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FACTORS AFFECTING MUSIC NAEP EXAM ACHIEVEMENT

A dissertation submitted in partial fulfillment
of the requirements for the degree of
DOCTOR OF EDUCATION
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THE SCHOOL OF EDUCATION
at
ST. JOHN'S UNIVERSITY
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by
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ABSTRACT

FACTORS AFFECTING MUSIC NAEP EXAM ACHIEVEMENT

Eric Mordhorst

Achievement in music may be affected by many factors such as the characteristics of the student, the chosen music program, the home environment, and the student's focus on music study. In music classes, teachers use various techniques to assist in the acquisition of music knowledge. This study determined the effect the different modalities of music study have on the acquisition of basic music skills common to all musical performances. This study also determined the effect of teaching techniques, gender, reading materials in the home, self-reported importance of the Music NAEP Exam, home music activities, and student's focus on the acquisition of music knowledge. This study investigated the difference in scores on the Music NAEP Exam related to the music study methods, student characteristics, and the students' focus on music. Results from the 2008 Music NAEP Exam have been used. The 4,028 participants are 8th grade students: 50.5% male and 49.5% female, 52.7% White, 18.1% Black, 22.6% Hispanic, 4.5% Asian, 1.2% American Indian/Alaskan Native, and 9% Other. 39.8% are eligible for free or reduced-price lunch while 87.4% are enrolled in public schools. The average scale score is 147 out of a possible 300 points. Factor analysis will be performed to determine the effects of the method of music study, reading materials at home, teaching techniques used in music class, and the students' focus on music. This analysis determined that significant differences in Music NAEP Exam scores exist as a result of music confidence, music class activities, performance in an ensemble, high literacy resources, and music interests. In addition, when considered individually, taking private lessons, singing in a chorus, and

performing in an instrumental ensemble all have a significant effect on music achievement.

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Chapter 1: Introduction

There are several methods of study when it comes to performing music in American schools. In the 8th grade, the level at which this study applies, performing music students are typically enrolled either in Band, Orchestra, or Chorus. Students who do not perform as a member of an ensemble are typically enrolled in an academically-oriented general music class.

Students have a different experience in music education according to which music course they are enrolled in, because of the natures of the respective courses. Students who are enrolled in instrumental music study instrument-specific performance techniques. These also vary according to the specific instrument chosen by the student. Students enrolled in choral music study the operation of the human voice and vocal production techniques.

There are, however, concepts that apply to all areas of music. These include basic music reading skills, music theory concepts, and music history, among others. These are the skills that can be assessed using a written exam such as the Music NAEP exam. Differences in achievement on this written exam, however, point to differences in the methods of instruction between performance-based classes and academic music classes.

In addition to the type of music class a student is enrolled in, student study behaviors such as listening to music at home, taking private lessons on their instrument, and attending musical performances affect their music NAEP exam achievement.

Purpose of the Study

The purpose of this study is to analyze the difference in achievement in the 2008 Music NAEP exam that is the result of factors that influence music knowledge acquisition, including ensemble membership, music class activities, student focus on music, and individual student characteristics. Comparisons will be made between NAEP exam scores and several characteristics of the music education of the students involved. This study addresses the differences in NAEP exam scores between students who study band, chorus, and orchestra, and those who do not participate in a performance ensemble. The field of music education can benefit from this information and take steps to analyze and address this gap between the subject areas. It is important that we are able to address the achievement of those who opt not to study music through performance in school. As a music education community, we have a duty to educate all students, regardless of the mode of instruction. This study may uncover ways in which choral students can improve their achievement in written music tests, as well as the student behaviors that influence musical achievement. Alternatively, it may be true that the Music NAEP exam is a better tool for assessing the acquisition of specific skills and knowledge that are studied in the context of performing music, and not necessarily a tool to assess general musical knowledge.

This study also addresses the differences in NAEP Exam scores as they relate to teaching techniques used in the music classroom. These techniques include: having students sing or play instruments in class, write down music, work on group projects, and listen to music in class. If these techniques have a significant effect on NAEP Exam scores, teachers should be encouraged to use them in class, as they may help to close the

gap between the achievement of performing ensemble members and general music students.

This study also addresses the way in which student confidence in music affects achievement. For this study, student confidence will be determined by student responses to questions about their perceptions about their own talent, whether they would like to play music for a living, and enjoyment of performance. If student confidence has a significant effect on achievement, the field of music education would be well-served by continuing to encourage this characteristic in students. Closely related, this study also addresses the effect of student interest in music, determined by student answers to questions about their participation in self-directed music activities, such as entering music competitions, attending summer music programs, reading about music, and talking to friends about music. If these are found to be significant to achievement, music teachers should continue to encourage students to take part in music activities outside of school on their own. Likewise, the effect of student focus on the test, based on student answers regarding how important the test was, and how hard they tried on the test may also indicate a link between motivation and achievement on this exam.

The presence of literacy resources in the homes of students, including newspapers, magazines, and an encyclopedia, may point to a link between music achievement and encouragement of literacy. If this is the case, further research may be warranted in the connections between literacy and music achievement.

In addition to studying the above factors, several questions on the NAEP exam were considered individually, including which type of ensemble students participate in,

whether or not they take private lessons at school, and being asked to compose their own music. If these have a significant effect on their own, the field would benefit from making these courses and experiences available to students.

The author of this study has been working as a Band Director in Public and Private Schools for the past eighteen years. He has taught students ranging from 3rd grade through college, with the vast majority of his experience in Middle School. One of the facets of the purpose of this study is to combine anecdotal experience with statistical information to inform the design of music course offerings, pedagogy, and curricula in order to best serve students.

Theoretical/Conceptual Framework

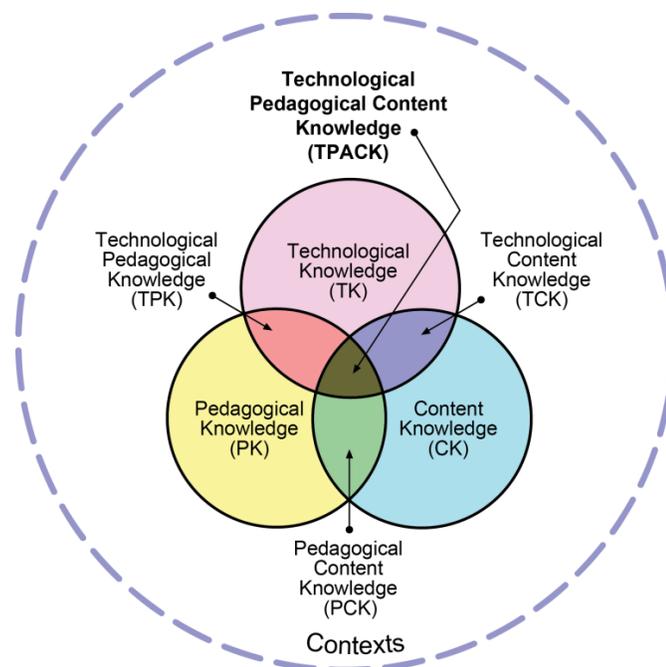
The technological, pedagogical, and content knowledge (TPACK) framework was utilized in this study. Koehler and Mishra define Pedagogical Knowledge (PK) as “Teachers’ deep knowledge about the processes and practices or methods of teaching and learning,” Content Knowledge (CK) as “Teachers’ knowledge about the subject matter to be learned or taught,” and Technological Knowledge as “Knowledge about certain ways of thinking about, and working with technology, tools and resources. and working with technology can apply to all technology tools and resources” (Mishra & Koehler, 2006).

The TPACK framework addresses the ways in which these different areas of a teacher’s knowledge interact. Pedagogical Content Knowledge (PCK) is the interplay between a teacher’s pedagogical and content knowledge, specifically the way in the teacher’s understanding of the material can influence the way in which it is taught. An example of this, in the field of music education uses a specific conducting technique to

demonstrate the appropriate style of a certain piece of music. Technological Content Knowledge (TCK) is the interplay between a teacher's technological and content knowledge; it is the appropriate application of technology influenced by the teacher's knowledge of the content. For example, teaching students the way in which an electronic tuner, based on the specific instrument played, will display different information, as well the ways in which a student should interpret and react to that information. Technological Pedagogical Knowledge (TPK) is the interplay between a teacher's technological and pedagogical knowledge. For example, a teacher may use technology to demonstrate the difference between just and equal temperament using technology, which will change the way in which the concept of listening for intonation within an ensemble can be taught.

Figure 1.1

The TPACK Framework



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Significance/Importance of the Study

This study may be able to provide music educators with information about the different results achieved by those who study music through performance and in an academic setting. There have not been any significant studies that make this comparison. If we are to understand the differences in the effect that these areas of study have on the acquisition of basic music knowledge and skills, educators may be able to format their respective curricula and pedagogical methods to strengthen their instruction. It is important that music educators are able to improve practice, and therefore student achievement, by using the strengths of all methods of music instruction.

By understanding that using specific instructional practices may strengthen student achievement, teachers can strive to use these practices extensively in their interactions with students. Music achievement is also inherently dependent on individual student behaviors outside of the classroom, such as practice at home. If the data supports that specific student behaviors support achievement, teachers will be well served to support and motivate these behaviors.

Research Questions

Q1. Which music class activities have a significant effect on Music NAEP Exam achievement?

Null hypotheses:

H_0 =Factor 3, Music Class Activities, does not have a significant effect of Music NAEP Exam Achievement.

H_0 =Students being asked to make up their own music does not have a significant effect of Music NAEP Exam Achievement.

Q2. Which individual student characteristics, home characteristics, and study habits have a significant effect on Music NAEP Exam achievement?

Null hypotheses:

H_0 =Factor 1, Music Confidence, does not have a significant effect of Music NAEP Exam Achievement.

H_0 = Factor 2, High Literacy Resources, does not have a significant effect of Music NAEP Exam Achievement.

H_0 =Factor 5, Music Interests, does not have a significant effect of Music NAEP Exam Achievement.

H_0 = Factor 6, Emphasis on Test Achievement, does not have a significant effect of Music NAEP Exam Achievement.

Q3. How does the method of music study (Performance or General) affect Music NAEP Exam achievement?

Null hypotheses:

H_0 =Factor 4, Performance, does not have a significant effect of Music NAEP Exam Achievement.

H_0 = Participation in Band does not have a significant effect of Music NAEP Exam Achievement.

H_0 = Participation in Orchestra does not have a significant effect of Music NAEP Exam Achievement.

H_0 = Participation in Chorus does not have a significant effect of Music NAEP Exam Achievement.

Q4. Does taking private music lessons at school have a significant effect on Music NAEP Exam achievement?

Null hypotheses:

H_0 =Taking private singing lessons does not have a significant effect of Music NAEP Exam Achievement.

H_0 = Taking private lessons on an instrument does not have a significant effect of Music NAEP Exam Achievement.

Definition of Terms

Band Student- a student who studies a woodwind, brass, or percussion instrument at school, in a concert band setting. This is determined by the student answering “yes” to the demographic question on the NAEP exam “Plays in a band at school.”

Choral Student- a student who studies performance on the human voice at school, in a choral setting. This is determined by the student answering “yes” to the demographic question on the NAEP exam “Sings in a chorus or choir at school.”

General Music Class- Music class in which the method of study is academic, rather than performance-based.

Performance Ensemble- a performing music group, such as a band, orchestra, or chorus.

Orchestra Student- a student who studies a string instrument at school, in an orchestral setting. This is determined by the student answering “yes” to the demographic question on the NAEP exam “Plays in an orchestra at school.”

Chapter 2: Review of Related Literature

NAEP, The National Assessment of Educational Progress, is responsible for publishing the Nation's Report Card. Keiper, Sandene, Persky, & Kuang (2009) explain the purpose of the exam: "The Nation's Report Card™ informs the public about the academic achievement of elementary and secondary students in the United States. Report cards communicate the findings of the National Assessment of Educational Progress (NAEP), a continuing and nationally representative measure of achievement in various subjects over time. NAEP is a congressionally authorized project of the National Center for Education Statistics (NCES) within the Institute of Education Sciences of the U.S. Department of Education. The Commissioner of Education Statistics is responsible for carrying out the NAEP project. The National Assessment Governing Board oversees and sets policy for NAEP." The exam is given to a representative sample of students, representing public and private schools, in urban, suburban, and rural areas. Students from various levels of socio economic status are tested, as are all areas of the country. NAEP administers the only music exam that is given to students in this size and scope. Whereas state music tests are limited in that they only test the population of a particular state, NAEP represents a sample of students more representative of the U.S. population.

Holmes (1997) found a statistically significant relationship between instrumental music study and written musical achievement. The purpose of this study was multi-faceted. The author studied participation in instrumental music lessons in relation to both academic achievement and musical achievement. The relationship between music education and academic achievement is not part of this current study and is therefore omitted from this review of the literature. The sample included 389 fifth graders. Music

achievement was measured by scores on Colwell's Music Achievement Test, Level 1. An ANOVA determined that students in this study who participated in instrumental music achieved higher scores on the test. However, the difference between scores of those who study instrumental music and choral music was not part of this study.

Kehrberg (1984) studied the relationships between several in-school and outside-of-school factors and music achievement. The purpose of the study was to determine which factors had an effect on achievement in music. This study included 169 fourth to twelfth-grade students. Through a regression analysis, the author found a significant relationship between instrumental music training and musical achievement. This appears to support a relationship between instrumental music study and music achievement. However, choral music study was not considered.

Kinney (2008) studies the connection between band participation and academic achievement. The study included 215 8th grade students. Through statistical analysis, the author found that students who participated in the 8th-grade band scored significantly higher than the students in the chorus on the Terra Nova achievement test. This study did not consider achievement on a music exam, however.

Johnson and Memmott (2006) also speak about the differences in academic achievement between choral and instrumental students. Although this study did not consider the achievement on a standardized music test, the author found a significant correlation, under certain circumstances between instrumental or choral participation and achievement. The author also considered the quality of the music program as a variable. In his study of 3,620 middle school students, he found that students in both exemplary instrumental and choral programs scored similarly higher on academic achievement tests

than their non-participating peers. However, he found that students in deficient instrumental programs scored significantly higher than students in deficient choral programs.

Schneider (2005) discusses the fact that the scope of the NAEP music exam is limited in that it does not assess creating or performing. This suggests that the scores on the exam may not tell us everything that is relevant to achievement in music classes. Since a large portion of the time in performing music classes is spent on performance techniques, this gap between the scores of instrumental students and choral students may not be an accurate measure.

Schmidt (2005) studies the relationships between motivation, performance achievement, and music experience, as they relate to achievement. This study found a correlation between musical self-concept as a motivation orientation and successful performance on an instrument. The author also found practice time to be strongly correlated with intrinsic motivation. In this study, gender was found to be non-significant. This may indicate that while gender has an effect on written music exam scores, it may not directly relate to the actual music performance.

Frey-Clark (2015) investigates the relationship between academic achievement and achievement in music performance. This study found a link between the scores of school ensembles on a state music performance assessment and school-wide academic achievement. The researcher found that school ensembles that scored higher on this performance exam also had higher average academic test results. This study, although it did not consider achievement on music exams as a result of music performance, indicates

a link between quality of ensemble experience and written test achievement, similar to Johnson and Memmott (2006).

Hedden (1982) studied the relationships between attitude toward music, self-concept, music background, academic achievement, and gender. The subject participants were 5th and 6th graders. This study found that academic achievement and self-concept have a positive effect on music performance achievement, while the other factors were found to be insignificant. The author suggests that teachers can improve the achievement of their students by supporting their self-concept.

Shuler (2009) discusses the fact that NAEP does not measure performing or creating in the Music Exam, and is therefore not a valid measure of student learning. Making the point that an exam that does not assess creating or performing is not a valid measure of student achievement in music ignores the fact that written music achievement is a valid component of music assessment. A better conclusion would therefore be that the lack of assessment of creating and performing makes the Music NAEP Exam an incomplete measure of student music achievement.

Tobin (2005) studied the achievements of high school all-state ensemble participants, and determined that these students are high achievers in music and academics, among other areas. All-state ensemble members have demonstrated high work ethic and commitment, through consistent practice over the course of their musical career. Participation in all-state ensembles requires an audition in a solo competition. This study found that these students excel in music, as evidenced by self-reported achievements and awards. This study did not consider student achievement on academic

music exams, but points to a link between voluntary participation in extra-curricular music activities and music performance achievement.

Chapter 3: Methods and Procedures

Introduction

This study compares the scores achieved on the NAEP exam against several student characteristics, as described in this chapter. Six factors: Music Confidence, High Literacy Resources, Music Class Activities, Performance, Music Interests, and Emphasis on Test Achievement were assessed from factor analyses. A regression analysis was performed on these six factors, as well as the following individual items: Ask you to make up your own music, Play in a band, Play in an orchestra, In school: Sing in a chorus or choir, In school: take private singing lessons, and In school: take private lessons on an instrument.

Sample

The 4,028 participants are all 8th grade students, 50.5% male and 49.5% female, 52.7% White, 18.1% Black, 22.6% Hispanic, 4.5% Asian, 1.2% American Indian/Alaskan Native, and 9% Other. 39.8% are eligible for free or reduced-price lunch. 87.4% are enrolled in public schools. The average scale score is 150 out of a possible 300 points.

Table 3.1

Means, Standardized Deviation, and Standardized Errors

		Group Statistics			
	Gender	N	Mean	Std. Deviation	Std. Error Mean
NAEP					
plausible music					
value #1	Male	1981	142.2396	35.02865	0.78701
	Female	1971	152.4191	33.97436	0.76526

Note. The table shows that girls have higher achievement scores as well as lower variance. Gender has a significant effect on music NAEP exam achievement.

Table 3.2

Parent's Education

		Parental education level (from 2 questions)			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Multiple	3	0.1	0.1	0.1
1	Did not finish H.S.	293	7.3	7.4	7.5
2	Graduated H.S.	611	15.2	15.5	22.9
3	Some ed after H.S.	674	16.7	17.1	40
4	Graduated college	1927	47.8	48.7	88.7
	I Don't Know	418	10.4	10.6	99.3
	Omitted	27	0.7	0.7	100
	Total	3953	98.1	100	
Missing	System	75	1.9		
Total		4028	100		

Note. The table above describes the parental education level of the students who took the exam.

Research Design and Data Analysis

This study is a correlational analysis of the Independent Variables affecting NAEP Plausible Music Values. Factor Analyses uncovered six factors; Music Confidence, High Literacy Resources, Music Class Activities, Performance, Music Interests, and Emphasis on Test Achievement. Correlational analyses were performed between each of the six factors against the NAEP Plausible Music Values. In addition, correlational analyses were performed between several individual items, listed below, and the NAEP Plausible Music Values.

Factor Analyses

Factors were selected based on the following criteria: the Eigenvalue must exceed 1, the minimum factor loading is .3000, components must load on only one factor, and the items must fit the underlying theory. Standardized factor scores are calculated for the 6 factors.

The first factor analysis uncovered two factors:

1. Music Confidence
2. High Literacy Resources

Factor 1: Music Confidence included questions on the NAEP exam that indicate how much significance importance student gives to music. It includes the self-concept questions such as: I think I have a talent for music, people tell me I am a good musician, I would like to be a musician when I grow up. It also involves activities that are normally done by students who are confident about their music abilities with questions such as: I like to play music for other people, I like to play music alone or with others, and I like to listen to music (see Table 3.4). Factor 2: High Literacy Resources is comprised of student responses to whether they have newspapers, magazines, and an encyclopedia at home.

Table 3.3

Component Analysis: Factor 1 (Music Confidence), Factor 2 (High Literacy Resources)

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings a
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	4.197	46.637	46.637	4.197	46.637	46.637	4.165
2	1.255	13.945	60.582	1.255	13.945	60.582	1.57
3	0.868	9.649	70.231				
4	0.78	8.666	78.898				
5	0.514	5.712	84.609				
6	0.412	4.574	89.183				
7	0.38	4.218	93.402				
8	0.355	3.946	97.348				
9	0.239	2.652	100				

Note. Extraction Method: Principal Component Analysis

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

Table 3.3 shows that Factor 1, Music Confidence fits the established selection criteria.

This factor has a large initial Eigenvalue of 4.197, indicating that the items included have a high degree of similar results. Factor 2, High Literacy Resources also meets the selection criteria, with an initial Eigenvalue of 1.255.

Table 3.4

Component Analysis: Factor 1 (Music Confidence), Factor 2 (High Literacy Resources)

Pattern Matrix a		
	Component	
	1	2
I think I have a talent for music	0.878	
People tell me I am a good musician	0.846	
I would like to be a musician when I grow up	0.839	

I like to play music for other people	0.823	
I like to play music alone or with others	0.813	
I like to listen to music	0.746	
Newspaper in home		0.724
Magazines in home		0.697
Encyclopedia in home		0.579

Note. Extraction method: Principal Component Analysis

Rotation Method: Promax with Kaiser Normalization

a. Rotation converged in 3 iterations

Music Confidence has a significant effect on the test results. All of the items included in this factor seem to indicate that a student has confidence in his or her abilities, and also spends a significant amount of time playing and listening to music. All of these items likely reinforce each other. Students with high confidence likely have this level of confidence reinforced by people telling them that they are good musicians, so they, therefore, like to play music for others. This, in turn, reinforces the result of practicing or playing music alone, which, in turn, increases music performance achievement. Students who feel good about their achievement in a certain subject area will often consider pursuing it as a career, which indicates that these items would logically integrate into a factor, which is demonstrated by the high factor loadings of .746 and higher.

Students with low music confidence would experience the opposite effect. Not receiving positive feedback from people telling them they are good musicians during their performances will cause their confidence to fall, their motivation to practice to lessen. They will feel that music as a career is not an option for them, and the desirability

to perform for others will suffer. This lack of practice and less time spent on practicing music are clear reasons for lower achievement in the exam.

Factor 2: High Literacy Resources has a significant effect on test results. This would seem to indicate that students from homes where literacy is highly valued and reinforced perform better on the exam. This may point to the fact that expectations of achievement are high in these homes, both in literacy and music. Similar to reading, time spent playing music increases proficiency. Having these materials in the home suggests that they are used regularly. It may be assumed that parents in these homes spend a significant time encouraging their children to read and practice music, which would have a positive effect on music exam results. Alternatively, this factor may be an indication of socio-economic status. Those homes with High Literacy Resources may also have resources to spend on a high-quality musical instrument or private music instructions at home. It may also indicate the type of dwelling. Homes that have space for these resources, particularly an encyclopedia, may have more space for instruments and practice. Often, students from smaller homes, particularly apartments, have more difficulty finding effective space to practice music. This can be due to sharing space with other family members for whom listening to someone practice may be disruptive, or to a desire to not disturb neighbors with adjoining walls.

The second factor analysis uncovered two factors:

3. Music Class Activities
4. Performance

Factor 3: Music Class Activities includes student responses to questions involving which activities are done in music classes: teachers plays music to listen to, write down

music, work on group assignment, sing, and play instruments. Factor 4: Performance includes student responses to the questions of whether they participate as a member of an orchestra, a chorus, or a band (Table 3.6).

Table 3.5

Component Analysis: Factor 3 (Music Class Activities), Factor 4 (Performance)

Initial Eigenvalues							
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative%	Total
1	4.028	50.344	50.344	4.028	50.344	50.344	3.685
2	1.82	22.756	73.1	1.82	22.756	73.1	2.854
3	0.705	8.814	81.915				
4	0.446	5.572	87.487				
5	0.321	4.016	91.503				
6	0.275	3.44	94.943				
7	0.251	3.142	98.085				
8	0.153	1.915	100				

Note. Extraction Method: Principal Component Analysis

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

Table 3.5 shows that Factor 3: Music Class Activities fits the established selection criteria. This factor has a large initial Eigenvalue of 4.028, indicating that the items included have a high degree of similar results. Factor 4: Performance also meets the selection criteria, with an initial Eigenvalue of 1.82.

Table 3.6

Component Analysis: Factor 3 (Music Class Activities), Factor 4 (Performance)

Pattern Matrix a	Component	
	1	2
Music class: teacher plays music to listen to	0.887	
Music class: write down music	0.871	
Music class: work on group assignment	0.804	
Music class: sing	0.787	
Music class: play instruments	0.756	
Play in an orchestra		0.956
In school: sing in a chorus or choir		0.899
Play in a band		0.850

Note. Extraction method: Principal Component Analysis

Rotation Method: Promax with Kaiser Normalization

a. Rotation converged in 3 iterations

Factor 3: Music Class Activities has a significant effect on test results. All of these activities are indicative of high-quality general music education. Students whose teachers regularly play music for the class to listen to, have students write down music, work on group assignments, and play instruments study music in an authentic and hands-on way. Experiencing music through these methods would increase student engagement and achievement. Conversely, students who take music classes in which these activities do not take place are likely to study music in an abstract and disconnected way. They may be studying music history without application or studying through a purely academic lens. These students are not given authentic music experiences. The above-mentioned

activities would normally take place in the classroom of a highly trained music teacher, and are interconnected by nature, which would explain the high factor loadings of .756 and higher.

Factor 4: Performance required the response of whether students participate in a performance ensemble, such as band, orchestra, or chorus. Students who participate in these ensembles regularly study music through creating it. This method of study allows students to not only experience music as an audience but as performers, allowing the application of the concepts they have learned. This also gives students the opportunity to perform publicly, which could arguably increase Music Confidence. It is also possible that students who do not perform as a member of an ensemble have a lack of interest in the study of music. In many school music programs where taking a music class is mandatory, the students who are more interested in music take a performance-based class, whereas students who lack interest take a general music class. The high factor loadings of .850 and higher would seem to indicate that the type of performance ensemble is not as important as the fact that a student is a member of an ensemble.

The third factor analysis uncovered two factors:

5. Music Interests
6. Emphasis on Test Achievement

Factor 5: Music Interests includes activities students engage in their own time at home, including entering music competitions, attending summer music programs,

watching videos about music, reading books about music, and talking to friends about music (Table 3.8).

Factor 6: Emphasis on Test Achievement, includes the self-reported responses of how hard the students tried in the test, how important it was to do well in the test, and how hard the test was compared to other tests (Table 3.6).

Table 3.7

Component Analysis: Factor 5 (Music Interests), Factor 6 (Emphasis on Test Achievement)

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.66	58.255	58.255	4.66	58.255	58.255
2	1.547	19.336	77.592	1.547	19.336	77.592
3	0.551	6.894	84.485			
4	0.358	4.476	88.962			
5	0.291	3.635	92.597			
6	0.238	2.978	95.575			
7	0.22	2.753	98.328			
8	0.134	1.672	100			

Table 3.7 shows that Factor 5: Music Interests fits the established selection criteria. This factor has a large initial Eigenvalue of 4.66, indicating that the items included have a high degree of similar results. Factor 6: Emphasis on Test Achievement also meets the selection criteria with an initial Eigenvalue of 1.547.

Table 3.8

Component Analysis: Factor 5 (Music Interests), Factor 6 (Emphasis on Test Achievement)

Pattern Matrix		
	Component 1	2
Not for school: enter a music competition	0.903	
Not for school: go to a summer music program	0.901	
Not for school: watch a video/tv prog about music	0.887	
Not for school: read a book about music	0.885	
Not for school: talk to family/friends about music	0.885	
How hard did you try in the test compared to other tests		0.932
How important was it to you to do well in this test		0.879
How hard was this test compared to other tests		0.744

Factor 5: Music Interests includes items that a student would engage in outside of school, on his or her own time. These items are all undertakings of a serious music student who spends more time studying music. This would seem to indicate that these activities help to hone a more well-rounded musician who seeks additional opportunities to study music. The increased achievement as a result of these interests can indicate that the student engages in more practice of music, as well as dedicates more mental resources to music. The high factor loadings of .885 and higher may indicate that students who have any of these outside interests often share the rest as well. Students with a low level of Music Interests spend most of their music study time at school exclusively, with limited time spent outside of school. The fact that these students spend less time on music has the predictable result of lower achievement on the exam.

Factor 6: Emphasis on Test Achievement describes a serious music student. The factor loadings of .744 and higher indicate that students answered these three questions similarly. A student who scored high on this factor tried hard on this test, and it was important for them to do well on this test. This indicates the importance of this test to the student. This may be related to Music Confidence, in that this student's self-concept is dependent on being a good music student. He or she also may have found this test less difficult than others, indicating a high level of music achievement in general, and confidence in one's own ability.

Conversely, a student who scored on the low end of this factor likely does not find music education to be important, finds the material difficult, and did not spend much effort on the test. This indicates that this is not a serious music student, and it is natural that he or she did not achieve a high score.

Chapter 4: Results

Introduction

Statistical analyses were performed on each of the six factors, as well as the individual independent variables listed below. Several of the factors were found to be statistically significant, indicating the effects of various student and music program characteristics on music exam achievement.

Multiple Regression Analyses

Regression analyses were performed with the AM Statistical Software (American Institutes for Research) between the above factors and the NAEP Plausible music values. Regression analyses were also conducted for the following individual variables: ask you to make up your own music, play in a band, play in an orchestra, in school: sing in a chorus or choir, in school: take private singing lessons, and in school: take private lessons on an instrument.

Dependent Variable

NAEP Plausible Music Values

Independent Variables

The factors are as follows:

Music Confidence.

High Literacy Resources.

Music Class Activities.

Performance.

Music Interests.

Emphasis on Test Achievement.

The individual items are as follows:

Ask you to make up your own music.

Play in a band.

Play in an orchestra.

In school: Sing in a chorus or choir

In school: take private singing lessons.

In school: take private lessons on an instrument.

Research Questions

Q1. Which music class activities have a significant effect on Music NAEP Exam achievement?

Q2. Which individual student characteristics, home characteristics, and study habits have a significant effect on Music NAEP Exam achievement?

Q3. How does the method of music study (Performance or General) affect Music NAEP Exam achievement?

Q4. Does taking private music lessons at school have a significant effect on Music NAEP Exam achievement?

Table 4.1
Multiple Regression

Plausible Value Regression

Selection: All

Observations: 3952

Strata variable: Jackknife variance stratum

Cluster Variable: Jackknife variance unit

Weight Variable: Student weight (unadjusted)

Adjusted Wald Test

$F(12, 55) = 32.5943$

$p(F > f) = 0$

Dependent variable: NAEP plausible music value #1

R-Square = 0.214

Parameter name	Estimate	Standard Error	z-Score	p > z
Constant	-528.907	128.936	-4.102	0.000
Music Confidence	-7.788	1.137	-6.848	0.000
High Literacy Resources	-6.618	0.686	-9.642	0.000
Music Class Activities	-9.68	1.124	-8.613	0.000
Performance	-261.938	50.744	-5.162	0.000
Music Interests	3.042	1.581	1.924	0.054
Emphasis on Test Achievement	-0.689	0.857	-0.804	0.422
Ask you to compose your own music	4.204	1.197	3.512	0.000
Play in a band	101.922	20.863	4.885	0.000
Play in an orchestra	115.863	22.901	5.059	0.000
In school: sing in a chorus or choir	105.992	20.727	5.114	0.000
In school: take private singing lessons	11.364	2.554	4.45	0.000
In school: take private lessons on an instrument	-5.176	1.451	-3.568	0.000
Root Mean Square Error	31.033			

Findings

Q1. Which music class activities have a significant effect on Music NAEP Exam achievement?

Regression analyses determined that Factor 3: Music Class Activities has a significant effect on Music NAEP Exam achievement (Table 4.4). The individual item, ask you to make up your own music, also has a significant effect (Table 4.8). The null hypotheses are rejected.

Q2. Which individual student characteristics, home characteristics, and study habits have a significant effect on Music NAEP Exam achievement?

Regression analyses determined that Factor 1: Music Confidence (Table 4.2); Factor 2: High Literacy Resources (Table 4.3), and Factor 5: Music Interests (Table 4.6) have a significant effect on Music NAEP Exam achievement. The null hypotheses for these factors are rejected. Factor 6: Emphasis on Test Achievement (Table 4.7), was found to be insignificant. The null hypothesis for Factor 6 is accepted.

Q3. How does the method of music study (Performance or General) affect Music NAEP Exam achievement?

Regression analyses determined that participation in Band, Orchestra, or Chorus (Factor 5: Performance) has a significant effect on Music NAEP Exam achievement (Table 4.6). In addition to this factor, it was also determined that participation in any of these ensembles has a significant effect on its own (Table 4.8). The null hypotheses are rejected.

Q4. Does taking private music lessons at school have a significant effect on Music NAEP Exam achievement?

Regression analyses determined that taking private singing or instrumental lessons at school has a significant effect on Music NAEP Exam achievement (Table 4.8). The null hypothesis is rejected.

Table 4.2

Factor 1: Music Confidence: Significant

Components

I think I have a talent for music

People tell me I am a good musician

I would like to be a musician when I grow up

I like to play music for other people

I like to play music alone or with others

I like to listen to music

Table 4.3

Factor 2: High Literacy Resources: Significant

Components

Newspaper in home

Magazines in home

Encyclopedia in home

Table 4.4*Factor 3: Music Class Activities: Significant*

Components
Music class: teacher plays music to listen to
Music class: write down music
Music class: work on group assignment
Music class: sing
Music class: play instruments

Table 4.5*Factor 4: Performance: Significant*

Components
Play in an orchestra
In school: sing in a chorus or choir
Play in a band

Table 4.6*Factor 5: Music Interests: Significant*

Components
Not for school: enter a music competition

Not for school: go to a summer music program

Not for school: watch a video/tv prog about music

Not for school: read a book about music

Not for school: talk to family/friends about music

Table 4.7

Factor 6: Emphasis on the Test: Not Significant

Components

How hard did you try in the test compared to other tests

How important was it to you to do well in this test

How hard was this test compared to other tests

Table 4.8

Individual Items: Significant

Ask you to compose your own music

Play in a band

Play in an orchestra

In school: sing in a chorus or choir

In school: take private singing lessons

In school: take private lessons on an instrument

Chapter 5: Discussion

Implications of Findings

This study determined many factors that significantly affect music achievement. These findings support the importance of school course offerings and specific teaching methods.

While all the items in the Music Confidence factor are not aspects a teacher or school can necessarily control, they can be affected by teacher–student interactions. Student responses to “I think I have a talent for music” and “People tell me I am a good musician” are directly related to the student’s confidence. Teachers are able to influence this self-concept in many ways such as complimenting the student’s performance, encouraging family members to support the student’s performance, and encouraging students to value and compliment the skills of their peers. This positive environment has shown to have an effect on achievement. The effect that this factor has on music achievement should encourage music teachers to continue and expand their support of students in this area. Undoubtedly, this would not come as a surprise to those music teachers who have experienced that success tends to breed success in music programs. As students become more skilled in performance and their confidence increases, they tend to work harder in order to continue to receive this positive reinforcement.

Music teachers can also encourage students to consider music as a career by showing positive examples of careers in music as those who answered “yes” to “I would like to be a musician when I grow up” are more likely to achieve a higher score on this

exam. As performing music alone or with others, and performing music for other people has a positive effect on music achievement, teachers should continue to encourage performing music in both solo and ensemble contexts. Music teachers have experience with the motivational power of concerts. Concerts that take place early in the careers of student musicians encourage increased practice, as well as has a positive effect on confidence. Once the music has been refined, the benefit of performing for peers, teachers, and parents is far-reaching in the experience of music teachers. Students are congratulated for their accomplishments, which instills a desire for further music study.

As listening to music has a positive effect on the test score, teachers can use this information to encourage listening to more music. Those students who regularly listen to music achieve higher levels of success in performance, through emulating those performances that they experience and appreciate. The technique and expression that they hear from the masters on their instruments influence their own technique and expression. People who have spent a lot of time refining their own performance and those who have succeeded as performers have a list of instrumentalists whose performances they have listened to and was influenced by. More than emulating the aspects of the performances of others that they appreciate, musicians add their own musicianship as well. Listening to music is certainly a predictor of success in music in this regard.

The factor, Music Program Activities, includes teaching methods that music teachers can opt to use in class. This study suggests that playing music for listening, having students write down music, working on group assignments, singing, and playing instruments have an effect on music achievement. This study suggests the importance of using these techniques in class to support music skill and knowledge acquisition. As

stated above, listening to music strengthens students' understanding of performing music. Young students wouldn't necessarily form this love of listening to music without the support of their teachers. Teachers should be encouraged, therefore, to continue to provide listening examples to their students in order to inspire the love for listening to music. Professionals in the field of music can point to early music listening experiences in music class as a child and provide specific examples of pieces played for them at an early age. It is not within the confines of this study to determine which specific pieces of music, when listened as a child, will inspire a lifelong love of music, so the responsibility of the music teacher is to expose children to a wide variety of music to listen to.

Having students write down music has an effect on music literacy as students are asked to notate music in written form. This would certainly improve achievement on a standardized music exam. As time in music class is often limited, this is an aspect of music education that may be tempting to neglect. However, one could make the assertion that writing down music is as influential on reading music as writing and reading are in a language class. Having an understanding of musical notations would increase the proficiency of music reading and performance.

It is logical to make the connection that singing and playing instruments in the general music class would have a similar effect. This is another example of experiencing music through different lenses. Playing instruments, singing, reading music, listening to music, and writing down music, are all aspects of music education that support each other. It is nearly impossible to tell the way in which working on one of these aspects of music will spark an understanding in the mind of a music student. Music educators have seen students who are adept at any one of these areas, and the ways in which they transfer

knowledge to others. This should continue to reinforce the importance of teaching music to all students through multiple modalities.

Since performance in a band, orchestra, or chorus, both as individual variables and as a combined factor, have a significant effect on the music test score. School districts should be encouraged to offer these classes. Taking each of these classes increases music achievement, with instrumental music having a more significant measurable effect. This study cannot explain why instrumental music has this greater effect. It is possible that instrumental music carries an increased stress on the technique required to perform a specific piece of music. While singing requires a musician to produce a certain pitch with vocal cords, instrumental technique is necessarily more specific, requiring certain fingers to be placed in certain positions on an instrument, connecting the embouchure and tongue with a wind instrument in a certain way, or the specific direction and velocity required to strike a percussion instrument with a mallet in order to create a certain sound. The other side of this coin, however, is the specific way of forming a vowel, or the correct placement of the tongue to form a specific consonant while singing, which is inherently difficult. It may be that we, as humans, spend a significant portion of our time communicating through language vocally, and therefore, singing, being a sort of an extension of speech, is something that we practice much more often than playing an instrument. This makes the study of the performance of music notation on an instrument to be seen more in isolation, while singing is pervasive. Further research may be warranted as to the reason for the higher effect that instrumental performance has on written music achievement.

It should be noted that performance in any ensemble vocal or instrumental, when analyzed together as a group, increases written music achievement. Performance in an ensemble requires skills that are not specifically measured on this exam, however, this study suggests that music skills and knowledge that are academic rather than performance-based are improved through ensemble performance. This may be due to the extra rigor that is typically required by performance in an ensemble. Students need to study the specific technique required to play their instrument, as well as the techniques required to perform as a member of an ensemble. It may also connect to the motivational power of performances as referenced above, which are not typically a part of academically based music classes. Therefore, this would suggest that if a school district values music achievement, they cannot rely on academic-based music classes alone. Including performance ensembles in course offerings will increase student music achievement.

For the factor, Music Interests, this study suggests that student achievement in music is affected by independent music activities outside of school. This suggests that music educators should encourage students to participate in self-directed music activities outside of school that are not mandated by or directly related to the course material. This can be related to motivation as well. Students who enjoy music at school are more likely to look for musical activities outside. Entering a solo music competition or attending a summer music program, as the more serious performers often do, is typically extra-curricular and not included in a student's music grade. This would suggest that a student who does this is intrinsically motivated to pursue music, whether their purpose is to elicit the comments and suggestions of another to improve their own performance or to enable

them to participate in other extra-curricular ensembles. Students who participate in these events are required to practice more. Thus, it stands to reason that their in-school music performance achievement will improve as well. The increased achievement is likely because of a combination of the extra motivation as well as the extra practice time. This suggests that a comprehensive approach to music study affects music achievement, by encouraging students to pursue musical opportunities outside of school.

Taking private lessons at school, whether they are vocal or instrumental lessons, also has a positive effect on music achievement. This would make sense to any music educator who has seen the power of private lessons. Performing music is a very personal activity that requires the development of very specific and difficult techniques. The study of performing music in a group setting, such as band, orchestra, or chorus, is effective for the development of these techniques, but the opportunity to impart one-on-one instructions gives the teacher an increased capacity to help students develop these specific skills. Ensemble rehearsals and every homogeneous lesson group in a school setting often focus on the correct performance of music for a concert, due to the often limited time available. The various deficiencies in the performance of specific students can only be addressed to a certain degree in a group setting in order to cater to the needs of all students in the class. When a teacher has the opportunity to work with one student on their own technique, they have the ability to spend as much time as needed on that student's specific needs. Individual demonstration on an instrument, as well as modeling and repetition, can be invaluable for the study of an instrument, as well as vocal production. Private instruction, however, requires a significant contribution of resources. In schools where families have the financial ability to support their children through

private instruction at home, the school music program benefits as a result. Unfortunately, programs in lower-income communities would typically have fewer students who study privately and therefore have fewer benefits. This suggests that for the sake of equality, schools should attempt to secure the funding necessary to provide private music instruction for those who are unable to do so at home.

Recommendations for Practice

As the data has found that several of these factors are significant, this study would suggest that schools and music teachers should consider these findings in the planning of pedagogical methods, curricula, and course offerings.

Music Confidence

Since the data indicates that students who play alone and with others affects achievement, teachers should encourage students to practice individually, play music for others, and listen to music. Most performing music teachers stress the importance of individual practice, but may not put enough emphasis on playing for others and listening to music. Teachers would be well-served to encourage their students to play for family members and friends whenever possible. Teachers should also provide listening lists for students. Many high-quality recordings of music performance are online and free. The volume of resources is exhaustive, so it would help students if their teachers can provide guidance as to which pieces or artists would be helpful to listen to. Teachers may consider specific lists, or recommend a certain ensemble, allowing students choice in their listening.

The data also shows that students believing that they are talented and hearing praise about good musicianship affects their achievement. The recommendation for this is simple; teachers should praise their students. It can be difficult, in the preparation of music performances, for teachers to remember to do this. It can be easy to focus on the negative; telling students what they need to “fix.” However, teachers should take time to praise improvement, and find those aspects of all students’ playing that are praiseworthy.

Finally in this factor, is the issue of careers in music. The data found that students who would like to be a musician when they grow up achieve higher scores on this exam. This points to a need for music teachers to emphasize the career possibilities that exist in the field of music. There is a wide variety of music careers, not just limited to performing music. Depending on student interests, they should be encouraged to look into music education, business, therapy, production, or manufacturing, to name a few.

Music Class Activities

The data found that having students play music to listen to, write down music, work on group assignments, sing, and play instruments are teaching techniques that have a significant effect on music achievement. These are activities that take place in many music classes, but since the data shows that these are effective, teachers should be explicitly encouraged to employ these in classes. Music is collaborative by nature, and all of these can be treated in a collaborative manner.

Performance

The fact that participating in band, orchestra, or chorus has a significant effect on music achievement should underscore the importance of making these courses available to all students. Performance classes are some of the first classes to get cut from offerings when budgets are an issue. However, this study shows that if a school plans to offer general music classes but not performance classes, music achievement in those students will decline. It is inconsistent of an administration to speak of the value of music in education without offering performance classes.

Music Interests

This study shows that the self-directed music activities of entering a music competition, attending a summer music program, watching a show or reading a book about music, and talking about music have a significant effect on music achievement.

It should be no surprise that entering a competition and attending summer music programs are effective tools for furthering one's own music education. This should indicate that music educators should support these activities in their students. These activities, however, can have an expense to the students' families, and therefore indicates a problem with equity. Entering a music competition is typically the lesser of these two as far as expense. The cost of attending a solo music competition is usually nominal. If we estimate that it usually costs less than thirty dollars, it may not represent a significant investment for most families, but it will for some. Schools can deal with this in a couple of ways. Some schools require that their students' families pay the fee. In this case, students who cannot afford it must turn to parent or community organizations to fund it. This is prohibitive to the student, can be embarrassing for the family, and will likely

discourage participation. Some schools pay the fee for any student who receives free or reduced-price lunch. This eliminates the work of the student trying to raise funds through parent or community groups, but does not save the family embarrassment, making it the best of those first two options. The best option, however, is for the school to fund participation for everyone who wants to attend. If we value achievement in music education, and studies show that this activity is beneficial to a student's music education, then it should fall upon the school to fund it.

Summer music programs, although usually significantly more expensive than attending solo competitions, have similar recommendations. If students whose families cannot afford sending their child to a private summer music program, the school cannot be responsible for funding this; the cost is prohibitive. They are left to try to find scholarship opportunities. However, schools have the ability to offer low-cost summer music programs of their own. Schools that already have the facilities, instruments, and staff, can extend instruction into the summer, usually for only the added cost of staffing. Depending on the amount of contact time, this staffing need not be prohibitively expensive. A six-week program where students see a teacher once or twice a week for small group lessons and/or an ensemble would give students significantly more time playing music, without a large investment on the part of the school. Additionally, if the school is running their own program, they have the ability to charge a fee to defray the cost, and offer the program for free to those who need the assistance. Ideally, the program would be provided free for everyone, but this may not be realistically possible. The essential point is that since summer music programs improve music achievement, schools have a duty to find ways to encourage student participation.

Teachers can have an effect on their students when it comes to reading about music, watching shows about music, and talking to friends about music through modeling. Teachers who talk to students about their own self-directed music activities have an effect on their students. Music teachers should be encouraged to speak about their own individual experiences with music outside of the school day, in order to encourage their students to do the same.

Relationship to Prior Research

The findings of this study support the findings of Holmes (1997) that instrumental music study supports musical achievement. This study also supports the research of Kehrberg, (1984) who found that out-of-school factors have an effect on music achievement.

Kinney (2008) found that participation in bands positively affected academic test scores but did not apply the study to written music exam achievement. However, since the Music NAEP Exam is an academically-oriented music test, this seems to establish that participation in bands could affect student outcomes on this exam.

Johnson and Memmott (2006) also found that participation in instrumental music affected academic test scores. Johnson and Memmott's study also made a comparison between high-quality programs and deficient programs not explicitly included in this current study. However, one may conclude that the factor, Music Class Activities, is indicative of the quality of the music program. Therefore, this study would support the findings in Johnson and Memmott's study.

Schmidt (2005) determined that musical self-concept has a significant effect on performance achievement. This is most closely related to the Music Confidence factor in this study. This suggests a strong connection between a student's musical confidence and achievement in music, both in written form and as evidenced by successful performance on an instrument.

Hedden (1982) also found that musical self-concept has a positive effect on music achievement. This study was also concerned with performance achievement but suggests a strong correlation with the Music Confidence factor.

Schneider (2005) and Shuler (2009) speak directly to the limitations of this study. Creating and performing are important aspects of music education that the NAEP Exam does not study. Nevertheless, the skills that are taught in performance classes have a significant effect on written music achievement.

Frey-Clark (2015) found that achievement in music performance and academic achievement are linked. Although achievement on music exams was not studied, the Music NAEP Exam is in many ways an academic exam, as far as the format. One could argue that the skill of test-taking holds true between an academic standardized exam and a music standardized exam. The author found that quality of ensemble experience has a significant effect on test results, which is consistent with the effect that ensemble performance has on the Music NAEP Exam.

Tobin (2005) found a link between high achievement in performing music and academic achievement. Also notably, the participants in this study had also participated in solo competitions, one of the components of the Music Interests Factor. The fact that

these high performing music students have participated in self-directed music activities speaks to the fact that participating in music activities outside of school has an effect on achievement.

Limitations of the Study

As mentioned by Schneider (1997) and Shuler (2009), the Music NAEP Exam does not assess creating or performing. Therefore, as the current study indicates that music achievement is affected positively by studying music performance, the scope only includes written music achievement. Written music test scores are only one small facet of the study of music achievement. It is quite possible that there are great performing musicians who would not score well on a written music exam, such as a performer of traditional music who plays by ear. It is also possible that there are many great music theorists who are not necessarily proficient at performing on an instrument.

Recommendations for Future Research

Since the music NAEP exam does not study creating music, future research may be warranted in the study of instrumental music study on the field of music composition. It may also be helpful to study the reasons for the study of instrumental music to have a more significant effect than the study of vocal music on written music achievement.

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Vita

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Baccalaureate Degree	<i>Bachelor of Science in Education with Specialization in Music, Hofstra University, Hempstead, NY</i>
Date Graduated	<i>May, 2002</i>
Master's Degree	<i>Master of Arts in Secondary Education with Specialization in Wind Conducting, Hofstra University, Hempstead, NY</i>
Date Graduated	<i>May, 2006</i>
Specialist Diploma	<i>Specialist Diploma in Educational Administration, School Building Leader, Queens College, Flushing, NY</i>

Date Graduated

August, 2012

Specialist Diploma

*Specialist Diploma in Educational
Administration, School District Leader,
Queens College, Flushing, NY*

Date Graduated

December, 2012