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Interdisciplinary Studies in General Music Education: Enhancing Learning Across Content Areas

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by

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Abstract

Some perspectives of educators and community members in small rural school districts fail to see the academic benefits of music education and the importance of integrated forms of study, despite the many clear connections that can be seen between the general music curriculum and other content areas such as math and language arts. Interdisciplinary studies in general music education are essential for student growth across content areas. This study reveals the importance of music integration and interdisciplinary music studies in small rural elementary schools. It gives example lessons of mathematics and language arts in the elementary music curricula. Guided by literature and observational data, this qualitative case study explores interdisciplinary studies in elementary general music classrooms. Findings on interdisciplinary music connections across content areas, music integration, and music and the brain have emerged as themes through exploring existing literature and observations of music classes in small rural elementary schools. Since music education longs to be understood, this study and the interdisciplinary lessons provided could benefit elementary general music education teachers and advance elementary teachers' knowledge and understanding across content areas. This project exemplifies the intersection between music education and learning across content areas, specifically mathematics and language arts. Further, this study and lessons encourage further research by music educators to find lessons and connections that increase student learning across content areas. Further research could also seek information regarding the perceptions of community members and educators towards music education in small rural elementary schools.

Keywords: *Music and Arts Integration, Curriculum Integration, Interdisciplinary, Mathematics, Language Arts, Neuroscience, Cognitive Abilities, Music Education*

Dedication/Acknowledgements

This dissertation is dedicated to my dad, Bruce Stradley, without whose endless support it would not have been possible; to my mother in heaven, Diane Stradley, who is looking down on me with love; and to my ultimate guide and support, Jesus Christ, Lord and Savior. I want to thank my dissertation committee; my advisor, Dr. Newman who has guided and helped me through this process; and my reader, Dr. Harris.

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Abbreviations

Common Core State Standards ..... CCSS

English Language Arts ..... ELA

English Language Learners .....ELL's

Every Student Succeeds Act..... ESSA

National Core Arts Standards .....NCAS

Reading .....R

Understanding By Design..... UbD

Writing..... W

Chapter 1: Introduction

Music functions as a vital part of human life, an individual's expression of emotion, and an educational benefit towards academic achievement. When the benefits of music education in school are considered, it is apparent that elementary students benefit from learning music in school. Educators focus on standardized testing in schools but do not always consider the crucial role music education plays in young students' lives. When President Obama passed the Every Student Succeeds Act (ESSA) in 2015, replacing No Child Left Behind, music came to be part of a well-rounded education.[1] The National Association for Music Education (NAfME) defines a well-rounded education:

> The term well-rounded education means courses, activities, and programming in subjects such as English, reading or language arts, writing, science, technology, engineering, mathematics, foreign languages, civics and government, economics, arts, history, geography, computer science, music, career and technical education, health, physical education, and any other subject, determined by the State or local educational agency, with the purpose of providing all students access to an enriched curriculum and educational experience.[2]

Music education is considered part of the core curriculum according to ESSA. This consideration is a huge stepping-stone for music educators and music education advocates. Despite being considered a core academic subject, music education still faces cutbacks and exclusions in many school districts nationwide.[3] Music classes are valued for providing content teacher planning periods and are seen as a fun break for students in small rural elementary

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1. "Privacy Policy," Privacy & Terms, U.S. Department of Education, accessed June 22, 2022, https://www.ed.gov/essa?src=rn.

2. "Privacy Policy," Privacy & Terms, National Association for Music Education, accessed September 14, 2022, https://nafme.org/advocacy/essa/.

3. Jennifer McDonel, "Exploring Learning Connections Between Music and Mathematics in Early Childhood," Bulletin of the Council for Research in Music Education, no. 203 (2015): 45.

schools. Music education does not tend to be valued for its educational benefits, cross-curricular connections, National Core Music Standards teaching, or as a vital part of students' lives.

Gaps in the literature framed the research questions and purpose of this study. After exhaustive research regarding interdisciplinary music education studies in rural elementary schools, some of the literature explored the benefits of arts integration and interdisciplinary approaches in general music education. No literature was found to explore the academic benefits of music education in small rural school districts. This study was significant because the research gathered, observational data, and interdisciplinary general music lessons provided will help to inform rural elementary schools, community members, administrators, content educators, and general music educators about the benefits of integrated forms of music education.

Background

Music education has had a fundamental influence on American education, undergoing many changes from colonial times to the present, and offering essential opportunities for the future.[4] Despite its fundamental influence, music education is losing its value in many school districts, specifically rural school districts. While general elementary music education has many advantages, interdisciplinary approaches may increase student learning across content areas and maintain the value of music education in schools.[5] Music educators, students, administrators, community members, and other content area educators may benefit from an interdisciplinary approach to music education to preserve the value of music education in elementary schools.

4. Michael Mark and Patrice Madura, Contemporary Music Education, 4th ed. (Boston: Cengage Learning, Inc., 2014), 20-21.

5. Janet R. Barrett, Claire W. McCoy, and Kari K. Veblen, Sound Ways of Knowing: Music in the Interdisciplinary Curriculum, (New York, NY: Schirmer Books, 1997), 9-31.

An interdisciplinary music curriculum, as documented in the literature, can enable students to learn from several cognitive and cross-curricular points of view.[6] Researcher Donald Hodges states that "a number of studies support the contention that students who participate in formal music education have higher academic achievement scores than students who do not participate in formal music education."[7] Barrett contends that when a general music teacher adopts an interdisciplinary approach, music becomes not only a "fluid force in student's lives and in society," but also that the "barriers to imaginative engagement are softened."[8] Barret believes, "The interdisciplinarian connects, integrates, and seeks to strengthen relationships between persons and ideas, the arts and education."[9] Interdisciplinary connections across content areas arise naturally in the field of music education. Further research supports that a comprehensive music education embraces valid interdisciplinary relationships.[10]

Interdisciplinary music activities that promote cross-curricular activities are great tools for demonstrating the value of music in schools. Mark and Madura note, "Music education advocates try to persuade decision-makers that their subject is vitally important and should not be subjected to curricular reductions. Their tools include the many research studies that indicate the value of arts in schools."[11] A variety of general music activities expose students to learning in

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6. Glenda Cosenza, "Implications for Music Educators of an Interdisciplinary Curriculum," International Journal of Education & the Arts, vol. 6, no. 9 (2005): 2.

7. Donald A. Hodges, Sounds of Learning: The Impact of Music Education, (Carlsbad, California: International Foundation for Music Research, 2005) 1.7, https://www.nammfoundation.org/sites/default/files/Sounds%20of%20Learning_The%20Impact%20of%20Music%20Education.pdf

8. Barret, Sound Ways of Knowing, 172.

9. Barret, Sound Ways of Knowing, 172.

10. Janet Barret, "Interdisciplinary Work and Musical Integrity: Interdisciplinary Connections Can Open Up Possibilities for Comprehensive Study While Preserving the Integrity and Validity of Musical Experience," Music Educators Journal, vol. 87, no. 27 (2001): 27, http://mej.sagepub.com/content/87/5/27.citation.

11. Mark and Madura, Contemporary, 4th ed.,

other subject areas and, according to Hallam and McDonald, "active engagement with music can enhance a range of skills in children and young people."[12] Sangeeta Karwa claims, "Students can engage in reading, writing, speaking, and listening while also studying various genres of music. Music enables students to become critical learners while exposing them to a world of language skills, literacy connections, and a spectrum of global cultures."[13] Music education can also pull students into contents of nature, art, literary texts, dramatic action, dance, religion, politics, history, and social movements.[14] This study identifies interdisciplinary music activities that promote learning across elementary school content areas.

Music education can be linked across many subjects and contents. Although this study focused on interdisciplinary connections between music education and the contents of language arts and mathematics, music education cannot be removed from its historical, geographical, and cultural context.[15] Music educators can integrate science, social studies, history, and cultural lessons by studying historical and cultural songs, the scientific effects of music, and many other musical traditions. Advanced knowledge and collaboration with other content area teachers are essential to successful interdisciplinary lessons. In a study contextualizing the content of Bengawan Solo, Jui-Ching Wang motivates students to engage in integrative thinking and interdisciplinary connections with subjects outside of music.[16] Wang confirms that collaboration with colleagues enriches the lessons' contents and helps "identify key concepts in each discipline

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12. Susan Hallam and Raymond MacDonald, "Introduction: Perspectives on the Power of Music," Research Studies in Music Education, vol. 35, no. 1 (2013): 83. https://doi-org.ezproxy.liberty.edu/10/1177/1321103X13488485.

13. Sangeeta L. Karwa, "Music: An Instrument for Language and Literacy Development, the Art of Interdisciplinary Teaching: ELA and the Beatles for Grades K-3" (MA project, California State University, 2021), v.

14. Barret, Teaching General Music, 172.

15. Jui-Ching Wang, "Flowing Down Bengawan Solo: An Interdisciplinary Lesson Model on Music and Rivers," Journal of General Music Education, vol. 31, no. 1 (2021): 23. Journals.sagepub.com/home/grnt

16. Wang, "Flowing Down Bengawan Solo," 23.

to be incorporated into the lesson."[17] Through arts integration and interdisciplinary connections, music teachers and other content educators can enrich the learning that is taking place in rural elementary schools.

Little research in recent literature has been conducted on the cross-curricular connections between music and other content areas in small rural elementary schools. Some scholars have recognized the need for interdisciplinary music activities and many researchers are interested in how music experiences relate to academic achievement.[18] Jenai Jenkins believes, "Teaching across subject areas has its benefits. It provides teachers and learners with multiple points of entry for various topics."[19] One study using arts integration with literacy learning shows an improvement in student motivation, but no improvement in language arts skills.[20] In a study comparing second graders in arts infusion, manipulative, and traditional groups, "there were no significant differences in math achievement among the three groups, though the arts infusion group had the highest gain scores."[21] Another study comparing six different third-grade classes that taught math with music and others with traditional methods found significant gains on the integrated classroom versus the control group.[22]

Music education can promote literacy learning in elementary students through reading and writing song text, phonological and tonal distinctions, and motivation. Youngsun Nam believes that "of all the school subjects, language arts lends itself most effectively to integration

17. Wang, "Flowing Down Bengawan Solo," 23.

18. Hodges, Sounds of Learning, 2.6.

19. Janai Nichelle Jenkins, "Attitudes and Practices of Urban Music Teachers toward an Interdisciplinary Approach and their Experience with Related Professional Development" (DP diss., Northwestern University, 2012), 15.

20. Hodges, Sounds of Learning, 2.15.

21. Hodges, Sounds of Learning, 2.17.

22. Hodges, Sounds of Learning, 2.17.

with music education."[23] Utilizing children's literature while making sound stories is another tool that supports the integration between music education and language arts. Putting music to text, spelling, or the alphabet makes memorizing information easier for young children. Music also can enhance poetry. Music education coordinator John Flohr enriches music and language arts experiences through many different approaches including phonics, whole-language, content prediction, sequencing, rhythmic chanting, and incorporating musical elements, recordings, and sounds.[24]

Literacy improvements in young students are linked to music education in schools. Educator researchers Shuaib and Sohyum Meacham analyzed seven genres of musical disciplinary discourse including song lyrics, live performances, musical interviews, reviews, internet forums, academic publications, and jam sessions.[25] The study concluded that disciplinary literacy is "the ability to use language and literacy to construct and retain knowledge in a given discipline. Diverse disciplinary fields such as science, history, mathematics, and literature exhibit unique ways of written and verbal communication."[26]

Mathematics presents another solid link for music education. According to Libby Azaryahu, et. Al, although controversy exists regarding connections between musical training and mathematics achievements, both subjects require abstract thinking and the usage of symbolic notations.[27] In Azaryahu's study, the results demonstrate a potential for using music to teach

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23. Youngsun Nam, "Integrating Music and Language Arts: Utilizing Picture Books to Teach Music in Elementary Classrooms" (Masters diss., California State University, 2012), 5.

24. John W. Flohr, "Enriching Music and language Arts Experiences," GMT (2006): 13-14.

25 Shuaib James Meacham, Sohyum Meacham, Misty Thomson, and Hattie Graves, "Hip-Hop Early Literacy in K-1 Classrooms," The Reading Teacher, vol. 73, no. 1 (2019): 35. Doi:10.1022/trtr.1809.

26. Meacham, Meacham, Thomson, and Graves, "Hip-Hop Early Literacy," 35.

27. Libby Azaryahu, Susan Joan Courey, Rivka Elkoshi, and Esther Adi-Japha, "MusiMath and Academic Music: Two Music-Based Intervention Programs for Fractions Learning in Fourth Grade Students," Developmental Science, no. 23)2020): 1. https://doi.org/10.1111.desc.12882.

fraction concepts in the elementary curriculum, showing that music education is an integral part of elementary curriculum that contributes to mathematics learning.[28] In a mixed methods study finding links between music and mathematics, McDonel states that "children made learning connections through a community of learning and sharing, expanded social conventions, and mutual reinforcement of learning."[29] Furthermore, a study exploring the effects of music participation on mathematical achievement found that music students performed well on mathematical tasks only if the mathematical tasks were of similar structure to those found in music.[30] The structure between standards-based mathematics instruction and music instruction is very similar at the elementary level.

It is the joint responsibility of all educators, administrators, and community members to ensure a valuable music education that incorporates interdisciplinary learning activities for all students. Several state and national standards include a need for interdisciplinary learning activities. The National Standards for Arts Education established a national music standard regarding interdisciplinary studies:

Anchor Standard 11: Relate artistic ideas and works with societal, cultural, and historical contexts to deepen understanding.

Essential Questions: How do the other arts, other disciplines, contexts, and daily life inform creating, performing, and responding to music?[31]

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28. Azaryahu, Courey, Elkoshi, and Adi-Japhy, "MusiMath and Academic Music," 1.

29. McDonel, "Early Childhood Learning Connections," 52.

30. H.A. Cox and L.J Stephens, "The Effect of Music Participation on Mathematical Achievement and Overall Academic Achievement of High School Students," International Journal of Mathematical Education in Science and Technology," vol, 37, no. 7 (2006): 758, https://doi.org/10.1080/002077390500137811.

31. "Privacy Policy," Privacy and Terms, National Core Arts Standards, accessed September 3, 2022. https://www.nationalartsstandards.org/

The state of Colorado established a national music standard regarding the relationship between music and other disciplines.

Standard 4.8: Aesthetic Valuation of Music

Connect musical ideas and works with societal, cultural, and historical contexts to understand relationships and influences.

Statement of the Problem

The problem is that some of the perspectives of educators, administrators, and community members in small rural school districts fail to see the academic benefits of music education and the importance of integrated forms of study. Therefore, music educators, content educators, administrators, and rural school district community members do not utilize music education for academic growth or connections across content areas. Many clear links and connections can be seen between the general music curriculum and other content areas, including math and language arts. Interdisciplinary studies in general music education are essential for student growth across content areas, however, rural school district educators and community members must be made aware of the benefit of interdisciplinary music studies and the natural connections that are made across content areas.

Previous research acknowledges the benefits of interdisciplinary music studies as an advocate to keep music education in schools. Several studies focus on the perceptions of music teachers. In a study regarding the perceptions of music, art, and physical education teachers, Ashley Coudriet notes that music, art, and physical education teachers "do not always feel valued within their schools."[32] Her study examines the need for integrated lessons in music, art, and

32. Ashley J. Coudriet, "A Multiple Case Study Examining Elementary School Art, Music, and Physical education Teachers' Perceptions, Attitudes, and Beliefs related to Interdisciplinary Teaching Practice" (PhD diss., University of Pittsburgh, 2013), 219.

physical education classes to increase their value in schools. Furthermore, many studies show the relationship between music integration and academic achievement in elementary, middle, and high schools. Angel Nazario provides substantial research about musical intelligence and how music plays a fundamental role in early childhood education.[33] Nazario's study explores the relationship between the academic achievement of students in schools that offer music education compared to those that do not.[34]

There is much literature supporting academic achievement in mathematics and language arts scores for students who participate in music education. The literature is not specific to rural elementary schools. There is also a gap in the literature promoting interdisciplinary lessons for kindergarten through fifth grades that integrate mathematics and literacy in music education courses. The gaps in the literature revealed the problem that needed to be examined, the research questions, and the theoretical framework for the study.

Statement of the Purpose

The purpose of this study was to investigate how integrated music education lessons support learning across content areas and examine specific music lessons that promote learning in mathematics and language arts for elementary students. This study reveals the importance of music integration and interdisciplinary music studies in small rural elementary schools. Elementary students can make academic improvements across content areas through an interdisciplinary approach to music education. Since music education longs to be understood, this study, and the interdisciplinary lessons provided, could benefit elementary general music

33. Angel Nazario, "The Relations Between Music Integration and Academic Achievement in Elementary Schools in Southwest Puerto Rico" (PhD diss., Northcentral University, 2018) 1-12.

34. Nazario, "The Relations Between Music Integration," 23.

education teachers and advance elementary teachers' knowledge and understanding across content areas. This project exemplifies the intersection between music education and learning across content areas, specifically in mathematics and language arts.

Significance of the Study

This study is significant to rural elementary educators and community members. It is especially significant for music educators in rural elementary schools. The interdisciplinary lessons included will inform music educators of practices that connect learning across content areas, specifically mathematics and literacy. This study's research and observational data informs all educators and community members of the benefits of music education, interdisciplinary studies, and arts integration practices in rural elementary schools. Barret contends that it is important to understand the relationships between music, the other arts, and disciplines outside the arts.[35]

This study is also significant to rural educators because little research explored the benefits of interdisciplinary music studies in general music education classes. According to the literature, focusing on tested subjects in rural elementary schools is a priority over music education. According to observational data of general music educators, music education holds many links to other content areas, specifically in the areas of mathematics and language arts.

Studies show that music is a powerful instrument that influences individual behaviors and actions. Susan Hallam and Raymond MacDonald found that music is a very powerful influence on humans "because it facilitates communication which goes beyond words, induces shared emotional reactions, and supports the development of group identity."[36] Music and the arts play

35. Barret, "Interdisciplinary Work," 27.

36. Hallam and MacDonald, "Introduction: Perspectives on the Power of Music,"83.

an essential role in elementary students' education, not only because of their powerful influence on individuals, but because of their connections to other contents and curricula. In a study, Deanna Ibrahim found "that it is crucial to extend opportunities for arts involvement to all students, and to expand the ways in which arts involvement can promote critical consciousness for youth."[37] Music and the arts remain an important influence in schools, on student behaviors, and on student critical consciousness.

Another study that investigated the relationship between music education and mathematics achievement found that schools may be able to increase mathematics scores by mandating music course enrollment.[38] There are many links between music and mathematics. Furthermore, in a study conducted to determine if music and academic achievement are connected. The results of the study showed some improvement in language areas and math scores.[39] Music education may increase student learning across content areas through an interdisciplinary approach. Mathematics instructional methods and curriculum have several drawbacks. Song An, et. Al, believes that interdisciplinary activities that integrate mathematics education as the context of music provide an opportunity for students to understand and apply mathematical knowledge, and have been shown to facilitate students' learning of mathematics.[40]

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37. Deanna A Ibrahim, Erin B. Godfrey, Else Capella, and Esther Burson, "The Art of Social Justice: Examining Arts Programming as a Context for Critical Consciousness Development Among Youth," Journal of Youth and Adolescence vol. 51, no. 3 (2021): 409. https://doi.org/10.1007/s10964-021-01527-8.

38. Nechelle Nipper Sharpe, "The Relationship Between Music Instruction and Academic Achievement in Mathematics" (PhD diss., Walden University, 2013), 61-62.

39. Mirastasha Ashley-Briann Thomas, "The Effect of Music Instruction on Math and Language Arts Scores in Elementary School" (MA thesis., California State University, 2010), iv.

40. Song A. An, Daniel A Tillman, Rachel Boren, and Jungjun Wang, "Fostering Elementary Student's Mathematics Disposition through Music-Mathematics Integrated Lessons," International Journal for Mathematics Teaching and Learning, vol. 15, no. 3 (2014): 1.

Research Questions

The following questions will be addressed throughout this research:

Research Question One: How can integrating music with other disciplines increase student learning across content areas?

Research Question Two: What musical activities and lessons promote mathematical and language arts connections in general music education in small rural elementary schools?

Hypotheses

Research Question One may be answered with the following hypothesis:

Hypothesis One: Integrating music with other disciplines increases student learning across content areas in terms of increased academic achievement, its positive influence on individuals, and making cognitive connections across subjects from multiple points of view.

Music educators can provide music lessons and activities that promote learning in mathematics and literacy. These interdisciplinary encounters can create new worlds for children that enlarge their depth of experiences beyond their than day to day encounters.[41] Students can make cross-curricular connections when general music lessons incorporate activities and learning from other content area disciplines. These connections will allow students to access and use information differently, increasing understanding of all content area disciplines involved. Students can recall the information learned from various methods to increase their knowledge and understanding of all contents and their educational links. Collaboration between educators is

41. Barrett, McCoy, and Veblen, Sound Ways of Knowing, 111.

necessary for interdisciplinary approaches in music education to improve learning across content areas.

Research Question Two may be answered with the following hypothesis:

> Hypothesis Two: Several musical activities and lessons promote mathematics and language arts connections in terms of rhythmic equations, studying note values, rhythmic compositions, and reading and writing lyrics.

Exposing students to mathematical and language arts opportunities through music instruction can promote learning in these contents. Music is mathematical by nature. When students know the connections between mathematics and music, their understanding of mathematical equations.

Janet Barrett argues that an interdisciplinary perception is a sustainable approach to music teaching and learning.[42] However, collaboration between all content teachers is necessary for the success of interdisciplinary music lessons. Janet Barrett, Claire McCoy, and Kair Veblen state, "For interdisciplinary understanding to flourish, teachers must share a collective responsibility for and commitment to integrated forms of study."[43] An interdisciplinary approach to music education may help administrators, community members, and other content area teachers in rural elementary schools understand the value of music education for students. Lawrence Scripp and Josh Gilbert assert, "After almost a century of emergent examples of arts integration teaching practices, today school administrators and both arts and classroom educators

42. Carlos Abril and Brent Gault (eds.), Teaching General Music: Approaches, Issues, and Viewpoints, (New York: Oxford University Press, 2016), 171.

43. Barrett, McCoy, and Veblen, Sound Ways of Knowing, 16.

increasingly subscribe to the view that discipline-specific teaching and learning can be optimized through arts and arts integration practices."[44]

Definition of Terms

Arts Integration: Direct instruction by teachers, taking advantage of areas of overlap between an arts lesson and another discipline Educators guide children to apply arts skills to another content area.[45] The investigation of curricular content through artistic explorations.[46]

Cognitive Abilities: Abilities that involve conscious intellectual activity such as thinking, reasoning, and remembering.[47]

Curriculum Integration: An effective teaching and learning method that is an interdisciplinary approach to learning core skills and concepts.[48] Students engage in a creative process which connects across subject areas, meeting evolving objectives in both.[49]

Interdisciplinary: Lessons and activities involving two or more academic disciplines, allowing students to make connections and learn at a deeper level.[50]

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44. Lawrence Scripp and Josh Gilbert, "Music Plus Music Integration: A Model for Music Education Policy Reform that Reflects the Evolution and Success of Arts Integration Practices in the 21st Century American Public Schools," Arts Education Policy Review, vol. 117, no. 4 (2016): 186. https://doi.org/10.1080/10632913.2016.1211923

45. Brouillette, Arts Integration in Diverse K-5, 130.

46. Donovan and Pascale, Integrating the Arts, 14.

47. Merriam-Webster Dictionary, s.v. "cognitive," accessed September 28, 2022, https://www.merriam-webster.com/dictionary/cognitive

48. Brouillette, Arts Integration in Diverse K-5, 21.

49. Brouillette, Arts Integration in Diverse K-5, 2.

50. Keith Mason, "Hello Dolly: An Interdisciplinary Approach," Choral Director, January/February (2019): 8.

Language Arts: the subjects (such as reading, spelling, literature, and composition) that aim at developing the student's comprehension and capacity for the use of written and oral language.[51]

Mathematics: The science of numbers and their interrelations, combinations, generalizations, and abstractions and of space configurations and their structure, measurement, transformations, and generalizations.[52]

Music Interdisciplinarians: Educators who seek to bridge meaningful connections between music and other closely related forms of study. They enable students to relate music in meaningful ways to their lives and experiences, whatever the content, classroom, or level of study.[53]

Neuroscience: A branch of the life sciences with a background in biology or chemistry with a principal focus on the mechanisms by which cells communicate with each other.[54]

Cognitive Neuroscientist: A person with a background in biology or chemistry who has the goal of understanding the anatomy or physiology of the brain.[55]

Summary

Music and other content educators in small rural school districts do not utilize music education for academic growth or connections across content areas because they fail to see the academic benefits of music education and the importance of integrated forms of study. However,

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51. Merriam-Webster Dictionary, s.v. "language arts," accessed September 28, 2022, https://www.merriam-webster.com/dictionary/language arts

52. Merriam-Webster Dictionary, s.v. "mathematics," accessed September 28, 2022, https://www.merriam-webster.com/dictionary/mathematics

53. Abril and Gault, Teaching General Music, 173.

54. Daniel Levitin, This is Your Brain on Music: The Science of a Human Obsession (New York: New York: First Plume Printing, 2007), 95.

55. Levitin, This is Your Brain on Music, 95.

there are many connections between the general music curriculum and other content areas. As a vital part of human life and student learning, music education is an important core subject in American education. Music education holds many links to other school subjects including mathematics, language arts, history, science, and cultural studies. Interdisciplinary studies in general music education and arts integration practices are essential for student growth across content areas.

Music learning, listening, and playing is also known to provoke many responses in the brain which may include psychological, emotional, cognitive, and behavioral reactions. Music can enhance aural perception, increasing the brain's encoding of sound. Susan Hallam and Raymond MacDonald claim that researchers know that music has powerful therapeutic effects; these same researchers note how music can "promote relaxation, alleviate anxiety and pain, and promote appropriate behavior."[56] Recent research has also found that learning a musical instrument has an impact on intellectual development and special reasoning.[57] Due to the many connections between music, the brain, and neuroeducation, it is apparent that music can enhance learning.

Several lessons were found and created that are included in this study through a thorough examination of literature, observations of elementary music classrooms, and observations of kindergarten through fifth grade classrooms in small elementary schools. Some of the lessons provided may help elementary teachers increase learning by integrating music into their teaching. Most of the lessons provided are to be used by elementary music teachers. The

56. Hallam and MacDonald, "Introduction: Perspectives on the Power of Music," 83.

57. Hallam and MacDonald, "Introduction: Perspectives on the Power of Music," 84.

interdisciplinary music lessons make connections to grade level content mathematics and language arts Kindergarten, first, second, third, fourth, and fifth grades.

This study investigates how music integration practices in the elementary classroom and interdisciplinary music education lessons support learning across content areas. This study also examines specific music lessons that promote elementary students' learning in mathematics and language arts, revealing the importance of music integration and interdisciplinary music studies in small rural elementary schools. This project exemplifies the intersection between music education and learning across content areas, specifically in mathematics and language arts.

Chapter Two: Literature Review

Interdisciplinary Music Education

Music education, although it is often seen as simply a performance art, also supports learning and relationships among other subjects within school. In her article, "Music Education and Community," Hildegard Froehlick states the following:

> In efforts to strengthen the academic footing of music amidst other school subjects, arts connoisseurs, general educators interested in the arts, policymakers in the arts, and music educators have spent considerable energy during the last 30 to 40 years to downplay the entertainment value of the arts in school relative to their inherently aesthetic and educational values.[58]

Froelick believes that school music entertains while exhibiting characteristics attributed to other academic subjects. [59]

An article written by Glenda Cosenza, "Implications for Music Educators," makes the case that authentic music learning does not have to be compromised in any way when the music teacher designs and teaches curricula and units of study that integrate music learning with learning in other academic subjects.[60] Oftentimes, music educators believe they are losing valid music instructional time when teaching other subjects within their music curriculum. Consenza contests, "If music teachers understand the cognitive connections and shared information among subjects, they have opportunities to enhance music learning in substantive and authentic ways."[61] Within an interdisciplinary curriculum, students learn "concepts from several cognitive and experiential points of view."[62] Evidence suggests that children and learners themselves are

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58. Hildegard Froehlick, "Music Education and Community: Reflections on "Webs of Interaction" in School Music, Action, Criticism & Theory for Music Education, vol. 8, no. 1 (2009): 85.

59. Froehlick, "Music Education and Community," 85.

60. Cosenza, "Implications for Music Educators," 1.

61. Cosenza, "Implications for Music Educators," 1.

62. Cosenza, "Implications for Music Educators," 2.

interested and engaged in learning that employs several subject areas.[63] When students see the connections between music and other disciplines and become excited about those connections, their learning will increase.

Collaboration among teachers of different disciplines is necessary for interdisciplinary learning. In his article about integrated arts teaching, Corin Overland says, "Classroom and arts educators frequently collaborate in the pursuit of common educational goals."[64] This collaboration occurs both in the general classroom and in the music classroom. Overland claims that the end goal in interdisciplinary education is to "combine ideas, terminology, or examples from multiple, unrelated subjects in ways that encourage a deeper understanding of the material and more than could be accomplished by presenting them separately."[65] Through interdisciplinary teaching, students have multiple access that will enhance learning across content areas, allow expression of themselves, and increase their enjoyment of learning.

Esteemed music education professor Janet Barrett notes the importance of intersecting different disciplines in school in her article. She believes, "A comprehensive music education embraces valid interdisciplinary relationships."[66] She states that "although educational institutions segment knowledge into separate packages called subjects, deep understanding often depends upon the intersections and interactions of the disciplines."[67] In her article, "Interdisciplinary Work and Musical Integrity," Barrett describes an interdisciplinary perspective in music education. She holds that this perspective "preserves the integrity of music while

63. Cosenza, "Implications for Music Educators," 2.

64. Corin T. Overland, "Integrated Arts Teaching: What Does It Mean for Music Education?" Music Educators Journal, vol. 100, no. 2 (2013): 31.

65. Overland, "Integrated Arts Teaching," 31.

66. Barrett, "Interdisciplinary Work and Musical Integrity," 27.

67. Barrett, "Interdisciplinary Work and Musical Integrity," 27.

making valid connections to disciplines outside music."[68] Although music education is a complete subject, a complete music education should embrace interdisciplinary relationships. Barrett states, "These relationships infuse the performance, description, and creation of music with meaningful associations to art, literature, history, cultural studies, and other complementary disciplines."[69]

In her co-authored book, *Teaching General Music*, Barret justifies an interdisciplinary education. She writes "there are historical precedents, complementary movements, and contemporary justifications for interdisciplinarity in education, music, and the arts at large."[70] She proposes "serious professional consideration as a viable stance for music teaching and learning."[71] According to Barrett, there are three realms within general music and an interdisciplinary approach. The first approach is an intradisciplinary focus where music teachers seek to bridge meaningful connections between various genres and styles of music.[72] A student-centered, emancipatory approach underlines the purpose of an interdisciplinary approach to general music education, "to enable students and teachers to relate music in meaningful ways to their lives and experiences, whatever the content, classroom, or level of study."[73] An interdisciplinary focus is when music teachers bridge meaningful connections between music and other forms of study. Barret believes, "The empirical base to justify an interdisciplinary curricular approach through systematic inquiry is pale and underdeveloped."[74]

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68. Barrett, "Interdisciplinary Work and Musical Integrity," 28.
69. Barrett, "Interdisciplinary Work and Musical Integrity," 28.
70. Abril and Gault, Teaching General Music, 171.
71. Abril and Gault, Teaching General Music, 171.
72. Abril and Gault, Teaching General Music, 173.
73. Abril and Gault, Teaching General Music, 173.
74. Abril and Gault, Teaching General Music, 173.

Authors Janet Barrett, Claire McCoy, and Kari Veblen believe that curriculum should be combined by blending content and process. Teachers, both of general education and music education, take on the responsibility of making decisions about content and process, setting goals and courses of action, and creating a curriculum for the designated discipline. In their book, *Sound Ways of Knowing*, Barrett, McCoy, and Veblen state, "Each discipline or school subject has its own central concepts, vocabulary, treasured examples, key figures, traditions, problems, and forms of experience."[75] An interdisciplinary approach to creating curricula allows students to make connections between disciplines and subjects. The authors believe that "for interdisciplinary understanding to flourish, teachers must share a collective responsibility for and commitment to integrated forms of study."[76] They write, "For educationally sound programs, teachers must consider the essential elements of musical experience, the strength of connections between and among disciplines, and broad goals and aims for the curriculum."[77]

Keith Mason is another researcher who supports interdisciplinary learning in schools. According to Mason, "Interdisciplinary curricula planning involves two or more subjects that allow students to make connections and learn at a deeper level."[78] Musicals are examples of an interdisciplinary curriculum that can make learning impacts across content areas. According to Mason, English as a second language learners "benefit from learning song lyrics through singing and listening, reading about musical, viewing the film version, and writing about a topic related to the music within United States culture and popular culture."[79] Musicals can enhance language

75. Barrett, McCoy, and Veblen, Sound Ways of Knowing, 10.

76 Barrett, McCoy, and Veblen, Sound Ways of Knowing, 10.

77. Barrett, McCoy, and Veblen, Sound Ways of Knowing, 31.

78. Mason, "An Interdisciplinary Approach," 8.

79. Mason, "An Interdisciplinary Approach," 9.

arts learning as students read the source material and "analyze lyrics, write song analyses, write interpretations, or other creative writing assignments."[80] Mason believes that musicals also improve mathematics learning as "students complete projects that require math or spatial intelligence such as a project that requires a logical progression, space planning, or three-dimensional projects."[81] Other subjects that benefit from the interdisciplinary approaches to music education and musicals, according to Mason, include family and consumer sciences, industrial arts, performing arts, science, social studies, visual arts, and world languages.

Music education makes connections to history, geography, and culture studies. Jui-Chang Wang writes in "Flowing Down Bengawan Solo," "Music cannot be separated from its historical, geographical, and cultural context; therefore, it is important that students be taught music from a variety of genres, cultures, and historical periods relevant to the music to which they are introduced."[82] Music is connected to mankind, learning, emotions, and the physical world. In his article, Wang suggests that an interdisciplinary approach can increase student learning by "enabling students to use music to respond to cultures and communities in various historical, society, and world contexts."[83] Wang believes that general music teachers can use an interdisciplinary approach to help students develop scientific and geographical understanding that invokes inspirations from nature, art, politics, history, and social movement.[84] Wang states that music educators should "design curricula associating music with other disciplines that allow

80. Mason, "An Interdisciplinary Approach," 2.

81. Mason, "An Interdisciplinary Approach," 2.

82. Wang, "Flowing Down Bengawan Solo," 23.

83. Wang, "Flowing Down Bengawan Solo," 24.

84 Wang, "Flowing Down Bengawan Solo," 24.

students not only to construct a wider scope of knowledge but also make meaningful connections with their lived experiences."[85]

Not only is music education important to increase student learning across content areas, but music also facilitates communication and social-emotional learning. Susan Hallam and Raymond MacDonald, in their article, "Perspectives on the Power of Music," believe that music is "powerful at the individual level because it can induce multiple responses such as physiological, mood, emotional, cognitive, and behavioral."[86] Music has therapeutic effects, alleviates boredom, and can "create environments appropriate for particular social events."[87] Hallam and MacDonald reveal that "research exploring the relationships between mathematics and active musical engagement has had mixed results."[88] They state, "Transfer is dependent on the extent of the match; for instance, children receiving instruction of rhythm instruments score higher on part-whole math problems than those receiving piano and singing instruction."[89] Music education can also enhance aural perception by increasing the brain's early encoding of linguistic sound. Hallam and MacDonald believe, "Learning to read music seems to transfer to improved phonemic awareness, which contributes to the development of literacy skills."[90]

Alena Holmes and Sharri VanAlstine believe interdisciplinary music instruction can improve international mindedness.[91] The authors write that some definitions of international mindedness "include the ability to be open-minded and respectful of cultures and peoples or

85. Wang, "Flowing Down Bengawan Solo," 24.

86. Hallam and MacDonald, "Perspective on the Power of Music," 1.

87. Hallam and MacDonald, "Perspective on the Power of Music," 1.

88. Hallam and MacDonald, "Perspective on the Power of Music," 2.

89. Hallam and MacDonald, "Perspective on the Power of Music," 2.

90. Hallam and MacDonald, "Perspective on the Power of Music," 2.

91 Alena Holmes and Sharri VanAlstine, "From/to International: Toward International-Mindedness through Interdisciplinary Music Instruction," Music Educators Journal, vol. 101, no. 2 (2014): 45.

having an awareness of the interconnectedness of people not only intellectually but also with growing empathy."[92] Within a general music education curriculum, it is common for music teachers to include lessons about worldly cultures and the music that comes from different cultures. Holmes and VanAlstine confirm, "Current music series textbooks are filled with useful resources and suggestions for teaching about world music."[93] The authors propose eight strategies to move students toward greater international mindedness. One of their strategies includes the integration of music in an interdisciplinary fashion.[94] They state, "Providing greater context and in-depth instruction than the music teacher can provide in the music class opens up the possibility of integrating music instruction with other content areas."[95] The authors believe that through interdisciplinary music instruction, student learning and international mindedness will increase.

Interdisciplinary music education occurs across many subjects including math, language arts, social studies, cultural studies, and science. Some studies show that participation in music can increase test scores. Darby Southgate and Vincent Roscingo write, "music participation, both inside and outside of school, is associated with measures of academic achievement among children and adolescents."[96] Kate Fitzpatrick performed a study to clarify the relationship between music participation and academic performance. Her study compared standardized test results of instrumental music students to those of their classmates that did not participate in

92. Holmes and VanAlstine, "From/to International," 45.

93. Holmes and VanAlstine, "From/to International," 46.

94. Holmes and VanAlstine, "From/to International," 48.

95. Holmes and VanAlstine, "From/to International," 49.

96. Darby E. Southgate and Vincent J. Roscingo, "The Impact of Music on Childhood and Adolescent Achievement," Social Science Quarterly, vol. 90, no. 1 (2009), 4-21.

instrumental music. Fitzpatrick claims that the result of the study shows that high-school instrumental students had significantly higher test scores across subjects.[97]

Regarding interdisciplinary approaches and teacher professional development, Jenai Nichelle Jenkins researched the attitudes and practices of teachers. According to Jenkins, there are many benefits to teaching across content areas.[98] Jenkins found that "an integrated approach breaks down philosophical walls and builds new relationships among teachers."[99] Despite the many benefits of an interdisciplinary approach to teaching, Jenkins found that many teachers also see challenges. One of these challenges is the lack of professional development around interdisciplinary teaching. Professional development is key to successful interdisciplinary teaching due to the variety of subjects taught in schools, the preparation time needed, and the number of educational resources that are necessary.[100] Jenkins writes, "Professional development that focuses on subject matter content helps to improve teacher knowledge and confidence, which leads to improved student learning."[101]

Ashely Coudriet studied the perceptions and attitudes of art, music, and physical education teachers regarding interdisciplinary teaching practices.[102] Coudriet believes that the subjects of art, music, and physical education "engage students in active learning experiences."[103] Due to the increase in reading and math accountability in schools, active learning contents help to increase learning in math and reading through interdisciplinary

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97. Kate R. Fitzpatrick, "The Effect of Instrumental Music Participation and Socioeconomic status on Ohio Fourth-, Sixth-, and Ninth-Grade Proficiency Test Performance," JRME, vol. 54, no. 1 (2006): 82.

98. Jenkins, "Attitudes and Practices," 15.

99. Jenkins, "Attitudes and Practices," 14.

100. Jenkins, "Attitudes and Practices," 21.

101. Jenkins, "Attitudes and Practices," 21.

102 Coudreit, "A Multiple Case Study," 18.

103. Coudreit, "A Multiple Case Study," 18.

approaches. Coudriet's research found that art, music, and physical education teachers "do not always feel valued within their schools."[104] The teacher participants in her study "all reported using integrated teaching methods within their practice" if the integrated teaching "merited connections across content areas."[105] Interdisciplinary teaching between art, music, and physical education, and other subjects is perceived as valuable in elementary schools.

Rose Bowe in her dissertation studies the benefits of integrating core subjects in elementary music classes. In her research, Bowe found, "Building on the success of arts integration motivated music educators to artistically and imaginatively embrace an enhanced learning strategy by embedding core subject content into music lessons."[106] The strategy of "Core Subject Integration," linked music with other core subjects including mathematics, reading, science, and history.[107] Bowe found that lessons that focused on rhythm, beat, and tempo encouraged students to think mathematically.[108] The study showed that incorporating literature into the music lesson helped students clarify concepts, made things come alive, and deepened expressions of words, art, and music which enhanced student listening and the expansion of multicultural awareness.[109] Bowe suggests, "future studies should investigate successful techniques, activities, musical strategies, and lesson plans used by K-6 music teachers who integrate the core subjects into music education."[110]

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104. Coudreit, "A Multiple Case Study," 219.

105 Coudreit, "A Multiple Case Study," 222-223.

106 Rose Cherie Jones Bowe, "Core Subject Integration in the K-6 Music Classroom" (Diss., University of Southern Mississippi, 2020), 5.

107 Bowe, "Core Subject Integration," 5.

108 Bowe, "Core Subject Integration," 6.

109 Bowe, "Core Subject Integration," 6.

110 Bowe, "Core Subject Integration," 107.

Arts Integration

Liane Brouillette explains in her book, *Arts Integration in Diverse K-5 Classrooms* the importance of understanding arts integration. She claims, "Children's ability to visualize a state of affairs, whether encountered through art or in real life, allows them to stabilize an image in their mind so they can remember it."[111] This visualization process enables students to "play out possible responses to similar situations in their imaginations so they can anticipate the consequences of their actions."[112] Broulliette explains a pathway to literacy through the arts, the drawbacks of standardized testing, and the benefits of a comprehensive, integrated education.[113] In the book, Broulliette describes the importance of cultivating literacy skills and conceptual understanding through music and art integration in the regular classroom.[114] She gives many examples of lessons that integrate the arts and that lay the foundation for literacy, make meaning of narrative text, make meaning from informational texts, build effective oral communication skills, teach expression through narrative, informational, and persuasive writing, and build executive function skills.[115]

Integrating Music Across the Elementary Curriculum is another book designed to support music integration throughout the elementary curriculum written by Kristin Harney. In her book, Harney specifically explains the common links between music and language arts, music and social studies, music and science, and music and mathematics. Throughout the book, Harney

111. Brouillette, Arts Integration, 1-2.

112. Brouillette, Arts Integration, 1-2.

113 Brouillette, Arts Integration, 1-2.

114 Brouillette, Arts Integration, 1-2.

115 Brouillette, Arts Integration, 1-2.

describes music integrated lessons that demonstrate learning connections across content areas.[116] Harney writes, "There are growing calls to foster self-expression, critical thinking, collaboration, and creativity in school settings, and music integration is a path for developing these skills."[117] Harney provides tools that can be used to examine current music integrated lessons to help teachers create their own. She conveys, "Two ideas to keep in mind when planning interdisciplinary lessons are integrity for each discipline and integrity between disciplines."[118] The author also writes about the common links between music and art, stating, "Concurrently exploring paired concepts, elements, or skill sin music and art enhances students' understanding in both disciplines."[119] In addition, Harney explains the overarching National Core Arts Standards between music and visual arts, clarifying that the two subjects share the processes of creating, presenting/performing, responding, and connecting.[120]

Lisa Donovan and Louise Pascale co-author the book, *Integrating the Arts Across the Content Areas.* Throughout the book, the authors explore the language of poetry, make musical connections, and give examples of music and art curriculum that can be integrated into the regular elementary classroom. They believe that arts integration is an inquiry of curricular content through artistic explorations.[121] Donovan and Pascale write, "The arts provide an avenue for rigorous investigation, representation, expression, and reflection of both curricular content

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116 Kristen Harney, Integrating Music Across the Elementary Curriculum (New York, NY: Oxford University Press, 2020): 3.

117. Harney, Integrating Music, 3.

118. Harney, Integrating Music, 7.

119. Harney, Integrating Music, 12.

120. Harney, Integrating Music, 14.

121 Lisa Donovan and Louise Pascale, Integrating the Arts Across the Content Areas (Huntington Beach, CA: Shell Educational Publishing, Inc., 2012), 14.

and the art form itself."[122] The authors give many reasons why the arts should be considered "an integral part of teaching and learning"[123] and address differentiation and 21st century skills through the arts and give examples of many arts-integrated lesson plans.

Renaissance in the Classroom by Gail Burnaford, Arnold Aprill, and Cynthia Weiss explain the value of awareness of arts in the classrooms. The authors claim that "arts integration begins with the strengths of the art forms."[124] From there, "the artist or arts teacher's presence and knowledge regarding each art form introduces teachers to other ways of knowing and reflecting knowledge."[125] The authors list many benefits of arts integration, including the following:

1. The arts produce a genuine synergy between content areas by engaging multiple modes of inquiry.
2. The arts provide varied, connected, and increasingly challenging opportunities to generate and represent knowledge over time.
3. The arts function as a way of committing concepts and content to memory.
4. The arts present concrete evidence of learning.
5. Contemporary arts experiences represent history and culture in the curriculum.
6. Historical art forms help students reflect on contemporary life.
7. The arts help students understand scientific and mathematical principles and vice versa.[126]

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122. Donovan and Pascale, Integrating the Arts, 14.

123. Donovan and Pascale, Integrating the Arts, 19.

124. Gail Burnaford, Arnold Aprill, and Cynthia Weiss, Renaissance in the Classroom: Arts Integration and Meaningful Learning (Mahwah, NJ: Lawrence Erlbaum Associates, Inc., 2011), 9.

125. Burnaford, Aprill, and Weiss, Renaissance in the Classroom, 9.

126. Burnaford, Aprill, and Weiss, Renaissance in the Classroom, 10-15.

Liora Bresler, in her article "Integrating the Arts: Educational Entrepreneurship in a School Setting," makes a case for arts integration into academic disciplines. Besler identifies characteristics that are important to arts integration that include going beyond the traditional disciplinary knowledge to creatively reflect ownership and personal commitments, how to listen to others and to collaborate, and how to persevere during experiential learning.[127] The author makes comparisons to educational entrepreneurs and musicians. She believes that "educational entrepreneurs, like artists and musicians, pattern themselves after their visions, thus giving form to their spirit in the process."[128] According to Bresler, the experience of arts integration allows students to "learn who they are, making schooling a space of relevance and meaningful knowledge."[129]

Cathy Kassell, in her article "Music and the Theory of Multiple Intelligences," writes about how music can increase student learning across different subjects, as well as across multiple intelligences. She believes that music can function as a distinct discipline and as aesthetic subject and cultural phenomena that is created under particular social, political, and economic conditions.[130] Kassell writes, "It is possible to integrate music with educational and musical integrity in ways that can lead students to a deeper involvement with the basics of music literacy and can provide with Howard Gardner had originally intended as a multiple entry point."[131] According to Kassell, the Theory of Multiple Intelligences, and music education in

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127. Liora Bresler, "Integrating the Arts: Educational Entrepreneurship in a School Setting," Hellenic Journal of Music, Education, and Culture, vol. 2, no. 1 (2011): 5.

128. Bresler, "Integrating the Arts," 15

129. Bresler, "Integrating the Arts," 15

130. Cathy Kassell, "Music and the Theory of Multiple Intelligences," Music Educators Journal, vol. 84, no. 5 (1998): 32.

131. Kassell, "Music and the Theory," 32.

schools, educators can make links between student learning and students "can begin to make connections and understand the ways that music can extend and add to other contexts and disciplines."[132]

Classroom teachers can foster learning connections by integrating the arts into their teaching. A magazine article by Felicia Hill, "Connections Through Art," advocates for differentiation through the arts.[133] Hill believes, "English language learners can learn both content and art from educators who teach by integrating the arts instead of teaching about the arts."[134] Hill gives ideas for engaging arts-integrated lessons including dance, dramatic arts and theater, media arts, music, and visual art. The author states, "Students can use soundscapes, such as instruments or body percussion, to enhance the content of a book."[135] She adds that "adding sounds such as tweeting, clanging, or crunching not only enhances the mood of a story, but also helps students remember its content."[136]

The article entitled "Evidence for Arts Integration: Trends and Ideas on the Arts and Creativity" shows evidence for arts integration methods in school. The magazine article claims that "teaching the arts helps students thrive and achieve."[137] The article reviews a study by American Institutes for Research that provides evidence that practicing arts integration in school

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132. Kassell, "Music and the Theory," 32.

133 Felicia Hill, "Connections Through Art," Literacy Today, March/April (2019): 26. https://literacyworldwide.org.

134. Hill, "Connections Through Art," 27.

135. Hill, "Connections Through Art," 27.

136. Hill, "Connections Through Art," 27.

137. Unknown Author, "Evidence for Arts Integration: Trends and Ideas on the Arts and Creativity," Educational Leadership, December/January (2018/2019): 8.

positively affects students' outcomes in more than one academic area.[138] The study also reveals that arts integration is linked "to improving attendance, behavior, and social skills."[139]

The study of the arts allows students to be creative in the learning process. In their magazine article, "Arts Integration: A Creative Pathway for Teaching," Amy Duma and Lynne Silverstein write, "Schoolwide arts integration programs can reenergize teachers' practice and boost student achievement."[140] The authors ask readers to visualize walking into an elementary school and seeing students in the classroom learning language arts, science, math, and social studies. They say, "As you observe them, you hear students singing, or see them dancing, acting, and creating works of visual art, all in ways that reflect their growing understanding of the core content area."[141] The authors describe arts integration to be a highly engaging approach to teaching where students learn core subjects through the arts.[142] All teachers can participate in arts integration and benefit from a shared understanding of arts integration when the arts are taught as curriculum, used to enhance a curriculum, or integrated with the curriculum.[143]

Authors Lawrence Scripp and Josh Gilbert explore integrative teaching and learning in music in their article, "Music Plus Music Integration: A Model for Music Education Policy Reform that Reflects the Evolution and Success of Arts Integration Practices in 21st Century American Public Schools." The authors believe that despite the many successes of arts integration in schools, there is opposition from educators and music educators alike.[144]

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138 Unknown, "Evidence for Arts Integration," 8.

139 Unknown, "Evidence for Arts Integration," 8.

140 Duma and Silverstein, "Arts Integration," 55.

141 Duma and Silverstein, "Arts Integration," 55.

142 Duma and Silverstein, "Arts Integration," 55.

143 Amy L. Duma and Lynne B. Silverstein, "Arts Integration: A Creative Pathway for Teaching." Educational Leadership, December 2018/January 2019, 55.

144 Scripp and Gilbert, "Music Plus Music Integration," 186.

According to Scripp and Gilbert, "Advocates for this type of integration recommend a framework for music education innovation that features authentic, comprehensive, and interdisciplinary approaches to teaching and assessing musical literary skills."[145] The authors contend that music integration is important for 21st-century school reform because of many links that include the following:

1. Evidence that the human brain is predisposed to musical development.
2. Evidence that musical experience, unlike anything else, engages the entire brain.
3. Evidence that musical training changes the structure, function, and growth of the brain.
4. Evidence that musical training builds brain capacity directly related to cognitive functions that underlie mental processing in other domains.
5. Evidence that musical training is highly associated with learning outcomes in other disciplines. [146]
6. Evidence that school-based music and music-integrated programs demonstrate an increasingly strong association between teacher professional development, arts learning, academic achievement, and positive school culture over time.

Music Education and Mathematics

Math is a subject in school that music relates to closely. In the article, "The Patterns of Music on Young Children Learning Mathematics through Beat, Rhythm, and Melody," Kamile Geist, Eugene Geist, and Kathleen Kuznik say that everyday learning experiences such as

145. Scripp and Gilbert, "Music Plus Music Integration," 186.

146. Scripp and Gilbert, "Music Plus Music Integration," 190-193.

listening to music are especially important in supporting the development of mathematics concepts in children.[147] Children can learn mathematics very early in life through beat, rhythm, tempo, and melody. The authors claim, "Music brings order to disorder. Teachers can demonstrate patterns without using any materials. All that is necessary is the presence of the caregiver offering an instinctive gift of rhythm and music to comfort the child."[148] Music is mathematical by nature, which can be beneficial to elementary students in making connections between music and mathematics.

David Sulzer, author of the book *Music, Math, and Mind: The Physics and Neuroscience of Music*, explains the math of pitch, scales, harmony, sound, resonance, and rhythm. Sulzer believes, "The creation and appreciation of music do not require knowledge of math and biology that allow it to exist. These topics are not taught to music students, and musicians create great work without knowing them."[149] However, Sulzer writes that understanding the basis of music, sound, and perception will explain more mysteries, open deeper ones, help the listener to understand what they hear, and provide ideas for works.[150] In his book, Sulzer explains how the parameters of sound are mathematical and scientific. In addition to writing about the mathematics behind music, the author also writes about the neural mechanisms behind music and the deep brain physiology of sound.[151]

147. Kamile Geist, Eugene A. Geist, and Kathleen Kuznik, "The Patterns of Music on Young Children Learning Mathematics through Beat, Rhythm, and Melody," YC Young Children, vol. 67, no. 1 (2012): 74.

148. Geist, Geist, and Kuznik, "The Patters of Music," 74.

149. Davis Sulzer, Music, Math, and Mind: The Physics and Neuroscience of Music (New York, NY: Columbia University Press, 2021): 1.

150. Sulzer, Music, Math, and Mind, 1.

151 Sulzer, Music, Math, and Mind, 1.

Jennifer McDonel explores learning connections between music and mathematics in her article, "Exploring Learning Connections Between Music and Mathematics in Early Childhood." She says that currently, music education needs evidence-based information to support music education in schools, including research regarding the possible relationships between music learning as well as the impact of music learning on other content areas.[152] The author also supports music as a critical domain in school, equal to mathematics, science, and literacy. McDonel claims, "From a neuroscience perspective, music training has both domain-specific and domain-general effects on learning."[153]

Arsalan Wares explores Howard Gardner's theory of Multiple Intelligences in his article, "An Application of the Theory of Multiple Intelligences in Mathematics Classrooms in the Context of Origami." Wares claims that Gardener's theory "provides a sound framework for mathematics educators."[154] Among Gardner's list of eight Multiple Intelligences is musical intelligence. [155]Wares writes, "Musical intelligence entails skill in the performance, composition, and appreciation of musical patterns."[156] Depending on the mathematics project, musical intelligence can support mathematics in school.

Some researchers have found that music instruction effects on mathematics achievement. In their article, "The Effect of Music Participation on Mathematical Achievement and Overall Academic Achievement of High School Students," H.A. Cox and L.J. Stephens study the

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152. Jennifer S. McDonel, "Exploring Learning Connections," 45.

153. Jennifer S. McDonel, "Exploring Learning Connections," 47.

154. Arsalan Wares, "An Application of the Theory of Multiple Intelligences in Mathematics Classrooms in the Context of Origami," International Journal of Mathematical Education in Science and Technology, vol. 44, no. 1 (2013): 123.

155 Wares, "An Application of the Theory," 123.

156. Wares, "An Application of the Theory," 123.

relationship between music participation and academic achievement. Teachers, principals, and school boards should be highly interested in the relationship. They authors state, "Principals should consider the effect of music programs on the academic performance of students before suggesting music is cut."[157] The authors note the research of Bahr and Christiansen who found that "music students performed better on mathematical tasks only if the mathematical tasks were of similar structure to those found in music."[158] The author's own study showed no conclusion of the exacts effects of music on mathematics achievement even though previous research suggests a link between math and music or overall academic success.[159]

Noe Goeghegan and Michael Mitchelmore, assuming that music education increases foundational skills for children when learning mathematics, studied the impact of music education on mathematics achievement in preschool students.[160] At the conclusion of their study, the authors found that no differences in mathematics achievement between the comparison group and the experimental group without music at home.[161] Goeghegan and Mitchelmore note, "However, the experimental group with music at home scored higher in mathematics achievement that the experimental group without music at home."[162] The authors concluded that the teaching of basic music concepts is comparable in several ways to the teaching of early mathematics concepts."[163]

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157. Cox and Stephens, "The Effect of Music Participation," 757.

158. Cox and Stephens, "The Effect of Music Participation," 758.

159. Cox and Stephens, "The Effect of Music Participation," 763.

160 Noel Goeghegan and Michael Mitchelmore, "Possible Effects of Early Childhood Music on Mathematical Achievement," Australian Research in Early Childhood Education, vol. 1 (1996): 56.

161. Goeghegan and Mitchelmore, "Possible Effects of Early Childhood Music," 56.

162. Goeghegan and Mitchelmore, "Possible Effects of Early Childhood Music," 56.

163. Goeghegan and Mitchelmore, "Possible Effects of Early Childhood Music," 63.

Mathematics has a shown links to music education. Authors Song An, Daniel Tillman, Rachel Boren, and Junjun Wang write, “There are numerous links between music and mathematics”[164] in their article “Fostering Elementary Students’ Mathematics Disposition.” They claim that “mathematical concepts such as numerical relations, proportions, integers, logarithms, arithmetical operations, trigonometry, and geometry are related to musical elements such as melody, rhythm, intervals, scales, harmony, and tuning.”[165] The overlap between mathematics and music education offers opportunities for teachers to demonstrate mathematical concepts and processes through music-themed activities.[166] Integrating music activities into mathematics lessons may increase student learning.

Jennifer McDonel proposed another study exploring the links between music and mathematics in her article, “Exploring Learning Connections Between Music and Mathematics in Early Childhood.” McDonel notes, “In the present American political, educational, and economic climate, music and the other arts face major cutbacks and even elimination in many school districts throughout the nation.”[167] Due to these cutbacks, it is crucial that music education advocates find evidence-based information to support music education in schools.[168] The connection between music and mathematics is one evidence-based support for music education. In her study, McDonel found that “active music instruction, in which students listen, sing, make music, and move responsively and rhythmically to music, often through games,

164. An, Tillman, Boren, and Wang, “Fostering Elementary Students’,” 2.

165. An, Tillman, Boren, and Wang, “Fostering Elementary Students’,” 2.

166. An, Tillman, Boren, and Wang, “Fostering Elementary Students’,” 2.

167. McDonel, “Exploring Learning Connections,” 45.

168 McDonel, “Exploring Learning Connections,” 45.

appears to enhance pre-K and elementary-aged children's spatial-temporal performance and mathematics skills."[169]

Some studies show that there are benefits to adding music and movement in early mathematics learning. Mohamad Samsudin, Kamariah Bakar, and Noorhayati Noor explored the use of the music and movement elements in teaching mathematics to preschool students. The authors write, "Music and movement are seen to be beneficial by helping to attract children's attention and interest, improving children's understanding, and building children's emotional development."[170] Since music education also incorporates kinesthetic, auditory, and visual elements, it can also be perceived as movement. Samsudin, Bakar, and Noor believe, "It is clear that music and movement have the potential to attract children to mathematical learning and can influence children's development at the preschool level."[171] At the conclusion of their study, the authors found that it would be beneficial for music and movement to be included in mathematics lessons.[172]

Francesco Banchini and Lynda Thompson are advocates for teaching mathematics and music through interdisciplinary learning.[173] In their article, "Bringing Music and Mathematics Alive through Interdisciplinary Learning," Banchini and Thompson found that students learned that bringing together aspects of two different subjects can deepen their understanding and ability to connect with and produce an outcome.[174] Throughout their unit of study, students

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169. McDonel, "Exploring Learning Connections," 47.

170. Mohamad Samsudin, Kamariah Bakar, and Noorhayati Noor, "The Benefits of Music and Movement in Early Mathematics," Creative Education, vol. 10 (2019): 3071.

171. Samsudin, Kamariah, and Noor, "The Benefits of Music and Movement," 3073.

172 Samsudin, Kamariah, and Noor, "The Benefits of Music and Movement," 3073.

173 Francesco Banchini and Linda Thompson, "Bringing Music and Mathematics Alive through Interdisciplinary Learning," Curriculum, Learning, and Teaching (2018): 42.

174. Banchini and Thompson, "Bringing Music and Mathematics Alive," 42.

explored a piece of music and found mathematical reasoning.[175] with emotional reaction. Through interdisciplinary learning, students were able to transfer skills between music and mathematics.

An article in the *International Journal of Music Education*, "Emerging Critical Evens in Creative Processes Involving Music, Dance, and Mathematics in School," explores creative processes throughout music and dance that promotes integrated learning across subject areas. Authors Maria Vinas, Albert Casals, and Laia Viladot identified the critical events that arise when assigning group work that is based on the integrated learning of music, dance, and mathematics around the concept of symmetry.[176] The results of their study showed that "the use of different forms of expression and the changes that students introduce when using one or another language to express their own ideas or knowledge are key moments in the advancement of joint creative activities and also learning in itself."[177]

Music may encourage mathematical thinking. Authors Libby Azaryahu, Susan Courey, Rivka Elkoshi, and Esther Adi-Japha claim, "Music and mathematics require abstract thinking and using symbolic notations"[178] in their article, "MusiMath and Academic Music." Their study examined two integrated intervention programs and their effects on fourth-grade students.[179] Fractions learning was the key comparison between the subjects of music education and mathematics. The results of the study demonstrated "the potential for using music to teach

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175. Banchini and Thompson, "Bringing Music and Mathematics Alive," 42.

176. Maria Vinas, Albert Casala, and Laia Viladot, "Emerging Critical Events in Creative Processes Involving Music, Dance, and Mathematics in the School, "International Journal of Music Education, vol. 40, no.2 (2022): 228.

177. Vinas, Casals, and Viladot, "Emerging Critical Events," 228.

178. Libby Azaryahu, Susan Joan Courey, Rivka Elkoshi, and Esther Adi-Japha, "MusiMath and Academic Music: Two Music-Based Intervention Programs for Fractions Learning in Fourth Grade Students," Developmental Science, no. 23 (2018): 1-17. https://doi.org/10.1111.desc.12882

179 Vinas, Casals, and Viladot, "Emerging Critical Events," 228.

fraction concepts in the elementary music curriculum."[180] The authors believe, "Music instruction as an integral part of the elementary curriculum contributes to the conceptual and procedural knowledge of fractions."[181]

Stajka Rajic believes that mathematics and music are two subject areas that are based on the practical needs. [182] Rajic writes," Mathematics for example for measuring, grading, counting, comparing and music by singing, improving rhythm, or dancing."[183] In his article, "Mathematics and Music Game in the Function of Child's Cognitive Development, Motivation, and Activity," Rajic aims "to present the extent to which the application of the concrete mathematical and musical play contributes to the child's cognitive development."[184] Rajic had children participate in a game called *Musical Monkeys* to encourage attention, motivation, activity, engagement, and critical thinking in solving both mathematical and musical tasks. The results of his study confirmed that "the children established a connection between the mathematical and musical segments, reaching a culmination in a moment of interest within the play."[185]

Nechelle Sharpe studied the relationship between music instruction and mathematics academic achievement.[186] The purpose of her study "was to investigate the relationship between music instruction and mathematics achievement scores for sixth-grade students."[187] Sharpe

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180. Azaryahu, Courey, Elkoshi, and Adi-Japha, "MusiMath and Academic Music," 15.

181. Azaryahu, Courey, Elkoshi, and Adi-Japha, "MusiMath and Academic Music," 15.

182. Stajka Rajic, "Mathematics and Music Game in the Function of Child's Cognitive Development, Motivation, and Activity," Early Child Development and Care, vol. 191, no. 9 (2021): 1468.

183 Rajic, "Mathematics and Music Games," 1468.

184. Rajic, "Mathematics and Music Games," 1468.

185. Rajic, "Mathematics and Music Games," 1468.

186 Sharpe, "The Relationship Between," 5.

187. Sharpe, "The Relationship Between," 5.

hypothesized that students' mathematics achievement scores would increase due to music instruction and be higher than students who did not participate in music.[188] The results of her study showedthat students who participated in music instruction as a part of the middle school curriculum scored higherin mathematics than students who did not participate in music. [189] Sharpe's study also found that "music instruction provided a gain in mathematics test scores for students who received music instruction as a part of the school curriculum."[190]

Many schools are beginning to focus more on science, technology, mathematics, and engineering. Rachel Renick studied the benefits of incorporating science, technology, mathematics, and engineering with music (STEAM) through interdisciplinary fourth-grade units. Renick writes that STEAM is significant to music educators.[191] However, Renick notes that "music teachers cannot help but wonder how they can be expected to effectively integrate science, mathematics, language arts, history, and engineering into their teaching."[192] In schools today, integrated units and lesson plans have become essential for music educators. Renick created interdisciplinary STEAM units for fourth graders with hopes that they "will provide an effective model that can be used by other music teachers."[193]

Michelle Mayes explored improvements in student learning through teaching mathematics and music.[194] Mayes writes that "a single subject focus is only one methodological

188. Sharpe, "The Relationship Between," 6.

189. Sharpe, "The Relationship Between," 61.

190. Sharpe, "The Relationship Between," 62.

191. Rachel Renick, "Steam in the General Music Classroom: Interdisciplinary Units for the Fourth Grade" (MA diss., University of Florida, 2015), 5.

192. Renick, "Steam in the General Music Classroom," 5.

193. Renick, "Steam in the General Music Classroom," 5.

194 Michelle Mayes, "Music and Math Curricula for Second-Grade Students: An Action Research Study" (Diss., Capella University, 2018), 1.

approach for teaching students."[195] She notes that this approach can be problematic since it is important for students to make connections between subjects.[196] Mayes claims that when students learn by making connections between content areas, "they are pushed to a higher level of learning and enabled to think at more complex levels," increasing academic achievement.[197] Integrating mathematics and music instruction may increase intrinsic motivation in students, creating a more enjoyable learning environment.[198]

Music Education and Language Arts

Not only is music interdisciplinary within the subject of mathematics but music education also supports language arts, literacy, and reading. In the article, "Using Music as a Background for Reading," Colleen Mullikin and William Henk studied how music can increase understanding when used as a background for reading. In their exploratory study, Mullikin and Henk found that music has been shown to facilitate other educational activities such as creative writing, mathematics, handwriting, spelling, and art.[199] The study also showed that certain types of music can relax most learners, drown out potential distractions, and stimulate active reasoning and creativity.[200]

Mirastasha Thomas studied the effect of music instruction on both math and language arts scores in elementary students.[201] Her research indicates "that the brain of a musician has

195. Mayes, "Music and Math Curricula," 1.

196. Mayes, "Music and Math Curricula," 1.

197. Mayes, "Music and Math Curricula," 1.

198. Mayes, "Music and Math Curricula," 1.

199 Colleen N. Mullikin and William A. Henk, "Using Music as a Background for Reading: An Exploratory Study," Journal of Reading, vol. 28. no. 4 (1985): 355.

200. Mullikin and Henk, "Using Music," 355.

201 Thomas, "The Effect of Music Instruction," 2.

more interconnected pathways than a non-musician."[202] In her study, Thomas tried to determine if music and academic achievement are connected to increase academic achievement in mathematics and language arts.[203] Thomas references Howard Gardner's theory of multiple intelligences extensively, stating that his contribution to the study of music in the classroom is important.[204] Thomas also studies the Mozart effect extensively, stating that "the Mozart effect is defined as a phenomenon where students experience a brief enhancement of special-temporal abilities after listening to a Mozart piano sonata."[205] After the completion of her study, Thomas concluded that although the results weren't as strong as expected "music does have some effect on content retention and test scores in language arts and math."[206]

Dee Hansen, Elain Bernstorf, and Gayle Stuber, in their book, *The Music and Literacy Connection,* examine links between text reading and musical decoding and comprehension. They write about four major principles that guide the scope, context, and organizational structure of their book:

1. Children are interactive learners.
2. Music teachers are literacy teachers; classroom literacy teachers are music teachers.
3. Literacy can be taught through multiple processes.
4. Musical training provides lifelong benefits. [207]

202. Thomas, "The Effect of Music Instruction," 2.

203. Thomas, "The Effect of Music Instruction," 4.

204. Thomas, "The Effect of Music Instruction," 5.

205. Thomas, "The Effect of Music Instruction," 8-9.

206. Thomas, "The Effect of Music Instruction," 71.

207 Dee Hansen, Elaine Bernstorf, and Gayle Stubor, The Music and Literacy Connection (Lantham, MD: Rowman and Littlefield, 2014): xxi.

The authors write about the occasional feelings of music educators, stating that they "feel as though other members of a school faculty consider music time an opportunity for a break, or simply time for children to do something extra instead of learn the important, tested subjects."[208] They promote literacy learning through music education and argue that "children are learning valuable skills in music class that are an integral part of becoming a literate person."[209] Hansen, Bernstorf, and Stubor advocate for literacy learning through music, making parallels between phonological awareness, phonemic awareness, rhyming, sentence segmentation, syllable awareness, initial and final sounds, phonemes, phonemic awareness, sight identification, cueing-system awareness, and reading fluency. The authors believe, "The ultimate goal then would be to move children toward literacy through multiple channels."[210]

Authors Julie Lorah, Steven Morrison, and Elizabeth Sanders studied music achievement of English language learners.[211] In their study, they found that "music background and experiences, such as piano background, have been shown to have a relationship with music achievement."[212] The authors believe that music achievement is related to academic achievement, performance achievement, and participation. Therefore, they propose that music achievement is important to ELLs when considering that music ability is a significant, positive predictor of ELL adults' phonological skills.[213] In addition, the authors write, "This phonological

208. Hansen, Bernstorf, and Stubor, The Music and Literacy Connection, 1."

209. Hansen, Bernstorf, and Stubor, The Music and Literacy Connection, 1."

210. Hansen, Bernstorf, and Stubor, The Music and Literacy Connection, 10."

211 Julie Lorah, Steven Morrison, and Elizabeth Sanders, "Music Achievement of English Language Learner Eighth-Grade Students," Bulletin of the Council for Research in Music Education, no. 206 (2015): 26.

212. Lorah, Morrison, and Sanders, "Music Achievement of English Language Learner," 26.

213. Lorah, Morrison, and Sanders, "Music Achievement of English Language Learner," 27.

benefit for second language learners is also consistent with neurological research that has demonstrated an overlap between language and musical processing areas of the brain."[214]

Isreal Eady and Janell Wilson believe that music has many benefits for students.[215] The authors write, "Music can make a significant contribution to all of education in terms of student benefits by enhancing key developmental goals such as self-esteem and creativity."[216] Their article, "The Influence of Music on Core Learning," confirms the belief that music education holds a strong influence on student learning in core subject areas. The authors claim that many similarities exist between music and reading. Eady and Wilson report that "using music in teaching reading may enhance motivation and abilities of children, whether or not they are musically talented or intellectually above average."[217]

The music education coordinator at Texas Woman's University, John Flohr, in his article, "Enriching Music and Language Arts Experiences," provides samples of music experiences within the content of language arts. Flohr believes, "Music can enrich literature and language arts, poetry, theater arts, transitions, science and math, as well as help meet special learner needs."[218] According to Flohr, one example is adding music to information, such as the alphabet song. "The experience becomes a memory aid for the alphabet by providing a short song to make information easier to memorize."[219] Other examples of music and language arts experiences

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214. Lorah, Morrison, and Sanders, "Music Achievement of English Language Learner," 27.

215 Isreal Eady and Janell D. Wilson, "The Influence of Music on Core Learning," Education, vol. 125, no. 2 (2004): 243.

216. Eady and Wilson, "The Influence of Music," 243.

217. Eady and Wilson, "The Influence of Music," 244.

218. Flohr, "Enriching Music," 12.

219. Flohr, "Enriching Music," 12.

include books that use accompanying songs, chants, and recordings, storytelling through rhythmic chant, and incorporating music elements within books.[220]

"Hip-Hop Early Literacy in K-1 Classrooms" by Shuaib Meacham, Sohyun Meacham, Misty Thompson, and Hattie Graves promotes hip-hop music as a link to more traditional literacy and literary practices.[221] Making a strong distinction between hip-hop and rap music, the authors believe, "When local artists and older students assist kindergarten and first graders with their hip-hop reading and writing, the students become more motivated to write for authentic purposes."[222] Because hip-hop music is literary by nature, it enables students to excel in literacy while retaining a sense of cultural authenticity.[223]

Authors Azwihangwisi Muthivhi and Samantha Kriger claim that research on music instruction and reading performance in South Africa, although rarely studied, is crucial to South African schooling when considering the significance of early reading ability on learners' overall academic performance.[224] In South Africa, interdisciplinary studies are referred to as conceptual and skills transfer. The authors write, "The question about transfer of cognitive and conceptual skills acquired in one domain of activity to the other, and how these skills could be exploited by teachers to benefit school learning in general, as well as conceptual skills transference from one subject area to the next, has relevance."[225] The authors' study found that music instruction

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220 Flohr, "Enriching Music," 12.

221. Meacham, Meacham, Thompson, and Graves, "Hip-Hop Early Literacy," 29.

222. Meacham, Meacham, Thompson, and Graves, "Hip-Hop Early Literacy," 29.

223. Meacham, Meacham, Thompson, and Graves, "Hip-Hop Early Literacy," 29.

224 Azwihangwisi Muthivhi and Samantha Kriger, "Music Instruction and Reading Performance: Conceptual Transfer in Learning and Development," South African Journal of Childhood Education, vol. 9, no. 1 (2019): 1. https://doi.org/10.4102/sajce.v9i1.544.

225. Muthivihi and Kriger, "Music Instruction," 2.

participation could have valuable influences on elementary student learning of early reading skills.[226]

To encourage participation in music education, Donald Hodges promotes the impact of music education on children. Hodges writes, "The purpose of this project is to determine the importance of music education in the lives of teenagers."[227] Low attendance can have a negative influence on student learning. Hodges believes, "There is a perception among many administrators and educators that the arts can positively influence students to remain in school."[228] His study showed that students who participated in instrumental music instruction had higher attendance rates and higher academic achievement than students who did not.[229] Participation in music can have great benefits for student motivation, attendance, and achievement.

Picture books are a sound source for integrating music education and language arts. Youngsun Nam writes about "the importance and necessity of music education" emphasized by research and educators who integrate music into teaching and everyday life.[230] Nam suggests that a solution to increasing music instruction in schools is through interdisciplinary studies.[231] Nam believes, "Language arts is the best subject to combine with music to meet the needs of language development and music instruction because the process of learning music and languages has many parallels, and many research studies have proven that music enhances language skills."[232]

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226 Muthivihi and Kriger, "Music Instruction," 2.

227. Hodges, "The Sounds of Learning," 1.3.

228. Hodges, "The Sounds of Learning," 4.1.

229. Hodges, "The Sounds of Learning," 4.1.

230. Nam, "Integrating Music and Language Arts," 1.

231. Nam, "Integrating Music and Language Arts," 4.

232. Nam, "Integrating Music and Language Arts," 8.

Her study reviews the benefits of music education in elementary schools, why music and language arts integration is effective, and the effects of utilizing children's books to enhance music education and language arts learning.[233]

Sangeeta Karwa studied music as a tool for language and literacy development through interdisciplinary teaching. Karwa writes, "Music as an art entails linguistic skills that play a significant role in education."[234] She claims that the impact of music on language development is a well-studied theory, showing that "the use of music in the language arts classroom can support students' fluency, vocabulary, and overall reading comprehension."[235] In her dissertation, Karwa addresses the critical necessity to "integrate the arts, specifically music, as a means to support and reinforce language arts and literacy development."[236] Karwa's study includes a handbook based on her research findings.[237] The handbook provides resources for teachers to integrate music into language arts teaching.[238]

The link between music experiences and the enhanced encoding of speech and phonological awareness motivated Borbala Lukacs and Ferenc Honbolygo to study to effects of music education on elementary students. The authors state the music-induced improvement in the encoding of shows through better phonemic categorization and phonological-lexical processing.[239] According to Borbala and Honbolygo, "It has been shown that phonological

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233. Nam, "Integrating Music and Language Arts," 8.

234. Karwa, "Music," 2.

235. Karwa, "Music," 2

236. Karwa, "Music," 7.

237 Karwa, "Music," 7.

238 Karwa, "Music," 7.

239. Borbala Lukacs and Ferenc Honbolygo, "Task-Dependent Mechanisms in the Perception of Music and Speech: Domain-Specific Transfer Effects of Elementary School Music education," Journal of Research in Music Education, vol. 67, no. 2 (2019): 155.

awareness is an essential precursor of later reading ability; thus, research has been expanded to discover the potential relationship not just between musical hearing and phonological awareness but also between musical hearing and reading acquisition."[240] The authors study resulted in inconsistent results. However, regarding the transfer effects of music education and language-related abilities, they recommend improving music curricula and develop new methods for music education.[241]

Ron Butzlaff studied music and whether it can be used to teach children to read.[242] Butzlaff's research seeks to justify the relationship between music education and language arts skills.[243] He poses four points of interest that relate music learning to learning to read:

1. First, music and written text both involve formal written notation which must be read from left to right.
2. Second, skill in reading requires a sensitivity to phonological distinctions and skill in music listening requires a sensitivity to tonal distinctions.
3. Third, when students learn the lyrics of songs, they may engage in reading written text.
4. Fourth, a motivational argument can also be made. When students form part of a music group, such as a school orchestra or band, they must learn to work together, instilling a sense of personal responsibility which in turn leads to heightened academic responsibility and performance.

240. Lukacs and Honbolygo, "Task-Dependent Mechanisms," 155.

241. Lukacs and Honbolygo, "Task-Dependent Mechanisms," 166.

242 Butlaff, "Can Music Be Used," 176.

243 Butlaff, "Can Music Be Used," 176.

Butzlaff's studies how to assess the relationship between music education and reading test scores to show the relationship between the two is neither large nor reliable.[244] However, he suggests further research and more studies and different methodology regarding the relationship between music education and reading to add more clarity and justification. [245]

Researcher Kathleen Diane Frasher believes that music and literacy share many of the same skills.[246] Frasher states that music and literacy programs can be used together to help children learn to read is no surprise.[247] According to Frasher, "Music study can help promote literacy skills such as vocabulary, articulation, pronunciation, grammar, fluency, writing, sentence patterns, rhythm/parts of speech, auditory processing, and prosody."[248] The author believes it would be beneficial for music educators and reading specialists to work together in order to help students communicate more effectively.[249] The author adds that "results show that younger children benefit the most from music instruction in their reading comprehension and that music interventions usually have a positive and significant effect on reading skills."[250]

Music and the Brain

Daniel Levitin writes about the effects of music on the brain in his book, *This is Your Brain on Music: the Science of Human Obsession.* Levitin claims that his book "is the story of how brains and music co-evolved: what music can teach us about the brain, what the brain can

244. Butlaff, "Can Music Be Used," 176.

245. Ron Butzlaff, "Can Music Be Used to Teach Reading?" The Journal of Aesthetic Education, vol. 34, no. ¾ (2000): 167.

246 Kathleen Diane Frasher, "Music and Literacy: Strategies Using Comprehension Connections by Tanny McGregor," General Music Today, vol. 27, no. 3 (2014): 6.

247. Frasher, "Music and Literacy," 6.

248. Frasher, "Music and Literacy," 6.

249 Frasher, "Music and Literacy," 6.

250. Frasher, "Music and Literacy," 6.

teach us about music, and what both can teach us about ourselves."[251] Levitin explains what music is from the standpoints of pitch, timbre, rhythm, dynamics, and harmony. Neuropsychological investigations have allowed scientists to make maps of brain function and cognitive operations throughout the areas of the brain. Levitin states, "Musical activity involves nearly every region of the brain that we know about and nearly every neural subsystem."[252] Simply listening to music activates both sides of the brain. Playing an instrument involves the frontal lobes of the brain and the motor cortex. Levitin says, "Tapping along with music, either actually or just in your mind, involves the cerebellum's timing circuits."[253] In Levitin's words, "Music can be thought of as a type of perceptual illusion in which our brain imposes structure and order on a sequence of sounds. Just how this structure leads us to experience emotional reactions is part of the mystery of music."[254]

The Ten Things: A Guide to Your Brain by Kim Bevill explores the benefits of sports, gaming, memory, hands-on, gender, play, mental health, relationships, and music on the brain. Bevill believes that listening to music is beneficial to health and intelligence. She writes, "Listening to and making music not only excites and electrifies us, but it also develops neural pathways that enhance neural success."[255] Bevill also comments on music training and its ability to build networks "for delivering and receiving information in speech, conceptualizing and processing math, reading comprehension, spatial reasoning, map skills, and improved social interaction."[256] Bevill writes that the research on many aspects of music from listening, playing

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251. Levitin, This is Your Brain, 12.
252. Levitin, This is Your Brain, 12.
253. Levitin, This is Your Brain, 86.
254. Levitin, This is Your Brain, 109.
255. Bevill, The Ten Things, 231.
256. Bevill, The Ten Things, 231.

an instrument, and participating in musical activities, and how it stimulates neural growth throughout the brain.[257] According to the information in her book, "Music calms the specialized immune response, improves cognition after surgery, lowers anxiety, improves efficiency in the workforce, and increases strength, pace, and coordination."[258]

Authors Trinetia Respress and Ghazwan Lutfi believe that there is research evidence showing that teaching fine arts engages the student in learning that is beyond the normal study used in the traditional classroom.[259] In their article, "Whole Brain Learning: The Fine Arts with Students at Risk," the authors write that "the first mode requires performance, whether painting, dancing or reciting, and the second mode requires creative action to be taken by the student to visual what to paint or to choose tempo, dynamics, and phrasing while performing music."[260] The authors touch on research by the American Psychological Association that suggests that music lessons, and listening to music, can enhance spatial reasoning performance.[261] Another study about music and the brain in their article confirms "an unmistakable causal link between music and spatial intelligence."[262] The authors also write that spatial reasoning is involved in many things including music and mathematical problems.[263]

Jay Shulkin, in his book *Reflections on the Musical Mind*, presents research supporting the positive effects of music and the brain. Shulkin writes about cognitive capabilities and problem-solving, time and timing, calculating, evolution, hearing and vocal expression, hearing

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257. Bevill, The Ten Things, 232-238.

258. Bevill, The Ten Things, 239-240.

259. Trinetia Respress and Ghazwan Lutfi, "Whole Brain Learning: The Fine Arts with Students at Risk," Reclaiming Children and Youth, vol. 15, no. 1 (2006): 26.

260 Respress and Lutfi, "Whole Brain Learning," 26.

261 Respress and Lutfi, "Whole Brain Learning," 26.

262 Respress and Lutfi, "Whole Brain Learning," 26.

263 Respress and Lutfi, "Whole Brain Learning," 26.

and seeing, seeing through hearing, and core motor systems of the larynx and cognitive motor expression.[264] He makes links between music and all of these brain functions. Shulkin states the following:

> Like language, the roots of music may be in the inherent shared features of our social brain, allowing us to communicate with others. Since its development, music has filled many other important roles for humans. It is a fundamental part of our evolution; we probably stand before we spoke in syntactically guided sentences. Song is represented across animal worlds. Not surprisingly, song is tied to a vast array of semiotics that pervade nature: calling attention to oneself, expanding oneself, selling oneself, deceiving others, reaching out to others, and calling on others. These creative capabilities so inherent in music are a unique human trait.[265]

E. Glenn Schellenberg believes that music increases cognitive abilities. In his article, "Music and Cognitive Abilities," he writes, "Intellectual benefits of exposure to music would be noteworthy if they extend to nonmusical abilities, they are systematic and reliable, and they are more likely to result from hearing or playing music than from other activities."[266] In his study about music lessons, the "experiment provided evidence that music lessons cause improvements in intellectual ability."[267] Shellenberg believes that music makes students smarter. He states, "Music listening, and music lessons can lead to short-term and long-term cognitive benefits."[268]

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264 Jay Shulkin, Reflections of the Musical Mind (Princeton, NJ: Princeton University Press, 2013), 35.

265. Shulkin, Reflections of the Musical Mind, 35.

266. Shellenberg, "Music and Cognitive Abilities," 1.

267. Shellenberg, "Music and Cognitive Abilities," 5.

268. Shellenberg, "Music and Cognitive Abilities," 6.

"The Art of Social Justice: Examining Arts Programming as a Context for Critical Consciousness Development Among Youth" by Danna Ibrahim, Erin Godfrey, Elise Cappella, and Esther Burson stresses that the arts can facilitate critical consciousness.[269] In their study that investigated whether participation in music and the arts relates to positive changes in students' critical consciousness, the authors write that their findings suggest the crucial importance to extend opportunities for arts involvement to all students by the ways in which arts involvement can promote critical consciousness.[270] The authors state, "General participation in the arts has been associated with outcomes related to critical consciousness, and its known mechanisms."[271] Critical consciousness promoted through the arts may help to engage youth and their development outcomes, build relationship skills, and expand social connections.

John Vitale investigates whether music makes people smarter in his article, "Music Makes You Smarter: A New Paradigm for Music Education?" Vitale studies four different groups involved in elementary education including elementary music teachers, elementary students, parents of elementary students, and non-music elementary students.[272] In his article, Vitale reviews several studies that associate learning and brain function with music education. [273]His quantitative findings indicate that studying music increases cognitive abilities and helps to validate that music makes you smarter.[274]

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269 Ibrahim, Godfrey, Cappella, and Burson, "The Art of Social Justice," 409.

270. Ibrahim, Godfrey, Cappella, and Burson, "The Art of Social Justice," 409.

271. Ibrahim, Godfrey, Cappella, and Burson, "The Art of Social Justice," 409.

272 John Vitale, "Music Makes You Smarter: A New Paradigm for Music Education? Perceptions and Perspective from Four Groups of Elementary Education Stakeholders," Canadian Journal of Education, vol. 34, no. 3 (2011): 335.

273 Vital, "Music Makes You Smarter," 335.

274. Vital, "Music Makes You Smarter," 335.

Allysa Lipsey examined the use of musical influence on the brain in her dissertation entitled, "This is Your Brain on Music: The Study of Musical Influence on the Cognitive Mindset and Learning." She writes about the "different trials and methods to potentially unlock new knowledge about the brain through listening to music during in-class group work."[275] In her study, Lipsey examined several groups of students to show that music affects student perceptions concerning course load, achievement, and attitude in math.[276] Lipsey writes, "Results of the research exemplify that music has an effect on the brain, both positive and negative, but inside the classroom is a special case because of the awareness and musical choice when students' minds are the most focused."[277] According to Lipsey, the song choice determines whether or not students make improvements in motivation and grades.[278]

Music philosopher David Elliott believes that music has many beneficial effects in students, including increasing neurophysiological and cognitive responses, which he explains in his book *Praxial Music Education*.[279] Elliott writes that children "are musically responsive and active from their earliest days, causing speculation about their early cognitive experiences and understandings of music."[280] Another cognitive benefit of music education for children are the emotional experiences. Elliott states, "Children's emotional experiences in music making and listening are generally very evident in their behavior. We see how music soothes or stimulates

275. Allysa Lipsey, "This is Your Brain on Music: The Study of Musical Influence on the Cognitive Mindset and Learning" (diss., University of Mississippi, 2019), 4.

276. Lipsey, "This is Your Brain on Music," 4.

277. Lipsey, "This is Your Brain on Music," 4.

278. Lipsey, "This is Your Brain on Music," 4.

279 David Elliott, Praxial Music Education: Reflections and Dialogues (NY: Oxford University Press, 2005): 250.

280. Elliott, Praxial Music Education, 250.

them in myriad ways."[281] Music making allows students to express emotions, images, and stories through their cognitive and intrinsic enjoyment.

Bennett Reimer associates the connections and interrelations of musical performance to the mental constructs of the brain in his book, *Seeking the Significance of Music Education.*[282] Reimer believes, "Performers must develop complex, subtle successions of interrelated connections (understanding) regarding such matters, not only as mental constructs but as internalized action patterns."[283] Reimer writes that connections, forming, and relevancy are the three concepts of thought and action that are required for understanding.[284] He states, "Forming is the function of the mind actively bringing connections into being."[285] Therefore, performing music may increase brain function for students.

In their book, *Music Matters: A Philosophy of Music Education*, Elliott and Marissa Silverman question whether there is a musical brain center.[286] The authors believe that the previous research in brain imagery which states intellectual and literal activities such as math and language were primarily housed in the left hemisphere of the brain and the creative and activities such as art, music, poetry, and dance were primarily housed in the right hemisphere are false dichotomies. [287] The authors write, "Music listening, performance, and composition engage nearly every area of the brain and involve nearly every neural subsystem."[288] Although it is clear

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281. Elliott, Praxial Music Education, 252.

282 Bennett Reimer, Seeking the Significance of Music Education: Essays and Reflections (Lanham, MD: Rowman and Littlefield, 2009): 214.

283. Reimer, Seeking the Significance, 214.

284 Reimer, Seeking the Significance, 211.

285 Reimer, Seeking the Significance, 212.

286 David Elliott and Marissa Silverman, Music Matters: A Philosophy of Music Education (New York: Oxford University Press, 2015): 180.

287 Elliott and Silverman, Music Matters, 180.

288 Elliott and Silverman, Music Matters, 180.

that music activates many areas of the brain, Elliott and Silverman believe the question of whether of not there is a musical brain center is an ongoing debate.

Summary

The literature from this research project focuses on the values of interdisciplinary studies and arts integration to promote learning and academic achievement across content areas. It dives deeper into the contents of music and mathematics as well as music and language arts. Further studies of literature address how music affects the brain and can increase learning, healing, and academic achievement. This review provides standards that promote music study in school through interdisciplinary lessons and arts integration.

Chapter Three: Methodology

Introduction

The purpose of this study was to examine mathematics and language arts integration in kindergarten through fifth music classrooms and music integration in kindergarten through fifth grade classrooms due to the limited research that exists regarding the benefits of integrated and interdisciplinary music studies in rural elementary schools. Chapter three highlights the theoretical framework of this study, the participants and setting, the design of the interdisciplinary music lessons, core concepts, and the data collection and analysis. The aim of this project is to enhance student learning in mathematics and language arts through participation in interdisciplinary music education lessons.

Design and Theoretical Framework

The data collection methods used in this qualitative case study were obtained through classroom observations and document analysis. Utilizing descriptive research, the author collected observational information from rural elementary music classrooms and kindergarten through fifth grade regular elementary classrooms. The observational data was used to obtain ideas of classroom lessons and teaching methods that can be integrated with music instruction. The document analysis included researching information about arts integration and interdisciplinary approaches, music and common core curricula, and music and common core standards. The literature was thoroughly examined to obtain high-quality qualitative data.

Existing information was gathered and examined for informative details, perspectives, ideologies, frameworks, and implications that define the concepts of interdisciplinary music education and arts integration to answer the proposed research questions via the outlined research method and approach. The collected material was analyzed for underlying themes of

how general music education increases learning across content areas in rural elementary schools, specifically in mathematics and language arts. As guided by qualitative data collection defined by Creswell and Creswell, material such as unstructured rural music classroom observations, visual materials, documents such as magazine articles and dissertations, scholarly books, scholarly journals, commentaries, and audio and visual recordings were examined and written about simultaneously. [289] The data was studied through an interdisciplinary lens for documented directions, goals, and motives that have guided music educators towards incorporating interdisciplinary music lessons and approaches in general elementary music education in rural schools.[290]

Additional data was gathered and examined, including scholarly journals, magazine articles, educational materials, dissertations, theses, and curricula such as books, websites, and lesson plans. The data was examined and written about simultaneously from a pedagogical perspective for implications of teaching interdisciplinary studies in the general elementary music classroom and integrated music instruction in the elementary classroom. The collection and examination of this material established a foundation for directing the study toward establishing an understanding within the literature of whether the rural elementary school structure benefits from the inclusion of interdisciplinary music lessons. The interdisciplinary lessons included in this study follow the backward design of Grant Wiggins and Jay McTighe's book, *The Understanding by Design Guide to Creating High-Quality Units.*

289. Creswell and Creswell, Research Design, 5th ed., 185-192.

290. Creswell and Creswell, Research Design, 5th ed., 185-192.

Questions and Hypotheses

Research Question One

The following questions will be addressed throughout this research:

Research Question One: How can integrating music with other disciplines increase student learning across content areas?

Research Question Two: What musical activities and lessons promote mathematical and language arts connections in general music education in small rural elementary schools?

Research Question One may be answered with the following hypothesis:

Hypothesis One: Integrating music with other disciplines increases student learning across content areas in terms of increased academic achievement, its positive influence on individuals, and making cognitive connections across subjects from multiple points of view.

Music educators can provide music lessons and activities that promote learning in mathematics and literacy. These interdisciplinary encounters "create new worlds for children and enlarges their scope of experience beyond that which they encounter day to day."[291] Students can make cross-curricular connections when general music lessons incorporate activities and learning from other content area disciplines. These connections will allow students to access and use information differently, increasing understanding of all content area disciplines involved. Students can recall the information learned from various methods to increase their knowledge and understanding of all contents and their educational links. Collaboration between educators is

291 Barrett, McCoy, and Veblen, Sound Ways of Knowing, 111.

necessary for interdisciplinary approaches in music education to improve learning across content areas.

Research Question Two

Research Question Two may be answered with the following hypothesis:

> Hypothesis Two: Several musical activities and lessons promote mathematics and language arts connections in terms of rhythmic equations, studying note values, rhythmic compositions, and reading and writing lyrics.

Exposing students to mathematical and language arts opportunities through music instruction can promote student learning in these contents. Music is mathematical by nature. Note values show basic counting and fractions, while reading rhythms helps students to understand mathematical values. When students know the connections between mathematics and music, their understanding of mathematical equations increases. When reading music and lyrics, students expand their language arts and literacy capabilities. Sight words can be incorporated into children's songs to increase children's foundational skills, print concepts, phonological awareness, reading fluency, speaking, and listening skills. Reading and creating sound stories is another musical connection to literacy that helps students to identify and analyze common structural features and sight words.

Participants and Setting

This case study involved extensive research into the benefits of music education both in the music classroom and the regular elementary classroom. The research explains how music can be integrated into K-5 mathematics and language arts learning as well as how K-5 mathematics and language arts learning can be integrated into the elementary music classroom to enhance student learning. The included lesson plans are intended for elementary music teachers and

students in grades kindergarten through fifth grade. The lesson plans are malleable to fit the needs of various levels of development. The lessons were adapted to encourage elementary music teachers to include interdisciplinary teaching in the contents of mathematics and language arts to enhance student learning through music and across content areas.

Design of Interdisciplinary Lessons and Procedures

The interdisciplinary lessons in this study were created by following Grand Wiggins' and Jay McTighe's *Understanding by Design Guide to Creating High-Quality Units*. The authors' book, in their words, is "targeted to individuals and groups interested in improving their skills in designing units of study based on the Understanding by Design (UbD) framework."[292] The UbD framework encourages lesson creators to follow three stages of design that include desired results, evidence, and the learning plan. UbD is based on eight key tenets:

1. UbD is a way of thinking purposefully about curricular planning, not a rigid program or prescriptive recipe.
2. A primary goal of UbD is developing and deepening student understanding; the ability to make meaning of learning "big ideas" and to transfer learning.
3. UbD unpacks and transforms content standards and mission-related goals into relevant Stage 1 elements and appropriate assessments in Stage 2.
4. Understanding is revealed when students autonomously make sense of and transfer their learning through authentic performance. Six facets of understanding; the capacities to explain, interpret, apply, shift perspective, empathize, and self-assess serve as indicators of understanding.

292. Grant Wiggins and Jay McTighe, The Understanding by Design Guide to Creating High-Quality Units (Alexandria, VA: ASCD Publications, 2011), 1.

5. Effective curriculum is planned "backward" from long-term desired results through a three-stage design process (desired results, evidence, learning plan). This process helps to avoid the twin problems of "textbook coverage" and "activity-oriented teaching" in which no clear priorities and purposes are apparent.
6. Teachers are coaches of understanding not mere purveyors of content or activity. They focus on ensuring learning, not just teaching (and assuming that what was taught was learning): they always aim, and check, for successful meaning-making and transfer by the learner.
7. Regular reviews of units and curriculum against design standards enhance curricular quality and effectiveness.
8. UbD reflects a continuous-improvement approach to achievement. The results of the designs, student performance, inform needed adjustments in curriculum as well as instruction. [293]

Ubd is intended for unit planning, rather than individual lesson planning. The unit plans included in the appendices can be broken down into individual lessons by music teachers. The researcher created units for mathematics learning and language arts learning. The units can be combined to work for multiple grade levels. The researcher included a total of seven unit plans following the Ubd Unit Plan design. The template used for each interdisciplinary unit plan included in this study can be found in Figure 1. Examples of some individual lesson plans that follow the unit design can also be found in the appendices following the unit plans.

293. Wiggins and McTight, The Understanding by Design, 3.

Figure 1. Understanding by Design Lesson Template

Understanding by Design (UbD) Unit Plan	
Title: Unit and Competency **Subject/Course:** Your Subject Area **Topic:** Topic of Lesson **Grade:** **Designers:** Your Name	
Stage 1 – Desired Results (PLAN)	
Established Goals: (What do students need to learn and be able to do?) Essential or Common Core Standards	
Understandings: *Students will understand that…* What understandings are desired about the big ideas of this unit?	**Essential Question/Big Idea:** What question(s) will guide inquiry and point toward the big ideas and transfer goals of the unit?
Students will know….	*Students will be able to….* What will students know and be able to do by the end of the unit? (List the few most important discrete knowledge and skill goals that are separate from the transfer goals.)

Stage 2 – Assessment Evidence (STUDY)
Performance Task (How will we know if they learned it?) *Summary in GRASPS form* Here is where you will develop a scenario for the activity/project. This section is for you to develop a guide for the students on what to do. **G**oal(s): (Scenario for Assignment/Project) **R**ole: (Student's role) **A**udience: (Who will see this information? It can be the teacher only.) **S**ituation: (How – individually, partners, groups – the goal will be accomplished.) **P**erformance: (What will the student do?) **S**tandards: (The criteria for success and how it will be assessed.)
Key Criteria: to reflect Performance Tasks: ***Examples****: Rubric, Checklist, etc.* By what criteria will performances and products be judged?
Other Evidence (How will we know if they learned it?) Summarized (tests, essays, work sample(s), etc. What other evidence (quizzes, observations. Homework, etc.) will be collected to determined whether or not Desired Results identified in Stage One have been achieved?

Stage 3 – Learning Plan (DO)
Learning Activities (How will students learn it?) **Consider the WHERETO elements:** **These questions are/can be directed as….** **What the teacher and/or the student do in regard to the WHERETO.** **W** **Where are we going? What is expected?** **H** **How will we hook (Introduce this to) the students?** **E** **How will we equip students for expected performances?** **R** **How will you rethink or revise? What are likely or predictable student misunderstandings and/or performance weaknesses in this unit? What do the research and teacher experience say we can expect the greatest difficulties to be? What suggestions can you offer about how to troubleshoot these issues?** **E** **How will students self-evaluate and reflect on their learning?** **T** **How will we tailor learning to varied needs, interests, and learning styles?** **O** **How will we organize the sequence of learning?** **Resources** **What print and web resource best support the unit? Also provide additional resources used in planning for activities or during instruction**

Core Concepts

Interdisciplinary music education and arts integration, as the core concepts of this study, provide a significant and scholarly examination of cross-curricular connections in elementary general music education. Keith Mason defines an interdisciplinary curriculum involving the planning of two or more subjects as something that "that allow students to make connections and learn at a deeper level."[294] Through an interdisciplinary approach to music education, music teachers make connections to other contents, like mathematics and language arts, within the music curricula and instruction. Barrett states, "Music teachers as interdisciplinarians seek to bridge meaningful connections between various genres and styles of music (an intradisciplinary focus), between music and other closely related forms of study (an interdisciplinary focus), and between music and students' lived experience (a student-centered, emancipatory focus).[295]

Arts integration works in an opposite manner to interdisciplinary music education. In arts integration practices, classroom and content area teachers pull music and arts practices into their lessons. According to Lisa Donovan and Louise Pascale, "Arts integration is the investigation of curricular content through artistic explorations. In this process, the arts provide an avenue for rigorous investigation, representation, expression, and reflection of both curricular content and the art form itself."[296] Music and other performing arts activities integrated into the classroom allow for expressive interaction as social collaborations.[297] Liane Brouillette believes that providing integration for K-5 students "lets students engage with ideas at their own

294. Keith Mason, "An Interdisciplinary Approach," Choral Director, January/February 2019, 8.

295. Barret, Teaching General Music, 173.

296. Lisa Donovan and Louise Pascale, Integrating the Arts Across Content Areas (Huntington Beach, CA: Shell Education, 2004), 14.

297. Liane Brouillette, Arts Integration in Diverse K-5 Classrooms: Cultivating Literacy Skills and Conceptual Understanding (New York, NY: Teachers College Press, 2019), 8.

developmental level" without detracting from the curriculum being taught.[298] Arts integration is a creative pathway for teaching in elementary schools, however professional learning experiences are necessary and "teachers need to examine their beliefs and understandings about the creative process in the arts."[299]

Another core concept of this project is the effects of music instruction on the brain. According to scholars, there is a link between music and the brain.[300] Kim Bevill writes, "Music training builds neural networks essential for learning and memory."[301] With this information in mind, students build neurons every time they sing or play an instrument, the same pathways used for "speaking, learning, language, recognizing words, and improving your lifelong memory."[302] The increased strength that music establishes between neurons increases the brain's capacity to recall and retain information and connects the brain's left hemisphere to the right hemisphere.[303] McDonel says, "From a neuroscience perspective, music training has both domain-specific and domain-general effects on learning."[304] This is another indicator that both music-specific information and general mental processes "affect linguistic and mathematical development"[305] are present during the process of making music.

298. Brouillette, Arts Integration in Diverse Classrooms, 9.

299. Amy L. Duma and Lynne B. Silverstein, "Arts Integration: A Creative Pathway for Teaching," Educational Leadership, December 2018/January 2019.

300 Kim Bevill, The Ten Things: A Guide to Your Brain (Bloomington, IN: Balboa Press, 2021), 245.

301. Bevill, The Ten Things: A Guide to Your Brain, 245.

302. Bevill, The Ten Things: A Guide to Your Brain, 245.

303. Cox and Stephens, "The Effect of Music Participation on Mathematical Achievement," 758.

304. McDonel, "Early Childhood Learning Connections," 47.

305. McDonel, "Early Childhood Learning Connections," 47.

Data Collection and Analysis

Janet Barrett argues that an interdisciplinary perception is a sustainable approach to music teaching and learning.[306] An interdisciplinary approach to music education may help administrators, community members, and other content area teachers in rural elementary schools understand the value of music education for students. Lawrence Scripp and Josh Gilbert assert, "After almost a century of emergent examples of arts integration teaching practices, today school administrators and both arts and classroom educators increasingly subscribe to the view that discipline-specific teaching and learning can be optimized through arts and arts integration practices."[307]

Data was analyzed through document analysis and through observations. The document analysis focused on research confirming the benefits of interdisciplinary and art integrated forms of teaching. Through observations of rural elementary music teachers and classroom teachers, the researcher collected ideas of classroom teaching, lessons, and content standards that could be integrated and enhanced into music instruction. The researcher analyzed the literature and observational data to create interdisciplinary music lessons that would benefit students across the content areas of music, mathematics, and language arts. Although the researcher did not collaborate with any individuals, she was able to collect and analyze data for all elementary grade levels through her observations.

306. Carlos Abril and Brent Gault (eds.), Teaching General Music: Approaches, Issues, and Viewpoints, (New York: Oxford University Press, 2016), 171.

307. Lawrence Scripp and Josh Gilbert, "Music Plus Music Integration: A Model for Music Education Policy Reform that Reflects the Evolution and Success of Arts Integration Practices in the 21st Century American Public Schools," Arts Education Policy Review, vol. 117, no. 4 (2016): 186. https://doi.org/10.1080/10632913.2016.1211923

Chapter Four: Research Findings

Introduction

The purpose of this chapter is to present the findings of the qualitative case study. The researcher examined music integration in the general elementary classroom through extensive classroom observations in several K-5 classrooms. The researcher also analyzed literature and curricula regarding music integration in the general elementary classroom. In addition, the researcher examined interdisciplinary music education by observing K-5 classroom lessons and activities in the general music classroom. Interdisciplinary music curricula and connections, and arts integration activities, were also thoroughly examined. This case study includes interdisciplinary unit plans that can be used in general music education classes to enhance mathematics and language arts learning for elementary students. The researcher supplies an overview of the findings through templates that follow the three stages of Ubd by Grant Wiggins and Jay McTighe. The results of the research and the resulting unit plans were created to answer the following research questions:

> Research Question One: How can integrating music with other disciplines increase student learning across content areas?
>
> Research Question Two: What musical activities and lessons promote mathematical and language arts connections in general music education in small rural elementary schools?

The research for this qualitative case study took place over the course of approximately one year. The observations occurred during school hours within one complete school year. Review of literature and curricula took place throughout the entire year. The purpose of the research was to create unit plans and lessons that support interdisciplinary learning within the elementary school music curriculum.

Results

Regular Classroom Observations

The researcher spent an average of two hours observing different classrooms for each grade level kindergarten through fifth grade (K-5). Due to time constraints, not all subjects that are taught in the regular classroom were observed. When observing in the regular K-5 classroom, classroom teachers utilized little to no arts integration in their teaching. Kindergarten was observed to utilize the most arts integrations of all six grade levels. Visual arts were integrated into the regular classroom more regularly than music. Table 1 below shows the time classroom teachers spent using music and visual art integration in their lessons for each grade level classroom based on the number of arts integrated activities that were utilized and the number of activities that were taught.

Table 1

Percentage of Arts Integration Utilized in the Regular Classroom		
	Music Integration	**Visual Arts Integration**
Kindergarten	40%	40%
First Grade	6%	6%
Second Grade	0%	11%
Third Grade	8%	16%
Fourth Grade	0%	10%
Fifth Grade	0%	23%

The researcher observed several reading, writing, and math lessons and activities in fifth grade classrooms. Students were seen reading in small groups, playing games to increase

learning such as root words, writing stories, and practicing vocabulary words by drawing in four-square organizers. Students were seen using cards to make inferences from pictures and sentences, writing answers to questions in a graphic organizer, taking independent reading assessments, and practicing figurative language by writing sentences that were made into a tree. During a math lesson, students used domino cards to work on math facts like adding and multiplying fractions and used grid paper to practice math facts and fractions. Students took quizzes based on individual readings and wrote summaries of what they had been reading. Fifth grade teachers used no music integration in their lessons. In the 5th grade classrooms, teachers utilized visual arts integration when using grids, drawing dominos for math and fraction practice, and creating a tree out of figurative language sentences written by each student.

Some of the lessons could be enhanced with arts integration despite the lack of music integration. When students are studying root words, they could sing a song with the meanings of the root words. When students would work on vocabulary words, they used graphic organizers which utilize some visual art. When working with the graphic organizers, instead of writing sentences, students can write songs. Students could improve memory by singing a song about synonyms and antonyms to help them recall the meanings of the words. Since music is mathematical by nature, music can be integrated in many 5th grade math lessons. When adding, subtracting, and multiplying fractions, students can use the values of notes such as eighth notes, sixteenth notes, and thirty-second notes. 5th grade students could also use a Blookets program by making a Blooket about music words.

Fourth grade teachers utilized no arts integration during observations. In fourth grade, the researcher observed students reading a book as a whole class where the students would choose which path the character would take. Students studied Colorado history and the Oregon Trail, the

meaning of Indigenous, and the history of Indigenous people. Fourth grade students were seen learning about types of waves through a PowerPoint presentation and whole group conversation. Students also meet for daily morning meetings. During math lessons, students worked on factors and multiples, specifically focusing on the box method for multiplying. Students played games with a partner to practice multiples together. Students had visuals of multiplication charts that they could refer to which included pictures, numbers, and writing. During whole group conversations, students made a hand motion to indicate that they agreed or disagreed with someone's statement or answer. When students were unable to complete and understand the math problems, the teachers would have a "math talk" to figure out what the problem was. During math lessons, students were also seen working on perimeter problems. Some fourth-grade teachers would start class with a motivational video on YouTube.

The only attempt at music integration was when one teacher used vocal inflection and choral responses to get students' attention and indicate what they should be doing. The routine helped students to transition and stay on task. Music could be integrated when learning about Colorado history, waves, and cultures. The teacher could present music from different groups of people and time periods. Students could also create a song or rap about Colorado after learning all the facts. When learning about types of waves, the teacher or students can compose a rhyme or song to help them recall information about different waves. When teachers begin each day with a morning meeting to talk about the daily schedule, a gathering song can be played or sung to bring students together for the meeting.

Little arts integration was seen in the observed lessons in third grade classrooms. In third grade, students were seen performing morning jobs like homework checker, classroom economy collector, and lunch counter. Students would answer a question of the day by writing their

individual answers. Students were observed taking spelling tests, math assessments, speaking the Pledge of Allegiance, free writing, studying math work for the test later that day, reading, writing suspense narratives, and working on word synonyms. During a science lesson, students were studying the weather and collecting data. One lesson involved students using grid observation charts to chart types of markers, time concepts, elapsed time, and observations. Students would look at pictures of different types of calendars and write their observations. In some third-grade classrooms, teachers used a "track" method. When a student was talking, the teacher would say to track that student. When the teacher was talking, the teacher would say to track the teacher. When students needed to look at the board, the teacher would tell students to track the board. Students would often work with shoulder partners to talk about observations and answers to questions. Students were seen observing types of rocks and writing about the main idea and details. Teachers would set timers to tell students they had a certain amount of time left. When learning about point of view, students used graphic posters and would fill in the blanks of pictures. During transitions, students would often chorally respond together and memorize chants or phrases.

Choral chants and responses are one way that some third-grade teachers integrated music. All the third-grade classrooms observed integrated some visual arts integration through graphs, PowerPoints, and pictures. More music integration may increase student recall, memory, and excitement about some of the observed lessons. When performing morning jobs, students can sing a song to monitor the time spent on the jobs. When introducing the question of the day, a song can be sung that introduces the question. During science lessons, students could utilize a song about the different types of data collection or create a chant about the weather as a writing assignment. When regrouping, students could sing a song or add more choral chanting and

rhythms. Playing music is another way students can make transitions. The track method would also grab more student attention if it included rhythm or melody.

The researcher observed no music integration in second grade. Students would look at picture and use their imaginations create sentences and would also look at pictures of characters and write about character feelings. Students were asked to analyze the character feelings to differentiate between telling or showing work choices. In one second grade classroom, students were also seen writing practice paragraphs about their recently celebrated Valentine's Day party. Other writing lessons involved adding an ending to a narrative, called the resolution. Several second-grade teachers used teaching videos that they had made themselves to explain parts of the writing lessons. Students had a narrative diamond, which was a visual that they would write in to create an entertaining beginning, main point, and extended ending of a narrative. Students were asked to talk to partners about the difference between telling and showing. During an economy lesson, one second grade class was learning about producers and consumers and explaining the difference in thinking about their own personal experiences with their families. During a math lesson, students were taking a quiz using real money to count, grids, and game boards. Some of the math problems involved work problems and others involved writing equations based on pictures and drawings. Students were also observed reading books.

Connections can be made to expression when creating sentences based on pictures and talking about character feelings. When students perform, they create movements, voice inflictions, and facial expressions to fit the mood and story presented in the music. When writing practice paragraphs, students can turn paragraphs into a song or rhyme. Rhythm can be connected to counting syllables when writing down action words. As students practice reading and writing to decipher the difference between showing or telling, the teacher can present a song

with the definitions of each word that students can sing to recall the meanings and differences of the words. Music can be added to teacher made videos to enhance excitement and learning. Songs and chants could be used for differentiating between words such as producer and consumer. Rhythmic chants could enhance writing lessons as students write narratives with beginning, main point, and ending.

In first grade, some music integration was observed. One activity observed in first grade involved students working on math worksheets and number lines. Students also counted with shapes and other small materials. Students worked on reading and learning sight words as well as reading books individually and in small groups. Students were learning to count to one thousand and used a chart. Students took spelling tests and completed worksheets to learn fact families. Teachers were observed using a lot of expression and voice inflection when reading books, which enhanced student interest. During whole group lessons, students would be asked to talk to their neighbors about their thoughts often. Students were learning the meaning of making a prediction and were asked to tell their partner what they thought would happen next. Students also practiced writing and word recognition by writing down words that ended in ‘ed’ when reading a book together. Some first-grade classrooms utilized Brain Pop videos. Students were asked to fill in the blanks from reading assignments. During math lessons, students learned about the value of different coins and practices adding money.

Although there was no intentional music integration observed, other than use of expression and voice inflection when reading, most of the lessons observed in first-grade classrooms would be enhanced with music integration. When learning about shapes, counting on number lines, and adding, students could use note shapes and add the values of the notes. First-grade lessons could also involve counting with notes using halves. When students would make

patterns of colors with the different shapes and items, a connection could be made to rhythm and patterns found in music. Sight word songs are a wonderful tool for first-grade students to learn their sight words. A counting song could help students when counting to one thousand. Songs that spell words may help with student recall when taking spelling tests. Many songs could be sung for transitions, to remember the definition of different words, and about words ending in 'ed.' Short reading lessons could be turned into songs or poems as students tap rhythms and count syllables to words.

Music and visual arts integration was seen regularly when observing kindergarten classrooms. Students sang many songs found on YouTube for math and reading lessons. Some of the songs included learning about shapes such as sphere, cylinder, cone, and square. Other songs taught children about digraphs, when two letters make one sound. All of the YouTube songs had a video with visuals that also helped with student learning. Songs were well memorized by students and loved. Kindergarten lessons were taught when children were sitting in desks, carpet circles, or on the floor. Some teachers would remind students to use 'star bodies' which meant sitting with good posture and facing the right direction. Some lessons involved students finding a 'high-five partner' and repeating the phrase, "I see" and filling in the blanks. When reading a book about fire trucks, the magic word of the day was fire truck and students were told to be very quiet when they heard it. Books were read by teachers using a lot of expression, sound effects, and acting. During reading lessons, students would point out rhyming words. In one kindergarten classroom, students would use expression to show that they were thinking silently in their brain and put on 'thinking faces.' In one classroom, the teacher would transition with a rhythmic countdown from three and a poem about tracking a specific student. Students would listen to stories through a program called Reading Rhinos. The stories would include pictures and music.

During math lessons, students would stack Legos and count. One lesson involved narrative writing using a picture-graph. Students would fill in the beginning, middle, and end to learn about setting, problem, and solution. One kindergarten classroom had the routine of writing in journals for the first five minutes of each day. Some students practiced writing numbers or sentences and others would draw pictures and color. Before reading a book online, a teacher asked each student what they want to be when they grow up because it related to the message in the book. Students would then write what they wanted to be on a coloring page. Some kindergarten classrooms were seen working on foundational skills and they would circle the words the teacher said.

Kindergarten classrooms naturally include arts integration practices. Music casually integrated into even more of the observed lessons. When students were told to use their star bodies, the lesson could make a connection to performances and showing performance posture as well as being a good audience when watching performances. When reading books, most kindergarten teachers already read rhythmically, using expression, sound effects, and actions. This could be enhanced using the voice in four different ways, whispering, calling, speaking, and singing. When thinking in their brain and putting on ‘thinking faces,’ the lesson can connect to showing expression when singing music and listening to music. As students learn to count and stack Legos or other objects, a counting song can be sung and utilized regularly. Other chants, songs, and rhythmic phrases for choral responses can also be integrated into many of the observed kindergarten teachings.

Elementary Music Classroom Observations

The researcher spent several days throughout the course of one school year observing elementary general music education classrooms. Kindergarten through fifth grade music classes

were observed equally. Most of the music lessons taught included some kind of interdisciplinary learning and making connections across content areas. Mathematics and Language Arts were utilized the most in elementary music classrooms. Cultural studies also played a large role in much of the music instruction, particularly in older grade levels. Historical connections were also observed and some links and connections were to science, particularly the science of sound. Social emotional learning and teamwork had a large impact on most of the music activities that were observed. Music instruction for every grade level kindergarten through fifth grade was observed in elementary music classrooms. Table 2 shows the time elementary music teachers spent making interdisciplinary learning connections within their music lessons. Data was analyzed separately for each grade level. The percentage found is based on the number of interdisciplinary connections that were utilized in each lesson or activity and the number of different lessons and activities that were taught. The researcher observed thirteen different units and lessons being taught within fifth-grade elementary music classrooms, fifteen different lessons within the fourth-grade music classroom, fourteen lessons in third-grade music classrooms, fifteen lessons in second-grade, twenty-seven lessons in first grade, and thirty-six lessons in kindergarten elementary music classrooms. Third and fourth grade music lessons had the most interdisciplinary lessons.

Table 2

Percentage of Interdisciplinary Studies in the Music Classroom	
	Interdisciplinary Connections
Kindergarten	44%
First Grade	59%
Second Grade	66%

Third Grade	100%
Fourth Grade	100%
Fifth Grade	77%

The researcher witnessed one fifth grade lesson that involved students learning a song in Italian. Students practiced reading pitch, rhythm, tempo, and dynamics to learn the song first, and then learned the Italian words and English meanings. Once the song was learned, students played a circle game where they were expected to greet each other with kind words and expressions as they played the game. The teacher gave examples of facial expressions and physical gestures that would make each other feel welcome versus unwelcome. This lesson made interdisciplinary connections to mathematics, language arts, cultural studies, and social emotional learning.

Another fifth-grade unit that was observed involved students working on a grade level performance. Fifth-grade students were learning songs to perform for a Veterans Day musical that they were to perform for their school, their families, and veterans with two different performances. The lesson involved a considerable amount of time with students learning about the meaning of being a veteran. Students studied the different branches of military and sang several patriotic songs that celebrated America's freedom and honored veteran's service to their country. The music teacher collaborated with the technology teacher when studying the meaning of a veteran. The technology teacher had the same fifth grade students prepare slides for a PowerPoint that was shown in the background of the performances. As students learning patriotic songs and speaking parts for the performance, they were making interdisciplinary connections to mathematics when working on rhythm, language arts when reading the words to

the songs and writing words for their PowerPoint slide, and history when learning about patriotism, America, and veterans.

One class of fifth-grade students played a game for a Halloween celebration. The teacher first sang a song for the students. She then presented a map to them with dots that represented the notes that made up the rhythm of the song. Students were asked to review the different notes and their values, making connections to mathematics. Students were then asked to turn the dots into notes by counting syllables, making a connection to language arts. After analyzing the rhythm and words of the song, students sang the song as a whole group and played the game. Two other music games were observed amongst fifth-grade observations which also involved students reading words to a song, reading pitch, rhythm, tempo, and dynamics in the music, and socializing with classmates. In another fifth-grade music observation, the teacher was explaining how students can use music notes to code, relating the music lesson to mathematics and technology. Another music activity involved listening and moving to instruments.

Some fifth-grade classrooms were learning to play different instruments. The researcher observed fifth graders learning to play guitars and ukuleles, and bucket drumming. Playing instruments involved reading pitch and rhythm. Students used mathematics to count music notes and connect math and rhythm to using a time signature. Students were composing music in small groups to play on bucket drums which included working with addition, subtraction, and division. Students were using language arts when counting syllables to words for which they wrote rhythms. Playing instruments in small groups and composing music in small groups enhanced student teamwork and social emotional learning.

The researcher observed fourth-grade students playing a bean-bag name game as they were learning the names of their classmates. This short lesson was not music oriented but did

allow students to work on socializing and teamwork. Several games were observed that involved students reading pitch, rhythm, tempo, and dynamics. Reading these four aspects of music related to mathematics as students worked on memorizing note values, adding and subtracting fractions, and adding notes to fit into a time signature. Students read the words to the songs, making connections to language arts. When studying tempo and dynamics, students the lesson made a cultural connection because the music words were in Italian. The teacher explained that most music is in Italian, and the students practiced saying the tempo and dynamic words using an Italian accent. After learning all aspects of the songs, students would work together or compete as they sang the songs and played the games.

One fourth-grade music teacher spent eight music lessons studying musical traditions from different countries, making cultural and historical connections. Students would learn songs, dances, and games from the different countries as well as learn facts about those countries. When studying Mexico, many students showed great excitement because of their personal heritage, enhancing their enjoyment of learning and music. When learning different dances and games, students also exerted a lot of physical activity, making connections to physical education curricula. Students practiced language arts when reading the words to songs and when reading information about the different countries and cultures they studied.

Fourth-grade students were observed preparing for a musical performance. All of the music that was learned and performed in their musical was from different eras in the genre of rock and roll, making connections to history and culture. Fourth-grade students were very excited about all of the music they were learning to perform. Students took risks when auditioning for speaking parts and singing solos. Students worked on reading and language arts when reading the words to the songs. Working on the musical also helped students to work on

teamwork when practicing songs in small groups, and performance skills working as a whole group. In one observation, fourth graders were learning to tune ukuleles and read chord charts. Students had to practice reading and following step-by-step directions to be successful.

The researcher also observed students in the third grade playing the bean-bag name game as they were learning the names of their classmates, working on teamwork and socialization. Several games were observed that involved students reading pitch, rhythm, tempo, and dynamics which related to mathematics as students would add and subtract note values and fractions. The lessons were also connected to mathematics as students were learning how to use a time signature, count measures and notes based on a time signature, and add note values within each measure or music. Students read the words to the songs, making connections to language arts. When studying tempo and dynamics, students the lesson made a cultural connection because the music words were in Italian. After learning all aspects of the songs, students would sing the song as they played the games that went along with each lesson and song.

Third-grade students were also observed preparing for a musical performance. They were learning Christmas and other holiday themed songs. One song they learned was in German, making a cultural connection. Students took risks when auditioning for speaking parts and singing solos. Students worked on reading and language arts when reading the words to the songs in magazines. One third-grade music class was learning to read the pitch, rhythm, tempo, and dynamics of a song that they played on mallet instruments. They learned about the science of sound as the bars of the instruments vibrated and as they heard the bigger bars make lower pitches and the smaller bars make higher pitches. Students would use mathematics and write equations as they practiced note values and learned to roll the long notes on the instruments. The

teacher would read a book to the students as they played on the mallet instruments, making more connections to language arts.

The researcher's second-grade observation found that students were not making quite as many interdisciplinary connections across content areas as they did in older grade levels. However, many interdisciplinary connections were still being made. Several of the lessons observed included learning songs and playing games. Of the game lessons, the researcher saw language arts connections in two of the lessons when students were reading the words to the songs. In other music game lessons, students learned the songs visually, as the teacher presented a graphical map that used pictures to help students learn and remember the words to the songs.

Second-grade students in one unit were learning the story of *Peter and the Wolf*. The teacher read the story to the students, making a language art connection. Students learned the four instrument families, the instruments found in each family, and the instruments played in an orchestra. Students were asked to write the names of instruments several times, as well as remember the instrument that portrayed each character of the story. The lesson made a cultural connection when the students studied Sergei Prokofiev, the Russian composer of the *Peter and the Wolf.* Students ended the unit by watching a fun movie of *Peter and the Wolf,* with real characters, animation, and all of the music played in the background.

Some second-grade students were also preparing for a musical. The teacher had music packets for them to use and they were expected to read the words and the music as they learned and sang the songs. The teacher also made packets for students that did not have music, but only the words. Students were given the option of which packet to use when working on the musical. Students were working extensively on reading and language arts as they read and sang the words

to the songs. They also listened to music with singing accompaniment in the background to enhance their reading learning.

The researcher noticed a progression of connections over the course of the first-grade school year. Lessons taught at the beginning of the school year in first grade used only few interdisciplinary connections. Lessons taught in the second half of the school year incorporated more interdisciplinary enhancements and connections. Lessons observed in first grade incorporated many singing games. Students learned songs by echoing the teacher. Students then played the games while singing the songs they learned together.

A music unit taught to first grade involved reading a series of books about Freddie the frog. Throughout the six books, students learned about the treble clef staff and the pitches on the treble clef staff, tempo and four Italian tempo words, pitches on the bass clef staff, notes that make up rhythm, jazz music, and Spanish music. Reading the books to the class involved interdisciplinary connections to language arts and reading. When learning about tempo, jazz music, and Spanish music, students were making cultural connections to music and genre. The teacher also took time to explain the notes learned in one of the books, making interdisciplinary connections to mathematics as students learned note values.

The researcher observed first grade students learning songs for a musical performance. The teacher typed the words to all of the songs and speaking parts into a PowerPoint and encouraged the students to read and sing as she pointed to the words. The first-grade students were very excited about the songs and loved singing along. Most of the students worked hard to read along as the teacher pointed and they sang. The words were accompanied with the music, so students also heard the words as they sang. Students also practiced reading speaking parts to prepare them for auditions.

The researcher noticed that most of the lessons in kindergarten involved some type of game or movement. Kindergarten students learned the meaning of four vocabulary words and moved to music while playing a game for each vocabulary word. When teaching vocabulary words to kindergarten students, the teacher would tell them the definition and have them chorally respond several times until they had learned and memorized the word. Vocabulary word song and games allowed students to hear and understand how that word worked in a song and then they would move and play to show their understanding. Many other games were taught and learned that did not relate to vocabulary words, but other aspects of music that the teacher would verbally talk about.

Students were learning about quarter notes, quarter rests, and eighth notes and their values in one particular lesson. This lesson made a connection to mathematics. Often, the music teachers would read short books to kindergarteners and then they would learn dances or re-tell the stories with movement and expression. These lessons made interdisciplinary connections to language arts and reading. When working on their musical, the students would look at a PowerPoint to read different words and letters, making another interdisciplinary connection to language arts and reading. Often, kindergarten lessons involved playing non-pitched percussion instruments. There was little to no interdisciplinary learning involved when playing instruments.

Review of Interdisciplinary Music Curricula and Connections

Language Arts

Music and language arts are closely related in content. Both subjects involve elements of rhythm, pitch, and accent. Both music and language arts convey direct and implied meanings, create imagery, affect student emotion, convey cultural information, integrate time and sound, and tell stories. Song texts can reinforce student reading abilities and understanding of phonemic

awareness, rhyming, alliteration, assonance, consonance, response to graphemes, syllable identification, and expression. Reading song lyrics may advance students' higher-level-thinking skills through paraphrasing, summarizing, inferring, comparing, contrasting, identifying the moral of the story or the mood, predicting outcomes, and sequencing events. Music can also reinforce writing skills.

Bernstorf, Hansen, and Stuber include many connections and activities regarding literacy learning in music education and how music can be an important channel towards student growth in their book.[308] Hansen, Bernstorf, and Stuber believe that students can learn language and literacy through musical play.[309] The author's state:

> Music should be used to promote learning for the following reasons:
>
> 1. Music reaches children at different levels, and thus it can promote a range of skills such as social and communicative interactions, motor skills, and self-expression.
> 2. Music may make play more joyful and thereby naturally increase play.
> 3. Music can be included in many activities, and its enjoyable qualities may motivate children to participate in those activities.[310]

Examples of K-5 music classroom activities that engage students in literacy learning and reinforce one-to-one correspondence, alphabetic principle, and phonemic awareness include "finger plays, traditional nursery rhymes, and songs like "B-I-N-G-O."[311]

Elementary music classroom activities may also help students gain decoding skills such as phonemic awareness and orthographic awareness. According to Hansen, Bernstorf, and

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308 Hansen, Bernstorf, and Stuber, "The Music and Literacy Connection," 31.

309. Hansen, Bernstorf, and Stuber, "The Music and Literacy Connection," 31.

310. Hansen, Bernstorf, and Stuber, "The Music and Literacy Connection," 31.

311. Hansen, Bernstorf, and Stuber, "The Music and Literacy Connection," 31.

Stuber, “Encouraging children to engage in singing or chanting in a directed or guided instruction setting allows them to construct meaning from the learning activity.”[312] The authors add, “Songs and chants offer endless opportunities for children to enjoy and explore language.”[313] When considering phonological awareness, it is important to note that songs, chants, and musical movement can help students to manipulate sounds through pitch, dynamics, rhythm, and articulation which surpasses linguistics. Hansen, Bernstorf, and Stuber stress that “song lyrics are full of rhyme, rhythm, and alliteration,”[314] which is an important factor in interdisciplinary music connections. When considering phonemic awareness, the authors write, “Virtually the same auditory and visual processes are involved in the acquisition of language and reading skills and the acquisition of music-learning skills.”[315]

The authors include interdisciplinary music activities that will aid in student decoding abilities. They suggest:

1. Build word walls with new vocabulary, emphasizing the sounds of the words by creating chants or rhymes and setting the rhythmic patterns to a melody to help reinforce pronunciation and meaning.
2. Write the lyrics to a familiar song on whiteboards and have students change the words to experiment with beginning and ending sounds, phonemes, or syllables. Students can use different colors to recognize rhyming phrases in the songs.
3. Sing a familiar song and have students identify all the words in the song that begin with a letter or sound they are studying.

312. Hansen, Bernstorf, and Stuber, “The Music and Literacy Connection,” 42.

313. Hansen, Bernstorf, and Stuber, “The Music and Literacy Connection,” 42.

314. Hansen, Bernstorf, and Stuber, “The Music and Literacy Connection,” 44.

315. Hansen, Bernstorf, and Stuber, “The Music and Literacy Connection,” 45.

4. Have children move in rhythm to a poem or song, creating a movement that they will do when they hear a repeated section or words.[316]

The authors write about how music enhances reading strategies in their book. The book includes music and reading connections such as sight identification, orthographic or graphophonemic awareness, cueing systems, and reading fluency. Hansen, Bernstorf, and Stuber state, "Children who engage in syllable-based music reading may have a better chance of becoming effective and efficient readers of both music and language."[317] Music education also provides opportunities for student writing when writing words to songs, identifying instruments, and many other examples.

Kristin Harney writes that music and Langage arts are two subjects that emphasize human expression.[318] She states, "Interacting with narratives in music and language arts encourages students to appreciate a wide variety of texts, critically analyze compelling themes, and develop empathy for another's point of view."[319] Therefore, it is important for educators to reinforce the relationship between music and language arts. As teachers and students make connections between the two disciplines, student understanding will grow, the learning environment will be enriched, and a sense of classroom community will be built. Harney suggests that "the creative and self-expressive aspects of music and language arts are also strongly associated."[320] Harney believes that many activities will be beneficial for students to improve music and language arts learning. She states,

316. Hansen, Bernstorf, and Stuber, "The Music and Literacy Connection," 55.

317. Hansen, Bernstorf, and Stuber, "The Music and Literacy Connection," 66.

318. Harney, "Integrating Music," 55.

319 Harney, "Integrating Music," 55.

320 Harney, "Integrating Music," 55.

> Examples of mutually beneficial strategies and activities include increasing phonemic awareness by exploring connections between pitch discrimination and the differentiation of sounds in speech; songwriting to create new lyrics to aid memory and recall of a set of facts; playing instruments to reinforce rhythm of chants and poems; journaling to record perceptions about music; comparing the experience of close listening to music and close reading a text; and exploring common concepts such as climax/resolution, perspective, and theme.[321]

Table 3 lists interdisciplinary music activities that can be used to enhance specific language arts learning.

Table 3

Interdisciplinary Music and Language Arts Activities	
Music Activities	**Language Arts Learning**
Nursery Rhymes and Finger Plays	One-to-One Correspondence Alphabet Principle Phonemic Awareness
Singing and Chanting	Decoding Skills Phonemic Awareness Orthographic Awareness Language Exploration Phonological Awareness Vocabulary Building Verbal Communication Learning Sight Words
Composition and Songwriting	Writing Spelling Reading Fluency Aiding in Memory and Recall of Facts Comparing How Sounds Make Words
Reading Music	Sight Identification Orthographic Awareness

321 Harney, "Integrating Music," 55.

	Cueing Systems Reading Fluency
Performance	Expression Perspective and Unity Determination of Central Themes or Ideas Interpretation of Words and Phrases Assessing Point of View
Playing Instruments	Reinforce Rhythm and Syllable Identification Exploring Common Concepts
Improvisation	Expression Understanding Interpretation of Words and Phrases Assessing Point of View

Mathematics

Music education can also be an important channel for elementary students' growth in mathematics. Hansen, Bernstorf, and Stuber write, "Some music teachers use songs as a way to learn the content of reading or mathematics such as memorizing grammatical structure or multiplication tables, and so on."[322] In his book, Music, Math, and Mind, David Sulzer writes about the mathematical side of pitch scales, harmony, waves, harmonics, sound, resonance, and rhythm and rhythmic structure. Sulzer relates the mathematical beliefs of Greek philosophers to music throughout his book. He writes Pythagoras philosophy stating that "all numbers, including musical intervals, are rational, meaning that every number can be expressed as the fractions composed from whole numbers."[323] Sulzer adds, "Importantly for understanding musical scales, Pythagorean theorem, which states that the length of the longest side of a right triangle is calculated by adding the squares of the other two sides and taking the square root of the sum."[324]

322 Hansen, Bernstorf, and Stuber, "The Music and Literacy Connection," 42.

323. Sulzer, Music, Math, and Mind, 36.

324. Sulzer, Music, Math, and Mind, 36.

The notes of the scale are calculated from rational numbers.[325] Regarding the relationship between music and mathematics, Sulzer also states, "Intervals of octaves and fifths are used throughout the world in musical scales and even by the prehistoric cave flutes."[326]

Music educators that teach interdisciplinary lessons that meet national standards in both music and mathematics may promote a balance between student understanding of musical and mathematical concepts.[327] According to Harney, "The disciplines of music and mathematics provide students with tools to understand the world around them and promote the development of strong reasoning skills, encouraging students to think in rational, logical ways to solve problems and evaluate information."[328] Harney believes that when students make connections between music and mathematics, they also reinforce a creative and intuitive approach to solving problems.[329] Harney believes that music is as indispensable as math.[330] Just as "musicians use numbers and patterns every day, likewise, music enhances math, promoting interest and enjoyment, offering real-life scenarios for applying skills, and encouraging disciplined, focused concentration."[331]

The connections between music and math may help students gain a better understanding of both disciplines. Harney gives an example of how students may strengthen their understanding between the two disciplines.

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325. Sulzer, Music, Math, and Mind, 37.

326. Sulzer, Music, Math, and Mind, 87.

327. Harney, "Integrating Music," 207.

328. Harney, "Integrating Music," 205.

329. Harney, "Integrating Music," 205.

330. Harney, "Integrating Music," 205.

331 Harney, "Integrating Music," 205.

A math student might know the procedures for adding fractions. A music student might know that to determine meter they listen for steady beat, discern the strong beat, then count beat groups. Knowing the procedures does not equate to the deep understanding though Simplification is a concept that can be explored in music and mathematics that connects the two previous examples. Highlighting these types of higher-level connections and providing opportunities for students to explore complex concepts in math and music help them to construct and understand those concepts in both concentrated multilayers ways, ultimately benefiting the whole child. Enduring ideas that can be explored in both disciplines include balance, complexity, counting, function, levels, line, measurement, part/whole, pattern, proportion, range, regularity, relationships, repetition, ratio, rules, same/different, shape, simplicity, structure, subdivision, symbol, symmetry, trend, and unit.[332]

Table 4 lists interdisciplinary music activities that can be used to enhance specific mathematics learning.

Table 4

Interdisciplinary Music and Mathematics Activities	
Music Activities	**Mathematics Learning**
Nursery Rhymes and Chanting	Memorizing Multiplication Tables Memorizing Names of Shapes Counting and Cardinality Using Place Value
Singing and Songs	Memorizing Mathematical Facts Learning Numbers Multiplication, Addition, Subtraction, and Division Facts

332 Harney, "Integrating Music," 206.

	Counting and Cardinality
Composition and Songwriting	Adding, Subtracting, Multiplying, and Dividing Whole Numbers and Fractions Relation of Fractions Understanding Patterns, Shapes, Repetition, and Contrast Understanding Symbolic Representation Make Sense of Problems Reason Abstractly and Quantitatively Number and Operations (Fractions)
Reading and Writing Music	Make Sense of Symbols Understanding Patterns, Shapes, Repetition, and Contrast Understanding Symbolic Representation Number and Operations (Fractions) Count Objects in a Set Represent Quantities with Manipulatives Determine Mathematical Rules
Performance	Understanding Patterns, Shapes, Repetition, and Contrast Understanding Symbolic Representation Model with Mathematics
Playing Instruments	Understanding Patterns, Shapes, Repetition, and Contrast Use Appropriate Tools Strategically Attend to Precision Number and Operations (Fractions) Determine Mathematical Rules
Listening to Music	Label Experiences Understanding Patterns, Shapes, Repetition, and Contrast Determine Mathematical Rules

Review of Arts Integrated Activities

Music education is beneficial to enhancing student learning when core subjects such as mathematics and language arts are combined with general elementary music lessons. Music education can also enhance learning when added to lessons within the general elementary classroom. Donovan and Pascale advocate for arts integration in the classroom. They write, “It is important to remember that integrating the arts is not about creating professional artists. It is

about deepening learning and about reaching all students of every ability, ethnicity, and linguistic background."[333] The authors add that arts integration "is most definitely about teaching students who learn in a variety of ways, not just through reading and writing."[334] Donovan and Pascale advocate for the arts, stating that "the arts are central to human learning and can serve as a foundation for education in many settings."[335] The authors believe that by learning to look through multiple perspectives, student may build bridges to healing and transformation.[336]

According to Donovan and Pascale, research suggests that arts integrated teaching benefits student learning in several ways:

1. Arts integrated teaching leads to deep learning and increased student engagement.
2. Arts integrated teaching provides a variety of strategies for assessing content and expressing understanding.
3. Arts integrated learning is culturally responsive and creates learning that is relevant in students' lives.
4. Arts Integrated teaching engages students in creativity, innovation, and imagination.
5. Art integrated learning and teaching renews teachers' commitment to teaching.[337]

The authors also believe that research suggests that the arts are an integral part of teaching and learning for several reasons:

1. The arts address multiple learning styles, recognize multiple intelligences, and reach across cultures and languages to address the needs of every student.

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333. Donovan and Pascale, Integrating the Arts, 15.

334 Donovan and Pascale, Integrating the Arts, 15.

335. Donovan and Pascale, Integrating the Arts, 17.

336. Donovan and Pascale, Integrating the Arts, 17.

337. Donovan and Pascale, Integrating the Arts, 19.

2. The arts promote analytical and critical thinking skills and can be used to motivate learning and assess it.
3. The arts address diversity by helping teachers create classrooms that teach to the needs of every student by presenting multiple perspectives, engaging parents and communities in learning, helping teachers critique schools as institutions, and instituting education reform.
4. The arts promote more democratic classrooms by expanding the number of languages able to be used in learning and by encouraging multiple perspectives.[338]

Brouillette believes that arts integration helps to deepen student understanding in school, particularly in literacy skills learning. She describes arts integration as an approach to learning where "students construct and demonstrate understanding through an art form that allows them to engage in a creative process, connecting the art form to other subject areas and meeting objectives in both."[339] Brouillette writes that the arts help students to make meaning through verbal interaction, narrative text, and informational texts while building oral communication skills and expression through writing.

Burnaford, Aprill, and Weiss suggest that arts integration is a powerful tool that crosses the borders of core subjects and arts concepts, cognitive modes of expression, form and content, processes and products, and self-expression.[340] The authors believe that the arts produce synergy between content areas, allow students to engage in multiple modes of inquiry, provide connected and challenging opportunities, commit concepts and content to memory, present concrete

338. Donovan and Pascale, Integrating the Arts, 19.

339. Brouillette, Arts Integration in Diverse, 2.

340 Burnaford, Aprill, and Weiss, Renaissance in the Classroom, xxxiii.

evidence of learning, and represent many contents throughout the elementary curriculum.[341] Music integration becomes a tool for music education advocacy. Table 5 references integrated music activities that can be employed in the classroom.

Table 5 introduces music activities that can be integrated into core classroom subjects.

Table 5

Integrated Arts Activities for the Regular Classroom	
Classroom Activity	**Music Activity**
Science and Social Studies	Song and Poetry Make Instruments Play Instruments Learn Historical Songs Learn Patriotic Songs Monologue about a Historical Figure Learning How Sound is Made Listening to Instruments from Different Countries Listening to Songs from Different Countries Compare How Music Sounds High or Low Based on Size Describe Frequency Using the Notes of a Piano Write/Sing Songs About Planets, Stars, or the Galaxy Make A Thunderstorm Using Instruments Sing Songs About Presidents, States, Countries, or Continents
Exploring Language	Song and Poetry Learn Musical Vocabulary (Italian) Learn Instrument Names (German) Sing Songs from Different Cultures Study Musicals and Opera Play Instruments from Different Countries Singing Music in Different Languages
Cultural Learning	Sing Songs from Different Cultures Play Singing Games Learn Traditional Folk Songs Learn Musical Vocabulary (Italian) Learn Instrument Names (German)
Reading and Writing	Read Words of Songs, Rhymes, and Poetry Write Lyrics and Rhyming

341 Burnaford, Aprill, and Weiss, Renaissance in the Classroom, 10-13.

	Write to Describe Sounds like Pitch and Dynamics Puppetry Write Plays Play Instruments from Different Countries Turn a Rhyming Book into a Rap Play Body Percussion When Reading and Hearing Rhyming Words Walk With Steady Beat While Rhyming Act Out Stories/Books Read Notes on the Staff Read Rhythms Write Notes on the Staff Write Rhythms Read Books about Composers, Musical Genre, Time Periods Persuasive Writing about Music and Song
Language Arts	Create Lyrics and Describe Using Detail Report on a Song Topic Song Writing Name Rhythms and Count Syllables Tell a Story Act a Story Recount an Experience Dramatic Inquiry and Performance Improvisation Singing, Playing, or Acting Practice New Vocabulary in Songs
Mathematics	Think Abstractly and Quantitatively When Reading Rhythm, Playing Instruments, or Singing Songs Generate and Analyze Patterns Practice Notes and Shapes Through Patterns Look for Form and Structure Attend to Precision in Reading and Writing Rhythms Use Time Signatures when Reading and Writing Music Categorize Sounds Creative Movement Say Math Facts in a Rap Sing Math Facts in a Song Use Beats to Represent Notes and Values Use Note Values to Solve Math Problems Arrange Notes by Number Order Arrange Instruments by Pitch
Literacy Skills	Listen to Music to Build Focus and Attention Span Describe Pitch and Dynamics Name Rhythms and Counting Syllables Song Writing
Critical Thinking and Abstract Reasoning	Create a Musical Score Creative Movement

	Music Games Musical Performances Memorizing Lines and Songs Teamwork Writing Music Reading Music

Summary

Research suggests that student learning will improve through interdisciplinary music activities in the elementary general music classroom and by utilizing music integrated activities in the regular classroom. Although there was a very limited amount of music integrated lessons seen in this case study, music educators often incorporated mathematics and literacy learning in their music lessons. The observations and data review provided insight into the benefits of interdisciplinary music education as well as integrated activities that increase student learning across contents.

Chapter Five: Conclusions

Summary of Study

The purpose of this study was to learn to what extent music teachers in rural elementary schools integrated core subjects into their music instruction and to learn to what extent rural elementary classroom teachers integrate music into general classroom learning. The goal of the study was to examine how integrating other disciplines into music instruction can increase student learning across content areas, specifically in mathematics and language arts. Within this study, the researcher sought to determine what musical activities and lessons promote mathematical and language arts connections in the general music classroom.

The findings suggest that rural elementary classroom teachers utilize very little music integration in the classroom. Kindergarten teachers were observed to use the most music integration, specifically by using song to teach basic facts. During the observed lessons, kindergarten teachers used music integration forty percent of the time when teaching. First grade and third grade classrooms used less than ten percent of music integration in the observed lessons. Second, fourth, and fifth grade teachers used no music integration in the observed lessons.

The literature reveals that music and art integration increases the visualization process for students and creates a pathway to literacy learning. Music integration can foster self-expression, critical thinking, creativity, and collaboration. Other benefits of music integration found in the literature include synergy between contents through multiple modes of inquiry, varied and challenging opportunities to represent knowledge, increased memory, and strong representation of history, culture, science, and mathematics. The literature suggests that teaching music can help students thrive and achieve in school, boost academic achievement, improve attendance,

behavior, and social skills, and better engage students and teachers in learning and teaching. Several music integrated lessons and activities were found throughout the literature review.

The results of the research findings suggest that elementary music teachers in rural schools include interdisciplinary studies in the music classroom most of the time. Third and fourth grade music classrooms taught interdisciplinary activities during one hundred percent of the observed lessons. First, second, and fifth grade music lessons utilized interdisciplinary learning more than fifty percent of the time. Kindergarten music lessons used interdisciplinary connections forty four percent of the observed music instruction.

Interdisciplinary music lessons were believed to strengthen academic achievement across content areas throughout the literature review. The literature suggests that music education need not be sacrificed or compromised to integrate other academic subjects. Music education is mathematical and literary by nature and a comprehensive music education embraces interdisciplinary relationships between subjects. When students understand the connections between music and other core subjects, cognitive learning increases significantly. Interdisciplinary learning is more effective when educators collaborate in pursuit of common educational goals. By combining ideas, terminology, and examples from multiple subjects, deeper understanding is encouraged and accomplished. The literature also reveals that music education facilitates communication skills and social-emotional learning, has therapeutic effects, alleviates boredom, increases enthusiasm for learning, promotes student engagement, engages students in active learning experiences, promotes imagination, improves clarity of concepts, deepens expression, and enhances aural perception. Music education also improved international mindedness, cultural respect, and multicultural awareness.

Significance

Examining the benefits of interdisciplinary music education and arts integration is significant to all educators. The research and observational data in this study reveals the importance of music integration in rural elementary schools and pathways to increase student learning across content areas. Interdisciplinary music unit lessons are included as results of this study. The units included will help to inform general music educators of activities that will enhance mathematics and language arts learning. The integrated music activities will help inform classroom teachers of activities that will increase student learning in daily lessons. This study is especially significant to rural music educators, educators, administrators, and community members because there is little research exploring the benefits of interdisciplinary music studies. Knowledge of the benefits of music in schools is not fully recognized in rural communities. The results of this study will help to inform rural educators, administrators, and community members about ways music can enhance student learning across content areas, specifically in the subjects of mathematics and language arts.

The results of the study show that there were notable findings to answer the two research questions. The findings to the first research question indicate that integrating music with other disciplines can increase student learning across content areas in terms of increased academic achievement, its positive influence on individuals, and making cognitive connections across subject areas. The findings to the second research questions indicate that there are several musical activities and lessons that promote mathematics and language arts connections through the study of rhythmic equations, note values, rhythmic compositions, reading and writing lyrics, reading music, and writing about music.

Limitations

The biggest limitation to this study is lack of time for observational data. Due to internal and external validity, the researcher was unable to observe all lessons taught within K-5 classrooms and elementary music classrooms. Specifically, since the researcher was still teaching full-time, observations could only be conducted during plan time, professional development days, and workdays. This unavoidable factor limits the results of the study. It is possible that music integration occurred more in the K-5 classroom during lessons that were not observed. It is also possible that interdisciplinary music lessons occurred more or less frequently in music classrooms.

Another limitation to this study includes the amount of rural elementary schools that were observed. Since all schools and educators educate differently, had the researcher observed more schools, the results of the study may have been different. Different schools may have included more or less music integration and interdisciplinary music studies.

Recommendations for Future Study

Future study should investigate teacher professional development regarding music integration in schools. Rural elementary teachers, administrators, and community members are unaware of the benefits of music education and integrated forms of study. Is there a lack of training and professional development for teachers to feel prepared to teach core subjects in their music classrooms? Is there a lack of training and professional development for elementary teachers to feel prepared to teach music activities in their classroom? Is there enough leeway in core subject curricula to add music integration activities? Is there a need for materials and resources of core subjects in elementary schools that support music integration in the classroom? What are the perceptions of community members and educators towards music education?

Professional development and resources for educators may help to increase music integration in rural elementary schools.

It would also be valuable for future study to investigate successful activities, lessons, musical strategies, lesson plans, and unit plans used by K-5 classroom teachers and music educators since it would be beneficial for future application and integration of core subject content. What music integrated lessons and connections improve student learning across content areas? Via music integration and interdisciplinary music instruction, research has shown that positive effects and enhanced student learning can be achieved.

Additional research to determine the reasons for music integration and the relationships between core subject and music learning is also recommended. Do interdisciplinary music lessons and activities compromise music curricula? Do the relationships between core subjects and music education enhance learning in all subjects?

Summary

With the current high stakes of testing and academic achievement in schools, interdisciplinary music education and arts integration should be explored by rural educators, administrators, and community members. Guided by the review of literature and curricula, and observational data, this qualitative case study explored interdisciplinary music studies and music integration practices in rural elementary schools. The results of the study showed that there are very little music integration practices utilized in the K-5 classroom. However, research suggests that music integration in the K-5 classroom may enhance student learning. The results also show that general elementary music educators naturally include interdisciplinary lessons in their music classrooms. This inclusion of core subject knowledge enhances learning for students across content areas. It is crucial for educational leaders to understand the implications for academic

achievement and success music education has on K-5 students. Core subject connections through notes and rhythms, note-reading, music reading, music writing, and listening skills promote mathematics and language arts learning in elementary schools. Music education is invaluable in elementary schools with its connections to enhance student learning and help student achieve academically.

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Appendix A

IRB Approval/Exemption

Dear Tara Stradley and Jerry Newman,

The Liberty University Institutional Review Board (IRB) has reviewed your application in accordance with the Office for Human Research Protections (OHRP) and Food and Drug Administration (FDA) regulations and finds that your study does not meet the definition of human subjects research. This means you may begin your project with the data safeguarding methods mentioned in your IRB application.

Decision: No Human Subjects Research

Explanation: Your study is not considered human subjects research because

It will not involve the collection of identifiable, private information from or about living individuals (45 CFR 46.102).

Please note that this decision only applies to your current application. Any modifications to your protocol must be reported to the Liberty University IRB for verification of continued non-human subjects research status. You may report these changes by completing a modification submission through your Cayuse IRB account.

Also, although you are welcome to use our recruitment and consent templates, you are not required to do so. If you choose to use our documents, please replace the word *research* with the word *project* throughout both documents.

If you have any questions about this determination or need assistance in determining whether possible modifications to your protocol would change your application's status, please email us at irb@liberty.edu.

Sincerely,

G. Michele Baker, MA, CIP
Administrative Chair of Institutional Research
Research Ethics Office

Appendix B

Understanding by Design (UbD) Unit Plan

Title: Adding Note Values **Subject/Course:** Music

Topic: Mathematics **Grade:** Kindergarten and 1st, and 2nd grade **Designers:** Tara Stradley

Stage 1 – Desired Results (PLAN)

Established Goals:

Students will be able to independently use their learning to…

1. Add and subtract quarter notes, half notes, dotted half notes, and whole notes.
2. Relate music and note values to mathematical equations.

NCAS MU:11 Relate artistic ideas and works with societal, cultural, and historical context to deepen understanding.

Essential Question(s): How do the other arts, other disciplines, contexts, and daily life inform creating, performing, and responding to music?

CCSS.Math.1 Make sense of problems and persevere in solving them.
CCSS.Math.2 Reason abstractly and quantitatively.
Counting and Cardinality

Understandings: *Students will understand that…* -Music and math have many similarities. -Notes have value. -Music is mathematical. -Adding and subtracting notes helps learn mathematical equations.	**Essential Question/Big Idea:** -How does adding and subtracting notes create rhythms? -How are music and mathematics similar?
Students will know…. -The values of quarter notes, half notes, and whole notes. -Adding and subtracting values using the numbers 1, 2, and 4. -Notes have different values that make rhythm. -Rhythm is patterns of long and short notes.	*Students will be able to….* -Add and subtract notes and values. -Use music and notes to improve mathematics adding and subtracting.

Stage 2 – Assessment Evidence (STUDY)
Performance Task (How will we know if they learned it?) **G**oal(s): Students will complete a music math worksheet adding and subtracting notes with values 4, 2, and 1. Students will explain for the teacher and the class why they chose their answers to the music math questions. Students will use a note map to count notes and values. Students will participate in class discussions making connections to music and mathemetics. **R**ole: Students will perform musical math equations. **A**udience: The music teacher will see the student's worksheets. The class will see the student explain answers. **S**ituation: Worksheets will be completed individually. Oral presentations will happen as a class.
Key Criteria: to reflect Performance Tasks: ***Examples****: Rubric, Checklist, etc.* -Oral and written responses to questions. -Tests on music and math facts. -Quizzes on music and math facts.
Other Evidence (How will we know if they learned it?) Summarized (tests, essays, work sample(s), etc. - Students will demonstrate proficiency while being observed. -Students will complete exit slips -Students will complete Self-Assessments -Students will demonstrate proficiency through well-spoken verbal responses and clear explanations.

Stage 3 – Learning Plan (DO)

Learning Activities (How will students learn it?)

The key to student understanding and transfer is that students need to understand the relation between music and mathematics.

The aim is for students to perform musical math facts on their own both verbal and written.

Pre-assess: Have student's complete a music and math worksheet to assess students' prior knowledge and identify further student-identified learning goals for the unit.

- **Revise music and math whole group instruction.**
- **Teach notes and values in a whole group using heart and note visuals.**
- **Do whole group math problems.**
- **Have students come to the board to complete note math problems.**
- **Have students work in pairs to create math problems using note print outs.**
- **To prepare students for transfer, during whole group instruction, talk about how music math transfers to math learned in the classroom, at home, on the playground, with family and friends.**
- **Have students complete the music math worksheet again to complete the unit.**

Resources:

Teacher will supply heart print outs, note print outs, prompts, music maps, worksheets, and graphic organizers. Teacher will write on the board and use an elmo to project maps and print outs. Teacher will guide whole group learning and discussion.

Understanding by Design (UbD) Unit Plan

Title: Reading, Writing, and Sequencing **Subject/Course:** Music

Topic: Language Arts **Grade:** Kindergarten 1st, and 2nd grade **Designers:** Tara Stradley

Stage 1 – Desired Results (PLAN)

Established Goals: (What do students need to learn and be able to do?)

Students will be able to independently use their learning to…

1. Read words to songs.
2. Listen to and retell stories through writing.

CCSS R.1 Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
CCSS R.2 Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.
CCSS W.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.

NCAS MU:1 Generate and conceptualize artistic ideas and work.
NCAS MU:11 Relate artistic ideas and works with societal, cultural, and historical context to deepen understanding.

Understandings:	**Essential Question/Big Idea:**
Students will understand that… -Music can enhance reading, writing, and retelling of stories. -Reading words in songs is like reading stories. -Opera is a musical way to tell a story	-How is reading and singing the words to a song like reading and telling a story? -What are the central ideas in the story of a song or opera? -What evidence from the song supports understanding the story?
Students will know…. -Opera is how composers tell a story through music. -The words to songs tell a story. -The stories in music can be retold by analyzing the literary and informational texts.	*Students will be able to….* -Read and sing the words to a song from an opera. -Retell the story of a song or opera by writing the story in their own words.

Stage 2 – Assessment Evidence (STUDY)
Performance Task (How will we know if they learned it?) **G**oal(s): Students will read and sing the words to songs. Students will listen to stories about music and opera. Students will retell stories told in music by writing the story in their own words. **R**ole: Students will read, sing, and retell the story told through a song or opera. **A**udience: The music teacher will help students read and sing and read students stories. **S**ituation: Students will sing and read in whole groups and write individually.
Key Criteria: to reflect Performance Tasks: ***Examples****: Rubric, Checklist, etc.* -Group reading and singing. -Retelling the story through writing.
Other Evidence (How will we know if they learned it?) Summarized (tests, essays, work sample(s), etc. Performances Observations Writing

Stage 3 – Learning Plan (DO)

Learning Activities (How will students learn it?)

The key to student understanding and transfer is that students will read and sing songs, listen to the story of a song or opera, use pictures to sequence the story, and retell the story by writing in their own words.

The aim is for students to understand that music helps with reading and that music tells a story.

Opening Activity: Read the story of an opera or the words to a song.
Singing Activity: Teach the song, asking students to read and sing along.

- **Ask the students how the song tells a story?**
- **What story is the song telling?**

Storytelling Activity: Create a character page with pictures that tell the main events of the story/song. Have students rearrange the pictures in the sequence of the story.
Writing Activity: Have students retell the story through writing. Have students use their sequenced pictures to guide the writing process.

Resources:

Project the song and point along as students read and sing together.
Create pictures for each main event of the song or story.
Make copies of the story and have students cut them out and rearrange in sequential order.

Understanding by Design (UbD) Unit Plan			
Title: Form and Geometric Shapes	**Subject/Course:** Music		
Topic: Mathematics	**Grade:** 1st and 2nd grade	**Designers:** Tara Stradley	

Stage 1 – Desired Results (PLAN)

Established Goals: (What do students need to learn and be able to do?)

Students will be able to independently use their learning to…

1. Identify and perform AB and ABA Forms.
2. Relate forms in music to geometric shapes.

CCSS.Math.7: Look for and make use of structure.
Geometry

NCAS.MU:2 Organize and develop artistic ideas and work.
NCAS.MU.7 Perceive and analyze artistic work.

Understandings: *Students will understand that…* Form in music relates to geometric shapes in math and geometry.	**Essential Question/Big Idea:** How does form in music relate to geometric shapes?
Students will know…. Form music and form shapes.	*Students will be able to….* Students will be able to identify different forms found in different songs.

Stage 2 – Assessment Evidence (STUDY)
Performance Task (How will we know if they learned it?) **G**oal(s): Students will read and sing several songs. Students will understand that different songs take different forms. Student will use geometric shapes to identify form in music. **R**ole: Students will read and sing several songs and use geometric shapes to identify the different sections within the form of the songs. **A**udience: Teacher and Whole group. **S**ituation: Students will sing as a whole group. Students will learn about form as whole group. Students will work together to assign geometric shapes to the different sections within the form of a song. Students will work along using geometric shapes to identify the different sections within the form of a song.
Key Criteria: to reflect Performance Tasks: ***Examples****: Rubric, Checklist, etc.* -Group work and performance. -Individual work.
Other Evidence (How will we know if they learned it?) Summarized (tests, essays, work sample(s), etc. Students will listen to lesson about form and geometric shapes. Students will participate in whole group discussions identifying different sections in songs. Students will use geometric shapes to individually identify different sections in songs.

Stage 3 – Learning Plan (DO)

Learning Activities (How will students learn it?)

The key to student understanding and transfer is that students will read and sing songs, learn about AB and ABA form, identify geometric shapes, and use geometric shapes to identify sections within the form of a song.

The aim is for students to understand that musical form relates to geometric shapes.

Opening Activity: Students will sing several songs together. The teacher will explain to the class that music has form. Form is the design of the song, breaking the song into sections.
Listening Activity: The teacher will teach a song that has AB form to the class and explain that when a song has two sections, it is considered AB form.
Listening Activity: The teacher will teach a song that has ABA form to the class and explain that when a song ends with the section it started with, it is considered ABA form.
Movement Activity: The teacher will add movements to the songs, changing movements when sections change and repeating movements when sections are repeated.
Listening Activity: The teacher will teach several geometric shapes. The class will talk about which shapes best represent the different sections in a song.
Listening Activity: The teacher will give each student a "Find the Sections" of an AB Song page and an ABA song page. Students will draw geometric shapes for A and B sections.

Resources

The teacher will need to project the songs and create movements.
The teacher will need to make copies of song sheets for students.
The teacher will need to project different geometric shapes.

Understanding by Design (UbD) Unit Plan

Title: Rhyming Words **Subject/Course:** Music

Topic: Language Arts **Grade:** Kindergarten and 1st grades **Designers:** Tara Stradley

Stage 1 – Desired Results (PLAN)

Established Goals: (What do students need to learn and be able to do?)

Students will be able to independently use their learning to…

1. Identify rhyming words in songs.

CCSS R.4 Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings and analyze how specific word choices shape meaning or tone.

NCAS MU:7 Perceive and analyze artistic work.

Understandings: *Students will understand that…* Reading music can help students learn to read and spell better by identifying rhyming words.	**Essential Question/Big Idea:** How does music relate to reading and writing poems?
Students will know… How to identify rhyming words within songs and poems.	*Students will be able to….* Students will be able to read and write rhyming words.

Stage 2 – Assessment Evidence (STUDY)
Performance Task (How will we know if they learned it?) **G**oal(s): Students will read and sing songs. Students will identify rhyming words in songs. **R**ole: Students will sing and identify rhyming words. **A**udience: Music teacher. **S**ituation: Students will learn songs and identify rhyming words as a whole group. Students will circle rhyming words in songs by themselves.
Key Criteria: to reflect Performance Tasks: ***Examples****: Rubric, Checklist, etc.* -Group work singing and identifying rhyming words. -Individual work reading words songs and identifying rhyming words.
Other Evidence (How will we know if they learned it?) Summarized (tests, essays, work sample(s), etc. Singing and moving to identify rhyming words as a whole group. Working alone to circle rhyming words within songs.

Stage 3 – Learning Plan (DO)

Learning Activities (How will students learn it?)

The key to student understanding and transfer is that students will read and sing songs and identify rhyming words by themselves and as a whole group.

The aim is for students to understand that music helps with reading and identifying rhyming words.

Opening Activity: Students will sing several songs such as "ABC Song" or "Twinkle, Twinkle Little Star" and will listening for rhyming words. The teacher will stop the song at the end of each phrase before singing the final word.
Listening activity: The teacher and students will sing several songs and listening for rhyming words. Students will create movements to show when words rhyme such as raising their hand, jumping, turning in a circle, etc.
Reading Activity: Students will read the words to a song as a whole group. Students will be asked to come up and point to/circle words that rhyme.
Writing Activity: Students will be given a copy of songs with rhyming words. Students will circle rhyming words.
Writing Activity: Students will be given a Rhyming Words Song page. Students will fill in the blanks with rhyming words.

Resources
The teacher must choose songs with rhyming words to sing for the class.
The teacher will need to make copies of rhyming word songs for students.
The teacher will need to create a Rhyming Words Song page for students to fill in the blacks with rhyming words.

Understanding by Design (UbD) Unit Plan

Title: Time Signatures and Fractions **Subject/Course:** Music

Topic: Mathematics **Grade:** 4th and 5th grade **Designers:** Tara Stradley

Stage 1 – Desired Results (PLAN)

Established Goals: (What do students need to learn and be able to do?)

Students will be able to independently use their learning to…

1. Read and perform in the meters of ¾, 4/4, 6/8, and 3/8.
2. Identify, recognize, and perform the whole note, half note, quarter note, eighth note, and sixteenth notes.
3. Add note values using whole numbers and fractions.

CCSS.Math.1 Make sense of problems and persevere in solving them.
CCSS.Math.2 Reason abstractly and quantitatively.
CCSS.Math.7 Look for and make use of structure.

NCAS MU:Cr1: Generate and conceptualize artistic ideas and work.
NCAS MU:Re7: Perceive and analyze artistic work.
NCAS MU:Cn11: Relate artistic ideas and wors with societal, cultural, and histrocial context to deepen understanding.

Understandings:	**Essential Question/Big Idea:**
Students will understand that… Music is mathematical by nature and notes and their values relate to time signatures.	How does adding notes relate to the time signature? How does music work together with adding and subtraction fractions
Students will know…. -Mathematical rules to music and form. -Basic math within music by adding and subtracting fractions (note values).	*Students will be able to….* -Determine mathematical rules within music. -Make generalizations based on relationships and properties the observe within musical patterns.

Stage 2 – Assessment Evidence (STUDY)

Performance Task (How will we know if they learned it?)

Goal(s):
Students will identify, recognize, and perform rhythms that use whole notes, half notes, quarter notes, eight notes, and sixteenth notes.
Students will read and perform rhythms in several different meters.
Students will correctly organize and represent musical form by adding and subtracting note values.

Role:
Students will read and perform rhythms.
Students will perform music math problems.

Audience:
Teacher and Classmates.

Situation:
Students will learn as a whole group.
Students will perform math problems and rhythms as a whole group.
Students will complete music math worksheets on their own.

Key Criteria: to reflect Performance Tasks: ***Examples****: Rubric, Checklist, etc.*

Students will be assessed as a whole group and individual worksheets.

Other Evidence (How will we know if they learned it?)
Summarized (tests, essays, work sample(s), etc.

Whole group work and conversation.
Whole group performance.
Worksheets.
Individual rhythm performance.

Stage 3 – Learning Plan (DO)
Learning Activities (How will students learn it?) **The key to student understanding and transfer is how students read and perform rhythms, use time signatures, and add note values.** **The aim is for students to understand that music is mathematical by nature and can help with math performance through form.** **Opening Activity: Review note values, rhythm notation and math map, and note relationships. Echo clap and perform different rhythms using different meters.** **Reading Activity: Give students a copy of rhythm notation and math map and have them analyze in small groups.** **Group Activity: Practice musical math facts as a whole group.** **Individual Activity: Have students complete the music and math worksheet.** **Resources** **What print and web resource best support the unit? Also provide additional resources used in planning for activities or during instruction.**

Understanding by Design (UbD) Unit Plan

Title: Elements of Music and Persuasive Writing. **Subject/Course:** Music

Topic: Language Arts **Grade:** 4th and 5th grade **Designers:** Tara Stradley

Stage 1 – Desired Results (PLAN)

Established Goals: (What do students need to learn and be able to do?)

Students will be able to independently use their learning to…

1. Demonstrate an understanding of the basic elements of music through persuasive writing.

CCSS W.1 Write arguments to support claims in an analysis of substantive topics or texts using valid reasoning and relevant and sufficient evidence.
CCSS W.2 Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.
CCSS W.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
CCSS SL.2 Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.

NCAS MU:Cr1 Generate and conceptualize artistic ideas and work.
NCAS MU:Re7 Perceive and analyze artistic work.
NCAS MU:Cn11 Relate artistic ideas and works with societal, cultural, and historical context to deepen understanding.

Understandings: *Students will understand that…* All music has degrees of tempo, dynamics, pitch, form, texture, style, mood, rhythm and duration, tone color, and timbre which can be analyzed through singing and listening and then written about to describe the music.	**Essential Question/Big Idea:** What elements are heard in music? What is the composer trying to convey through the music? How does music relate to societal, cultural, and historical contexts?
Students will know…. The meaning of tempo, dynamics, pitch, form, texture, style, mood, rhythm and duration, tone color, and timbre.	*Students will be able to….* Recognize and describe different musical elements while listening to music.

Stage 2 – Assessment Evidence (STUDY)

Performance Task (How will we know if they learned it?)

Goal(s):
Students will recognize elements within the music they sing and hear.
Students will write about the elements of music the hear.

Role:
Learn the meanings of the different elements within music.
Recognize the different elements within music and demonstrate understanding through writing.

Audience:
Teacher

Situation:
Students will sing and listen to music as a whole group.
Students will list elements heard within the music in small groups.
Students will write a persuasive piece about the music on their own.

Key Criteria: to reflect Performance Tasks: ***Examples****: Rubric, Checklist, etc.*

Students will be assessed on their performance, group work, and final writing assignment.

Other Evidence (How will we know if they learned it?)
Summarized (tests, essays, work sample(s), etc.

If students are able to write about more than 4 elements within a piece of music they performed at a grade level writing performance, they have achieved their learning goal.

Stage 3 – Learning Plan (DO)
Learning Activities (How will students learn it?) **The key to student understanding and transfer is how students read and perform music and then identify the different musical elements.** **Opening Activity: Teach students a patriotic song. After singing, ask questions bout tempo, dynamic, pitch, form, etc.** **Identification Activity: Play another piece of music and ask the same questions as in the opening activity. This time, write the students' responses on the board.** **Team Activity: In small groups, have students write the musical elements they hear in a third piece of music played for the class.** **Writing Activity: Play a recording of music and have each student write a description of the music with their best writing skills, identifying at least four elements heard in the music.** **Resources** **The teacher will need recordings of several pieces of music.** **The teacher will need to make definition cards of all the musical elements.** **Students will need pencils and writing boards.**

Understanding by Design (UbD) Unit Plan

Title: Time Signatures and Syllables **Subject/Course:** Music

Topic: Language Arts and Mathematics **Grade:** 1st and 2nd grades **Designers:** Tara Stradley

Stage 1 – Desired Results (PLAN)

Established Goals: (What do students need to learn and be able to do?)

Students will be able to independently use their learning to…

1. Identify eighth note pairs and quarter notes by counting the syllables of words.
2. Students will use a time signature to correctly identify notes and values.

CCSS.Math.1 Make sense of problems and persevere in solving them.
CCSS.Math.2 Reason abstractly and quantitively.
CCSS.L.1 Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

NCAS MU:Cr1 Generate and conceptualize artistic ideas and work.

Understandings:	**Essential Question/Big Idea:**
Students will understand that… Words have syllables and notes match up to those syllables to create rhythm.	What notes are used when a word has two syllables? How does rhythm relate to reading syllables? How does a time signature relate to rhythm and reading syllables?
Students will know…. -The value of eighth notes and quarter notes. -How to count out syllables of words using rhythm.	*Students will be able to….* Count syllables, identify eighth note pairs and quarter notes, use a time signature correctly, and match up notes to syllables to make rhythm.

Stage 2 – Assessment Evidence (STUDY)
Performance Task (How will we know if they learned it?) **G**oal(s): Students will understand how to count syllables. Students will understand the relationship between notes and words. **R**ole: The student will read and perform a song as a whole class. The student will clap syllables. The student will tap rhythm. The student will add notes to match a time signature. The student will assign notes to words. **A**udience: Teacher and classmates. **S**ituation: Students will learn as a whole group. Students will practice counting syllables with a partner. Students will complete a worksheet on their own.
Key Criteria: to reflect Performance Tasks: ***Examples****: Rubric, Checklist, etc.* Students will be assessed through performance of rhythm through observation. Students will be assessed by their worksheet completion.
Other Evidence (How will we know if they learned it?) Summarized (tests, essays, work sample(s), etc. None.

Stage 3 – Learning Plan (DO)
Learning Activities (How will students learn it?) **The key to student understanding and transfer through adding notes and values and counting syllables to words by assigning notes.** **The aim is for students to understand that music is mathematical and literary.** **Opening Activity: Students will read and sing a song. Students will tap the rhythm as they sing.** **Opening Activity: Students will review the value of eighth notes and quarter notes. Students will discuss the value of eighth note pairs. Students will identify that each note gets one sound.** **Group Activity: Students will work with a partner to add notes to the song by matching syllables with notes and adding notes to match the time signature.** **Individual Activity: Students will work alone to add notes to a song by matching syllables with notes and adding notes to match the time signature.** **Resources** **What print and web resource best support the unit? Also provide additional resources used in planning for activities or during instruction.**

Appendix C

2nd Grade Math and Reading with Rhythms Name:
By Tara Stradley

Apple Tree

Quarter Note  Eighth Note Pair 

_____ _____ _____ _____
Apple tree, apple tree,

_____ _____ _____ _____
Will your apples fall on me?

_____ _____ _____ _____
I won't cry, I won't shout,

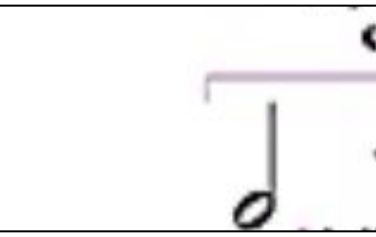
_____ _____ _____ _____
If your apples knock me out!

1. **Read the words to the song below.**
2. **Count the syllables and add a quarter note or eighth note pair on the line above the words.**
3. **Adding the values, draw a bar line every 4 beats.**
4. **Draw a double bar line at the end of the song, indicating the song is over.**

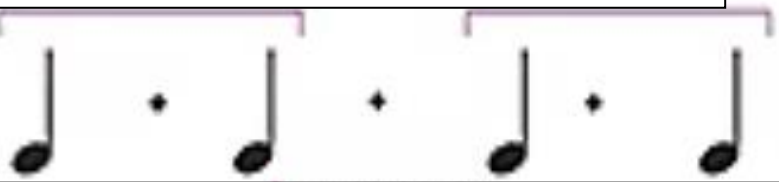
Rhythm Notation Map and Math Practice
by Tara Stradley

Every note gets its name due to its mathematical relation to the whole note.

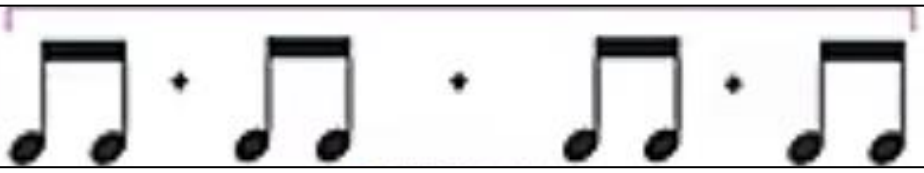
A whole note gets 4 beats.



2 half notes. A half note gets 2



4 quarter notes. A quarter note gets 1



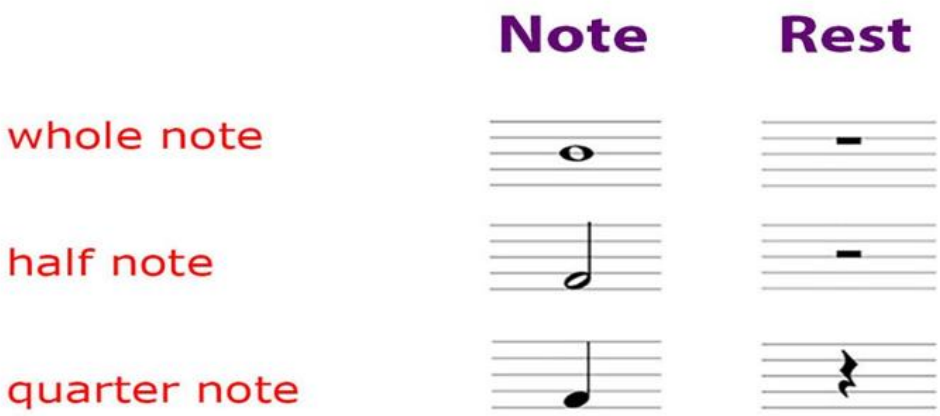
8 eighth notes. An eighth note gets ½ a beat

16 sixteenth notes. A sixteenth note gets ¼ of a beat

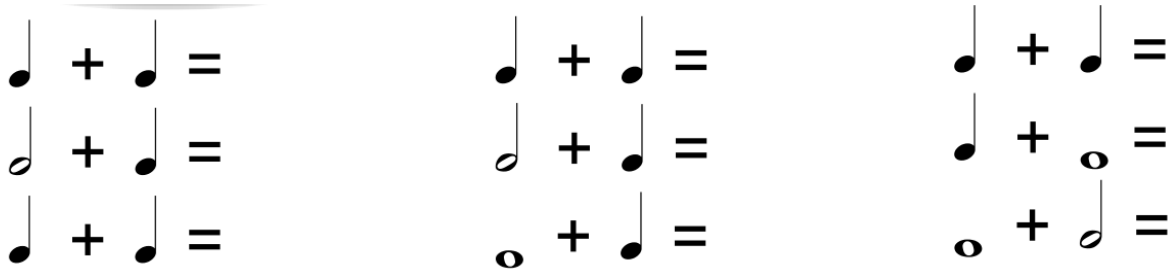
Kindergarten and First Grade Musical Math

By Tara Stradley

Write the number of beats each note and rest gets in beside its name.

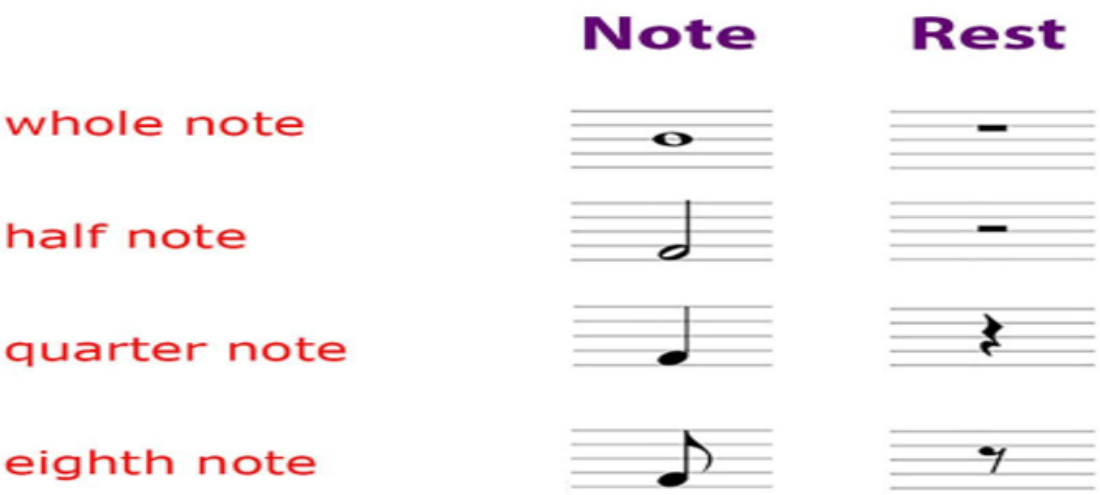


Add each musical math problem.



Second/Third Grade Musical Math By Tara Stradley

Write the number of beats each note and rest gets beside its name.



Complete the musical math equations below.