had chosen for this particular study.

The WASL tests that had been administered by the state of Washington had undergone revisions throughout the experiment years. The fact that the researcher was comparing test results from the same years as the revisions did not affect the experiment. The confidence in the WASL test was the responsibility of the state of Washington and had not been considered as a necessary variable for the study. It was assumed that students taking the survey answered honestly.

Hypothesis

Students that participated in the school athletic programs at Toledo Middle School will score higher on the Washington State Assessment of Student Learning in Mathematics than non-participants.

Null Hypothesis

There will be no significant difference in mean scores on the WASL from students that participated in the TMS athletic programs as compared to non-participants. Significance was determined for $p \geq .05, .01, .001$.

Significance of the Project

The experiment provided Toledo School District and similar school districts a scientific, research-based evaluation of athletic programs as a variable to consider in

standards-based institutional testing, and Academic Yearly Progress under No Child Left Behind guidelines. The project could have assisted in the decision making process as to where funds should have been distributed or reallocated, parents and community members could have been made aware of the effectiveness or ineffectiveness of school athletics in relationship to academic achievement. The results of the study were compared to prior views of athletics within the Toledo School District.

Procedure

For the purpose of this project the following procedures were implemented:

1. Students from the class of 2012 were given a survey of opinion regarding their participation in athletics and a possible connection between WASL scores and athletic participation. (see Appendix A)
2. The class of 2010 was chosen at random from classes that had taken the WASL at TMS. (see Appendix B)
3. Students in the class of 2010 at TMS were identified as participant and non-participants as related to the TMS athletic program. This was done by checking prior rosters and by cross-referencing those rosters with coach's stat books.
4. Once identified as participants, students became the experimental group.
5. The scores of the experimental group and the control group were collected from the Office of Superintendent of Public Instruction (OSPI) electronic database, and entered into an excel spreadsheet. (see Appendix C)
6. Permission to conduct the special project was given by TMS Principal Mr. Bill Waag. (See Appendix D)
7. Analysis of the survey developed for 8th grade students that had recently taken the WASL was done. (See Appendix E)
8. Permission to survey the students was given by TMS Principal Mr. Bill

Waag. (See Appendix F)

9. A t test for evaluation of the means was used to check for significance at the .05, .01, and .001 levels. The formula used was:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\left(\frac{SS_1 + SS_2}{n_1 + n_2 - 2}\right) \left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

(See Appendix G)

Definition of Terms

Microsoft Excel, A computer spreadsheet program that is part of Microsoft Office.

StatCalc, Computer Statistical Software

STATPACK, A Windows based computer statistical analysis tool accompanying L.R. Gay's Educational Research textbook.

WASL, A series of Washington State tests that helps ensure that students are learning the foundational skills and knowledge that educators, parents and community leaders in the state have determined are important to student success later in life. The Education Reform Law passed by the Washington State Legislature in 1993 required the state to create a set of common learning standards for grades K-10. The law called for a testing system that measured student learning of those standards. Washington fourth-graders started taking the WASL in 1997. Students are tested each spring in grades 3-8 and grade 10 in reading and math. Students also are tested in writing in grades 4, 7 and 10, and science in grades 5, 8 and 10. Unlike most standardized tests, which are multiple choice,

the WASL is a mix of multiple-choice, short-answer and extended-response questions. The WASL is used to meet testing requirements under the federal No Child Left Behind Act. WASL scores determine whether a school, district, and the state have met Adequate Yearly Progress (AYP) as defined by the Washington State Office of Superintendent of Public Instruction (OSPI): <http://www.k12.wa.us/assessment/WASL/default.aspx>)

I-728 , Washington State's Initiative 728 was passed by an overwhelming 74 percent and went into effect in the year 2001-2002. Its aim was to improve public education and academic success for students by reducing class sizes and other improvements. The law provides dedicated funding that may include a broad range of where resources can be applied. They include funding for smaller class sizes, full day kindergarten and after-school programs, additional teacher trainings, and faculty improvements to support reduced class sizes and enhanced learning opportunities. Spending of I-728 funds must be reported by school districts on a yearly basis.

Acronyms

NCLB No Child Left Behind

OSPI Office of Superintendent of Public Instruction

WASL Washington Assessment of Student Learning

AYP Annual Yearly Progress

TSD Toledo School District

TMS Toledo Middle School

NCAA National Collegiate Athletic Association

CHAPTER 2

Review of Selected Literature

Introduction

This chapter has been organized around the following topics: (a) Participation in Sports, (b) Psycho-educational Factors, (c) Academic Resilience, (d) Academic Achievement, and (e) Summary. The research available on topic with bridging athletics participation and academic achievement was a varied survey. What attributes of academic success can be linked to a student's participation in athletic activities took on multiple perspectives. Included in the discussion were sports psychology perspectives: social-emotional learning, perceived scholastic competence, and acceptance views to name a few. In the studies there were age factors to consider, physical wellness, teacher preference, and self-esteem issues, among others. Depending on school demographics, attitudes and coaching methods, these factors touched upon some or all of these variables, and as a result of a perceived view of many who believe participation in athletics led to positive character-building, parents and administration must be able to engage that perception in critical debate. The researcher asked the questions: What were the common conceptions or misconceptions that were being propagated in this discussion? Do sports compete for a student time? Can a focus on athletic participation improve academic achievements? The purpose of the researcher's literature review was to find how school sports provide students positive foundations for success in school and life.

Participation in Sports

A continuing debate about the effects of athletic participation has become an even

bigger issue now that there were budget constraints in our nation's schools. Decision makers often found it easy to cut athletic programs because they believe sports were not overly important in the academic arena. A study in the late 1980's, argued that many secondary schools eliminated some of the extracurricular programs based solely on financial grounds without considering the empirically based knowledge of the positive effects of these programs on adolescent development. (Holland Andre 1987)

Was it obvious that decision makers needed to be well informed about the impact of athletics on academics before they decided to retain or eliminate them? The research suggested that athletic participation enhanced, rather than decreased, academic achievement (NFHS 2002). The National Federation of State High School Associations (NFHS) and its membership asserted that interscholastic sports promoted citizenship, sportsmanship, lifelong lessons, teamwork, self-discipline, and facilitated the physical emotional development of our nation's youth. A 1997 study also examined the importance of athletics during childhood and adolescent development. They argued that participating in athletics "encourages the development of leadership skills, self-esteem, muscle development and overall physical health" (Eppright 1997). Clearly stated participation in school clubs and sports predicted higher grades and educational expectations. (Fredricks Eccles 2006)

Psycho-educational Factors

Literature on the relationship between students' participation in sports and their various psychosocial and psycho-educational factors provided mixed findings. The findings of a group of studies indicated that participation in sports increased students' overall interest and commitment to schooling as well as their engagement in more

student-teacher contact, more positive attitudes about schooling, and more parent-school contact. (Crain 1981) (Trent Braddock 1992).

There were additional findings that supported a connection with the commitment to school or ability to identify with the school because of athletic participation as an indicator of academic performance. Extracurricular participation can facilitate youths' connections to school by linking them to supportive peers and adults and by contributing to their identity as valued members of the school community (Eccles Barber Stone Hunt 2003).

A number of researchers focused on the influences of sport participation on various psychosocial aspects of high school students. As the literature showed, one such benefit was that participation in sport activities provided extrinsic rewards to students and helped them form social bonds and relationships within school (Crain, 1981; Slavin & Madden, 1979; Trent & Braddock, 1992). Furthermore, sport participation also created intrinsic values for students, according to Kavussanu and McAuley (1995), highly active individuals were significantly more optimistic and experienced greater self-efficacy than those non-active or low-active people. There were more opportunities for differential experiences in extra-curricular activities. This led to opportunities to relate to school.

“Furthermore, extracurricular activities allow students to demonstrate a wider range of skills and interests than is available in most academic contexts.”

(Fredricks Eccles 2006 p. 712) Similar findings were also reported in research from the late eighties and early nineties (Bandura (1986), Hamid (1990), Scheier and Carver (1987), and Thayer (1987)). With respect to whether students' participation in sport activities was beneficial to their academic goals, it was reported that participation in too

many activities produced diminishing returns. (Marsh 1992) Participation in sports and other extracurricular activities was consistently beneficial, but participation in some activities had mixed or predominantly negative effects. With regard to the relationship between athletic participation and higher educational goals, there was found to be an association between athletic participation and higher educational goals. (Spreitzer Pugh 1973) Sport involvement was not necessarily detrimental to academic pursuits. Influence of sport involvement was particularly strong for boys who were not otherwise predisposed to attending college. Sport involvement tended to engender high-perceived peer status, which in turn stimulated a desire for further status acquisition through college attendance.

Academic Resilience

In a study of the impact of participation in sport activities on academics, results showed greater resilience among African-American 8th grade male students that participated in school sports. Their analyses indicated that sport participation for these students was positively related to their aspirations to enroll in college preparatory programs in high school, to have definite plans to complete high school and enter college. (Braddock; Royster 1991) Both interscholastic and intramural sport participants derived social status advantages (i.e., popularity and sense of importance) among their schoolmates, which were directly related to their involvement in sports. Children who participated in certain school extracurricular activities were less likely to drop out of school (Mahoney, 2001; McNeal, 1995) and were less likely to be arrested (Mahoney, 2001). It was also reported that students from a low-income household benefit from participation in sports. The benefits of extracurricular participation are greatest for low-

income youths. ([Marsh, 1992](#); [Marsh & Kleitman, 2002](#))

Athletics and Academic Achievement

Another body of literature focused on the association between sport participation of high school students and their academic achievement. A study published by the American Sports Institute (1996) reported on the effects of a yearlong high school course program, which used sports to enhance academic achievement. The grade point average (GPA) was the primary measure for evaluating the program results. Analysis of the study's data revealed that the program students outperformed those in the control group on all of the applicable measures, including GPA and academic eligibility for extracurricular activities. These findings showed that by participating in the program, students of the program improved their academic performance as measured by overall GPA. To determine the effects of participating in school sport program on standardized CTBS test percentiles of students in the 4th and 11th grades, the study compared a sample group's scores to those of the students from the rest of the United States. (Fleenor 1997) In this study, both male and female students who either did not play at all or who participated in school-sponsored baseball, basketball, cheerleading, football, golf, softball or tennis at any time from 4th grade through 11th grade participated. Twenty students formed the experimental group and 20 made up the control group. Each group contained 10 boys and 10 girls. The data evaluation showed no significant differences in the CTBS percentiles of any of the groups in this study. The two groups showed no significant differences when analyzed together. Results of the study suggested that no negative/positive effects on achievement were found for students' participation in sports. There were similar findings on the impact of suburban high school students' participating

in sport activities on their academic achievement, and it was suggested that further study on this issue was needed. (Din, Ernst and Olczyk 2003)

Summary

As the issue of raising standardized tests scores in schools becomes an important consideration in funding extra-curricular programs in relation to No Child Left Behind, researchers must re-examine an existing body of literature that introduces existing parallels between academic achievement and school sports participation. The topics available for discussion included different inquiries and perspectives and cross-curricular studies. It was the intent of the researcher to survey a broad landscape of available research so as to place this specific study in the body of research in what may come as a mainstream critical debate in rural schools facing the possibilities of athletics cut-backs in the face of school closure.

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, (f) Treatment of Data, (g)

Summary

Methodology

The researcher investigated by means of surveying student opinions, the current view of a possible link between athletics and academic performance, and then collected data to study the correlation of athletics, and academic performance on the WASL. The survey was compared to research and narrated upon. A sample was selected for experimentation. Data was collected and analyzed. The appropriate data analysis tool was selected. The results were compared to the researcher's hypothesis. A statement of the findings was presented.

Participants

The participants for the survey were 8th grade students attending TMS. The participants (N=74) for the experiment were selected from 7th grade students at Toledo Middle School in Toledo, Washington. There were 8 classes of students that had taken the WASL. The group chosen, class of 2010, consisted of 74 students that completed the WASL examination while at Toledo Middle School. From the group of 74 students in the class of 2010, 41 were participants in an athletic program organized and funded by Toledo Middle School. Those sports were football, volleyball, track, wrestling, and

basketball. 33 students were non-participants in any of the mentioned sports. Toledo Middle School is not much different from other school in rural Lewis County Washington in terms of socio-economic status, academic achievement and cultural backgrounds.

Instruments

1. Student survey
2. WASL scores
3. Coaches rosters
4. Random number charts
5. Computer statistical software (T-test)

Experimental Research

The entire population of the class of 2010 was used for this experiment. The validity of using this class rested on the fact that the student population did not vary from year to year, and the school system had not changed due to new building structures or major shifts in curriculum. There had been no new economic development in the area. The population in the city limits of Toledo had not varied for 50 years according to census data. So therefore it can be determined that by choosing a year at random that the researcher was using a valid sample of the population. The classes in which the researched had data were the class years 2005-2012. Using a table of generated random numbers (Gay et al. 2006) the researcher assigned 2005 the numeral 0 and 2012 the numeral 7. The researcher identified the number 67125 from a set of ten thousand random numbers and using the 5 at the end identified the graduation class 2010.

Design

The Posttest-Only Control Group Design and random sampling were used for this experiment. Although mortality is a potential threat to this design it did not prove a threat because the group size remained nearly constant throughout the study. Because of the length of the study, a pretest was not needed and the researcher determined that this was the best design for the study.

Procedure

The researcher began by taking a survey of student opinion and data gathering. The purpose of the survey was to be used as a comparison to the data that was to follow. Students at Toledo Middle School currently in the eighth grade were asked questions about their participation in school sports. In addition they were asked about their scores on the Washington State Assessment of Student Learning, and if they passed or not. They were then asked if participation in sports helped them do better on the WASL. The researcher believed that students would see there to be no relationship. Then a class was chosen for the study. The researcher received a class list from the Washington State Information Processing Cooperative for the graduating class of 2010. The list was put into an excel spreadsheet. In the column next to their names their corresponding WASL scores were entered. The next column was a yes or no entry depending on if the score was greater than or equal to 400. Excel Formula =IF (B2>=400,"yes","no"), where B2 is the cell with the WASL score. Then students were identified as participants and non-participants in school sports. This was information collected from the TMS office of athletic participation awards, which was compiled by coaches submitting a roster to the office. Yes and no were entered into this column titled Participation. The next column contained a formula to count the number of yeses. Excel formula (=COUNTIF

(B2:D2,"yes"). If there were the numeral 2 in this column then the student was a participant AND passed the WASL. If there were the numeral 1 then either the student was a participant AND didn't pass the WASL; or they did pass the WASL and were not a participant. The numeral 0 represented a non-participant that did not pass the WASL. Using this method the researcher then separated and discriminated the numeral 1 category into participants and non-participants. The participants and non-participants were determined by using a formula in excel and creating a column of WASL scores for each that were summed and averaged. The formula used was =IF (H2="yes", E2) for participants and =IF (H2="no", E2) for non-participants.

Treatment of Data

The survey results were entered into a spreadsheet where they were graphed. The experimental data was also entered into a spreadsheet for graphing. The researcher used statistical software to run a T test on the data the control group being the non-participants and the experimental group were the participants. The Excel spreadsheet was used as well as StatCalc software to verify the data results. In excel under the Tools column, addins were selected and statistical analysis was then chosen as well as the t-Test: Two-Sample Assuming Unequal Variances. In StatCalc a Two-Sample difference of means test was run. Both software programs provided the same results. The test for significance was calculated using the formula:

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

Summary

The simple survey was of all 8th grade students at Toledo Middle School. The design of a posttest only control group and random sampling were used in this experiment. Excel spreadsheet software and StatCalc software analyzed the data to test for significance used a t-test for two sample means. The instruments of the study were identified for weakness and it was determined that the sample was a valid representation of the population.

CHAPTER 4

Analysis of the Data

Introduction

Chapter 4 has been organized around the following topics: (a) description of environment, (b) hypothesis, (c) results of the study, (d) findings, and (e) summary.

Description of the Environment

The city of Toledo, Washington, recorded an average population of 653 during the 2000 census. As a rural area of Lewis County, the district drew its student population from an area equal in size to 15 square miles to include a population closer to 1400. Many people in this community commuted to work north to the cities of Chehalis, Centralia, and Olympia, and south to the cities of Kelso and Longview via Interstate 5. The Toledo community shared strong views about the positive benefits of extra-curricular athletics programs, and basketball was a large focus of many families living within the district. Toledo had successful basketball programs at the high school level in recent years and had sent student-athletes from the community to play NCAA Division I basketball.

The researcher had recognized considerable amounts of time and money spent by parents at TSD to take students to basketball tournaments throughout Washington and Oregon. In Toledo, basketball was the focus of many conversations that led to public involvement within the school district. The researcher surveyed the opinions of the community that made up TSD and measured responses to questions relating to feelings about academics and academics in particular.

Data from the 2006 Washington State school report card shows Toledo Middle School as having a student population that is 1.3% Native American, 2.5% Hispanic, and 96.2% White. The income level was determined from the free and reduced lunch count of 35.4% for TMS and 36.8% for the Toledo School District. This percentage is comparable with the state average of 37%.

Hypothesis 1

Students that participated in the school athletic programs at Toledo Middle School will score differently on the Washington State Assessment of Student Learning in Mathematics than non-participants in athletic programs.

Null Hypothesis

There will be no significant difference in test scores on the WASL when participants in school athletics are compared to non-participants. Significance was determined for $p \geq .05, .01, .001$.

Results of the Study

According to the t value produced by the data, the null hypothesis is rejected at all stated levels of significance. The data therefore supports the hypothesis at the tested significance levels of the experiment.

The table that follows shows the p values from the analysis of the data as 2.749 compared to the p values of significance. Table 1 displayed the experimental t value as being greater at all significance levels that were tested.

Ex.=	Experimental	2.749
		2.408
	Ex. t = 2.749	1.678
	1.300	
	p>=.10	p>=.05
		p>=.01

Table 1: Test of critical t values at the significance levels stated.

According to the t value produced by the data, the null hypothesis is rejected at all tested stated levels of significance. The data therefore supports the hypothesis at a significance level of .01. Therefore there is less than a 1% probability for a type I error which would be that we reject the null hypothesis when we should have accepted the null hypothesis. The data analysis gave a probability of 0.8% chance of type I error.

The null hypothesis is rejected at a significance level of .01. Therefore there is support for the hypothesis from the data that was collected at Toledo Middle School.

In January to test whether students at TMS felt that athletics helped them to pass the MATHEMATICS WASL the researcher gave a survey to 8th grade students that had taken the MATHEMATICS WASL, and were aware of their test scores. They were asked about their participation in athletics and whether they thought that participating helped or would help their performance on the MATHEMATICS WASL in the future. The survey showed that most students do not see a relationship between athletics and

academic success on the MATHEMATICS WASL. When asked the question “If you participated in sports do you think it helped you pass the WASL? Yes No”, only about 1/5 of the students answered Yes. (See Figure 1)

When asked “Do you think that your participation in school sports will help you with the 10th grade WASL? Yes No”, one more student said yes than when asked if it helped in the past. (See Figure 2) The percent of students that answered Yes to the possibility of athletic participation helping them with future WASL tests was about the same, less than 20%. (See Figure 3) The survey shows that some students did think there was a relationship between participation and passing WASL scores while most did not.

The survey of participants showed a nearly even split between athletes and non athletes. The students surveyed were not the same students in the experiment (Class of 2010). This graph shows a small percentage of participants than the class of 2010 which had a participation percentage of 58%.

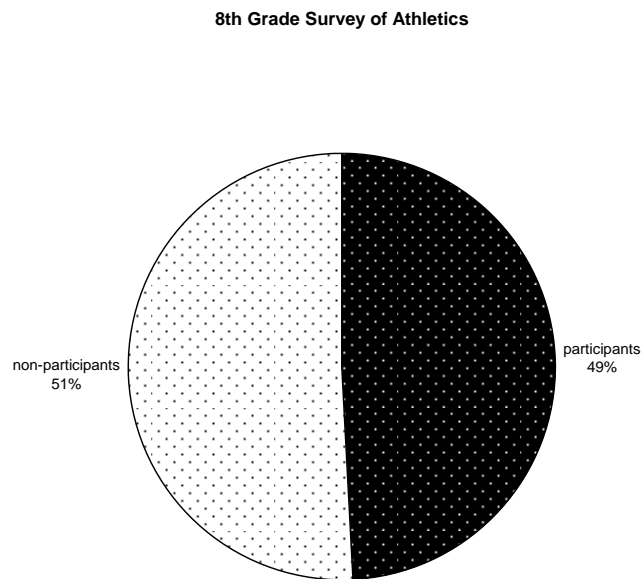


Figure 1: Participation in athletics at Toledo Middle School.

This graphic showed that students did not feel that their participation helped them pass the WASL. It also showed that there were few that thought it did help them. They saw some value that might have transferred itself to the test.

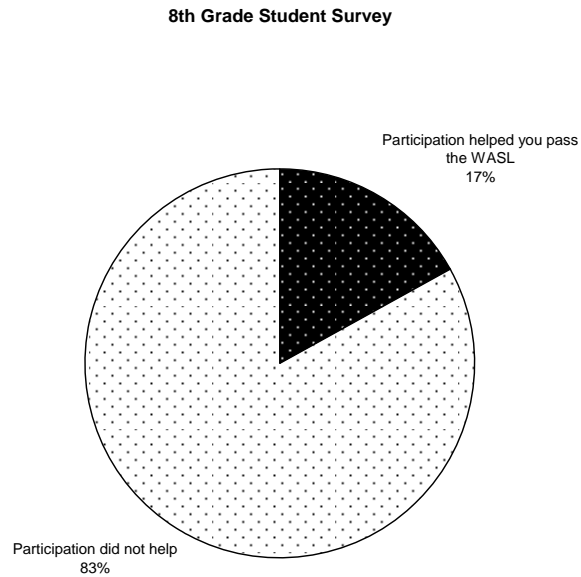


Figure 2: Answer to the question: If you participated in sports do you think it helped you pass the WASL? Yes No

This graphic showed that the same number of students that saw school sports as being related to WASL performance also thought it would be helpful to them in the future, that there was value that could be applied to future success.

8th Grade Survey Results

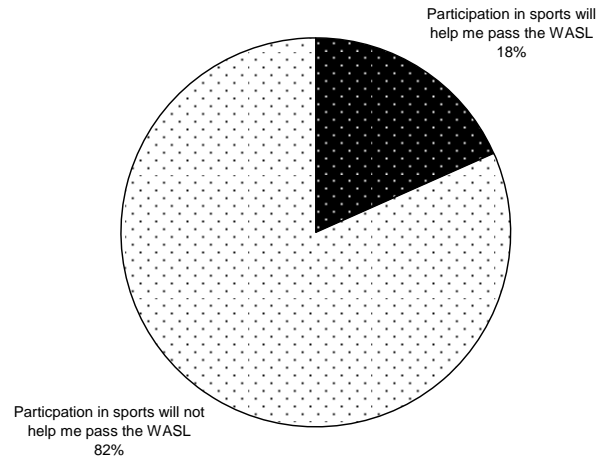


Figure 3: Students that think that their participation will help them pass future WASL tests.

This information gathered from the survey lead the researcher to believe that the view of most students at TMS to be that there was not a relationship between participating in athletics and WASL outcomes, although there were some that did. Once student opinion had been gathered it was time for the researcher to look at the results of the experiment.

There were 74 students in the sample, 31 in the control group (non-participants) and 43 in the experimental group (participants). 36 students passed the WASL and 38 did not pass the WASL. (See Figure 4). The state average of students passing the mathematics portion of the WASL was 50.8%.

A larger percentage of participants in athletics passed the WASL. The mean score of participants in an athletic program at TMS was greater than that of the entire sample population and there was a significant difference in the mean scores. This suggested that participation in sports could lead to improved WASL scores, but does not identify a particular aspect of school sports.

Washington State was focused on the percentage of students that pass the WASL. This was how AYP is determined. In 2005 when the sample class was given the WASL test 50.8% of students in Washington passed the WASL. The graphic that follows showed the percent of students in the study that passed the WASL. The graph showed the difference in TMS percentages and the state percentage was minimal and insignificant.

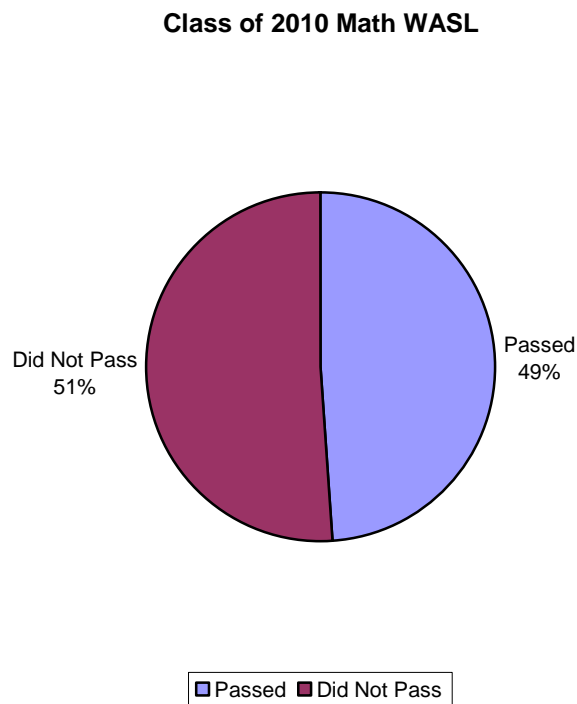


Figure 4: Shows the percent of all students in the study, class of 2010, which passed the WASL.

This graph showed the percentage of those that did not participate in sports at TMS. The passing percentage was 32% which was a significant difference from the state average of 50.8%. If the total population had a passing percentage of 32%, there would have been cause for concern as it related to AYP.

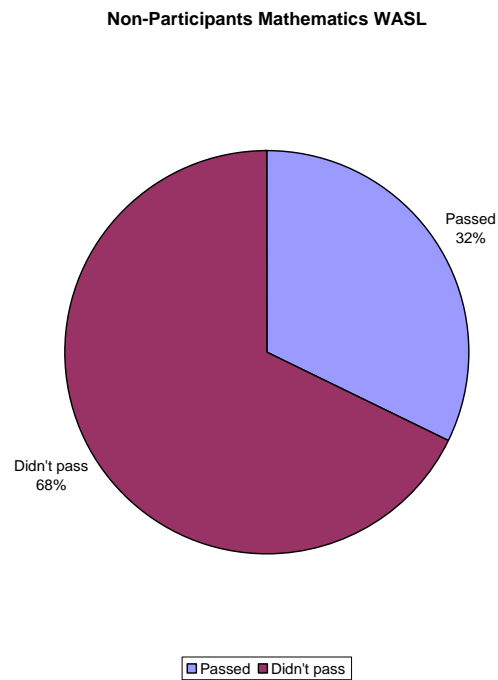


Figure 5: Shows that 32% of non-participants (control group) passed the WASL.

This graphic showed the percent of passing WASL scores of participants in sports at TMS. Students that participated in sports at TMS had a higher passing percentage than the state of Washington on the mathematics portion of the WASL.

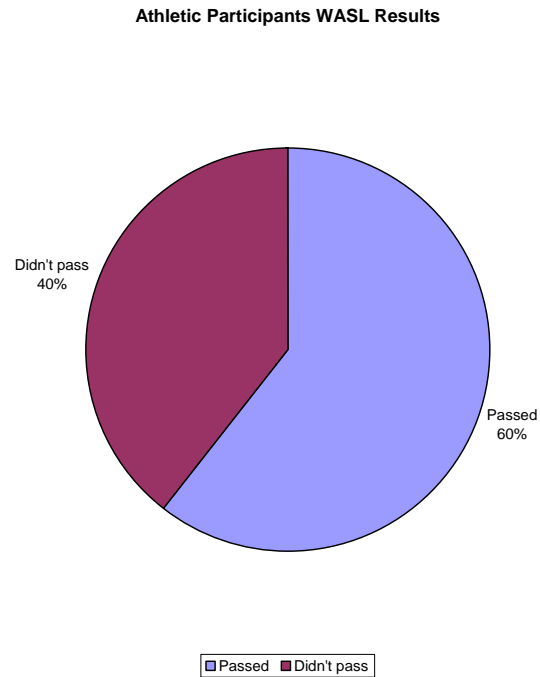


Figure 6: Showed that of the participants in athletic programs (experimental group) 60% passed the WASL.

This graphic combined the information from the previous into a single graphic comparing all possible outcomes of the experiment. There were four possible outcomes. The graphic showed that the largest numbers of students were participants that passed and the smallest portion was non-participants that passed.

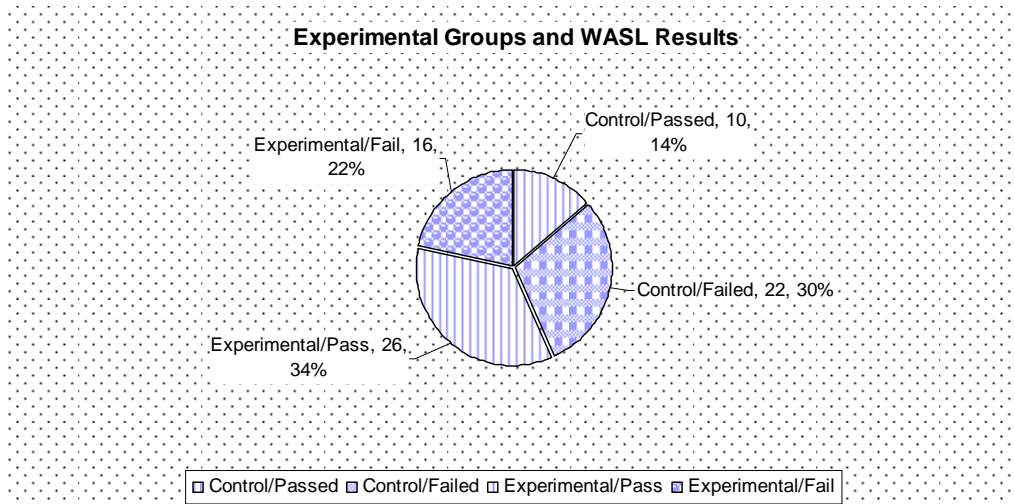


Figure 7: Shows that the Experimental group (participants in athletics) had a 20% larger amount of students passing the Mathematics WASL.

This chart shows the mean comparison of the scores of the participants and non participants. This data is compared to the values at the specified percentage level as stated. The data from the experiment was analyzed to find the t value.

t-Test: Two-Sample Assuming Unequal Variances

	<i>Participants</i> <i>(exp.)</i>	<i>Non-Part</i> <i>(control)</i>
Mean	404.5581395	377.4194
Variance	950.6334441	2336.785
Observations	43	31
Hypothesized Mean Difference	0	
df	47	
t Stat	2.748621926	
P(T<=t) one-tail	0.004231852	
t Critical one-tail	1.677926722	
P(T<=t) two-tail	0.008463705	
t Critical two-tail	2.01174048	

Table 2: Values obtained from STATCALC software.

This table showed the same values as Table 2 from different calculation software.

This information was to check calculation and to show that all work from this experiment could be repeated easily using one computer program, Microsoft Excel spreadsheet software. The table also shows how the data is presented in the program.

Two-Sample Difference of Means (2-tail)

	p	np
Sample Mean	404.5581	377.4194
Std Deviation	30.8323	48.3403
Sample Size (n)	43	31

Homogeneity of Variance

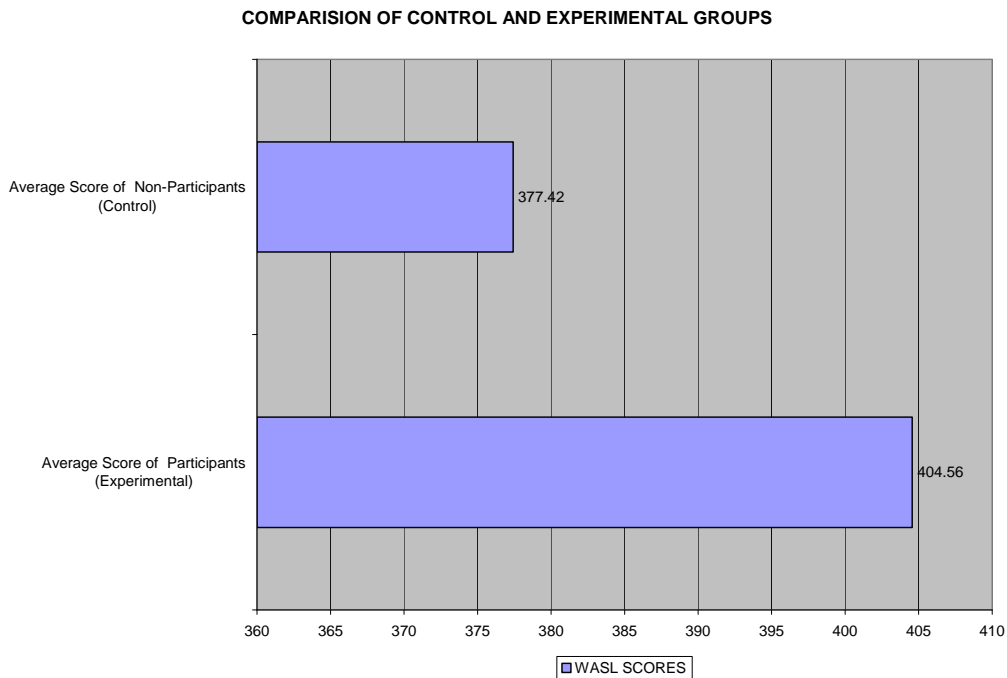
F= 2.46 DF= (30, 42) p < 0.004

	T-statistic	DF	p < (2-tailed)
Equal Variance	2.9460	72	0.0040
Unequal Variance	2.7490	48	0.0080

Table 3: Shows t-Test values from Excel Spreadsheet.

Findings

Comparison of mean (average) scores was compared in the t test to see if the amounts were significant. The graph shows the average scores of participants and non-participants. Note that the x axis does begin at a score of 360 and not at zero. But it should also be known that few if students score below a 300 on the WASL, only one in the sample, therefore it should not be considered misleading to not have it begin at zero since a score of zero would not occur.



Figure

8: Shows a comparison of mean test scores from the experiment.

Summary

The data led the researcher to reject the null hypothesis at all significance levels ($p \geq .10$, $.05$, and $.01$). Therefore the data supports the researcher's hypothesis.

CHAPTER 5

Summary, Conclusions and Recommendations

Introduction

This chapter has been organized around the following topic: (a) introduction, (b) summary, (c) conclusions, (d) recommendations.

Summary

The project addressed the reform in schools and the role of school athletic programs. Athletic programs were tested to determine whether or not they had an impact on student learning as measured by the WASL. Text is provided which recasts the important facets of the project. The high points of each chapter are reconsidered. Typically, no new information is introduced and usually there are no new citations of references.

Conclusions

It is the researcher's conclusion that there was academic value in participating in athletics at Toledo Middle School. Students at Toledo Middle School did not recognize the importance of athletic participation. Since the Toledo School District and Toledo Middle School intended to continue meeting AYP they should continue funding the athletic programs at Toledo Middle School. Students and parents at Toledo Middle School should be made aware of the relationship found in this study.

The survey clearly showed that students did not view a relationship between athletics and passing the WASL, when only 17% of the students answered that they believed sports had helped. Only 18% thought that it would help them on future WASL

tests. The literature reinforces the results of the study and goes on to identify other positive effects of student participation. Toledo School District and the community of Toledo did support their athletic programs and the review of literature and the data gives validation.

The data showed a clear statistical significance at all levels tested. At the highest level tested in the null hypothesis left only a 1% probability for error. Therefore statistically there was strong evidence to reject the null hypothesis and therefore support the hypothesis that student athletes will perform better on the mathematics portion of the WASL.

Recommendations

Based on the conclusions, the researcher suggests the following recommendations:

1. That the correlation between athletic participation and WASL scores should be studied further. A significant relationship was found to exist. Additional studies to isolate the cause of the relationship would be beneficial.
2. A program should be developed that will share the results of the literature available on this topic and the results of experiments like this.
3. Research of experimental studies that were to limit factors related to participation would better serve to find the factors for the relationship.
4. School administrators, faculty, and community should support the development of Toledo Middle School's athletic programs.
5. Conduct studies into other subject areas of the WASL.
6. Individual schools and school districts should duplicate the data analysis done in

this research project.

This study can be easily be repeated on other groups of students, so as the test results are published to test the importance of athletic programs in districts that are facing spending cuts due to budget short falls or other financial requirements.

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Appendix A

Survey of student opinion Survey: Administered to 8th grade students in January.

Survey of 8th grade students at Toledo Middle School

Circle the correct answer.

Gender: **Male Female**

School sports you participated in the 7th grade: **Football; Volleyball; Basketball; Track**

Did you pass the Math WASL? **Yes No**

Did you pass the Reading WASL? **Yes No**

Did you pass the Writing WASL? **Yes No**

If you participated in sports do you think it helped you to pass the WASL? **Yes No**

School sports you participated in the 8th grade: **Football; Volleyball; Basketball; Track**

Do you think that your participation in school sports will help you with the 10th grade WASL? **Yes No**

What aspect/activities if any in school sports do you think helped you in passing the

WASL? Write Below

Appendix B

Random selection procedures: The classes in which the researched had data were the class years 2005-2012. Using a table of generated random numbers (Gay et al. 2006) the researcher assigned 2005 the numeral 0 and 2012 the numeral 7. The researcher

identified the number 67125 from a set of ten thousand random numbers and using the 5
at the end identified the graduation class 2010.

2005 – 0

2006 – 1

2007 – 2

2008 – 3

2009 – 4

2010 – 5

2011 – 6

2012 – 7

Selection : 67125

Source: was reprinted by permission from Statistical Methods by George G. Cochran,
sixth edition © 1967 by Iowa State University Press, pp. 543-546. Appears in
Educational Research – Competencies for Analysis and Application on pp. 562- 565

Appendix C

Identification of participants and those who passed the WASL and athletic participation.

Passed 7th Grade					
Student	WASL	raw	10th	athletics	# of yes
s1	yes	492		yes	2
s2	no	375		no	0
s3	no	358		yes	1
s4	no	375		yes	1
s5	no	383		yes	1
s6	no	375		yes	1
s7	no	296		no	0
s8	no	386		no	0
s9	no	394		yes	1
s10	yes	400		yes	2
s11	no	378		yes	1
s12	no	345		yes	1
s13	yes	412		yes	2
s14	no	361		no	0
s15	yes	401		no	1
s16	no	388		yes	1

s17	no	342	no	0
s18	no	338	no	0
s19	yes	401	yes	2
s20	yes	404	yes	2
s21	yes	434	yes	2
s22	no	391	yes	1
s23	yes	451	yes	2
s24	yes	409	yes	2
s25	yes	424	yes	2
s26	no	396	yes	1
s27	yes	468	no	1
s28	no	381	no	0
s29	yes	434	no	1
s30	no	391	yes	1
s31	yes	432	yes	2
s32	no	391	no	0
s33	no	330	no	0
s34	yes	446	yes	2
s35	no	355	no	0
s36	yes	400	yes	2
s37	no	349	no	0
s38	no	345	yes	1
s39	yes	427	yes	2

s40	yes	432	no	1
s41	yes	418	yes	2
s42	yes	421	yes	2
s43	no	391	yes	1
s44	no	386	yes	1
s45	yes	434	no	1
s46	yes	427	no	1
s47	no	330	no	0
s48	yes	442	no	1
s49	yes	432	yes	2
s50	no	308	no	0
s51	yes	415	yes	2
s52	no	318	no	0
s53	no	342	no	0
s54	no	352	no	0
s55	yes	442	no	1
s56	no	352	yes	1
s57	yes	451	yes	2
s58	no	345	yes	1
s59	no	326	no	0
s60	no	391	yes	1
s61	yes	400	yes	2
s62	yes	409	yes	2

s63	yes	418	yes	2
s64	yes	421	yes	2
s65	no	342	no	0
s66	yes	438	yes	2
s67	yes	424	yes	2
s68	yes	456	no	1
s69	yes	415	yes	2
s70	yes	418	yes	2
s71	no	381	no	0
s72	no	349	no	0
s73	yes	442	no	1
s74	no	370	no	0

Appendix E

Results of 8th Grade Student Survey (Appendix A)

f	n	y	y	n	y	y	y	n	n	y	y	n	n	2
f	n	n	n	n	y	y	y	n	n	n	y	n	n	0
m	y	y	n	n	y	y	y	n	y	y	n	n	n	2
m	n	n	n	y	y	y	y	n	n	n	n	y	n	1
m	y	y	n	n	y	y	n	n	y	y	n	n	n	2
m	y	y	n	y	y	y	n	y	y	y	n	y	y	3
m	y	n	n	y	n	y	n	y	y	n	n	y	y	2
m	n	n	n	n	y	y	y	n	n	y	n	y	n	0
f	n	y	n	y	y	y	y	n	n	n	y	n	y	2
f	n	y	n	y	y	y	y	y	n	n	n	n	y	2
m	y	y	n	n	y	y	y	n	n	y	n	n	n	2
f	n	y	n	y	y	y	y	y	n	y	n	y	n	2
m	n	n	n	n	n	y	y	n	y	n	n	n	n	0
m	n	n	n	n	y	y	n	n	n	n	n	n	n	0
m	n	n	n	n	y	y	y	n	n	n	n	n	n	1
m	n	n	n	n	y	n	y	n	n	n	n	n	n	0
m	n	n	n	n	y	y	y	n	n	n	n	n	n	0
m	n	n	n	n	y	y	y	n	n	n	n	n	n	0
m	y	y	n	y	n	y	y	n	y	y	n	y	n	3
m	n	n	n	n	y	n	n	n	n	n	n	n	n	0
f	n	n	n	n	n	n	n	n	n	n	n	n	n	0
f	n	n	n	n	y	y	y	n	n	n	n	n	y	0
f	n	n	n	n	n	n	n	n	n	n	y	n	n	0
f	n	y	n	n	n	n	n	n	n	n	n	n	n	1
m	n	n	n	n	n	n	n	y	n	n	n	n	y	0
m	n	n	n	n	n	y	y	n	n	n	n	n	n	0
f	n	n	n	n	n	y	n	n	n	n	y	n	n	0
m	y	n	n	n	y	n	n	y	n	y	n	n	y	1
m	n	n	n	n	n	y	n	n	n	n	n	n	n	0
f	n	n	n	n	n	n	n	n	n	y	y	n	n	0
m	n	n	n	n	n	y	y	n	y	n	n	n	n	0
f	n	n	n	n	n	n	y	n	n	y	y	n	n	0
f	n	n	n	n	n	y	y	n	n	n	n	n	n	0
m	y	y	n	n	y	y	n	n	y	y	n	n	n	2
f	n	n	n	n	y	y	y	n	n	n	n	n	y	0
m	y	y	n	n	n	n	n	n	y	y	n	y	n	2
m	y	y	n	n	y	y	y	y	y	y	n	n	y	2

f	n	y	y	n	n	y	y	n	n	n	y	n	n	2
f	n	n	n	n	n	y	y	n	n	n	y	n	n	0
f	n	y	n	n	n	y	y	n	n	y	n	n	n	1
m	n	n	n	y	y	y	y	n	n	y	n	n	n	1
m	n	n	n	n	n	n	n	n	n	n	n	n	n	0
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f	n	n	n	n	y	n	n	n	n	y	n	n	n	0
m	n	n	n	n	n	n	n	n	n	n	n	n	n	0
m	n	n	n	n	n	n	y	n	n	n	n	y	n	0
m	n	n	n	n	n	n	n	n	n	n	n	n	n	0
m	n	n	n	n	y	y	n	n	y	n	n	n	n	0
f	n	y	n	n	n	y	y	n	n	n	n	y	n	1

Appendix G

Calculation of the t values.

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

$$t = \frac{377.4194 - 404.5581}{\sqrt{\left(\frac{70103.55 + 39926.6}{31 + 43 - 2}\right)\left(\frac{1}{31} + \frac{1}{43}\right)}}$$

$$t = \frac{-27.1388}{\sqrt{\left(\frac{110030.2}{72}\right)(0.055514)}}$$

$$t = \frac{-27.1388}{\sqrt{(1528.197)(0.055514)}}$$

$$t = \frac{-27.1388}{\sqrt{84.83612}}$$

$$t = \frac{-27.1388}{9.210652}$$

$$t = -2.94646$$

t=2.946, when calculated values were rounded to show work, t=2.749 from statistics software