MUSIC INSTRUCTION AND THE READING ACHIEVEMENT OF MIDDLE SCHOOL STUDENTS

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Music Instruction and the Reading Achievement of Middle School Students

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Abstract

Juanita Huber. MUSIC INSTRUCTION AND THE READING ACHIEVEMENT OF MIDDLE SCHOOL STUDENTS. (Under the direction of Dr. Leonard W. Parker) School of Education, December, 2009. Comparative analysis examined responses on a descriptive questionnaire from 267 students in grades 6, 7, and 8. The study compared duration of and participation in music instruction, types of musical instruments learned, and experience in musical ensembles to scores from the state English language arts assessment. Analysis of results included descriptive statistics and the use of the Pearson r correlation coefficient. Overall findings yielded a significant positive relationship between the study of music and reading development in middle school students. A comparison of test scores to music instruction lasting longer than two years, performance on a brass or woodwind instrument, and active participation in band and chorus reflected similar results.

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CHAPTER ONE

Introduction

Significant shifts in student learning needs have contributed to a gradual reduction or elimination of arts programs in public education across the country (Holcomb, 2007; "Where is Art?," 2006; Winik, 2003). In an arena where the playing field has rarely been level, the visual and performing arts have continued to experience a decline in educational influence. Advocates of the arts argue there is far more at stake than the systematic removal of exploratory courses from the public school curriculum in American education. Organizations such as New Horizons for Learning (Dickinson, 1997), Learning Through the Arts (Boyes & Reid, 2005), and Arts Education Partnership (Catterall, 2002) function, largely, to justify the inherent value of arts in education. Advances in medical technology have made it possible for researchers to observe brain activity that occurs as a result of participating in the visual and performing arts. Of particular interest to this study are investigations related to brain activity during reading and making music (Flohr, Miller, & Debeus, 2000; *Reading Rockets*, 2006). Among the findings are those indicating that individuals actively engaged in music performance have significant differences in the size and shape of areas of the brain responsible for language processing (Hodges, 2000B; Kemmerer, 2003; Wilcox, 1999). Performing music also facilitates activity in regions of the brain that are frequently involved in other disciplines of learning and cognition (Gray Matters, 2003; National Coalition for Music Education, 1999; Weinberger, 2004). Researchers propose that individuals process music and language in similar ways due to an overlapping or sharing of neural pathways that travel throughout both hemispheres of the brain (SAGE Publications, 2009; Waterhouse, 2006).

According to Catterall (2002) and Rauscher (1999), reading is an activity that involves the processing of spatial information, a task that is also utilized when performing music. As an arts discipline, making music is characterized by several factors, one being the ability to develop individual creativity in expressing thoughts, ideas, and emotions. However, findings from educational and brain research suggest that music performance may positively affect areas of cognitive development that were, at one time, not seriously considered.

Background of the Study

Three frameworks for the context of this study form the basis for examining any association music performance may have with cognition. A historical perspective will discuss the importance of and changes in formal music training in American education over the past three centuries. This will be followed by a theoretical perspective, highlighting current theories of learning related to the proposed research. The final section will examine previous research conducted and its relationship to the current investigation.

Historical Perspective

The origins of music education in America can be traced back to the early 18th century when singing schools were established. During this time, music was cultivated primarily for religious purposes and was generally limited to congregational singing within the church setting (Palos-Tuley, 2003). The singing schools were designed to improve the quality of singing in worship services, emphasizing the rudiments of reading music and sight singing. Local church choir directors served as instructors. Lowell Mason introduced similar courses of instruction in the Boston public schools in 1838 (Broudy,

1990; Palos-Tuley, 2003; Reimer, 1999A). Six years later, Horace Mann established vocal music classes in all public schools (Bowles, 2003).

While vocal music education served as an instructional measure within church and public school settings, instrumental music instruction was frowned upon by public opinion of the day. Prior to the mid-1800s, the church perceived such music as functioning for the purpose of entertainment and was, therefore, evil (Bowles, 2003; Palos-Tuley, 2003). It was not until after the Civil War that private music teaching, both vocal and instrumental, generated an increase in numbers of choral ensembles, bands, and symphony orchestras across the nation. Conservatories of music were established where the primary goal of music instruction was to teach individuals how to read music. The gradual move from teaching students the fundamentals of singing to instruction in how to read music for performance purposes characterized music education curricula in the public schools by the 20th century (Palos-Tuley, 2003). Performance became the authentic assessment tool for evaluating the recognition and comprehension of musical symbols and notation. However, music education never fully achieved equality as a necessary course of instruction either in the 19th or 20th century. According to Broudy (1990), the reason was related to public perception. Music and the arts focused on individual development while success in academic subjects was required for acceptance into college. The arts were deemed desirable, but not necessary.

John Dewey, the pioneer of progressive education during the first half of the 20th century, stated that the goals of education could be obtained by developing the intellect, moral sense, social awareness, and aesthetic sense (Berube, 1999). Balancing an educational curriculum with core academics and exploratory courses of study meets the

requirements that Dewey envisioned. The development of such an inclusive education for students targets a variety of learning styles and maximizes student achievement (Aprill, 2001).

Historical world events in the latter half of the 20th century precipitated a shift in American education from the ideas of Dewey. The launching of Sputnik in 1957 followed by the onset of the Cold War prompted increased emphasis on core academics in the classroom. Federal and state funding were poured into the instruction of the sciences, mathematics, and literacy skills, in efforts to remain a top contender in education and assuage concerns that nations such as the Soviet Union (Russia) had surpassed the United States in scientific knowledge. Arts educators witnessed this new focus that resulted in a gradual expendability of the visual and performing arts within the education system, accompanied by a reduction in federally funded arts education research (Berube, 1999; Palos-Tuley, 2003).

Government funding was only one of several resources used to increase public awareness concerning education standards in American schools. In 1983, The National Commission on Excellence in Education published *A Nation at Risk* which described the United States as trailing badly behind other countries in mathematics and science (Ponter, 1999). Recommendations in the report called for educational reforms that did not include a viable place for the arts in the core curriculum (Berube, 1999). In 1994, the National Committee for Standards in the Arts established disciplines in the arts that were later included as part of *Goals 2000: Educate America Act* (Kemmerer, 2003). The arts were eventually designated as core subjects in education with the inception of the No Child Left Behind (NCLB) federal legislation of 2002 (Holcomb, 2007).

Even though the current law includes arts as a core academic subject, the underlying push on the part of NCLB to focus on improved test scores in other disciplines, according to Holcomb (2007), has had a negative effect on arts education. Numerous schools across the nation have struggled to find ways to enhance academic achievement while striving to maintain enrichment areas that address and develop the aesthetic and creative abilities in students (Cardarelli, 2003). School districts operating under financial stress and working to meet the required standards, as established by NCLB, are frequently left with little choice but to eliminate unnecessary subjects, even when deemed desirable (Babo, 2001; Johnson, 2000). According to the Center for Education Policy, 22% of school districts across the nation have reduced the number and variety of arts courses since the inception of NCLB ("Where is Art?," 2006).

American K-12 public education has gone from being number one in the world to number 19 over the past 30 years (Bartiromo, 2007). In 1988, the International Association for the Evaluation of Educational Achievement (IAEEA) ranked the United States 14th out of 17 countries who participated in an instrument assessing science achievement of eighth and ninth grade students. According to Ponter (1999), the top performing students on the test came from countries where the inclusion of music performance is a required discipline at elementary and secondary levels of education: Hungary, Japan, and the Netherlands (Arthington, 2001; Babo, 2001; Bracey, 2003; Dickinson, 1997; Jensen, 2000). Hungary requires formal training in vocal and instrumental music twice weekly for the first eight years of school. Japanese students study music twice weekly in grades one through six. In the middle grades, courses in music history, music theory, and music appreciation of Western and Japanese cultures are

added. Music and art have been mandatory subjects in the Netherlands since 1968. Compulsory examinations in the arts were implemented in 1976 to assist in determining student qualification for university study (Kelstrom, 1998; Ponter, 1999).

These observations are similar to findings from recent longitudinal studies conducted with American students in grades 8 through 12. The National Center for Educational Statistics tracked 18,000 students over a three-year period of eighth through tenth grade. Results showed that students who were actively engaged in music received academic grades that were 6 to 10% higher than students not involved in music activities (Babo, 2001). A 2005 College Board study found that students taking four years of arts coursework outperformed peers who took one-half year or less of arts courses by 58 and 38 points, respectively, on the verbal and mathematical sections of the Scholastic Aptitude Test (Holcomb, 2007). Catterall, Chapleau, and Iwanaga (1999) conducted a panel study of more than 25,000 students in grades 8 through 12, over a 10-year period (National Educational Longitudinal Survey). Academic gains for students who were involved in band, orchestra, chorus, dance, theater, and/or visual arts were more significant over time than for students who had little or no arts participation. Findings also revealed significant correlations between sustained involvement in music and success in math and reading. While these results suggest positive outcomes for students participating in the arts, other variables contribute to the solution of higher academic achievement as well. Personal attitudes of an individual such as interest, perseverance, self-discipline, genetics, and/or environmental settings are influencing factors that need to be considered when analyzing the academic success of a student.

Theoretical Perspective

While music, as an arts discipline, has been frequently cited for elimination in education, considerable literature addresses its possible influences on academic achievement. Howard Gardner (1993) and Edwin Gordon (1977) developed theories of learning that have been the basis for and contributed to a growing body of educational research. Gardner included musical intelligence as one of seven areas of gifting while Gordon's framework focused exclusively on music achievement. Both perspectives suggest the existence of an association between the study of music and reading development.

Howard Gardner (1993) theorized that learning occurs by means of multiple intelligences that individuals possess in varying degrees and levels. Linguistic and musical intelligences are related by the combined utilization of sight and sound for processing and understanding information. More than any of the other intelligences, verbal-linguistic and musical depend on these two senses working in conjunction with one another for effective cognitive development.

Gordon (1977) based the music learning theory on the concept of musical aptitude. Defined as the measure of potential observed in an individual, musical aptitude is an indicator of future achievement in music. Gordon believed that similarities in learning processes establish a relationship between musical aptitude and academic achievement as well as the possibility of a transfer of learning between the two disciplines.

Empirical research has frequently cited the work of Gardner and/or Gordon as a foundational basis in conducting studies in education. Both theorists agreed that effective cognitive abilities and skills are necessary for learning and understanding to take place.

Music performance and reading development rely on abilities and skills that include efficient visual and auditory mechanisms for the purpose of manipulating symbol systems that facilitate successful acquisition and understanding of information. Included in this association is the decoding of the symbol systems for purposes of discriminating between what a particular symbol represents and the sound or sounds related to each.

Research Perspective

Educational research suggesting a relationship between music performance and reading is widespread and diverse. Some studies have found that participation in fine arts programs has a positive effect on academic achievement (Boyes & Reid, 2005; Catterall, et al., 1999; Kinney, 2005; Palos-Tuley, 2003; Respress & Lufti, 2006). Their findings are primarily based on the observation of higher standardized test scores with individuals participating in fine arts programs as opposed to students having little or no involvement. According to Horne (2002), while these results have merit, they assume a position that all the disciplines included have the same positive effects on all areas of academic achievement. Since fine arts encompasses a variety of visual and performing disciplines, it is difficult to determine what positive effects on reading achievement can be attributed to participation in musical activities.

Other research has examined integrated instructional programs for any noticeable effects one field of study may have on another. Findings from these investigations have yielded mixed results. Ingram and Seashore (2003) and Matthews (2001) found significant differences in reading that favored disadvantaged learners who participated in arts integrated programs. A study conducted by Eaton (2006) revealed significant positive effects on fourth grade students who participated in an integrated program of reading and

music. However, similar integrated programs conducted by Andrews (1997) and Lauder (1976) yielded little or no measureable effects of music on reading achievement. The inconsistent findings may have been due to sample sizes and/or duration of the studies. Only one of the investigations (Ingram & Seashore, 2003) tracked a substantial number of subjects for a time period longer than one year.

Results are also mixed in studies investigating the influence of general music classes on reading development (Bowles, 2003; Bygrave, 1995/1996; Fisher, 2001; Gromko, 2005; Gromko & Poorman, 1998; Kemmerer, 2003; Laczo, 1985). There is general agreement however, as to the enhancing potential that music class can have on specific underlying skills necessary for developing reading competence. These skills include phonemic awareness (Gromko, 2005), phonemic listening skills (Lamb & Gregory, 1993), vocabulary skills (Bygrave, 1995/1996), and language development (Fisher, 2001).

The work of Frances Rauscher (1999) is the result of actual investigations that evaluated the relationship between music instruction and academic achievement. Participants for her studies ranged in age from preschool to college-age students. Conclusions from research infer that the study of music can enhance spatial-temporal abilities and overall intellectual development in individuals.

Investigations that examined the relationship between reading development and music performance have yielded significant findings. The use of piano/keyboard instruction with young children to facilitate music performance has been investigated for effects on learning. Among the findings observed are increases in IQ (Schellenberg, 2004) and gains in spatial-temporal reasoning (Costa-Giomi, 1999; Grandin, Peterson, &

Shaw, 1998; Rauscher, 1999). Although the ability to read relies on effective spatial reasoning, so do other disciplines such as mathematics and science (Rauscher, 1999). It is difficult, therefore, to discern to what degree piano/keyboard instruction enhances reading development.

Research that has focused on participation in instrumental music programs and the association to academic achievement has yielded the most consistent findings that establish a positive link between music performance and reading development. Babo (2001) examined the relationship between instrumental music instruction and academic achievement in eighth grade students. Findings concluded that participation in an instrumental music program has its largest impact on mathematics, reading, and language arts development. In clarifying a relationship between music participation and academic performance with fourth, sixth, and ninth graders, Fitzpatrick (2006) observed higher scores on standardized reading tests with students actively involved in instrumental string programs. Neuharth (2000) examined the effects active band participation had on academic achievement in middle school grades. Results show significant differences in reading achievement that favored band students. A similar study conducted by Wallick (1998), who observed elementary students, found statistically different results in reading that favored those individuals actively engaged in a string program over students who were not.

Literature discussing results from recent brain research has also yielded specific links connecting cognitive skills to the arts, particularly the study of music. Technology has uncovered valuable information about brain activity that occurs during learning processes through such advances as computed axial tomography (CAT), magnetic

resonance imaging (MRI), and positron emission tomography (PET). Findings affirm that, while the left hemisphere of the brain is responsible for processing cognitive tasks like language, the right hemisphere is dominant for spatial relations, emotion, and music (Arthington, 2001; Hodges, 2000A). Since music performance includes a combination of cognitive and emotional responses, several researchers in the field strongly suggest that both hemispheres of the brain are engaged when an individual is actively involved in music instruction (Babo, 2001; Bowles, 2003; Fernandez, 2006; Flohr, et al., 2000; Gurian & Stevens, 2005; Jensen, 2000). Hence, the left hemisphere of the brain, which is dominant for language, is affected by music.

Statement of the Problem

Research examining the relationship between academic achievement and music performance found significant differences in reading development that favored students who were involved in the study of music. Further research is necessary to directly investigate the nature and intensity of a link between music instruction and a specific branch of learning. This study examined the relationship active participation in musical activities has with reading achievement.

Research Questions

1. Is there a relationship between the study of music and reading development in middle school students?
2. What is the nature of the relationship between the study of music and reading development in middle school students? The primary concern will be whether or not significant differences can be observed between the reading development of subjects having two years or less of music instruction and the

reading development of subjects having more than two years of experience in music performance.

3. What is the intensity of the relationship between the study of music and reading development in middle school students? Results from the current research will suggest to what extent the relationship changes over time.

Research Hypotheses

The following null hypotheses were proposed for examination in the current study:

1. There is no significant positive relationship between the study of music and reading achievement in middle school students that is directly proportional to the number of years an individual is actively engaged in musical activities.
2. There are no observable differences in reading development at the middle school level that favor students with more than two years of music instruction over students having two years or less.
3. The number of years a sixth grade student participates in music instruction has no significant positive relationship with reading development.
4. The number of years a seventh grade student participates in music instruction has no significant positive relationship with reading development.
5. The number of years an eighth grade student participates in music instruction has no significant positive relationship with reading development.
6. There are no observable differences in reading development at the middle school level that favor students currently engaged in music instruction over students who terminated or had no experience in the study of music.

7. There is no significant positive relationship between years a middle school student participates in band and reading development.
8. There is no significant positive relationship between years a middle school student participates in chorus and reading development.
9. There is no significant positive relationship between years a middle school student participates in orchestra and reading development.
10. There is no significant positive relationship between years a middle school student performs on a brass instrument and reading development.
11. There is no significant positive relationship between years a middle school student performs on keyboard instruments and reading development.
12. There is no significant positive relationship between years a middle school student performs on percussion instruments and reading development.
13. There is no significant positive relationship between years a middle school student performs on string instruments and reading development.
14. There is no significant positive relationship between years a middle school student performs on woodwind instruments and reading development.

Significance of the Study

This study is designed to examine the nature of a relationship between the study of music and reading development in middle school students to determine the effects one discipline may have on the other. Should results be positive, they will build upon previous research and add to a growing body of knowledge that validates the theory. Results will also provide implications for educators, parents, and students in regard to improving the level of excellence in education.

Research that has already been conducted in this area has examined subjects ranging in age from preschool children to college students. Of the literature reviewed for the current study, 21 investigations involved preschool and elementary students while 7 studies involved middle school students. This imbalance is noted by Wayman (2004) who states that in the past 50 years of research on this specific topic, middle school students are underrepresented as compared to subjects at elementary levels. Expectations speculate that this proposed study will make a positive contribution to empirical literature investigating the learning processes and cognitive development of sixth, seventh, and eighth grade students.

Gardner (1999) contended that arts education should be based on its existence to create wonderful, beautiful, and good things regardless of whether or not one will do better academically in another subject. While this is certainly true, the current trends and requirements in education may slowly erode the already tenuous position the arts hold in the public school system. Legitimate findings that justify the inclusion of arts education as an adjunct to other fields of study will help establish its status for enhancements to learning as well as aesthetic capabilities in fostering creativity and imagination. The benefits of studying music have been viewed for such enhancements.

Zoltan Kodaly (1882-1967) developed a comprehensive music curriculum in the 20th century to perpetuate the language of music in his native country. While the educational framework of Hungary mandates vocal and instrumental training for the first eight years of school, older students may opt to study further by learning to play a new instrument each year they attend secondary school. Evidence that government officials have supported Kodaly's philosophy is reflected in the following statement that was

issued by the Hungarian embassy in Washington, D.C. "Hungarians have known for a long time that music education trains one to think and that there is a very close connection between musical competence and mathematical ability" (Kelstrom, 1999, p.38).

Overview of the Methodology

This investigation examines differences that exist in the reading development of individuals actively participating in the study of music as demonstrated by performance in a choral/instrumental program and students who have limited or no such experience. While the study of music as a specific arts discipline acts as a primary variable, the field includes instrumental, vocal, and keyboard training for evaluative purposes. Some literature cited was not as inclusive. For example, there were studies that investigated the effects of keyboard training on nonmusical outcomes (Costa-Giomi, 1999; Englehardt, 2005; Rauscher, 1999; Schellenberg, 2004, 2006). One study examined a vocal music program for its impact on reading development (Laczo, 1985). Most literature evaluated either band or orchestral instrumentation for effects on academic achievement (Babo, 2001; Cardarelli, 2003; Fitzpatrick, 2006; Neuharth, 2000; Pearce, 2000; Wallick, 1998).

The methodology of this study replicates that of much of the literature that has been cited. Subjects provided information concerning their involvement in the study of music. Responses were compared against standardized test scores in English language arts (ELA), and results analyzed using Pearson r correlation coefficient.

Definition of Terms

- Achievement – a measure of what a student has learned
- Active participation – involvement in a specific activity as measured by

regularly-scheduled and consistent times of engagement

- Aptitude – a measure of present potential a student shows to achieve in a given domain
- Arts instruction – a general reference to five primary fields of aesthetic study: visual art, music, dance, theater (drama), and literature/creative writing
- Audiation – hearing music or musical patterns internally when no sound is physically present
- Correlation coefficient – a number between -1.00 and +1.00 that indicates whether, and to what degree, a relationship exists between two or more variables (A correlation coefficient of .00 indicates no relationship between the variables examined. Coefficients near +1.00 signify a positive relationship between variables. As one variable increases, so does the other. Coefficients near -1.00 imply a negative relationship. As one variable increases, the other decreases.)
- ELA – English language arts; a term used to include reading and reading comprehension, writing, listening, and speaking (Standardized testing in New York State assesses all the components to measure learning, identify strengths and weaknesses in each section, and determine the next level of placement.)
- Means – the arithmetic average of scores
- Middle school – sixth, seventh, and eighth grades, ages 11-14 (approximately)
- Multiple Intelligences – Howard Gardner's original theory of seven independent intelligences including language, musical, logical-mathematical, spatial, bodily-kinesthetic, interpersonal, and intrapersonal (Each person has a primary biological potential for learning that falls into one or possibly more of these categories.

Since each classroom is comprised of students having a variety of learning potentials, instructional delivery styles should vary to include and accommodate all the ways an individual learns best. Some intelligences are interrelated based on similarities in the learning processes and skills necessary for effective cognitive development.)

- Music instruction – the study and understanding of musical notation as it applies to melody, rhythm, harmony, tempo, and interpretation
- Music Learning – Edwin Gordon's original theory that music achievement is determined by levels of musical aptitude (Music aptitude is developed in early and middle childhood years, stabilizing by adolescence. Levels of aptitude are determined by environmental factors, amounts of exposure to and experience in music. Learning music follows processes similar to those utilized in learning to read.)
- Music performance – the result and by-product of music instruction which includes the study and understanding of musical notation as it applies to melody, rhythm, harmony, tempo, and interpretation (Examples of music performance include lessons, rehearsals, and concerts where learning is demonstrated on musical instruments both individually and as part of an ensemble.)
- NYSTP – New York State Testing Program; the site for developing, testing, and procuring state-approved standardized assessments in various academic fields of study
- Pearson r – also known as the product moment correlation coefficient; a technique used when two variables that are to be correlated are expressed in terms of ratio or

interval data; the most appropriate correlational research tool for determining a relationship between two variables

- Reading development – the ability to process and understand the English language as it relates to reading and reading comprehension, as evaluated by authentic assessments and standardized testing
- Spatial-temporal reasoning – combining separate elements of an object into a single whole by arranging objects in a specific spatial order to match a mental image
- SPSS – Statistical Program for the Social Sciences; computer software for Windows that performs numerous types of statistical analyses used in the social sciences, business world, and other scientific disciplines
- Standard deviation – the most stable measure of variability, used with interval and ratio data; an indication of how spread out a set of scores is around the mean (average) of the total scores; the distance that the average subject falls from the mean

Organization of the Study

Information covered, thus far, has provided a historical perspective and rationale for examining the existence and nature of a relationship between music instruction and reading development in middle school students. Subsequent chapters review, in detail, literature that verifies this theory through empirical research and theoretical applications. Data collection procedures for the study are described, with data compiled and reported in a statistical format. Findings from data analysis are interpreted and explained in light of the original hypothesis, and accompanied by recommendations for future research.

CHAPTER TWO

Review of the Literature

Theoretical Research

The theoretical framework of education has been challenged and influenced as researchers uncover new information about the processes of learning and theorists act on those ideas. Two individuals whose ideas have been popularized in various areas of education in the latter half of the 20th century are Howard Gardner and Edwin Gordon. The theory of multiple intelligences, as developed by Gardner, describes learning as it relates to several diverse disciplines. Gordon introduced his music learning theory to cultivate the idea of musical aptitude acting as a factor in predicting successful achievement in music. Gordon and Gardner's contributions to research in cognitive development and learning are worth examining as they relate to reading development and music instruction.

The Theory of Multiple Intelligences

Howard Gardner (b. 1943) is currently a professor of cognition and education at Harvard Graduate School of Education. He first introduced the theory of multiple intelligences (MI) in 1983 in *Frames of Mind: The Theory of Multiple Intelligences* to define and explain the numerous ways learning occurs. Up to this time, there had been a general belief that intelligence was an inherited single entity as indicated by an Intelligence Quotient (IQ). Gardner challenged this concept by defining intelligence as the result of specific roles, potentials, and skills that allow individuals to process information in a manner that will solve problems or create products that are of particular value to a specific culture or community. Everyone possesses a measure of all the

intelligences. However, no two people have all the intelligences to the same degree or the exact same combination of the intelligences (1999).

Achievement in any intelligence, according to Gardner, is a reflection of inborn ability, cultural stimulation, and training. This training, or learning, results in specific alterations in the synaptic connections within the brain. The various combinations of these altered synapses led Gardner to develop specific criteria that described and explained the characteristics of several possible intelligences (1993).

Gardner originally outlined seven intelligences. The first two, linguistic and logical-mathematical, have traditionally been the primary focus in educational settings (Dickinson, 1993). The next three intelligences, musical, bodily-kinesthetic, and spatial, are related to the arts. Inter-personal and intra-personal intelligences reflect the capacities to understand the intentions, desires, and motivations of self and others (Smith, 2002).

In developing the MI theory, Gardner classified several of the intelligences into broad categories. The spatial, logical-mathematical, and bodily-kinesthetic intelligences are "object-related" since they are controlled by objects an individual comes in contact and interacts with in a particular environment. "Object-free" intelligences consist of linguistic and musical, as they are dependent upon language and musical systems as opposed to being shaped by physical elements (Sherman, 2006).

Gardner (1993) described linguistics as the ability to learn language, both spoken and written, and to use language to achieve specific goals. Musical intelligence involves skills necessary for performance, composition, and appreciation of musical patterns. Gardner suspected that linguistic and musical expressions have common origins. One similarity is their reliance on auditory and oral systems for processing and understanding

information. Another common factor between linguistic and musical intelligences is dependence on similar systems of communication (Sherman, 2006). Both intelligences, as noted by Eady & Wilson (2004), incorporate symbol structures and decoding mechanisms to interpret and conceptualize meaningful sounds. Linguistic intelligence is characterized by the ability to aurally and visually process sounds as they relate to the letters representing the language. Musical intelligence is the ability to utilize the elements of pitch, melody, rhythm, harmony, and tone in creating an expressive means of communication when translated from music notation (Gardner, 1993).

The characteristics that linguistic and musical intelligences have in common, as suggested by Gardner, have been confirmed by studies in research as linking reading development with music instruction (Anvari, Trainor, Woodside, & Levy, 2002; Butzlaff, 2000; Chang, 2000; Darby & Catterall, 1994; Dickinson, 1993; Fisher, 2001; Hansen & Bernstorf, 2002; Ingram, 2003; McIntire, 2007; Preston, 2003; Weinberger, 2004). Several researchers have even suggested that the similarities in the processes and symbol systems of one discipline may transfer and enhance the learning of another (Chang, 2000; Dickinson, 1997; Gromko, 2005; Ingram, 2003; Rauscher & Hinton, 2006; Scripp, 2002; Teitelbaum & Gillis, 2004; Wallick, 1998). However, others feel further research is necessary to substantiate the claim (Butzlaff, 2000; Eisner, 1999; Tunks, 1992; Winner & Cooper, 2000).

Within all the intelligences Gardner suggested the existence of subintelligences that break down the general intelligence into various roles or activities in which an individual may participate. Linguistics can be broken down into reading, writing, speaking, creating, and analyzing. Musical intelligence includes playing, singing, writing

scores, conducting, critiquing, and appreciating (Sherman, 2006). According to Reimer (1999B), each subintelligence, or role, has its own set of cognitive processes that sets it apart from others within the one general intelligence. For example, oral reading requires a process of converting a coded message (letters, words, sentences) into intelligible language. However, writing is more of an encoding process where the spoken word is converted into a coded form of letters, words, and sentences. Both of these disciplines are part of the linguistic intelligence, yet each relies on different learning processes. Similarly, the roles included in musical intelligence, such as conductor, listener, performer, and improviser, necessitate talents that are associated with each particular position. A subintelligence is dependent on a unique set of learning operations that characterizes it as distinct from another. Assuming that similarities in learning processes within a single intelligence have the capacity to exhibit equal measures of effectiveness on all subintelligences within that given domain is inappropriate. Consequently, the degree of similarities in multiple learning processes, when comparing two or more general intelligences, decreases significantly.

Educational appeal of the MI theory. With the tide of opinion among researchers seemingly shifting from a mindset related to a single intelligence to a belief in multiple intelligences, the response of educators to Gardner's theory has been generally positive. Smith (2002) noted that one attraction to the theory is rooted in the ways students think and learn. Since learning styles vary in every classroom, the opportunity for developing multiple delivery styles is endless. The theory provides a conceptual framework for organization and reflection. It allows for the development of new instructional

approaches and flexible curriculums capable of facilitating a transfer of knowledge from one educational setting to another.

The MI theory has generated several moves toward reforming education. For example, the University of North Carolina at Greensboro (UNCG) developed curriculum that used the theory as a basis for teaching and learning. Since 1995, 43 A+ schools have been established across the state. Interdisciplinary teaching and daily arts instruction are available for children to learn in all the ways they are able. Each school is staffed with at least one educator in the areas of visual arts, music, dance, and theater. Additionally, all faculty members undergo training for teaching within the confines of the school philosophy. Similar changes in education are occurring in Arkansas and Oklahoma where A+ school programs are emerging (Sloan, 2009; A+ Schools Program, UNCG, n.d.).

Concerns surrounding the MI theory. The theory of multiple intelligences, although widely accepted and embraced by the educational community, presents legitimate concerns to experts in psychology, psychometrics and neuroscience. Empirical support is an area where the theory has significant problems (Smith, 2002; Waterhouse, 2006). There are no published empirical studies that validate the theory of multiple intelligences, a point that Gardner himself conceded (2004). The theory cannot be validated by means of testing since Gardner has not clearly defined the components within the intelligences that could be effectively evaluated. Neither can the MI theory be validated through application research since, according to Waterhouse (2006), that process assumes the theory to be valid. There is better empirical support for the theory of a single intelligence factor, particularly in the fields of cognitive psychology and neuroscience.

The MI theory sounds like a viable way of thinking and practice. However, without adequate empirical support caution should be exercised with regards to its general application in education. In light of the literature reviewed, there is specific significance in the theory as it relates to the current research study. First, the MI theory is based on the value of achieving educational success through various abilities and learning styles. Whether there is one general intelligence or several, the fact that individuals learn and process information at different rates, using various methodologies cannot be overlooked. Since the process of learning is equally as important as the final product, a goal of education should be to tailor instructional environments in such a way as to enhance and generate more effective academic achievement. Secondly, in developing the concept of multiple intelligences, Gardner suggested the existence of a possible relationship between linguistic and musical abilities. Since the purpose of this research study is to examine the extent and relevance of such a link, as it relates to music instruction and reading development, evaluating the claim for its merit in similar investigations is necessary.

Music Learning Theory

Edwin E. Gordon (b. 1927) is a research professor in music education and music psychology. Considered to be a leading researcher in the field of musical aptitude, he is the founder of the Gordon Institute for Music Learning (GIA Publications, 2006; Johnson, 2000). In his book, *Learning Sequences and Patterns in Music* (1977), Gordon described and detailed the music learning theory. Gordon also developed and implemented several standardized tests designed to measure music aptitude at various

ages. The oldest and most thorough music assessment tool is the *Musical Aptitude Profile* (MAP) for children in grades 4 through 12 (Johnson, 2000).

Gordon based music learning on two concepts, aptitude and audiation. The former is readily definable and relates to most areas of learning. The latter, a term coined by Gordon, is somewhat abstract by definition and limited to its relationship with music understanding. Relating the two as integral learning components is the foundation of the music learning theory.

According to Gordon (1977; 2004), aptitude is the potential to achieve. Musical aptitude is a measure of potential to learn music. Children are born with a specific level of music aptitude, which is innate, as opposed to being inherited (Gordon, 1986). Music aptitude can be developed; however, as with the MI theory, it is dependent on environmental exposure and experience in music. Therefore, inborn potential and early environmental influences such as exposure to listening and experiences in performing are determining factors in developing music aptitude (1977).

Musical aptitude is divided into two stages. The first is defined as the developmental music aptitude stage, which occurs in children from birth to nine or 10 years of age. During this time period, music aptitude levels fluctuate considerably, a factor that Gordon claimed substantiates the need for early and continuous childhood music education (1977). Somewhere after the age of 10, the developmental stage evolves into the stabilized stage. According to Gordon (2004), this is due to the diminishing effects of environmental factors at this stage of childhood development.

How effectively an individual learns music is dependent on the level of musical aptitude development. An individual learns music when what is heard is understood. That

learning is based on audiation. Moore (1995) defined audiation as the act of hearing music or musical patterns internally when no sound is physically present (p. 26). Gordon theorized that audiation is related to music in ways similar to those in which thought is related to language. Language is used to communicate speech; speech is how communication takes place; thought is that which is communicated. Similarly, music is a tool used for communication purposes; performance is how communication occurs; audiation, or musical thought, is what has been communicated. Therefore, learning music is based on audiation, which is the precursor to musical understanding (2004).

Gordon's approach to learning music is by means of a sound-to-symbol process where aural skills are taught before visual skills (1977). Such a learning strategy emphasizes the process of sequencing using melodic and rhythmic skills, thus preceding descriptive words and definitions of musical symbols and structures. Children listen to and perform music before they learn to read and write musical notation (Johnson, 2000). This concept has served as a foundation to education approaches in music learning that were created and developed by Zoltan Kodaly (Hungary; 1882-1967) and Shin'ichi Suzuki (Japan; 1898-1998).

The music aptitude tests developed by Gordon are appropriate assessment tools for students and music educators (Gordon, 1977, 1986, 2004). They measure the musical strengths and weaknesses of individuals. The assessments evaluate the ability of one to learn music through aural means and understand it based on present and prior knowledge. Because students have diverse abilities, the aptitude tests are also geared to assist music educators in tailoring instruction to meet as many learning needs as possible (Gordon, n.d.).

Although the music learning theory focuses on the development of musical aptitude, Gordon made comparisons of the similarities between reading text and reading music, using the sound-to-symbol process. Language and music utilize units of sound for aural processing, identified as phonemes and pitches, respectively. Both disciplines follow set rules for arranging sounds and pitches into well-formed sentences and melodic phrases. The objective of each is to facilitate meaningful comprehension as it relates to performing linguistically and musically (Johnson, 2000).

Once linguistic and musical vocabularies have been mastered through listening and speaking and reading and writing, the symbols associated with each discipline can be learned. Reading language is recognizing words as unique groupings of letters that create mental images of the objects representing said words. What results is reading with a sense of comprehension. Similarly, reading music involves identifying patterns as groups of notes that develop a mental familiarity with how those patterns sound. The parallels in the processes of learning result in achievement in reading text and reading music. Gordon (1977) explained, "Just as students learn to read a language after a functional vocabulary of words is established, so students learn to read and write music […] after a functional vocabulary of tonal and rhythmic patterns is established" (p.5). As with the MI theory, the music learning theory suggests that similarities in the symbol and communication systems may account for a relationship between music instruction and reading development. As a result of these common factors, Gordon suggested that a transfer of skills from one discipline to another is possible (Gordon, 1977; Johnson, 2000).

While the transfer of skills among music instruction and reading is acknowledged, critics of the music learning theory argue that although Gordon has developed a system

designed to possibly replace previous ones, questions arise as to whether the theory serves the needs of music educators and students any better. Brink (1983) asserted that Gordon reinvented the wheel by creating new terms that describe the same learning concepts and processes found in research conducted prior to the music learning theory. Zimmerman (1986) took issue with Gordon's stages of musical aptitude development and the ages assigned to each. She strongly recommended further research into successive ages of children before definitive statements are made with regard to the developmental nature of musical aptitude and the age at which it stabilizes. While Gordon (2004) contended that the stabilized stage of musical aptitude occurs around the age of 10, he did not rule out the possibility that middle school students, as a whole, are in a borderline period of moving out of one stage and into another.

Review of Empirical Literature

The purpose of this research was to investigate the nature and intensity of a relationship between music instruction and the reading development of middle school students. In linking proposed research to prior research, the nature and purpose of empirical literature as it relates to the present study need to be defined. There is a general misunderstanding, according to Bumgarner (2001), as to issues of causality versus correlation. No empirical evidence exists suggesting that significantly higher academic grades are the direct result of active participation in the study of music. Winner and Cooper (2000) conducted a series of meta-analyses on correlational and experimental studies, comparing overall effects of learning in the arts on academic achievement. While results yielded a definite relationship between arts education and verbal and mathematical achievement, findings indicated no foundation for a cause-and-effect relationship.

At best, available literature questions a causal relationship between the two fields of study (Bumgarner, 2001; Johnson, 2004). Reviews of literature suggest a possibility of causal links between playing music and spatial reasoning (Boyes & Reid, 2005; Hetland & Winner, 2001). However, Butzlaff (2000) and Scripp (2002) have conducted meta-analyses of available correlation studies that used standardized assessments to evaluate reading ability following a time period of music instruction. Findings from both investigations yielded positive significant associations between music and reading.

Studies that have investigated the correlation between the study of music and academic achievement indicate a positive relationship, specifically as it relates to mathematics and reading (Babo, 2001; Costa-Giomi, 1999; Englehardt, 2005; Fitzpatrick, 2006; Grandin, et al., 1998; Gromko, 2005; Gromko & Poorman, 1998; Johnson, 2006; Kemmerer, 2003; Laczo, 1985; Neuharth, 2000; Rauscher, 1999; Schellenberg, 2004, 2006; Wallick, 1998). Other studies focus directly on the relationship between the study of music and reading development (Fisher, 2001; Horne, 2002; Lauder, 1976; Matthews, 2001; Pearce, 2000). The review of literature that follows discusses these studies and those from the field of brain research, in light of the theories of Gardner and Gordon. Literature involving middle school students is included for its significance to this present study.

Brain Research Relating Music Skills to Reading Development

The study of music is best assessed by actual performance. When an individual actively participates in doing what has been learned through making music, progress can be readily observed in the process as well as the final product. Technological and medical advances in research have yielded findings that reveal the positive effects the study of

music has on various areas of the brain. Neuroimaging, as in CAT, MRI, and PET scans, have given researchers in neuroscience and cognition valuable information on the mental processes that occur when learning takes place. Researchers in education have used these discoveries as a foundation for formulating hypotheses and generating new studies in cognitive development.

Within the human brain are billions of nerve cells capable of receiving, transmitting, and delivering electrical impulses (Nagel, 2000; Spiker, 2008; Wesson, 2006). Commonly referred to as neurons, these cells pass impulses to one another by means of chemical transmitters that exist in the gaps separating them. These gaps are known as neural connections or synapses. When tasks are performed, messages are transmitted back and forth between neurons. The more complex the task, the more complex is the communication needed between the neurons to complete the cycle.

One of the keys to successful transmission of messages among neurons is the condition of the synapses between them. According to Wormeli (2001), neurons grow, multiply, and branch off in different directions as new information is received. The role of the brain is to create the necessary networked connections among these neurons so messages can be effectively transmitted (Wesson, 2006). From birth through puberty, the establishing of new synapses in the brain is a continuous and rapid process that changes the brain both structurally and functionally, thus making it easier to assimilate information (Lehr, 1998; Rauscher, 1999; Respress & Lufti, 2006; Sousa, 2006; Wormeli, 2001).

The number and strength of synapses in the brain, as influenced by heredity, experience, and environmental factors, generally determine the effectiveness of

transmitting messages among neurons (Jensen, 2000; Rauscher, 1999). Fernandez (2006) stated that the more education one has, the more synapses exist in the brain. This being the case, Lehr (1998) suggested that more developed synapses equate to greater brain efficiency. The playing of music, according to Jensen (2000), contributes to the developing of strong synapses, thereby enhancing the brain's effectiveness. This action likely has an impact on overall learning, thus establishing a relationship between music and other disciplines (Ingram, 2003).

According to Rauscher (1999), repeatedly using synapses for storing and retrieving information results in reinforcement of the brain's circuitry. Wormeli (2001) concurred, adding that the more frequently stored information is accessed in the brain, the stronger the synapses become. One could conclude that the more an individual participates in making music, the more stored information (i.e., prior knowledge) is accessed in the brain, thereby increasing the strength of synapses.

The largest part of the brain, the cerebrum, is divided into two parts, the left and right hemispheres. Both hemispheres are differentiated by the information that is processed in the neural mechanisms of each. While the left hemisphere of the brain has been thought to specialize in language processing and cognition, the right hemisphere involves spatial relations, music, and emotion (Arthington, 2002; Babo, 2001; Begley, 2000; Dickinson, 1997; Gardner, 1993; Hodges, 2000A). Situated between the two hemispheres is the corpus callosum, a large band of neurons connecting both parts (Begley, 2000; Nagel, 2000; Schaug, Winner, & Norton, 2005). Consisting of approximately 200 million neurons, the corpus callosum is responsible for carrying vast amounts of information between both hemispheres (Nagel, 2000). Research indicates that

the neural pathways within the corpus callosum that are responsible for specific tasks become more highly developed in individuals who repeatedly perform those tasks (Viadero, 2008). According to Jensen (2000), MRI studies show that fibers in the corpus callosum are as much as 15% wider in musicians than nonmusicians.

Because of its abilities in transporting information between the two cerebral hemispheres, the role of the corpus callosum has significant implications as they relate to the current research. The performance of specific tasks may not be the responsibility of neural activity in an isolated area of one hemisphere. Rather, performing particular tasks may activate multiple brain sites in both hemispheres. Literature confirms that both hemispheres of the brain are involved when performing music (Babo, 2001; Flohr, et al., 2000; Gurian & Stevens, 2005; Hodges, 2000A; Jensen, 2000; Lehr, 1998; National Coalition for Music Education, 1999). Gurian & Stevens (2005) noted that neuroscientists refer to music performance as a whole-brain activity, as both hemispheres are engaged simultaneously. Fernandez (2006) suggests that both hemispheres are involved when participating in musical activities because music is an intellectual and emotional discipline. Ponter (1999) cited Howard Gardner for asserting that musicians participate in learning processes which activate both hemispheres of the brain simultaneously. Reading and following a progression of notes is a sequential left brain process, while observing musical phrase patterns and rhythmic patterns are right brain skills. While musical capabilities seem to originate in the right hemisphere, increasing and mastering fine motor skills are found in the left. These skills seem to migrate across the corpus callosum into the linguistically dominant left hemisphere. The role of the

corpus callosum in bridging the learning processes of one cerebral hemisphere to those of the other, may explain the activation of the entire brain when performing music.

Specific areas of the brain have been cited in literature as having functions that affect language and music. The brain stem, located in the lower part of the brain and on top of the spinal cord, is considered the neural gateway to the brain. It offers a common pathway that processes music and speech (Northwestern University, 2007). The temporal lobe, located just behind the ears, has been referred to as the music center of the brain (Begley, 2000; Gray Matters, 2003). Processing linguistic messages also depends on the temporal lobe (Gardner, 1993; Gray Matters, 2003). Research by Weinburger (2004) found that an area in the frontal lobe of the brain facilitates a proper construction of the syntax for music as well as language. PET scans have identified three parts of the brain that are responsible for symbol processing. These are the right cerebellum, left frontal cortex, and the area connecting the two, the anterior cingulate (Oddleifson, 1990). Since reading and the study of music rely on symbol systems as a means to effective learning, these regions are integral to developing and reinforcing skills in each discipline.

During music making, memory systems in the areas previously mentioned are strengthened, thus reinforcing mental processes related to mathematical and spatial reasoning, reading skills, physical activities, and intelligence (Boyes & Reid, 2005; Bracey, 2003; Dickinson, 1997; Hetland & Winner, 2001; Jensen, 2000; Ponter, 1999; Schellenberg, 2004). Such cognitive benefits strongly suggest that playing a musical instrument increases the brain development of an individual (Druckenbrod, 2006; Oxford University Press, 2006; Schellenberg, 2004). In fact, playing a musical instrument is

recommended for older adults as a maintenance mechanism for coordination and mental speed, as well as keeping the brain sharp and youthful ("How to Keep," 2006).

Music and Reading Skills in Early Childhood Education

The importance of early childhood education, as it relates to brain research, is substantiated by the work of Flohr, et al. (2000), who estimated that children have up to twice the amount of neural activity and synapses in their brains as adults do. The younger the child is, the greater the ability of the brain to respond, grow, and change its functions. This is known as plasticity, a characteristic of the brain that ensures neural connections and communication between neurons by consistently challenging them (Spiker, 2008). A child's brain is generally more plastic before the age of 10, a time period Gordon (1977, 2004) theorized developmental musical aptitude becomes more stabilized. According to Flohr (1999), this plasticity represents a significant window of opportunity for music learning in early childhood years.

Current research in music education suggests that early and continuous music training and performance can result in enhanced brain activity between hemispheres (Jensen, 2000). Enhanced brain activity increases the number and strength of synapses between different cranial regions (Babo, 2001; "How to Keep," 2006; Lehr, 1998; Rauscher, 1999). The more a child is exposed to music making, the more neural changes occur in the brain.

Mauk (2009) reported on a four-year study that was conducted with children ages 9 to 11 to measure changes in the brain as a result of music training. Two groups of students were observed. One group learned to play a musical instrument in a weekly half-hour lesson and daily practice sessions that lasted 10 minutes. The other group had no

such training. After 15 months, researchers observed improved performances in fine motor control and listening discrimination skills. Measured brain activity indicated structural changes and strengthened connections in musically relevant areas of the brain.

Much of the literature suggesting a relationship between music performance and reading development in early childhood education focused on the similarities that connect the two disciplines. The first involved the sensory and mental mechanisms used and shared in the assimilation processes of reading and music. The second factor discussed the learning processes required for effective acquisition of each.

Sensory and mental mechanisms. Gardner (1993), in his theory of multiple intelligences, stated that both linguistic and musical intelligences rely significantly on auditory discrimination for effective conceptualization. Similarly, Gordon (1977) listed listening as one of several activities necessary for learning language and music. More recent literature agreed, stating that music and reading depend on auditory skills bearing striking similarities (Anvari, et. al., 2002; Bygrave, 1996; Hansen & Bernstorf, 2002; Johnson, 2000; Junkins, 2003; McIntire, 2007; Wachtel, 2006). Both disciplines aurally discriminate between sounds as related to speech or musical tones. Segmenting speech and music into sounds and pitches that are recognized and identified by the speaker or performer in the context they are heard requires auditory analysis in the learning process (Eady & Wilson, 2004).

Reading development and the study of music also depend on visual discrimination. Both disciplines are oriented to reading symbols that need to be decoded into meaningful sounds. This allows for consistency in reading words and notation (Jensen, 2000; Eady & Wilson, 2004). The decoding processes result in word and note

identification, which enhances problem-solving skills (Jensen, 2000; Oddleifson, 2006; Sousa, 2006; Wachtel, 2006).

According to Dickinson (1997), mental mechanisms that process music are significantly entwined with the brain's basic functions that include language. One such example is the use of symbol systems, the understanding of which is dependent on the decoding processes of each discipline. Considerable literature cited this similarity in relating language with music (Dickinson, 1997; Eady & Wilson, 2004; Fisher, 2001; Ingram, 2003; Wallick, 1998; Weinberger, 2004). Whereas letters and numbers make up the symbols used to acquire proficiency in language, notes and rests are symbols utilized in understanding and performing music (Dickinson, 1997). The symbol structure is decoded by means of visual discrimination into meaningful sounds and tones (Eady & Wilson, 2004). Comprehension occurs when objects represented by words or melodic patterns provide mental pictures, thereby giving relevance to the mind of the individual.

Learning processes and skills. According to Weinberger (2004), music and language are both a means of communication resulting from a set of rules that dictate a proper combination of notes or words. The processes and skills used to conceptualize these guidelines in both disciplines are structurally parallel:

- Phonological awareness: aurally discriminating between sounds and units of sound (melodic patterns, words/notes, and letters).
- Phonemic awareness: understanding and identifying the smallest units of sound (letters and notes)
- Sight identification: instantly recognizing words or notes by glancing at them.

- Orthographic awareness: understanding the use of letters or notes with a specific context.
- Cueing systems awareness: accessing meaning from information surrounding a word or musical phrase.
- Fluency: reading/performing with speed and accuracy (Chang, 2000; DANA Foundation, 2008; Fisher, 2001; Hansen & Bernstorf, 2002; Ingram, 2003; Kinney, 2004; Preston, 2003).

These processes and skills are essential to emergent literacy development in children. Activities utilized to facilitate learning include listening, speaking, reading, and writing. The study of music emphasizes similar skills. Instructional strategies make use of manipulation, repetition, and rhyming in reinforcing reading development. These same activities are appropriate and encouraged when learning music skills as well (Fisher, 2001).

Empirical research examining this relationship in early childhood education bears significance to the current study. According to Jensen (2000), prior experience in the study of music is an important variable to consider when investigating an association between music and reading development at the middle school level. Findings in early childhood music education have potential for predicting outcomes in similar studies with young adolescents.

Music and Reading Development in Young Children

Empirical research investigating the relationship between music and reading development in preschoolers and elementary children is somewhat limited in scope. This is due, in part, to the fact that most, if not all, public schools in the United States

introduce formal training on musical instruments in fourth or fifth grade. Additionally, preschool and lower elementary students are in the initial stages of reading development, causing researchers to examine other variables that assist in the process of learning to read.

Anvari, et al., (2002), examined relationships between phonological awareness, music perception skills, and emergent literacy skills in 100 four- and five-year-old children. A series of tests were administered that included standardized assessments and tests developed by the authors. Each child took the tests over a period of five 20-to-30 minute sessions. Music and language tasks were alternated with the number completed being dependent on the attention span of the child. The tasks involved such activities as phonemic awareness, reading, vocabulary, music, digit span, and mathematics. A typical task related to language involved generating as many words as possible that rhymed with a given word. Music tasks required the individual to identify two musical presentations as being the same or different in terms of melody, rhythm, chords, and other variations. Factor analysis and hierarchal regression analysis were applied to the scores of each test. Results of the study suggested that there is a reliable relationship of music perception skill to phonological awareness and early reading development in young children due to the possibility of both disciplines sharing some of the same auditory mechanisms.

Two studies examined music programs that included music making on instruments as part of the investigation. Gromko (2005) observed what effects music instruction had on the development of phonemic awareness in kindergarten children. After 103 participants were divided into two groups, the treatment group was given one 30-minute session of music instruction weekly, for four months. Several activities

comprised the sessions including making music on percussion instruments. The control group received no music training. Pretests and posttests utilized the same early literacy skills assessments. Findings supported the hypothesis that active music making accompanied by the association of sound with the appropriate notation symbols may develop similar cognitive processes to segment spoken words in language.

Research conducted by Bygrave (1996) examined the relationship between learning language and learning music. In a study that spanned 30 weeks, 29 children, ages six through nine, were divided into 4 groups that were exposed to different learning programs. Only one group was involved in a music program that included playing musical instruments. Pretests and posttests were administered to assess any acquisition of reading skills. Test results showed students involved in the music program outscoring the other groups in vocabulary skills. The small sample size in this study was a factor that may have affected results. Further research that uses larger numbers of participants is necessary to determine the reliability of outcomes from this study.

Cardarelli (2003) investigated the effects an instrumental music program had on the performance of standardized tests with third grade students. Two groups of students participated in a study that compared scores received on the *Florida Comprehensive Achievement Test* (FCAT) with the level of involvement in an instrumental music training program that lasted five months. A sample of 75 students participated in the music program, while a similar group of 51 subjects did not. Results of the study yielded statistically significant differences between the mean scores of both groups on the reading and mathematical portions of the FCAT. Conclusions indicated a positive impact on student reading and math skills when actively participating in music instruction.

Johnson (2000) compared hours of music instruction with music aptitude scores and scholastic achievement in 240 elementary students. Edwin Gordon's *Intermediate Measures of Music Audiation* (IMMA) was administered to third through sixth grade students, with scores compared to scores received on the *California Test of Basic Skills* and *Kentucky Instructional Results Information System.* Findings suggested that a relationship exists between music aptitude and music instruction. A strong positive correlation was also observed between music aptitude and academic achievement in reading and mathematics.

In a study with fourth grade students, Wallick (1998) examined the effects of a string program on academic achievement as it related to the writing, reading, math, and citizenship sections of a state proficiency test. The study divided 296 students, half being string students and the other half having no experience in the program. Students in the string program were pulled out of class twice a week for a 30 minute music lesson during the course of a school year. Findings from the testing yielded no evidence of negative effects in reading development on the part of students who were pulled out of class for lessons. In fact, statistical differences favoring the string students were observed in reading and citizenship.

While research varied with respect to duration and number of participants, findings from these studies suggest the existence of a relationship between the study of music and reading development in preschool and elementary students. In no situation did the study of music have a detrimental effect on reading achievement or emergent literacy skills. Other researchers concurred with this conclusion (Chang, 2000; Douglas & Willatts, 1994; Johnson, 2006; Kinney, 2005; Sharman, 1981).

Active participation in piano/keyboard training may have positive effects on reading development. In addition to enhancing brain development (Arntz, 2000), the ability to think ahead and refine spatial-temporal reasoning skills may be strengthened by participating in piano instruction (Catterall, et al., 1999). According to Jensen (2000), the piano is the only tested musical instrument in which instruction and performance has been shown to develop spatial-temporal reasoning. Training that starts in early childhood years can have a significant impact on cognition since the brain is highly sensitive to environmental influences at this time of child development (Schellenberg, 2004). Research conducted by Frances Rauscher also suggests such a relationship.

Rauscher is well known for studies conducted in the 1990s involving subjects ranging in age from preschool through college. Findings from one study in particular generated national attention in educational research. A brief enhancement of spatial-temporal abilities was noted with college students who listened to a Mozart sonata (K.448). Results from the "Mozart Effect" study indicated that college students who listened to the musical selection prior to taking a test outperformed students who did not participate in the listening activity (Rauscher & Shaw, 1997). Implications from this investigation provided impetus for additional research into the processes of learning and cognition. Unfortunately, the "Mozart Effect" was misinterpreted when the idea that music can make one smarter was introduced to the general public (Rauscher & Hinton, 2006).

The effects of music on spatial-temporal abilities became a focus of future research conducted by others (Catterall, et al., 1999; Costa-Giomi, 1999; Grandin, et al., 1998; Gromko & Poorman, 1998; Jensen, 2000; Johnson, 2000; Kemmerer, 2003; Palos-

Tuley, 2003). Rauscher (1999) defined spatial-temporal reasoning as the ability to combine separate elements of an object into a single whole by arranging objects in a specific spatial order to match a mental image (p.37). Spatial-temporal reasoning is an important factor to understanding and achieving in mathematics. Several studies exist that strongly suggest the ability to reason spatially can be positively enhanced with piano/keyboard instruction which, in turn, may influence mathematics achievement (Begley, 2000; Bygrave, 1996; Costa-Giomi, 1999; Grandin, et al., 1998, Gromko & Poorman, 1998; Rauscher & Shaw, 1997; Sousa, 2006). A relationship between spatial-temporal, arithmetic, and music abilities may also be explained by their initial designation as predominant right-brain activities.

Rauscher (1999) conducted studies on the effects of piano/keyboard training on spatial-temporal abilities with preschool and kindergarten children in control and treatment groups. One study (1993) had relatively small samples of participants while studies in 1994 and 1997 had larger groups of children. The methodology for each investigation was similar. Treatment groups received piano/keyboard lessons for time periods ranging from eight to nine months. Students in the control groups received no musical training. All studies involved posttests in the form of standardized testing that revealed higher scores from the treatment groups than students in the control groups. Tentative conclusions indicated that while music does not act as a panacea for poor academic achievement, music making (i.e., piano/keyboard training), as opposed to music listening can enhance spatial-temporal abilities in children as well as benefit overall intellectual development (Rauscher, 1999). In addition, long-term effects of music instruction on academic achievement can be observed (Rauscher & Hinton, 2006).

Subsequent studies by others have yielded similar conclusions. Gromko and Poorman (1998) found that making music can enhance the spatial intelligence of three- and four-year old children. With 30 individuals divided into two groups, the treatment group had music instruction for seven months, one-half hour per week. Both groups were tested before and following the research. The authors admittedly recognized the small sample size as affecting results. Additionally, keyboard instruction was not implemented. However, findings showed a positive relationship between music training and the development of spatial intelligence in preschool children.

A study by Grandin, et al., (1998) involved 78 preschool students equally divided into groups. The treatment group received keyboard lessons for six months while the other children received no music instruction. Results from pretests and posttests revealed significant improvements in spatial-temporal reasoning for individuals taking keyboard lessons.

Costa-Giomi (1999) conducted a study involving young children over a three-year period to determine the effects of piano lessons on learning. Students were selected from grades four through six and divided into two groups. The first group received individual piano lessons while the control group received no instruction in keyboard. Children who were exposed to the piano lessons made significant gains over the control group during the first two years in general and spatial cognitive development. At the end of the third year, however, this advantage had disappeared. Results suggest that piano lessons could develop cognitive abilities, but caution should be exercised in setting unrealistic expectations regarding cognitive benefits of music education.

In a study conducted by Joseph M. Piro and Camilo Ortiz (SAGE Publication, 2009), second grade students from two public schools represented control and intervention groups. The intervention school studied piano for three years while the control school did not. Both schools had balanced literacy programs. The researchers wanted to see if children who receive keyboard training as part of the music curriculum perform better on measures of vocabulary and verbal sequencing than those who do not. At the beginning of the third year (start of second grade), testing was administered to see if there were any differences. Surprisingly, both groups had near identical reading scores. However, at the end of the third year, the keyboard training group had better vocabulary and verbal sequencing skills on reading tests than the nonmusic group. Explanations were given for the unanticipated results at the beginning of the third year: 1) Testing in September might have been influenced by vacation time where there was no keyboard instruction; 2) The duration of keyboard training (2 years) was not long enough to impact reading skills; 3) Medical research indicates several spurts in brain growth and development during childhood one, of which, occurs around the ages of 6 and 7.

Several researchers suggest that positive cognitive benefits observed as a result of participating in piano lessons increases the longer the instruction lasts. Dickinson (1997), Jensen (2000), and Schellenberg (2004), agreed that a significant relationship between keyboard instruction and noticeable cognitive development requires a minimum of seven to eight months of weekly lessons. According to Costa-Giomi (1999), long-term benefits require early and continuous instruction that lasts longer than one year. Rauscher (2003) stated that a minimum of two years of piano instruction is necessary to observe any differences in spatial development with young children.

While spatial-temporal reasoning is considered an essential building block for developing math skills, reading achievement is also influenced by the same cognitive function. As defined by Catterall (2002), spatial reasoning is the ability to understand the relation of ideas and objects to space and time (p. 3). He asserted that the ability to read is a prime example of spatial reasoning as the process involves the comprehension of words in broad contexts. Sounds and letters make up words that establish meaning by the proper arrangement of those words in sentences. Aural and visual recognition of sentences create relevant mental images. In this context, learning skills and processes in reading development may draw from spatial-reasoning abilities which are enhanced by active participation in making music.

Music and Reading Development in Middle School

Middle school is traditionally represented by grades 6, 7, and 8. These are the years that transition an individual from childhood to that of a young adult. The period of adolescence is typically characterized by significant physical, emotional, and mental changes. Young adolescents frequently experience a crisis in self-esteem that seriously affects their ability to learn and achieve (Pollack, 1998).

In addition to self-esteem issues, many teenagers tend to experience a loss of confidence in abilities and talents they once actively pursued and developed, including academic achievement (Holloway & LeCompte, 2001). One noticeable example, according to Sample (2005), is the diminished motivation to read throughout middle and high school, possibly due to an inability to process and internalize more complex material. At this point in the education process, expectations are that the typical student has an adequate working knowledge in the basic fundamentals of reading and is capable

of moving forward in further development. However, this is increasingly not always the case. For the individual who needs remediation in reading in order to keep up in other academic areas, this is perceived as an increased work load that carries a negative stereotype. In addition, time constraints experienced by public school systems sometimes do not allow for addressing those issues that are salient to the lives of middle school students. Junkins (2003) explained further, "There is not enough time in a school day for 6^{th}, 7^{th}, or 8^{th} grade teachers to teach reading when the benchmark standards of curriculum demand instructional time to be directed toward other academic content areas" (p.107).

Involvement in the arts has been shown to increase academic achievement at middle school levels by facilitating the development of communication and higher order thinking skills (Holloway & LeCompte, 2001; Respress & Lufti, 2006). As mentioned previously, music and language depend on similar skills for effective communication. One way to develop both simultaneously is through following the written lyrics of a song (Junkins, 2003).

Song lyrics are usually formatted as a poem and enhanced with rhythmic qualities. According to Douglas and Willatts (1994), rhythm is significantly related to reading ability as both are processed by the same hemisphere of the brain. Lyrics provide extensive exposure to frequently used words, common vowel patterns, repetition, and rhyming. Raps, poems, and lyrics to various songs provide opportunities to increase sight and oral vocabulary, comprehension, and rate of comprehension (Sample, 2005; Junkins, 2003). Reading skills developed through song lyrics include sound discrimination, accent

and rhythm placement, and decoding. Singing incorporates basic auditory and verbal skills required to further develop and maintain reading abilities.

Participation in instrumental music programs at the middle school level appears to have a significant influence on reading achievement. Babo (2001) conducted a study using two groups of eighth grade students to determine if participation in an instrumental program had any effect on their reading and mathematics achievement. One group of 93 students was enrolled in an instrumental music program while the other group of 85 students was not. Test scores from three standardized assessments that evaluated reading/language arts and mathematics were analyzed and compared between both groups. Findings from the study indicated the strongest impact that participation in an instrumental music program has on eighth grade academic achievement is IQ. However, quantitative results from the various statistical designs support a conclusion that participation in an instrumental music program has significant positive impact on reading and language arts achievement.

In a study that examined the effect active participation in band had on academic achievement, Neuharth (2000) observed that reading abilities of middle school students tend to improve over time for those who remain in band. Participants included band and nonband students in grades five through eight. Test results from the *Comprehensive Tests of Basic Skills* showed significant differences in reading achievement that favored band students.

Pearce (2000) developed a model for enhancing reading skills through instrumental music instruction. Band and orchestra students were required to read at least one music-related article weekly and write a short summary of the piece. Part of the

assignment included selecting a specific number of vocabulary words from the article, defining them, and writing each in a sentence. After a nine-week period, the project was expanded with options designed to encourage higher level thinking skills. These included writing synonyms and antonyms for the selected vocabulary words. Students were to substitute the new words in the article and observe if any changes in meaning occurred within the sentence. Another option required students to select a paragraph in the article and write a paragraph that challenged the position as stated in the article. All types of assignments had a point reward attached to them, which was reflected in the students' instrumental music grade each quarter.

Positive outcomes were observed in the first year of implementation. In the beginning, most students opted for the easiest way to complete the assignments. However, by the second year there was a significant shift toward the more time-consuming tasks. Increased enthusiasm and excitement resulted as students became more engaged in the reading project and discovered information they were not aware of previously.

The importance of piano/keyboard training as it relates to nonmusical outcomes was the focus of research conducted by Englehardt (2005). Using an experimental and a control group, 134 middle school students were equally divided; the experimental group received six months of keyboard instruction while the control group received none. Musical outcomes were measured, prior to and following the research, by means of the *Iowa Tests of Music Literacy.* Math and reading grades for each participant were recorded. First quarter grades served as a pretest to academic achievement while fourth quarter averages represented posttest measures. Results provided evidence suggesting

the use of keyboard training for enhancing academic achievement with at-risk students. However, the duration of instruction in the study may have been a contributing factor in the lack of conclusive data to support the educational benefits of piano instruction at middle school levels as a whole. This finding concurs with previous research which suggests a minimum time period of one year of piano/keyboard training for enhancing cognitive development (Costa-Giomi, 2000).

Johnson (2006) conducted research that examined relationships between student academic achievement and participation in high or low quality school music programs. The two-part study involved 1,119 elementary and 3,620 middle school students from several regions of the United States. Students in middle school were classified as participating in band, orchestra, or chorus. Students having little or no music experience were also classified. English and math scores on standardized tests were examined against student participation in music instruction. Findings from the study yielded clear positive distinctions in English and math scores based on the quality of music programs. Test scores of middle school students participating in exemplary instrumental and choral music instruction were higher than those of students having no music instruction. Even more interesting were results that showed students in deficient instrumental programs having higher scores on English standardized tests than nonmusic students. One of the three potential explanations for the findings suggests that many organizational skills and learning strategies found in music programs can assist students in the acquisition of knowledge in other academic disciplines (Olsen, 2008).

Summary and Connection to the Current Study

According to theoretical and empirical research, there is a positive relationship between the development of reading skills and active participation in the study and performance of music. Both disciplines make use of similar symbol systems and decoding processes for effective interpretation and conceptualization. Each field of study acts as a means of communication through visual and auditory mechanisms that develop discrimination between symbols used and sounds that are heard.

Such similarities depend on several factors. The potential to achieve is largely determined by environment, exposure, and experience. The more opportunities, activities, and knowledge an individual experiences, the greater the development in a particular area of learning. The age that formal training begins, accompanied by the duration of instruction, are also factors that affect the development of specific skills and cognition in any branch of learning.

Recent brain research reinforces the existence of links between reading and the study of music. Findings reveal that brain efficiency depends on the number and strength of synapses in transmitting and storing information. Increased frequency in storing and accessing information results in heightened brain development of the areas affected. Specific regions of the brain have been identified as being responsible for learning processes that are necessary to both reading and making music. However, music performance is a whole brain activity, strengthening neural connections and transferring information between both cerebral hemispheres.

The plasticity of the brain is most evident in early childhood development. Early and continuous education provides the optimum conditions for enhanced brain development as it relates to cognition and learning, both in reading development and

music performance. Regardless of the mental, emotional, physical, and physiological changes occurring during the middle school years, brain development can be further enhanced and maintained by those same factors originally credited for the developmental processes in early childhood.

Theoretical, empirical, and medical research have established associations between music and academic achievement that warrant consideration. While most literature has focused on the benefits of music instruction for young children, more research is needed to examine the effects of music interventions for nonmusical outcomes on older children. This proposed study will investigate the relationship between reading development and the study of music in sixth, seventh, and eighth grade students.

CHAPTER THREE

Methodology

Introduction

The purpose of this research was to examine the relationship between the study of music and the level of reading development in middle school students. Reading, understanding, and interpreting musical notation as it relates to melody, rhythm, harmony, tempo, and tone quality serve as indicators that learning has occurred. Achievement is authentically assessed by means of performance on musical instruments in various settings such as formal lessons, ensemble rehearsals, and concerts. The human voice is included since performers are able to demonstrate understanding and interpret musical notation vocally. Reading development involves auditory as well as visual recognition and comprehension of linguistic sounds as represented in words and sentences. Standardized tests and authentic assessments are utilized to measure cognitive growth in this content area.

Research Questions and Hypotheses

The collection of data served to address the following research questions:

1. Is there a relationship between the study of music and reading development in middle school students?
2. What is the nature of the relationship between the study of music and reading development in middle school students? The focus is on whether or not significant differences between ELA test scores of subjects having two or less

years of music instruction and assessment scores of subjects having more than two years experience in music performance can be observed.

3. What is the intensity of the relationship between the study of music and reading development in middle school students? A comparison of correlations across grade levels indicates how the association changes over time.

Data collected also tested the following null hypotheses:

1. There is no significant positive relationship between the study of music and reading achievement in middle school students that is directly proportional to the number of years an individual is actively engaged in musical activities.
2. There are no observable differences in reading development at the middle school level that favor students with more than two years of music instruction over students having two years or less.
3. The number of years a sixth grade student participates in music instruction has no significant positive relationship with reading development.
4. The number of years a seventh grade student participates in music instruction has no significant positive relationship with reading development.
5. The number of years an eighth grade student participates in music instruction has no significant positive relationship with reading development.
6. There are no observable differences in reading development at the middle school level that favor students currently engaged in music instruction over students who terminated or had no experience in the study of music.
7. There is no significant positive relationship between years a middle school student participates in band and reading development.

8. There is no significant positive relationship between years a middle school student participates in chorus and reading development.
9. There is no significant positive relationship between years a middle school student participates in orchestra and reading development.
10. There is no significant positive relationship between years a middle school student performs on a brass instrument and reading development.
11. There is no significant positive relationship between years a middle school student performs on keyboard instruments and reading development.
12. There is no significant positive relationship between years a middle school student performs on percussion instruments and reading development.
13. There is no significant positive relationship between years a middle school student performs on string instruments and reading development.
14. There is no significant positive relationship between years a middle school student performs on woodwind instruments and reading development.

Procedure

Research Design

The research perspective for this study was quantitative in that findings searched for a relationship. This investigation was correlational in nature since results analyzed relationships that may exist between standardized ELA assessment scores and 16 variables associated with music instruction. Analysis of data collected was conducted using the Pearson r correlation coefficient.

Site of Study

This study was conducted, with permission from the administrator, in a suburban school district in the western region of New York State that is made up of four elementary schools, one middle school, and one high school (see Appendix A). The predominantly Caucasian middle school had a population of 912 students in grades six through eight. A breakdown of student population according to grade level is as follows: sixth grade, 271; seventh grade, 321; eighth grade, 320. Students were selected from this particular middle school because of their accessibility in collecting data.

Population Sample

Of the total middle school population, 300 students, including students with special learning and/or physical needs, were randomly selected to participate in the study. However, 33 students were eliminated for various reasons. Of the 267 remaining participants, 83 were from sixth grade, 79 were from seventh grade, and 105 came from eighth grade. According to Gay and Airasian (2000), an appropriate sample for a population of 912 individuals is 269.

Instrumentation

Two instruments were used to represent the primary variables for the study. Test scores from the *New York State Testing Program for English language arts* (NYSTP), taken in January 2008, were compared against student responses that were recorded on a *Participation in Musical Activities* questionnaire (see Appendix B). The former is an approved standardized assessment in English while the latter was developed by the researcher.

NYSTP for English language arts is a valid assessment tool administered annually to students in third through eighth grades throughout New York State. Developed by

CTB/McGraw-Hill, in collaboration with the New York State Education Department and certified teachers, *NYSTP* is designed to address requirements of No Child Left Behind (NCLB). The tests are based on state learning standards, measuring four levels of performance in reading, listening, and writing. Results provide information useful in assessing student readiness for study at the next grade level in English language arts (NYSED, 2008).

The English language arts assessment addresses how accurately a student performs to state standards at a specific grade level. Raw scores are converted to scaled scores that fall within four levels of proficiency. The highest possible score is 800. Scores ranging between 650 and 800 make up levels three and four, indicating an ELA proficiency at grade level. Students scoring at levels one and two come under state mandate for academic intervention services (AIS) for a specified number of hours per week in reading.

Data analysis of the English language arts assessment is based on two sets of scores, multiple choice (MC) and constructed response (CR). Since the exam includes more than one type of question, two types of reliability statistics are necessary to calculate and assess the internal consistency, Cronbach's alpha and the Feldt-Raju coefficient. Both are appropriate for analyzing tests having multiple-item formats.

Overall test reliability for the 2008 NYSTP in English language arts in sixth, seventh, and eighth grades fall between 0.86 and 0.90. These results indicate high internal consistency which also constitutes evidence of construct validity. Reliability of MC items for the three grades range from 0.83 to 0.86 while those of CR items range from 0.66 to 0.84. Since reliability is directly affected by test length, estimates for tests by individual

item will always be lower than those for the overall test. However, reliability coefficients for CR items should be interpreted with caution as the number of items is significantly lower in comparison to MC items (CTB/McGraw-Hill, 2008).

The concept of utilizing a questionnaire in collecting data originated with a study conducted by Johnson (2006) where middle school students indicated to what degree they participated in instrumental music, choral music, or no music at all. Responses were compared against standardized test scores in English with findings establishing a relationship between participation in music and reading achievement. Designed to obtain information pertaining to levels of experience in the study of music, the *Participation in Musical Activities* questionnaire consisted of several items that students were asked to respond to in writing. Student responses indicated the number and type, if any, of musical instruments played and the duration of public school and/or private lessons. Questions associated with participation in band, orchestra, and chorus, within the school district as well as music ensembles in the community and/or church settings, were also included (suggested in the previously mentioned study by Johnson as a recommendation for future research). Any termination, if applicable, of instruction in the study of music was also indicated.

Description of Data Collection

Two weeks prior to the collection of data, each student in the middle school received a parent consent letter that explained the purpose of the study and requested permission to include his/her child in the selection process (see Appendix C). Written responses were required from students who either did not wish to participate or did not have parental permission. The time period for responses to be returned was one week.

Of the 912 students enrolled in the middle school, 87 indicated a preference to be eliminated from the study. Names of the remaining 825 students were obtained from computer print-outs supplied by the school attendance office and were cut, folded, and placed in a container. From the 825 students' names, 300 were randomly selected. These students were notified, in writing, regarding the date, time, and location of the study (see Appendix D).

Data collection took place in the school cafeteria, during a block of noninstructional time that varied with each grade level. Eighth grade students completed the questionnaire in the morning (third period) while students in sixth and seventh grades completed the questionnaire during the last two periods of the school day. Data from seventh grade students was obtained during eighth period and sixth grade data was collected during ninth period.

Students were provided with sharpened pencils and seated at tables in the cafeteria. After the questionnaires were passed out, students were instructed to print their first and last names in the space provided. This information was later removed after English language arts (ELA) assessment scores were attached to the correct questionnaire in order to assure anonymity. The purpose of the questionnaire was explained with verbal directions and examples given for each question. Students took approximately 10-15 minutes to complete the questionnaire. At the end of the period they were dismissed from the cafeteria. Several faculty members assisted in distributing and collecting materials.

While the quality of data collected did not seem to be significantly affected, the maturity level of each group combined with the time of day each grade level participated in the study was a concern. Collecting data toward the end of the school year may have

also contributed to the preciseness of responses received, since students were also preparing for final exams and looking forward to summer break. Eighth grade students filled out the questionnaire early in the day. They were attentive, seemed focused, and followed the directions as indicated. Seventh grade students took part in the study during the early afternoon. While subjects completed the questionnaire appropriately, there was not the same degree of attentiveness toward the task as was observed with eighth graders. Sixth grade students participated during the final period of the day. There was a noticeable decrease in the attention span of several students leading to speculation that a better focus to the task may have been achieved had this grade level answered the questions in the morning.

In order to protect the privacy of each individual, three faculty members assumed responsibility for matching individual ELA test scores with the appropriate questionnaire. Student scores were transferred from the master list of rankings to the lower right hand corner of the questionnaires. Following this procedure, the student name was cut off the questionnaire and discarded. Questionnaires were collated by grade level.

In reviewing the questionnaires, some responses did not align with either the verbal or written directions that were given. For example, a verbal directive instructed students to indicate years of participation in a musical activity with a whole number. Any half-year experience was to be rounded up. In situations where subjects listed a half-year, the figure was rounded up to the nearest whole number.

Some subjects listed more years of musical experience in a public school setting than years they were actually attending school. As an example, a sixth grader listed years of participating in school chorus as eight when the longest he/she could have been

eligible, in a normal progression from grade to grade, was seven. In this and other similar situations, the original response was used for analysis based on the following possibilities: the student had repeated a grade, transferred from a school where chorus was offered in kindergarten, or included singing in a preschool or kindergarten musical as choral experience.

Of the 300 subjects selected, data from 267 participants proved useful for analysis. A number of students were not in attendance for the study. Illegible handwriting eliminated some data. Other questionnaires bore fictitious names and had to be discarded. Three individuals had no test scores to compare with their responses on the questionnaire as they were students with special needs and were exempt from taking the state assessment. This data was also eliminated.

Data Analysis

From responses on the questionnaires, 15 variables were extrapolated from responses and entered for data analysis using the software package *Statistical Product and Service Solutions (SPSS 11.0).* All variables, with the exception of three, were represented by the number of years an individual was an active participant. They included the following:

- Total years of music instruction – As one of two primary variables, music instruction represented time a subject was actively involved in musical activities and/or received formal training through services available within and outside the school district. This was the largest number recorded across all variables. For instance, a student may have listed four years experience in playing a musical instrument but six years experience in chorus. The higher number was selected

since six represented the total years this student participated in musical activities and was subject to music instruction.

- Instrumentation – Six variables indicated the type of musical instrument subjects learned to play. Included were brass, percussion, woodwinds, strings, piano/keyboard, and voice. Classifications were based on similarities in the physical and technical aspects that facilitate appropriate sound production.
- School ensembles – Three variables included band, chorus, and orchestra.
- Ensembles outside the public school – Church music groups and community music organizations made up these two variables.

The remaining variables were represented by other means. They included:

- Status – Subjects currently active in the study of music were coded as 1. Students who terminated or had no formal music training were coded as 2.
- Grade level – Classifying subjects by grade level allowed for examining variations in the relationship between music and reading development across individual grades. There were 83 participants from sixth grade, 79 from seventh grade, and 105 from eighth grade.
- English/language arts (ELA) test results – This was indicated by individual scores on the January, 2008 assessment.

Analysis of the quantitative research design involved identifying the direction and magnitude of a relationship existing between two primary variables, namely, time spent actively participating in the study of music and assessment scores from standardized ELA tests. Further investigations were made by substituting each of the additional variables for total years of instruction and comparing them against the ELA test scores. The Pearson r

correlation coefficient, a research tool considered the most appropriate for determining a relationship between two variables, was used to obtain results.

Summary

Information presented in this chapter described and detailed the process of data collection for the current study. In the following chapter, results of the data that include descriptive statistics and correlations as they relate to the original hypothesis will be presented in table format. Any additional correlations that are detected and discerned as being significant will also be presented. Data analysis will signify the existence of a positive relationship between music and reading development in middle school students.

CHAPTER FOUR

Results of Data Analysis

Overview

The purpose of this study was to examine the nature and intensity of the relationship between music and reading development in middle school students. To determine if a correlation exists, data analysis was conducted, using the statistical software package, *SPSS 11.0.* Recognized as a comprehensive system for purposes of analysis, *SPSS 11*.0 is capable of taking data and using them to generate reports in the form of tables, charts, and plots. These formats illustrate distributions, descriptive statistics, and statistical analysis (*SPSS 11.00*, 2001). Information and data from the current study were organized in terms of the variables identified on a questionnaire and standardized test scores in English language arts (ELA).

A total of 267 students responded to a *Participation in Musical Activities* questionnaire that asked for information regarding their involvement in studying music. Responses were categorized into 14 possible variables and correlated with the 2008 ELA standardized test scores each student received. Assessment scores used were converted from raw to scaled scores and distributed across four levels of ELA achievement. Level 1 was the lowest indicator of achievement while level 4 represented mastery with distinction in English language arts.

The primary focus in the current research centered on the correlation between the total number of years each subject actively participated in the study of music and standardized ELA assessment scores. Preliminary observations of data revealed that 23

subjects, from the original sample size, scored at the highest level of ELA achievement. Of this number, 21 participated in music at the time the study was conducted.

Descriptive Statistics

Descriptive statistics of all 267 subjects revealed the average number of years a student actively participated in musical activities to be slightly more than five. The span of test scores ranged from 597 to 790. The average test score was 673.46. (see Table 1).

Table 1

Descriptive Statistics: Years of Music Study and ELA Test Scores

	n	Minimum	Maximum	Mean
Years of Music Instruction	267	0	11	5.22
ELA Assessment Scores	267	597	790	673.46

Table 2 shows descriptive statistics on those subjects engaged in music instruction for two years or less. Previous research suggested less than two years as being insufficient for observing significant differences in cognitive development as a result of active participation in music instruction (Piro & Ortiz, 2009; Rauscher, 2003). Since the total number of subjects examined with less than two years of music instruction encompassed a small sample (19), students with two years of music experience were included. The new total of 38 subjects is considered an appropriate sample size for correlational purposes (Gay & Airasian, 2000). Results are included here to compare with data related to subjects who had more than two years of music instruction. Findings yielded a lower average assessment score than overall results.

Table 2

Descriptive Statistics: Two Years or Less of Music and ELA Test Scores

	n	Minimum	Maximum	Mean
Years of Music Instruction	38	0	2	1.26
ELA Assessment Scores	38	602	709	665.26

Mean scores were calculated for subjects who actively participated in the study of music longer than two years. Results showed an increase in the average test score that was higher than findings associated with students having less than two years of music instruction. The mean test score was also slightly higher than the overall average. Similar findings were observed with the average number of years students participated in music instruction. (see Table 3).

Table 3

Descriptive Statistics: Music Instruction Longer Than Two Years and ELA Test Scores

	n	Minimum	Maximum	Mean
Years of Music Instruction	229	3	11	5.88
ELA Assessment Scores	229	597	790	674.83

Correlations

The Pearson product-moment correlation coefficient for the total years of music instruction and English language arts test scores for 267 students is .262 (see Table 4). Indications reveal that this correlation is significant at p= .01, suggesting a positive

relationship between the active participation of middle school students in music instruction/musical activities and levels of reading development.

Table 4

Correlation Between ELA Test Scores and Years of Music Instruction

	Years of Music Instruction		
ELA	r=.262	p=0.01	n=267

Data analysis was conducted on subjects having two years or less of music instruction and English/language arts test scores (see Table 5). Results show no observable differences between the amount of time participating in musical activities and reading development. According to Gay and Airasian (2000), small sample sizes require higher correlation coefficients to be considered statistically significant in research. A sample of 38 subjects needs a coefficient of about .304 (p=0.05) or .393 (p=0.01).

Table 5

Correlation Between ELA Test Scores and Two Years or Less of Music Instruction

	Two Years or Less of Music Instruction	
ELA	r=.253	n=38

Table 6 shows the correlation between ELA test scores and students with more than two years of music instruction. The sample size is considerably larger, necessitating a lower correlation coefficient to be significant. In this case, analysis indicates a significant positive relationship between students with more than two years of music instruction and ELA test scores.

Table 6

Correlation Between ELA Test Scores and More Than Two Years Music Instruction

	Two or More Years Music Instruction		
ELA	r=.231	p=0.01	n=229

Correlations between total years of music instruction and reading development, across single grade levels, were conducted to observe any statistical similarities or discrepancies to the overall findings in Table 4. Data at the sixth grade level yielded a correlation between total years of music instruction and reading development that was considerably lower from overall results, indicating no significance at either the 0.01 or 0.05 levels (see Table 7).

Table 7

Correlation Between ELA Test Scores and Sixth Grade Music Instruction

	Sixth Grade	
ELA	r=.197	n=83

Data for participants in seventh grade yielded a higher correlation coefficient, r=.229, which, while lower than overall findings in Table 4, is a significant correlation at the 0.05 level (see Table 8).

Table 8

Correlation Between ELA Test Scores and Seventh Grade Music Instruction

	Seventh Grade		
ELA	r=.229	p=0.05	n=79

When comparing data from eighth grade subjects, the correlation between total years of music instruction and English language arts test scores was higher than that of sixth grade students but slightly lower than seventh graders. The correlation coefficient was significant at the 0.05 level, r=.226 (see Table 9).

Table 9

Correlation Between ELA Test Scores and Eighth Grade Music Instruction

	Eighth Grade		
ELA	r=.226	p=0.05	n=105

Results indicate that correlations seem to level off in intensity between seventh and eighth grade. This suggests that the relationship between music instruction and reading development may intensify through seventh grade. During eighth grade the relationship may simply be one of sustaining the benefits the study of music has on reading development.

Further analysis of data was conducted on the relationship between music instruction and reading development as it related to individuals currently participating in musical activities and those who terminated instruction or had none at all. Of the 267 participants, 157 were involved in music instruction at the time of the current study. Their status, for statistical purposes, was coded as 1. The remaining 110 were coded as 2 for having terminated music instruction or having no formal musical training. Correlations for each group indicated a stronger and significant positive relationship for students currently participating in music instruction than for the group having little or no involvement in musical activities (see Tables 10 and 11).

Table 10

Correlation Between ELA Test Scores and Current Involvement in Music Instruction

	Currently Involved in Music		
ELA	r=.205	p=0.05	n=157

Table 11

Correlation Between ELA Test Scores and Students Terminating/No Music

	Students Terminating/No Music	
ELA	r=.141	n=110

Correlations Between Other Variables and ELA Assessment Scores

Analysis was conducted on 12 of the remaining variables, comparing data collected with standardized assessment scores to observe the intensity of any positive or negative correlation. Statistical data on six variables yielded no correlational significance that established a relationship. These included formal training in strings, keyboard, and voice, as well as participation in orchestra, church ensembles, and community music organizations. When compared with ELA assessment scores, formal training in percussion instruments yielded a significant positive correlation coefficient, r=.474. However, the sample size, 18 subjects, was considerably smaller than the minimum of 30 that is recommended by Gay and Airasian (2000) for correlational purposes (see Appendix E, Table 1).

Data from four variables revealed a statistical significance between specific types of music instruction and reading development in middle school students. Among subjects

participating in music ensembles, findings yielded a significant positive correlation between English language arts test scores and years of involvement in band (see Table 12). A statistically significant correlation between years of participation in chorus and ELA test scores was also observed (see Table 13).

Table 12

Correlation Between ELA Test Scores and Band Participation

	Band Participation		
ELA	r=.360	p=0.01	n=137

Table 13

Correlation Between ELA Test Scores and Chorus Participation

	Chorus Participation		
ELA	r=.211	p=0.01	n=245

Analysis of the relationship between specific instrumental classifications and reading development in middle school students yielded a positive correlation with subjects actively involved with brass and woodwind instruments (see Tables 14 and 15).

Table 14

Correlation Between ELA Test Scores and Brass Playing

	Brass Instruments		
ELA	r=.342	p=0.05	n=44

Table 15

Correlation Between ELA Test Scores and Woodwind Playing

	Woodwind Instruments		
ELA	r=.273	p=0.05	n=85

Summary

Statistical results from this research indicate higher ELA test scores that favor students actively engaged in music instruction. Correlations statistically stronger than the original hypothesis included band participation and learning to play a brass or woodwind instrument. In addition, subjects with more than two years of music instruction revealed observable differences in cognitive function as they relate to reading achievement. Interpretation of these differences is discussed in the following chapter. Suggestions for conducting research similar to the current study are also considered.

CHAPTER FIVE

Summary and Discussion

Introduction

As a source of assistance to the reader, the final chapter restates the research problem and reviews the methodology utilized in the study. Data analysis is recapitulated as it relates to the original hypotheses. The major sections that follow summarize the results and discuss potential implications with recommendations for future research.

Restatement of the Problem

As explained in chapter 2, American public education has experienced a gradual reduction or elimination of arts programs to accommodate increased instructional time in reading, mathematics, and the sciences. Other nations, while retaining music in the curriculum, have moved ahead of the United States in academic achievement. Considerable research suggests that individuals actively involved in the study of music over time have higher grades in school and on standardized tests. Studies examining the relationship between academic achievement and music performance also found specific differences in math and reading development that favored students engaged in music instruction. Since empirical research related to a specific academic discipline at middle school levels is limited, in comparison to elementary grades, this study examined the association active participation in musical activities has with reading development in sixth, seventh, and eighth grade students.

Review of Methodology

The study was conducted from a perspective that originally focused on searching

for a correlation between two variables, namely, scores from standardized testing in English language arts (ELA) and years of participation in the study of music through various venues. Additional variables were extracted from data collected to examine other possible relationships existing with the test scores.

Research relied primarily on the responses of middle school students to questions related to the type and duration of formal training in music that was experienced by each individual. Data collected included years of participation in music ensembles both in and outside the public school setting. Analysis was conducted using the *SPSS 11.0* software package. Findings originated from bivariate data utilizing the product moment of correlation coefficient (Pearson r).

Description of Findings

Data analysis was conducted to investigate the relationship between the study of music and reading development in middle school students. Results from correlational research yielded coefficients indicating direction and intensity of any associations. The following results were examined in relation to 14 null hypotheses presented in chapters 1 and 3.

1. There is no significant positive relationship between the study of music and reading achievement in middle school students that is directly proportional to the number of years an individual is actively engaged in musical activities.

A total of 267 English language arts (ELA) test scores from grades 6, 7, and 8 were compared with total years subjects participated in music instruction. Findings revealed a significant positive correlation coefficient ($p=0.01$) between assessment scores and years a student was engaged in the study of music ($r=.262$). Based upon the results,

the first null hypothesis is rejected. There is a significant positive relationship between years of participation in the study of music and reading achievement in middle school students.

2. There are no observable differences in reading development at the middle school level that favor students with more than two years of music instruction over students having two years or less.

The correlation coefficients associated with ELA test scores of students with two or less years of music instruction were compared with coefficients related to ELA test scores of students having more than two years of music instruction. No significant positive or negative relationship between assessment scores and participation in musical activities was observed in students with two or less years of instruction. However, a significant positive correlation was found with subjects actively engaged in music performance for more than two years. Based on the results of these comparisons, null hypothesis two is rejected. Differences in reading development exist that favor students with more than two years of music instruction.

3. The number of years a sixth grade student participates in music instruction has no significant positive relationship with reading development.

ELA test scores from 83 sixth grade students were compared with total years of music instruction. Findings yielded no significant correlation coefficient between the two variables (r=.197). Based on these results, null hypothesis three is accepted.

4. The number of years a seventh grade student participates in music instruction has no significant positive relationship with reading development.

A total of 79 ELA test scores were compared with total years of music instruction each student had. The correlation coefficient was significant (r=.229). Based on this finding, null hypothesis four is rejected. There is a significant positive relationship between years of participation in the study of music and ELA test scores across seventh grade students.

5. The number of years an eighth grade student participates in music instruction has no significant positive relationship with reading development.

Total years of music instruction were compared with the ELA test scores of 105 students in eighth grade. A significant positive correlation coefficient (r=.226) resulted. This finding necessitates the rejection of null hypothesis five. There is a significant positive relationship (p=0.05) between years of participation in the study of music and ELA test scores across eighth grade students.

6. There are no observable differences in reading development at the middle school level that favor students currently engaged in music instruction over students who terminated or had no experience in the study of music.

A comparison of correlation coefficients was made between students who were involved in music instruction at the time the current study was conducted and those who terminated study or had no prior musical experience. A significant positive coefficient was observed that favored students currently involved in musical activities while no such association existed with the other group. On that basis, null hypothesis six is rejected. There is a significant positive relationship between years of participation in the study of music and ELA test scores with middle school students currently involved in formal

music training. No significant relationship exists for students who terminated formal music training or had none at all.

7. There is no significant positive relationship between years a middle school student participates in band and reading development.

A total of 137 ELA test scores were compared with total years subjects actively participated in band. The correlation coefficient was significant at .360. The relationship proved to be not only positive but the highest result of all the hypotheses tested. Based on this finding, null hypothesis seven is rejected. There is a significant positive relationship between participation in band and reading development with middle school students.

8. There is no significant positive relationship between years a middle school student participates in chorus and reading development.

Of the 267 subjects examined, 245 had musical experience in chorus. This was the largest number of students making up a single variable. ELA test scores were compared with total years a student participated in chorus. Results showed a significant correlation coefficient of .211. Based on this finding, null hypothesis eight is rejected. There is a significant positive relationship between participation in chorus and reading development with middle school students.

9. There is no significant positive relationship between years a middle school student participates in orchestra and reading development.

A total of 66 student ELA test scores were compared with total years of involvement in orchestra (see Appendix E). Findings showed a correlation coefficient that was not significant at either the 0.01 or 0.05 level (r=.168). Therefore, null hypothesis nine is accepted.

10. There is no significant positive relationship between years a middle school student performs on a brass instrument and reading development.

From the group of students who participated in the study, 44 were brass instrument players. ELA test scores were compared with years subjects were actively engaged in music performance. Findings revealed a correlation coefficient that was significant, r=.342. Based on this result, null hypothesis ten is rejected. There is a significant positive relationship between reading development and music instruction on brass instruments with middle school students.

11. There is no significant positive relationship between years a middle school student performs on keyboard instruments and reading development.

A total of 54 student ELA test scores were compared with total years of involvement in piano/keyboard instruction (see Appendix E). Findings showed a correlation coefficient that was not significant at either the 0.01 or 0.05 level (r=.193). Based on the results, null hypothesis eleven is accepted.

12. There is no significant positive relationship between years a middle school student performs on percussion instruments and reading development.

A total of 18 ELA student test scores were compared with years subjects were actively engaged in music performance using percussion instruments. Results yielded a significant correlation coefficient, r=.474. Based on the findings alone, null hypothesis twelve is rejected.

13. There is no significant positive relationship between years a middle school student performs on string instruments and reading development.

A total of 99 student ELA test scores were compared with years of involvement on string instruments (see Appendix E). Findings yielded a correlation coefficient that was not significant at either the 0.01 or 0.05 level (r=.113). Based on the results, null hypothesis is accepted.

14. There is no significant positive relationship between years a middle school student performs on woodwind instruments and reading development.

From the group of students who participated in the study, 85 were woodwind instrument players. ELA test scores were compared with years subjects were actively engaged in music performance. Findings revealed a significant correlation coefficient, r=.273. Based on the results, null hypothesis fourteen is rejected. There is a significant positive relationship between reading development and music instruction on woodwind instruments with middle school students.

Discussion of the Results

Of the 14 null hypotheses tested, four were accepted based on results related to the current study. No significant associations, either positive or negative, were found when ELA test scores were compared with total years of music instruction in sixth grade (hypothesis three), orchestra (hypothesis nine), piano/keyboard training (hypothesis eleven, and string instruments (hypothesis thirteen). These findings suggest the absence of a relationship between music instruction and reading development in middle school students within the specific variables.

The remaining 10 null hypotheses were rejected, suggesting the existence of a positive relationship between the study of music and reading development among middle school students. The relationship intensifies through seventh grade and is generally

sustained throughout eighth grade as students continue participating in musical activities. This is particularly evident with individuals who have formal training in learning to play brass and woodwind instruments while actively participating in band. Involvement in school choral ensembles may also be beneficial to enhancing reading development.

Results observed are similar to findings in a study conducted by Johnson (2006) who compared years of experience in musical activities with ELA and math assessment scores from middle school students located in four regional areas of the United States. Findings showed differences in math and reading development that favored students actively engaged in choral and instrumental music programs.

When examining relationships, according to Gay and Airasian (2000), a correlation coefficient is interpreted in terms of its statistical significance. The level of significance is an indicator of the probability that a relationship is a true one. In light of the results presented, the correlation between the study of music and reading development in middle school students reflects a true statistical relationship as opposed to a chance one with no meaning ($p=0.01$).

Coefficients below .35 indicate a low or weak relationship, regardless of how significant the coefficient is. Findings from the current study reveal a positive but weak relationship between the study of music and reading development among middle school students. Similar results were observed with those variables that yielded significant positive outcomes. The exception was the relationship between participation in band and reading development ($r=.360$). A coefficient at this level indicates a moderate relationship (Gay & Airasian, 2000).

A significant correlation was found between years of music instruction and ELA test scores that favored students with more than two years of musical experience. These findings coincide with previous research that yielded similar conclusions. The longer an individual participates in the study of music, the more possible it is to detect positive benefits formal training may have on cognitive development. Dickinson (1997), Jensen (2000), and Schellenberg (2004) recommended weekly music lessons for a minimum of seven to eight months Costa-Giomi (1999) suggested instruction lasting longer than one year. Rauscher (2003) and Piro and Ortiz (SAGE Publications, 2009), however, affirmed that significant observations of musical influences on reading and math development could not be adequately detected without active participation in music performance lasting at least two years. Results from the current study examined subjects in light of the longest time period recommended.

Findings from research conducted showed differences in reading development at the middle school level that favored students actively engaged in music instruction over those who terminated study or had no musical experience at all. This suggests that the longer an individual participates in the study of music the greater the enhancements such training may have on cognitive functions that influence other academic disciplines. Studies by Babo (2001), Holcomb (2007), and Catterall et. al. (1999) concur, stating that sustained involvement in music can influence success in math and reading.

While overall results suggest a weak correlation between the study of music and reading development with middle school students, evidence implies a true association that intensifies and is sustained over time. Additionally, students who continued active involvement in making music had a stronger correlation with ELA test scores than

students who terminated participation or had no formal training in music. This supports the theory that continuous involvement in the study of music enhances reading achievement.

Findings from the current study form the basis for answering three research questions stated in previous chapters.

1. Is there a relationship between the study of music and reading development in middle school students? Yes, a significant positive association exists between music instruction and reading development at the middle school level. This relationship is true as opposed to one that occurs by chance.

2. What is the nature of the relationship between the study of music and reading development in middle school students? Significant differences in reading development can be observed that favor students actively participating in music instruction for more than two years. This suggests an approximate time frame of regular and continuous participation in musical activities necessary for enhancements on cognitive functions.

3. What is the intensity of the relationship between the study of music and reading development in middle school students? The relationship between music instruction and reading development is one that increases and is sustained over time the longer an individual is actively engaged in musical activities.

Factors Explaining the Results

Conclusions from some empirical research question whether the association between the study of music and reading development is the result of enhancements one discipline has over the other. Kemmerer (2003) stated it is possible that more intelligent students are naturally attracted to and engage themselves in musical activities. This

serves to explain why assessment scores are higher. Bowles (2003) proposed that music may not enhance reading ability to the extent research implies. The possibility exists that exceptional reading ability predisposes students to study music. The quality of music programs, according to Johnson (2006) and Winner and Cooper (2000), may play an important role in relating the study of music to reading development. Academically gifted students are attracted to superior programs where they may positively enhance the environment for other individuals.

Students who are actively engaged in the study of music may be self-motivated in practicing and learning musical concepts to the same extent they process information in other academic subjects. These students are self-disciplined and take significant interest in the quality of their work/performance. Parental influence may also play an important role when the same emphasis that is placed on completing homework is also stressed in practicing a musical instrument (Winner & Cooper, 2000).

Relationship of Current Study to Prior Research

In clarifying the relationship between music participation and academic development in middle school students, previous studies yielded positive findings. Research conducted by Babo (2001) and Fitzpatrick (2006) concluded that instrumental music programs have a significant impact on academic achievement, particularly math and reading development, based on standardized test scores favoring students actively involved in formal music training. Prior research also suggests that years of instruction in the study of music can influence academic results in a positive manner. Of the various academic disciplines, Babo (2001) found that years of formal music instruction with eighth grade students had the largest positive impact on reading/language achievement

and mathematics. Neuharth (2000) observed significant differences in reading achievement that favored band students even after one year of participation in the study of music. Reading abilities tended to improve over time for those students who remained in band. While keyboard instruction had a positive influence with at-risk middle school students, Englehardt (2005) found significant correlations in examining several variables, one of which was reading achievement. Johnson (2006) conducted research using factor analysis that found middle school students in instrumental music programs scoring higher on English and math standardized tests than those with no music instruction.

Unanticipated Findings

The current study hypothesized the existence of a significant relationship between music instruction and reading development that intensifies over time in middle school students. However, data analysis of eighth grade subjects revealed a slightly lower correlation coefficient (r=.226) than seventh grade (r=.229). These statistics indicate a possible stabilization of the influence of the study of music on reading achievement at this level. As mentioned in a previous chapter, Gordon's music learning theory (1977) stated that musical aptitude is largely determined by environmental factors and experience. These influences have diminishing effects on musical aptitude once an individual moves from the developmental to the stabilized stage of achievement which is around the age of 10. Since Gordon did not rule out the possibility that eighth grade students may be in a borderline process of moving from one stage to another, speculations suggest that subjects examined may have reached the stabilized stage of musical aptitude by the time ELA standardized testing was administered. Given the minimal effects environment and exposure have on musical aptitude in the stabilized

stage of development, influences that the study of music might have on other academic disciplines may be negligible at this period of adolescent development.

Other unexpected findings revealed a significant discrepancy between subjects who participated in formal training playing a string instrument and subjects playing a band instrument. Wallick (1998) examined equal numbers of fourth grade instrumental string and nonstring students for variations in academic achievement on standardized tests. Statistically different results surfaced in reading that favored the string students. While this particular study involved elementary subjects, it was anticipated that similar findings might be observed with middle school students. Results suggested just the opposite. Data analysis revealed no significant relationship between the study of music utilizing string instruments and reading development at middle school levels (see Appendix E, Tables 2 and 3).

Several instrumental music educators employed by the school district were questioned, separately, about the discrepancy. Of the various possibilities suggested, the same explanation was mentioned by each individual interviewed. The band/ orchestra recruitment process within some of the district elementary schools was perceived as having an influence on the results of the current study. Gordon's *Primary Measures of Musical Audiation* is administered to third grade students prior to selecting an instrument. Because the community places a greater emphasis on band instruction, elementary students with higher scores on the measurement tool are frequently recruited for learning to play a brass, woodwind, or percussion instrument. One of the educators interviewed hypothesized that a replication of the study in a school district where instruction in band

and string instruments shared equal importance might have outcomes differing from those of the current research.

Additionally, results related to the effects of piano/keyboard instruction on reading development yielded findings that were contrary to similar research conducted in elementary grades (see Appendix E, Table 4). The sample size was appropriate, as 54 subjects in the study participated in piano instruction. However, Gay and Airasian (2000) noted that for a true relationship to exist with this sample size, a correlation of at least .273 (p=0.05) or .354 (p=0.01) is necessary. The current study yielded no significant results (r=.193). A possible explanation for this finding at the middle school level may be the amount of practice and/or motivation needed to succeed at performance. Whereas a motivating factor to practice a musical instrument in a public school setting may be the numerical grades that are assigned each marking period, piano/keyboard instruction occurs in private settings where achievement is more dependent on individual persistence and/or parental stimulus.

Implications for Practice

A single research study cannot provide a sound basis for establishing and explaining the relationship between music and reading development in middle school students. This investigation does, however, contribute to a growing body of empirical research that supports active participation in making music for the enhancements it provides in further developing reading skills beyond elementary education. Factors affecting the relationship include the passage of time and continued involvement. Findings also continue to support research related to brain activity that occurs as a result of music-making activities. The study of music is a venue that scientific brain research

refers to as having potential for stimulating growth and development in the areas of creative and academic cognition. Since evidence confirms that music instruction does not have a negative impact on reading achievement, building a case for continued inclusion of music education in middle school curriculums warrants serious consideration (Andrews, 1997; Butzlaff, 2000; Chang, 2000; Kinney, 2005; Neuharth, 2000).

The importance of studying music in early childhood is well-documented in research. Continuation of music instruction through the middle school years suggests a strengthening of the relationship anywhere from marginal to moderate levels. Left uninterrupted, the study of music may have more significant gains in reading development through secondary education and beyond.

While the study of music enhances academic achievement, characteristics that define music education for its own entity should not be underestimated or ignored. Eisner (1999) asserted that arts educators are conceding that the arts are not important apart from their contributions to more important subjects. This could prove disconcerting because "if you say the reason to teach music is to make people better in math, and it turns out that it doesn't make people better in math, then you have a real problem in continuing to teach music" (Gardner, 1999, p.18). Justifying the inclusion of music education in a middle school curriculum should be based on what it offers in developing intellectual and emotional areas of cognition that other academic disciplines can or do not (Hetland & Winner, 2001). Making music is an activity that fosters the creativity and expression of an individual. Additionally, the study of music allows for subjective interpretation of thoughts, ideas, and emotions that cannot always be effectively communicated by other

measures. How successful an individual becomes in these areas may depend on the opportunities that are available to realize and develop that innate potential.

Limitations of the Study

- This study was conducted during the 2007-2008 school year using students from one middle school containing sixth, seventh, and eighth grades.
- The study of music was limited to active music making on a musical instrument. It did not include passive listening or music learned in a general music class.
- The scope of the study focused on the enhancement of ELA test scores as a result of active participation in the study of music through formal training. A state standardized English assessment served as one measurement tool while a descriptive questionnaire was another.
- Information asked for on the questionnaire included the number of years an individual was actively engaged in musical activities, the structure of those activities, and instrumentation utilized for participation purposes.
- Data collection took place toward the end of the school year (June). Variables such as room temperature, time of day and year, and location may have been contributing factors to how appropriately the questionnaire was completed.

Recommendations for Future Research

Previous research suggests a positive relationship between learning to play a string instrument and reading development at elementary levels. However, the present study reveals no correlation in middle school grades. Replicating the same investigation in a school district where equal importance is placed on band and string programs may yield results in keeping with prior findings.

Literature suggests that the longer an individual is actively engaged in the study of music, the more significant are the academic gains (Babo, 2001; Catterall, et. al., 1999; Jensen, 2000; Mauk, 2009; Northwestern University, 2007; Ponter, 1999; Schellenberg, 2004; Wilcox, 1999). Since extended studies seem to produce the most conclusive results, observing a specific population from elementary through high school is recommended for further consideration. Long-term investigations are more time-consuming; however, researchers caution that formal training in music making lasting less than one year is not sufficient enough to adequately evaluate its relationship with reading achievement (Bowles, 2003; Jensen, 2000; Rauscher, 1999; Schellenberg, 2004). Wilcox (1999) speculated that a possible failure of numerous investigations lay in the short time periods that musical interventions were applied to control groups. Findings where the study of music lasts longer than two years may reveal significant differences in the strength of the correlation while providing valuable information related to cognitive function (Rauscher, 2003).

The possibility of a transfer of knowledge from one discipline to another, which suggests benefits in the learning processes of both, has yielded mixed results in research (Andrews, 1997; Bygrave, 1996; Chang, 2000; Dickinson, 1997; Englehardt, 2005; Gromko, 2005; Ingram, 2003; Johnson, 2000; Kemmerer, 2004; McIntire, 2007; Rauscher & Hinton, 2006; Teitelbaum & Gillis, 2004; Tunks, 1992; Wallick, 1998; Wolff, 2004). Given the parallels that exist in the learning processes of reading text and reading music, future research into transferability as it relates to specific similarities that facilitate cognitive performance is suggested. Such an examination may yield specific skills and/or abilities that transfer between two or more fields of study.

Prior research raises the possibility of strong readers being predisposed to learning a musical instrument (Bowles, 2003; Butzlaff, 2000; Johnson, 2006; Kemmerer, 2004). Consideration should be given to examining the association between levels of reading skills and any inclination a young child may have to learn a musical instrument before formal training in the study of music commences.

The current study did not take into account gender or race as having any influence on statistical data and results. A suggestion for future research is an investigation of the relationship between music instruction and reading development in middle school males and females or as related to race.

Conclusions

There is evidence in this study that suggests the existence of a relationship between active participation in the study of music and reading development in middle school students. While the association is weak, it is positive and true, meaning it is not a relationship that occurred by chance. In addition, this relationship is more observable with individuals having two or more years of formal training in music performance.

Learning to play a band instrument (i.e., brass or woodwind) and participating in ensembles that feature such instrumentation have the most significant impact on reading development. This may be due to a combination of the technical requirements needed for effective performance, self-discipline, and/or parental influence. Whatever the factor(s), medical research confirms that playing music activates multiple areas of the brain, thus enhancing cognition and increasing brain efficiency.

The importance of music education in public school systems of the United States should not be justified solely on the basis of its effects on other academic fields of study.

Making music should be recognized for the cognitive and emotional effects it has on the individual. Viewed from this perspective, music and the arts play a valuable role in developing the whole person, completing the educational process as Dewey envisioned it (Berube, 1999), and communicating in ways that words alone will not suffice.

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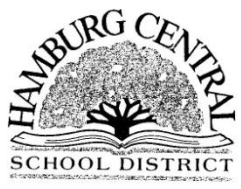
Appendix A

School District Letter of Permission to Conduct Research



Pursuing Excellence Through Partnership

1/2/08

January 2, 2008

Ms. Ellen Milacci
Assistant to the Director
Graduate Center for Research and Evaluation
Institutional Review Board
Liberty University

Dear Ms. Milacci:

As building principal, I give Juanita Huber permission to conduct her research data here at Hamburg Middle School. If you have any questions please call me at 646-3251.

Sincerely,

Geoffrey Grace
Principal

GG/sh

C: J. Huber

Hamburg Middle School
360 Division Street
Hamburg, NY 14075-4598
Telephone (716) 646-3250 • Fax (716) 646.3272

Administration Building
5305 Abbott Road
Hamburg, NY 14075-1699
(716) 646-3200

Armor Elementary
5301 Abbott Road
Hamburg, NY 14075-1698
(716) 646-3350

Boston Valley Elementary
7476 Back Creek Road
Hamburg, NY 14075-7202
(716) 646-3240

Charlotte Avenue Elementary
301 Charlotte Avenue
Hamburg, NY 14075-3895
(716) 646-3370

Union Pleasant Elementary
150 Pleasant Avenue
Hamburg, NY 14075-4828
(716) 646-3280

Hamburg High School
4111 Legion Drive
Hamburg, NY 14075-4595
(716) 646-3300

Appendix B

Participation in Musical Activities Questionnaire

Name_____

Active Participation in Musical Activities

START HERE:

1. Do you presently take lessons for one or more musical instruments? (The voice is considered a musical instrument.)

_____YES _____NO

If you answered "no", skip to question #5.

2. List the musical instrument(s) you play and the number of years you have played each. COUNT THE CURRENT YEAR.

Instrument	Number of Years
A) _____	A)_____
B) _____	B)_____
C) _____	C)_____

3. How many years, including this one, have you taken music lessons at school?

_____number of years

4. How many years, including this one, have you taken private lessons?

_____number of years

5. If you have played a musical instrument, in the past, but no longer take lessons, list the instrument and number of years you played.

Instrument	Number of Years
A) _____	A) _____

6. List the number of years you have participated in each of the following musical groups.

Chorus_____ Band_____ Orchestra_____

7. List the number of years you have participated in musical group <u>outside of school</u> (church choirs, community choruses, bands, and orchestras.

Group	Number of Years
_____	_____

Appendix C

Parent Consent Letter

May, 2008

Dear Parents and Hamburg Middle School Students:

I am a teacher at HMS, studying for a doctorate in education (EdD). As a final requirement, a research project is being conducted that examines the relationship between music instruction and the reading development of middle school students. This school has been selected as a source of possible participants in this study. Involvement is voluntary. However, parental permission is needed in order for student participation.

A minimum of 270 volunteers is needed for the research to be effective. Even if you are not involved in musical activities, your participation will provide valuable information related to the results. Volunteers will fill out a questionnaire that asks for years of experience in taking instrumental lessons, involvement in music ensembles, and the instruments you have played or currently play. Completion time will be10-15 minutes, during school hours (ENCORE).

Responses will be compared against scores received on the *New York State English/Language Arts* assessment taken in January, 2008. Student data used will be treated with confidentiality and anonymity. For identification purposes, student names will be substituted with an ID number assigned by a guidance counselor.

Student participation in the study needs no response from you. However, if you prefer that your child <u>not</u> be involved, please fill out the bottom portion of this letter and return to your child's homeroom teacher by the end of the week.

Thank you.

Mrs. Huber, Hamburg Middle School vocal music teacher

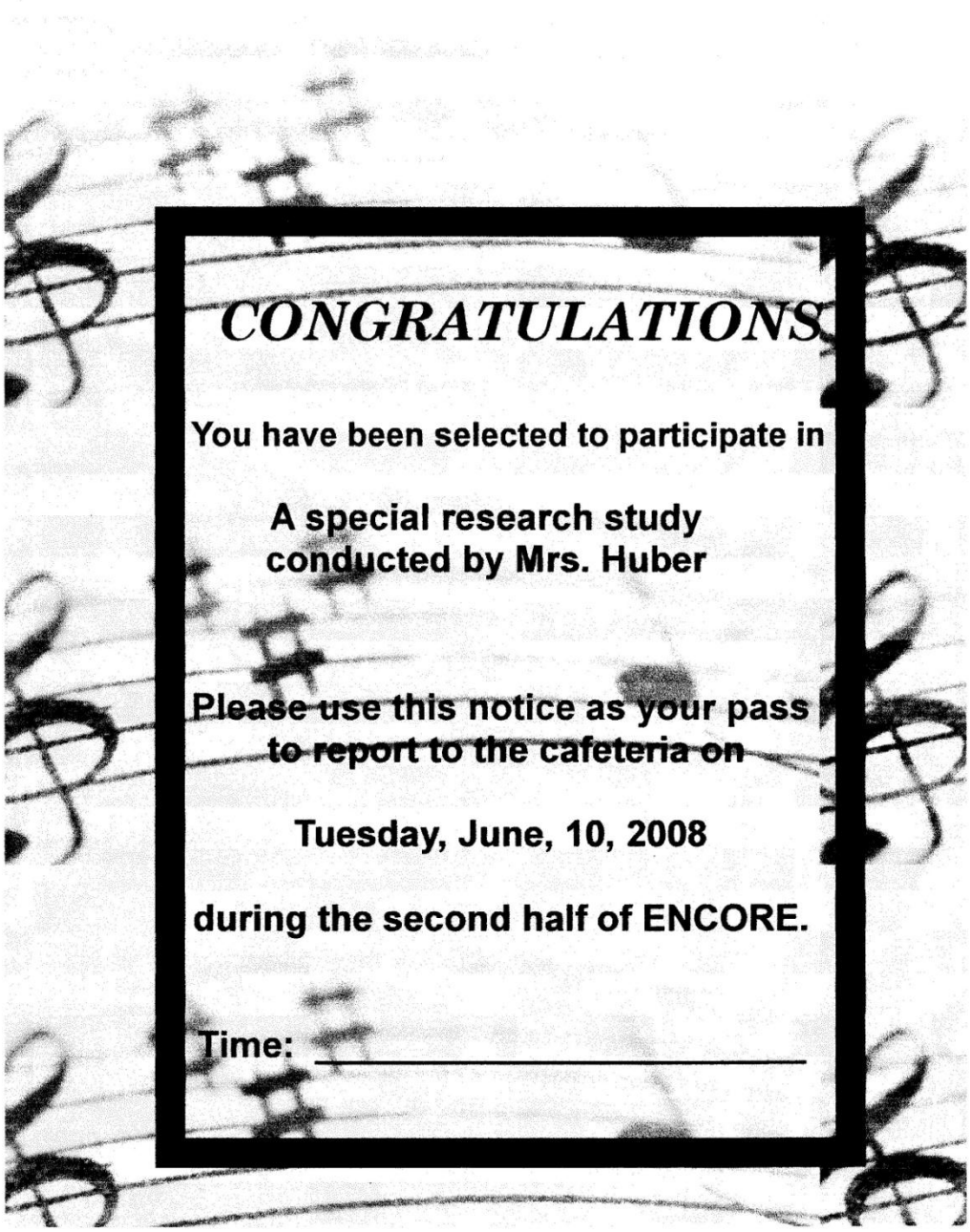
I prefer that my child, _____ not participate in the research study.

Parent Signature_____

Parent Signature_____

Appendix D

Student Selection Notification Letter



Appendix E

Correlational Tables

Table 1

Correlation Between Percussion Instrument Training and ELA Test Scores

	Percussion Instruments		
ELA	r=.474	p=0.05	n=18

Table 2

Correlation Between String Instruments and ELA Test Scores

	String Instruments	
ELA	r=.113	n=99

Table 3

Correlation Between Orchestra Participation and ELA Test Scores

	Orchestra Participation	
ELA	r=.168	n=66

Table 4

Correlation Between Piano/Keyboard Instruction and ELA Test Scores

	Piano Instruction	
ELA	r=.193	n=54