

Participating in Music Programs  
Increases a Student's Chances of Passing  
The Reading Writing and Math Sections of the WASL

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A Special Project  
Presented to  
Dr. Mel Mangum  
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Tim Henderson  
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FACULTY APPROVAL

Participating in Music Programs Increases a Student's Chances of Passing

The Reading Writing and Math Sections of the WASL

Approved for the Faculty

\_\_\_\_\_, Faculty Advisor

## ABSTRACT

The research project was conducted with the purpose of measuring whether participating in music programs increased a student's chance of passing the reading writing and math sections of the WASL. The project involved two groups of students during a two-year period. The control group did not participate in music and the experimental group did participate in music. After statistically analyzing the raw WASL scores, it was found that there was a high correlation between being involved in music and passing the reading writing and math portions of the WASL.

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## TABLE OF CONTENTS

	Page
FACULTY APPROVAL .....	ii
ABSTRACT .....	iii
PERMISSION TO STORE .....	iv
TABLE OF CONTENTS .....	v
LIST OF TABLES .....	viii
CHAPTER 1 .....	1
Introduction.....	1
Background for the Project .....	1
Statement of the Problem.....	1
Purpose of the Project .....	2
Delimitations .....	2
Assumptions.....	2
Hypothesis.....	3
Null Hypothesis .....	3
Significance of the Project .....	3
Procedure .....	3
Definition of Terms.....	4
Acronyms .....	4
CHAPTER 2 .....	5
Review of Selected Literature.....	5
Introduction.....	5

No Child Left Behind.....	5
Washington State Assessment of Student Learning .....	6
Music’s Effect on Cognitive Development.....	7
Summary.....	8
CHAPTER 3 .....	10
Methodology and Treatment of Data.....	10
Introduction.....	10
Methodology .....	10
Participants.....	10
Instruments.....	10
Design .....	11
Procedure .....	11
Treatment of the Data .....	11
Summary.....	12
CHAPTER 4 .....	13
Analysis of the Data.....	13
Introduction.....	13
Description of the Environment.....	13
Hypothesis.....	13
Null Hypothesis .....	14
Results of the Study .....	14
Findings.....	20
Discussion.....	20

Summary .....	20
CHAPTER 5 .....	21
Summary, Conclusions and Recommendations.....	21
Summary.....	21
Conclusions.....	22
Recommendations.....	23
REFERENCES .....	24
APPENDIX.....	26

## LIST OF TABLES

	Page
Table 1, Music and Non-Music Student Sections Passed on the WASL for School Year 2005 – 2006.....	(14)
Table 2, Music and Non-Music Student Sections Passed on the WASL for School Year 2006 – 2007.....	(15)
Table 3, <i>t</i> -test of number of WASL sections passed Music to Non-Music Students for school year 2005-2006 .....	(16)
Table 4, <i>t</i> -test of number of WASL sections passed Music to Non-Music Students for school year 2006-2007 .....	(16)
Table 5, Comparison of <i>t</i> -score Values for 2005-2006 music and non-music student.....	(17)
Table 6, Comparison of <i>t</i> -score Values for 2006-2007 music and non-music student.....	(18)
Table 7, Distribution of <i>t</i> with Degrees of freedom 40 and 60 .....	(19)



## CHAPTER 1

### Introduction

#### Background for the Project

In 2001 the Bush administration amended and renamed the Elementary and Secondary Education Act to what became known as the No Child Left Behind Act. The Washington Assessment of Student Learning was created by the state of Washington to measure student's achievement. The Washington Assessment of Student learning later was modified to fit goals set forth by the No Child Left Behind Act.

Each school district and individual school was held accountable to meet performance goals annually. Because of the pressure placed on school districts, some chose to eliminate elective classes to focus time and money on areas tested on the Washington Assessment of Student Learning. As a result classes such as choir, band, physical education, and vocational programs have seen a decrease in enrollment which has led to teacher loss.

#### Statement of the Problem

Students in a school district in the state of Washington were removed from elective classes following unsuccessful completion of course work or failure to pass any section of the Washington Assessment of Student Learning. The Struggling students were then placed in either two math classes, two science classes, and/or two English classes depending on the content area student were struggling. In doing so the school district felt the students would have a better chance at being successful on the Washington Assessment of Student Learning.

Some struggling students have chosen to drop out of school because elective classes were no longer available. A music class or drama class may have been the only class that inspired struggling students to attend school.

### Purpose of the Project

The purpose of this project was to show a correlation between student involvement in music courses and a higher success rate on all sections of the Washington Assessment of Student Learning. An increase in the rate of success on more sections of the Washington Assessment of Student Learning demonstrated that music courses had a positive effect on overall student achievement.

### Delimitations

The project compared a random selection of 60 music students to a random selection of 60 non-music students from a high school in Kennewick, Washington. The project was conducted during the winter of the 2007 – 2008 school year using scores from the 2005-2006 and 2006-2007 Washington Assessment of Student Learning.

### Assumptions

The researcher made several assumptions during the course of the research. The first assumption made was that the musical curriculum taught was appropriate for the students' cognitive level. A second assumption made was that the musical educators were competent in the curricular area taught. A final assumption made was that the Washington Assessment of Student Learning was scored in a fair and valid manner.

### Hypothesis

Tenth-grade music students demonstrated proficiency on more sections of the WASL at a significantly higher level than non-music students.

### Null Hypothesis

There was no correlation in the number of sections passed on the WASL between 10<sup>th</sup> grade music students and non-music students. Significance was determined for  $p \geq 0.05, 0.01, 0.001$ .

### Significance of the Project

The correlation study was significant for two reasons. The first reason was all students would be held responsible to meet standard on the reading and writing sections of the Washington Assessment of Student Learning in order to earn a Certificate of Academic Achievement, the high school graduation certificate. The second reason that students that earned below standard, or had not demonstrated proficiency, would be required by the school district to take multiple classes in those content areas. As a result, music and all other elective courses had shown a decrease on over all student enrolment.

### Procedure

A sample of Washington Assessment of Student Learning scores from 2005-2006 and 2006-2007 school years were collected from a random group of music and non-music students from a high school in Kennewick Washington. The two samples were compared using a t-test which measured for a correlation between being involved in music and success in the reading writing and math sections of the Washington Assessment of Student Learning.

## Definition of Terms

music students. The term music students referred to any students enrolled in choir, band, or orchestra during the school year in which the test was taken.

non-music student. The term non music student referred to any student not involved in choir, band or orchestra during the school year in which the test was taken.

## Acronyms

AYP. Adequate Yearly Progress

EALRs. Essential Academic Learning Requirements

ESEA. Elementary and Secondary Education Act

NCLB. No Child Left Behind

OSPI. Office of the Superintendent of Public Instruction

WASL. Washington Assessment of Student Learning

## CHAPTER 2

### Review of Selected Literature

#### Introduction

The author chose to review literature on the No Child Left Behind Act and the testing component used by the state of Washington known as the WASL. The author explains what the WASL is. The Author further proceeded with a review of literature on music's effect on cognitive development.

#### NCLB

The No Child Left Behind Act, public law 107-110, known as NCLB was a reauthorization of the 1965 Elementary and Secondary Education act (ESEA) (Wikipedia, n.d. para. 1). No Child Left Behind's focus was to provide all children a fair, equal, and significant education of the highest quality regardless of race and socioeconomic backgrounds. The reauthorization of ESEA into NCLB was the largest government investment into K-12 education, "Over 11 billion in financial assistance to schools educating low-income students. ESEA allocates almost another 10 billion for teacher recruitment and professional development, educational technology, after school programs, and other purposes" (The Education Trust, n.d. para. 1). The United States department of education emphasized four pillars within the bill: accountability, flexibility, research-based education, and parent options (Office of Superintendent Public Instruction, n.d. para.2).

"No Child Left Behind makes major changes in the federal government's role in education. The new law increases testing, reporting, and other

requirements for schools” (NEA, n.d., para. 3). “The overall goal of NCLB is to have all students achieve state standards by 2014. Between now and 2014, states, districts and schools must take a series of specific steps toward that goal” (WASA, n.d., p. 1)

Schools and districts would be required yearly to demonstrate that all groups of students had met state performance goals in order to make Adequate Yearly Progress (AYP) and schools that did not meet AYP faced consequences (WASA, n.d.). NCLB did however give the ability to each state to determine the standards to measure AYP such as assessments, graduation rates, and other indicators (Wikipedia, 2007).

#### Washington State Assessment of Student Learning

In 1993 the state of Washington had begun the development of a comprehensive school change effort with the primary goal of improving teaching and learning. The goal the Commission had involved three important tasks in support of the school change effort. First the state of Washington needed to establish the Essential Academic Learning Requirements (EALRs) that described what all students should know and be able to do, second to develop an assessment system to measure progress and thirdly to recommend an accountability system. (OSPI, n.d.c., p1)

By 1995 the Commission had achieved their first major task the ELARs in Reading, Writing and Math, and by 1996 Science, Social Studies, Health and Fitness and the Arts were adopted (n.d.c., p. 2) By 1999 the Commission had completed its work and was dissolved. From that point on all subsequent testing

and test development has been conducted by the Office of Superintendent of Public Instruction (OSPI) (n.d.c., p.3)

The Office of the Superintendent of Public Instruction "... develops or selects and administers all state assessment and reports achievement data for individual students, schools, districts, and the overall state" (OSPI, n.d.b., p1) The assessments used were "... standardized and on demand, meaning all students respond to the same questions, under the same conditions and at the same time during the school year" (n.d.a., p.2).

Each spring students in grades 3-8 and 10 had been tested in reading and math. Also each spring students in grades 4, 7, and 10 had been tested in writing and grades 5, 8, and 10 in science (n.d.b). The WASL "assessments require students to both select and create answers to demonstrate their knowledge, skills, and understanding in each of the ELARs" (n.d.a., p. 1). Three types of questioning strategies were used on the WASL: selected response (multiple choice); short constructed response: and extended constructed response (n.d.a).

#### Music's Effect on Cognitive Development

For some time now research had shown that a child's cognitive abilities and spatial intelligence have been enhanced through the learning of music. One experiment known as the "Mozart Effect" found that 36 college students who listened to 10 minutes of Mozart's Sonata scored higher on spatial-temporal tasks (Rauscher, 2003, para 2). Another experiment published the following year stated that, "The reason that Mozart's symphonies have the ability to improve IQ scores is that music activates the temporal lobes of the brain" (Elmore, 2004, p.1).

At birth a child's brain was wired to learn. However the brain needs stimulation in order to make neural connections. The number of neural connections, which are the basis for higher level learning and memory, are developed in early childhood (Slavin, 2003, p.185). Early exposure to musical training had enabled children's brains to reach maximum potential by generating neural connections utilized in abstract reasoning (Yoshimura, 2007, .n.d.). Music helped open new pathways into the mind.

In 1975 a study done by Hurwitz, Wolff, Bortnick and Kokas on music and reading showed, students who received 40 minutes of music five days a week for seven months, as compared to the control group exhibited "significantly higher reading scores than did the control group, scoring in the 88<sup>th</sup> percentile vs. the 72<sup>nd</sup> percentile". (Weinberger, 1994, p.1) Another report published in 1996 by the College Entrance Examination Board stated

that students who played an instrument scored roughly 50 points higher on the verbal sections of the SAT and 39 points higher on the math sections than the national average ...as the temporal lobes are activated in effective ways they are more likely to have improved function over all (Elmore, 2004, p,2).

### Summary

With the governments reauthorization of the ESEA to NCLB the governments focus was to provide all children a fair, equal, and significant education of the highest quality. The new law increased testing, reporting and other requirements for schools with an overall goal to have all students achieve state standards by the year 2014.



Each state developed their own test to meet the requirements of NCLB. The State of Washington tested students in the spring in grades 3-8 and 10 using the WASL which tested in the areas of reading, writing, math and science. Students were required to both select and create answers to demonstrate their knowledge, skills and understanding in each of the EALRs.

Due to the importance placed on the students' success on the WASL, parents, teachers and school district officials have looked for ways to help improve a student's learning ability. One area that had begun to be researched heavily was brain research. The research found that a child's brain was wired to learn, but the brain needed stimulation. Early exposure to musical training had enabled children's brains to reach maximum potential by generating neural connections utilized in abstract reasoning. Music had helped to build new pathways in the mind.

## CHAPTER 3

### Methodology and Treatment of Data

#### Introduction

The author conducted a correlation study. The correlation study involved comparing music students to non-music students to see if there was a correlation between passing the reading writing and math portions of the WASL and being involved in music. A high school in Kennewick Washington's WASL scores from the 2005-2006 and 2006-2007 school year were used comparing music students to non-music students.

#### Methodology

The research method chosen for the study was correlation. The researcher chose to use a correlation study to find if participating in music gave students a better chance at passing the reading, writing and math portions of the WASL as compared to non-music students.

#### Participants

The project involved 120 students from a high school in Kennewick Washington. Of the 120 students 60 came from the 2005-2006 school year and 60 came from the 2006-2007 school year. Of the 60 for both school years 30 were music and 30 were none music students.

#### Instruments

The author used WASL scores form the 2005-2006 and 2006-2007 school years. The music and non-music students were selected by using a random

number index form Gay and Airasian (2003, p. 552-555). These numbers were compared by using a *t*-test.

### Design

A correlation study was used for the design of the study. The researcher looked to determine if being involved in music gave students a greater chance to pass the reading writing and math portions of the WASL. The researcher used WASL scores for the 2005-2006 and 2006-2007 school years and compared music to non-music students.

### Procedure

A sample of Washington Assessment of Student Learning scores from 2005-2006 and 2006-2007 school years were collected from a random group of music and non-music students from a high school in Kennewick, Washington. The two samples were compared using a *t*-test which measured for a correlation between being involved in music and success in the reading writing and math sections of the Washington Assessment of Student

### Treatment of the Data

The researcher used the *t*-test correlation to statistically calculate the data. The researcher used music and non-music WASL scores from the 2005-2006 and 2006-2007 to see if there was a relationship between being involved in music and the passing the reading writing and math portions of the WASL. The researcher used the Stat Pak (Gay & Airasian, 2003) to conduct the *t*-test correlation.

## Summary

WASL scores from the 2005-2006 and 2006-2007 school year were used to determine if there was a relationship between being involved in music and passing the reading, writing and math portions of the WASL. The data was gathered using a *t*-test correlation statistical device.

## CHAPTER 4

### Analysis of the Data

#### Introduction

The data used in the analysis was gathered from the high school in which the researcher worked over a two-year period. The statistical analysis consisted of gathering the number of reading writing and math sections passed on the WASL by the individual students and then doing a *t*-test to measure for significance. After the statistical analysis was completed, the researcher found that there was support for the original hypotheses. Because the original hypothesis was supported, the null hypothesis was rejected.

#### Description of the Environment

The research was conducted at a high school Kennewick Washington over a two year period. The high school in Kennewick was a large urban high school with approximately 1,600 students at the time the research was conducted. The student body was composed of two main ethnic groups: Caucasian and Hispanic. The data was gathered from the sophomore 05-06 and the sophomore 06-07 classes. The control group consisted of students that had not participated in music courses.

#### Hypothesis

Tenth-grade music students demonstrated proficiency on more sections of the WASL at a significantly higher level than non-music students.

### Null Hypothesis

There was no correlation in the number of sections passed on the WASL between 10<sup>th</sup> grade music students and non-music students. Significance was determined for  $p \geq 0.05, 0.01, 0.001$ .

### Results of the Study

The number of sections the students passed were shown in Table 1. The experimental group, music students during year 2005-2006, and the control group, non-music students during year 2005-2006, were both included.

Table 1

Music and Non-Music Student Sections Passed on the WASL for School Year 2005 – 2006

Music	Sections Passed	Non-Music	Sections Passed
S1	2	S1	0
S2	2	S2	1
S3	3	S3	3
S4	3	S4	1
...	...	...	...
S26	3	S26	0
S27	3	S27	1
S28	3	S28	0
S29	2	S29	3
S30	2	S30	1

(see Appendix A)

The number of sections the students passed were shown in Table 2. The experimental group, music students during year 2006-2007, and the control group, non-music students during year 2006-2007, were both included.

Table 2

Music and Non-Music Student Sections Passed on the WASL for School Year 2006 – 2007

Music	Sections Passed	Non-Music	Sections Passed
S1	2	S1	2
S2	2	S2	1
S3	3	S3	3
S4	3	S4	0
...	...	...	...
S26	2	S26	3
S27	2	S27	2
S28	2	S28	3
S29	3	S29	1
S30	3	S30	2

(see Appendix A)

Table 3. Showed the statistical analysis of the 2005-2006 students raw scores. Both groups were included in the analysis.

Table 3.

*t*-test of number of WASL sections passed Music to Non-Music Students for School Year 2005 -2006

Student	N	Mean	Standard deviation
Music	30	2.47	.73
Non-Music	30	1.50	1.20
df = 58		t = 3.78	p<.001

Table 4. Showed the statistical analysis of the 2006-2007 students raw scores. Both groups were included in the analysis.

Table 4.

*t*-test of number of WASL sections passed Music to Non-Music Students for School Year 2006 -2007

Student	N	Mean	Standard deviation
Music	30	2.50	.73
Non-Music	30	1.87	1.15
df = 58		t = 2.52	p<.02



Table 5. Comparison of *t*-score Values for 2005-2006 music and non-music student.

Statistic	Value
No. of Scores in Group X	30
Sum of group X	74.00
Mean of Group X	2.47
Sum of Squared Scores in Group X	198
SS of Group X	15.47
No. of Scores in Group Y	30
Sum of Group Y	45
Mean of Group Y	1.50
Sum of Squared Scores in group Y	109.00
SS of Group Y	41.50
<i>t</i> -Value	3.78
Degrees of freedom	58

Table 6. Comparison of *t*-score Values for 2006-2007 music and non-music student.

Statistic	Value
No. of Scores in Group X	30
Sum of group X	75.00
Mean of Group X	2.50
Sum of Squared Scores in Group X	205.00
SS of Group X	17.50
No. of Scores in Group Y	30
Sum of Group Y	56
Mean of Group Y	1.87
Sum of Squared Scores in group Y	142.00
SS of Group Y	37.47
<i>t</i> -Value	2.82
Degrees of freedom	58

The formula for  $t$ - scores was drawn from Gay and Airasian (2003, p. 458) and follows with the statistical values that were provided by StatPak (Gay and Airasian, 2003) calculations:

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

2005-2006

$$t = \frac{2.47 - 1.50}{\left( \frac{15.47 + 41.50}{30 + 30 - 2} \right) \left( \frac{1}{30} + \frac{1}{30} \right)}$$

$t = 3.78$

2006-2007

$$t = \frac{2.50 - 1.87}{\left( \frac{17.50 + 37.47}{30 + 30 - 2} \right) \left( \frac{1}{30} + \frac{1}{30} \right)}$$

$t = 2.52$

The values used to determine significance were published in Gay and Airasian (2003, p. 561). Table 7 represented the  $t$ -values with 40 – 60 degrees of freedom used in this study.

Table 7.

Distribution of  $t$  with Degrees of freedom 40 and 60

PROBABILITY				
<i>Df</i>	.10	.05	.01	.001
40	1.684	2.021	2.704	3.551
60	1.671	2.000	2.660	3.460

## Findings

Statistical analyses of raw scores, table 3 2005-2006 and table 4 2006-2007 demonstrated *t*-values of 3.78 and 2.52 respectively showing a high correlation between being involved in music and passing the reading writing and math portions of the WASL. This supported the original hypotheses.

## Discussion

Brain research has shown that music activates the cognitive centers of the brain helping students learn. The number of neural connections, which are the basis for higher level learning and memory, are developed in early childhood (Slavin, 2003, p.185). Early exposure to musical training had enabled children's brains to reach maximum potential by generating neural connections utilized in abstract reasoning (Yoshimura, 2007, .n.d.). Music helped open new pathways into the mind.

## Summary

The data for research was collected from the 2005-2006 and 2006-2007 sophomores WASL scores. The scores were than put through statistical analysis looking for a correlation between being involved in music and passing the reading and writing portions of the WASL. After analyzing the raw data there was a significant statistical correlation between being involved in music and passing the reading writing and math portions of the WASL for both 2005-2006 and 2006-2007 sophomore classes. Because a high correlation was found the original hypotheses was accepted.

## CHAPTER 5

### Summary, Conclusions and Recommendations

#### Introduction

With the amendment and renaming of the ESEA to NCLB and pressure placed on all school districts to achieve, districts in the state of Washington have chosen to eliminate elective classes to focus time and money on areas tested on the WASL. As a result classes such as choir, band, physical education, and vocational programs have seen a decrease in enrolment, which has lead to teacher loss. Do to this change the researcher chose to do a correlation study on being involved in music courses and achieving a higher rate of success on the reading, writing and math portions of the WASL. After statistical analysis the data demonstrated that being involved in music classes gave students a greater chance on passing the reading writing and math portions of the WASL. The study suggests that students should be involved in music classes from kindergarten through twelfth grade.

#### Summary

In 2001 when ESEA was amended and renamed NCLB, the state of Washington was given the responsibility to create a high-stakes test, the WASL, to measure student achievement. With the pressure placed on school districts to achieve elective classes have been scaled back causing some teachers to loose their jobs. Brain research shows that early exposure to musical training had enabled children's brains to reach their potential by generating neural connections used in abstract reasoning.

The research project was designed to show a correlation between being involved in music and a student's ability to pass the reading writing and math portions of the WASL. The first set of data collected was WASL reading, writing and math sections passed from the 2005 – 2006 school year from music and non-music students. The second set of data collected was WASL reading, writing and math sections passed from the 2006 – 2007 school year from music and non – none music students. At the conclusion of the research project the data was statistically analyzed.

### Conclusions

Statistical analysis was completed using a *t*-test to measure for significance between being involved in music and students passing the reading, writing and math portions of the WASL. The students' raw scores, shown in table 1 and table 2 were used to calculate a *t*-value. The statistical analysis of table one was shown in table 3 and the statistical analysis of table two was shown in table 4. Significance was determined for  $p \geq .05, 0.01, 0.001$  which was reported in table 7.

After analyses it was found that there was a high correlation between being involved in music classes and passing the reading, writing and math portions of the WASL. With these findings the study found support for the original hypotheses that music students were more likely to pass the reading, writing, and math portions of the WASL than non-music students.

## Recommendations

The researcher recommends that students take some form of music class from kindergarten through twelfth grade because on the average the music students will pass more sections of the WASL as compared to non-music students. A final recommendation would be for all teachers to incorporate some kind of musical activity into their daily lessons. What that is would be left up to the teacher.

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APPENDIX A

Table 1

Music and Non-Music Student Sections Passed on the WASL for School Year  
2005 – 2006

Music	Sections Passed	Non-Music	Sections Passed
S1	2	S1	0
S2	2	S2	1
S3	3	S3	3
S4	3	S4	1
S5	2	S5	0
S6	2	S6	3
S7	2	S7	1
S8	0	S8	0
S9	3	S9	0
S10	2	S10	1
S11	2	S11	2
S12	3	S12	3
S13	3	S13	3
S14	3	S14	3
S15	3	S15	1
S16	3	S16	0
S17	3	S17	2

(Continued from page 14)

APPENDIX A

Table 1

Music and Non-Music Student Sections Passed on the WASL for School Year  
2005 – 2006

Music	Sections Passed	Non-Music	Sections Passed
S18	3	S18	2
S19	3	S19	0
S20	3	S20	1
S21	3	S21	3
S22	1	S22	3
S23	3	S23	2
S24	2	S24	3
S25	2	S25	2
S26	3	S26	0
S27	3	S27	1
S28	3	S28	0
S29	2	S29	3
S30	2	S30	1

(Continued from page 14)

APPENDIX A

Table 2

Music and Non-Music Student Sections Passed on the WASL for School Year  
2006 – 2007

Music	Sections Passed	Non-Music	Sections Passed
S1	2	S1	2
S2	2	S2	1
S3	3	S3	3
S4	3	S4	0
S5	2	S5	0
S6	3	S6	3
S7	3	S7	1
S8	3	S8	3
S9	3	S9	1
S10	2	S10	0
S11	2	S11	3
S12	3	S12	0
S13	2	S13	3
S14	3	S14	2
S15	3	S15	0
S16	3	S16	2
S17	3	S17	0

(continued from page 15)

APPENDIX A

Table 2

Music and Non-Music Student Sections Passed on the WASL for School Year  
2006 – 2007

Music	Sections Passed	Non-Music	Sections Passed
S18	3	S18	2
S19	1	S19	3
S20	3	S20	2
S21	3	S21	3
S22	0	S22	2
S23	3	S23	2
S24	3	S24	3
S25	3	S25	3
S26	2	S26	3
S27	2	S27	2
S28	2	S28	3
S29	3	S29	1
S30	3	S30	2

(continued from page 15)