Liberty University

Auditory Development in Beginner Elementary Strings Classes

A Thesis Submitted to

the Faculty of the School of Music

in Candidacy for the Degree of

Master of Arts in Music Education

by

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June 5, 2023

Abstract

Integrating auditory and visual learning is vital in instrumental music instruction. There is an order of precedence that guides the teaching sequence to raise students who can hear and read the music they play. In order to teach students to think musically while reading notation important auditory preparation needs to take place. It should not occur via passive listening but via active music-making. This practice-based method creates experiential knowledge of music which can then lead to a conceptual understanding of musical symbols. Such practical engagement produces positive long-term effects on the depth of skill and the emotional state of the learner. Despite studies in cognitive development, most method books implement significant reliance on conceptual learning or symbolic representation. Guided by the neuroscience available, this applied research investigates a sound-based approach that serves as a step to traditional method books in elementary string classes. Perspectives on auditory processing and what Csikszentmihalyi refers to as the "flow state" have emerged as exploratory themes among existing literature. Such comprise of personal interviews with participating students who are enrolled in beginning strings classes. To address the gap in research pertaining to learning to read music, this research provides an experience-first curriculum, tracks the engagement, and survey the participating families about their learning experiences. This project will serve as a preparatory method for note-reading and explore the difference in pedagogical sequence between traditional and sound-first methods of teaching beginner strings classes.

Keywords: auditory development, sound-to-symbol, experiential learning, music-making, audiation, and language development.

Acknowledgments

I would like to express my deepest gratitude to my advisor and chair of my committee, Dr. Nathan Street, for his expertise, patient guidance, and Godly encouragement during this research. Thank you for inspiring me to press on. I owe a debt of gratitude to Dr. Kathryn Wert for her time, knowledge, and careful attention to detail during this research and throughout my time at Liberty. I would like to extend my sincere thanks to all the patient musicians and music educators who influenced and inspired me throughout my life: my dad, Yefim Kurchenko, Galina Moskalenko, Alla Zernitskaya, Mickey Reisman, Kathleen Goodrich, Janet Fantozzi, Lauren Widney, Dalouge Smith, Marie Butler, professors at the Hartt School of Music and at Liberty University, and so many others.

I also could not have undertaken this journey without family, my loving husband Evan, and our wonderful daughters, Mallory and Charlotte. Their belief in me helped me weather the storms of doubt. Thank you for your endless supply of coffee and hugs. Finally, I thank my God and King for His presence throughout this time. To echo the prayer of St. Ignatius, everything I have or hold, God has given me. I restore it all to Him and surrender it wholly to be governed by His will. Soli Deo Gloria.

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Chapter One: Introduction

Introduction

Music literacy in traditional public-school orchestras is vital. The ability to read musical notes determines a student's success in his or her school music career and possibly beyond. Although most method books address an ample amount of conceptual knowledge in the form of symbols, many students are not ready to acquire such information until they have developed some skills on their instrument. Decoding musical symbols before teaching sound production is similar to teaching foreign words without translation.[1] This traditional method book teaching sequence may result in shallow understanding or frustration. According to Jean Piaget, the concrete operational stage of cognitive development occurs prior to the formal operational stage of cognitive development.[2] At this point most children are not able to think abstractly and need concrete, physical experiences to help them learn.

The same is likely true for language acquisition. The concrete experiential phase of language application without relying on symbols lasts a few years during which symbols are naturally introduced. Language literacy continues with vocabulary-rich play, quality age-appropriate literature, and considerable amounts of practice in speech. Writing and reading are then taught simultaneously. Following the same approach, music educators should provide a vast variety of repertoire, ample opportunity to listen to quality music, and many chances for students to play their instruments prior to the introduction of notation. Just like a child naturally absorbs some symbols prior to formal reading (stop sign, or "I like to Eat Apples and Bananas" song) so

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[1] Edwin E. Gordon, "Audiation, Imitation and Notation: Musical Thought and Thought About Music." *American Music Teacher* 38, no. 5 (1989): 15. http://www.jstor.org/stable/43543904

[2] Saul McLeod, MD., Piaget's Stages of Cognitive Development, *Simply Psychology*, December 7, 2020, https://www.simplypsychology.org/piaget.html

should he or she absorb some music understanding during the process of music-making. The experiential knowledge will thus lead to conceptual.[3]

This research will investigate the cognitive transition point between learning to play an instrument and decoding music. The intended study group will be fifth and sixth-grade students enrolled in beginning strings. This proposed curriculum will follow the following steps: listening and musicing, encoding, decoding, and evaluating. It will begin in the form of a rote book, introducing familiar symbols - letters and fingerings instead of musical notes. Provided with the traditional folk song melodies are basslines. Sung and played together in harmony, working with basslines will help students develop the concepts of cadence and tonality. The second half of the rote book is dedicated to encoding: the process where students learn to write music on the staff, creating and understanding the symbols they will later encounter. After the students have written all the songs they have learned to play, they will begin to use a traditional method book. At various points of the proposed curriculum, the students and their parents will complete a short survey about their perception of learning. If this study finds that the majority of students succeed in this particular sequence of learning, then using such an approach will establish an aural understanding of music so music literacy learning would be more effective.

Thesis Statement

To prepare students for music literacy in public school strings classes, public school music teachers need to develop a strong auditory foundation first. Auditory processing, according to Nina Kraus, is “affected by experience, environmental influences, and active

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[3] Bruce Torff and Howard Gardner. “Conceptual and Experiential Cognition in Music.” *Journal of Aesthetic Education* 33, no. 4 (1999): 98. https://doi.org/10.2307/3333723.

training."[4] This training should occur through active music making: singing and listening, playing basslines with melodies, guessing secret songs, recalling, and segmenting, all of which should lead to experiential and eventually conceptual understanding of music and the symbols that represent it.[5]

Background

The forming of the auditory system in humans precedes the visual, developed during to the twenty-second week of gestation.[6] Speaking skills precede reading skills and experiential learning precedes conceptual understanding. In instrumental music lessons, auditory preparation and experience must precede visual decoding of the music symbols. The educators who have successfully pioneered this principle in their work are Jean Piaget, Jerome Bruner, John Feirabend, Edward Gordon, Howard Gardner, and David Elliott.[7]

The concrete operational stage of cognitive development occurs prior to the formal operational stage according to Piaget.[8] Most children during the concrete stage are not able to

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[4] Nina Kraus and Karen Banai, "Auditory-Processing Malleability: Focus on Language and Music," *Current Directions in Psychological Science* 16, no. 2 (2007): 105, http://www.jstor.org/stable/20183172.

[5] Sheila, C. Woodward, Reflections and Dialogues – Early Childhood Music Education, edited by David J. Elliott. (New York, NY: Oxford University Press, 2005): 253.

[6] David R Moore, "Auditory development and the role of experience," *British Medical Bulletin*, Vol. 63, Issue 1, October (2002): 171, https://doi.org/10.1093/bmb/63.1.171

[7] DeVries, Rheta DeVries, "Developmental Stages in Plagetian Theory and Educational Practice," *Teacher Education Quarterly* 11, no. 4 (1984): 80, http://www.jstor.org/stable/23474552; LeAnn Garrett, "Dewey, Dale, and Bruner: Educational Philosophy, Experiential Learning, and Library School Cataloging Instruction." *Journal of Education for Library and Information Science* 38, no. 2, (1997): 131, https://doi.org/10.2307/40324216; Missy Strong, "Fostering Independent Musical Thinkers with Conversational Solfege," *National Association for Music Education*, July 2, 2019, https://nafme.org/fostering-independent-musical-thinkers-conversational-solfege/; Gordon, Edwin E. "All about Audiation and Music Aptitudes." Music Educators Journal 86, no. 2 (1999): 42. https://doi.org/10.2307/3399589; Bruce Torff and Howard Gardner. "Conceptual and Experiential Cognition in Music." *Journal of Aesthetic Education* 33, no. 4 (1999): 96, https://doi.org/10.2307/3333723; Elliott, David J "Musicing, Listening, and Musical Understanding." *Contributions to Music Education*, no. 20 (1993): 68, http://www.jstor.org/stable/24127332

[8] Saul McLeod, MD., Piaget's Stages of Cognitive Development, *Simply Psychology*, December 7, 2020, https://www.simplypsychology.org/piaget.html

think abstractly and need concrete, physical experiences to help them learn. The preoperational stage precedes this step with concrete experiential opportunities to apply the language without relying on symbols. This phase usually happens between ages two and six during which various symbols are naturally introduced. Experiential knowledge thus leads to conceptual.[9]

An example of a method that follows concrete to formal operational stage sequence is called *Conversational Solfege* introduced by John Feirabend. He describes his method as "similar to a conversational language-learning model, in which a student first hears and then works on speaking a language before ever moving on to reading and writing it."[10] Dr. Feierabend's method is widely used in general music classes since its publishing in 2001. However, the method books used in traditional beginner instrumental lessons published since then still do not reflect the application of those theories.[11]

Another example that follows Piaget's sequence of cognitive development is Shinichi Suzuki's method of teaching the youngest of students by ear prior to introducing them to music notation.[12] Suzuki observed that all children possess the ability to learn to speak their own language however complex.[13] He also emphasized that through a nurturing environment, such ability is enhanced.[14] He called this process the Mother Tongue Method and referred to his

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[9] Bruce Torff and Howard Gardner. "Conceptual and Experiential Cognition in Music." *Journal of Aesthetic Education* 33, no. 4 (1999): 98. https://doi.org/10.2307/3333723.

[10] Missy Strong, "Fostering Independent Musical Thinkers with Conversational Solfege," *National Association for Music Education*, July 2, 2019, https://nafme.org/fostering-independent-musical-thinkers-conversational-solfege/

[11] "Orchestra Method Books," JW Pepper, accessed 6/4/2023, https://www.jwpepper.com.

[12] "Suzuki Method," International Suzuki Association, accessed April 10, 2023, https://internationalsuzuki.org/method

[13] Shinichi Suzuki, *Nurtured by Love*, trans by Waltraud Suzuki, (USA: Alfred Music, 2018), 2.

[14] Ibid.

pedagogy as Talent Education.[15] Such a method is ideal in the private setting since parents play a vital role in engaging and sustaining the child's motivation and growth by being taught first, and staying actively involved in their child's listening and practicing sessions. The repertoire books therefore are not written for a string orchestra but for individual instruments, in the tonalities best suited for that instrument. Adopting such a method to public school heterogeneous setting may be challenging considering the parents' work schedules and various transpositions that would be required for each piece.

Problem Statement

This research originates from the desire to see all children succeed in the initial stages of learning music. If the early introduction of note-reading discourages students from continuation of instrumental study, then the teaching method should be questioned and another sequence tried to ensure that every child is successful. It is critical to find an ideal method for students to obtain music literacy while learning an instrument, so that these young musicians can stay involved in a lifetime of music-making. The traditional method books for beginning strings students have an almost immediate expectation to decode musical symbols. Although current practices in public schools support Piaget's theory of cognitive development, specifically concrete operation in regards to language, literature has not clearly addressed the application of this theory in instrumental music education.[16],[17] The problem is that there exists a gap in instrumental music

[15] "Suzuki Method," International Suzuki Association, accessed April 10, 2023, https://internationalsuzuki.org/method

[16] Greg Dimitriadis and George Kamberelis, T*heory for Education*, 1st ed., (New York: Routledge, 2006), 174. https://doi.org/10.4324/9780203958933

[17]John J. Warrener, "Applying Learning Theory to Musical Development: Piaget and Beyond", *Music Educators Journal*, November, 1985, pg. 25.

literature and in teaching application supporting the sequence of learning with respect to music literacy.[18]

Purpose Statement

The purpose of this applied research is to investigate the connection between a specific sound-based learning sequence and the student's ability to read music in beginning strings lessons. The purpose is to analyze a learning sequence that has not yet been explored in music education, and to document the student's perceptions concerning the experience. Questionnaires will be administered to test the concrete to the abstract theory that predicts that the proposed sound to symbol learning sequence will have a positive effect on elementary school student's ability to read music and play an instrument in beginning strings classes at Northern California public schools. Interviews with students and parents will explore the perception of students' personal learning experiences and will provide insight and possible motivation entry for future instruction. This can illuminate how educators can better support students' learning in this concrete to abstract transition point.

Significance

This study may provide further information about Piaget's theory as it relates to music literacy. Jerome Bruner investigated Piaget's theory on this subject of sequence in cognitive development.[19] Bruner believed that concepts should be taught in stages, from enactive, representing action and/or experience; iconic, representing picture representations; and finally

[18] Janet Mills and Gary E. McPherson, *The Child as Musician,* (New York, NY: Oxford University Press, 2015), 189.

[19] Carol Krueger and Jill Wilson, "Foundations of Music Literacy: Jerome Bruner's Contributions to Choral Music Education," *The Choral Journal* 59, no. 1 (2018): 19, https://www.jstor.org/stable/26600186.

symbolic, the notation stage.[20] The study also demonstrates the significance of students' auditory development as an important step to conceptual understanding leading to music symbol decoding.[21] An aural understanding of music may positively affect students' performance on a stringed instrument. According to David Elliott, music learning occurs when the opportunity to make music occurs in an authentic musical situation, with peers, goals, and standards supporting student learning.[22] The methods of Carl Orff, Zoltán Kodály, Émile Jaques-Dalcroze, and Shinichi Suzuki support Elliott's perspective.[23] Consequently, the results of this study can suggest different implications for teachers in their approach to the learning sequence as well as emphasize the priority for procedural knowledge in their work with children.

Research Questions and Hypotheses

RQ1: How does the sound-based curriculum affect students' motivation to practice, attend lessons, or seek more musical experiences after school?

RQ2: In what specific areas can the depth of knowledge be observed in classroom performance, using rubrics, auditory exercise on guessing the music, and improvisation?

RQ3: In the process of music making, in what ways do students find themselves in the state of flow per Csikszentmihalyi, engaged and motivated to keep learning?

RQ4: How does this study of sound-based learning sequence help to explain the connection between auditory development and performance observed in decoding unfamiliar music?

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[20] Ibid.

[21] Allison Maerker Garner, "Singing and Moving: Teaching Strategies for Audiation in Children." *Music Educators Journal* 95, no. 4 (2009): 46. http://www.jstor.org/stable/30219238.

[22] Howell, Allen C. "Curricular Pillars in the Elementary General Music Classroom." *Music Educators Journal* 95, no. 3 (2009): 38. http://www.jstor.org/stable/30219212.

[23] Ibid.

If this study finds that most students succeed in this sequence of learning, then such an approach may lead to an aural understanding of music so music literacy learning would be more effective. It is hypothesized that the application of a new sound-based curriculum will have a direct effect on students' ability to decode and play with accuracy. It is also hypothesized that the student retention rate will remain high as the students' feeling of success will motivate them to continue playing an instrument.

Chapter Two: Literature Review

Many scholars have written about neurological development as it relates to learning sequence, language acquisition, and constructing meaning from sound. The existing literature will be examined to evaluate the traditional instrumental music teaching sequence in regard to auditory development. This chapter will address the structure of the brain which suggests a particular learning order that develops parallel to language acquisition, connecting to what is already known about reading. It will examine students' perception of their own learning, compare the music content acquisition in traditional and sound-based methods, and explore the optimal approach to teaching sequence in beginner instrumental music classes.

Brain Created for Learning

James E. Zull, in his book *The Art of Changing the Brain*, investigated the structure and functions of the cerebral cortex.[24] He discovered that the structure of the brain reveals the sequence that is optimal for learning.[25] Relying on ideas of the scholars Kolb, Dewey, Lewin, and Piaget, Zull examined the following four brain regions involved in the process of obtaining knowledge: first, the sensory cortex indicating that learning originates in concrete experience; second, the integrative cortex at the back suggesting the absorption and reflection period; third, the frontal integrative cortex, where new abstract concepts are created; and fourth, motor brain, which involves the active testing.[26] If the learning progression is connected to brain structure, learning to read would follow the above-mentioned steps starting with a concrete experience of seeing or hearing the word, remembering and reflecting on images associated with this word or

[24] James E. Zull, *The Art of Changing the Brain*, (Sterling, VA: Stylus Publishing, LLC, 2002), 15.

[25] Ibid.

[26] Ibid., 19.

related words and ideas, involving student's abstract thinking by generating new words and ideas, and finally actively testing by speaking and writing new ideas and words. This new experience of learning and registering teachers' or parent's responses will initiate a new cycle. Such a cycle conforms the natural brain structure.[27] To initiate this cycle, the word the student experiences would have to be a familiar word, or the reflection and image assigning would not be accurate. To expect students to infer the meaning of a new word or musical symbol without reflecting on prior knowledge would mean to asking them to imagine an abstract concept to which they are unable to attach any meaning.

Building on Prior Knowledge

Edwin Gordon, the author of *The Music Learning Theory*, underscored two ways people generally learn: discrimination and inference.[28] After students learned and memorized a musical composition by rote, they can discriminate among sounds and rhythms in other pieces of music. That is referred to as discrimination. Inference occurs when students have acquired sufficient discriminatory prowess to take the unfamiliar and infer from familiar adding to their knowledge by scaffolding.[29] Gordon writes, "the more facts and ideas students can discriminate among, the more inferences they will be able to make."[30]

The richer the child's vocabulary, based on this research, the more accessible the process of reading becomes to that child. It is the same with music: the richer the child's sound vocabulary, the more accessible the process of note reading. A child's sound vocabulary here

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[27] James E. Zull, *The Art of Changing the Brain*, (Sterling, VA: Stylus Publishing, LLC, 2002), 19.

[28] Edwin E. Gordon, *Learning Sequences in Music – A Music Learning Theory*, (Chicago, IL: GIA Publications Inc. 2003), 97.

[29] Ibid., 98.

[30] Ibid.

refers to their previous experience with music, listening, singing, playing, and thinking in musical patterns Gordon refers to as *audiation*.[31] He insists that prior to the inference stage of learning a few important steps in the discrimination process should occur. These are aural/oral experiences, verbal association, partial synthesis, symbolic association, which is an introduction to reading and writing, and composite synthesis.[32]

There seems to be an established learning sequence in reading and writing the native language that assumes students will do well by first learning to read familiar individual patterns at the symbolic association level of discrimination, then read series of familiar patterns with comprehension at the composite synthesis level of discrimination learning. When these are well established, teachers can expect students to be performing at the generalization level of inference learning: students are able to read unfamiliar patterns with comprehension.[33] Teachers who devote more time in the first three steps prior to reading notation in the symbolic association and composite synthesis allow students to not only develop a basis to enhance their sound vocabulary but also develop more skill and artistic intuition in the process.[34] Music comprehension, in this case, is an experiential understanding of relations among notes and rhythmic and tonal patterns.[35] It is fluency of what can be called thinking in sound. To be fluent in a language implies interacting with ease, speaking, improvising a conversation, understanding and sending

[31] Edwin E. Gordon, *Learning Sequences in Music – A Music Learning Theory*, (Chicago, IL: GIA Publications Inc. 2003), 5.

[32] Ibid., 90.

[33] Ibid., 280.

[34] Ibid., 279.

[35] Ibid., 281.

messages. To be fluent in musical language, the same practical process of listening must occur: singing, playing, creating, and reflecting.[36]

Connection to Language

Although there are various methods and approaches to teaching children to read their native language, researchers agree that "reading is best achieved through speech, the basic structure and vocabulary of the language have first been established."[37] Similarly, music literacy will be best achieved after music vocabulary and playing skills have been developed. Jarrod Richey, author of *Bach to the Future – Fostering Music Literacy Today*, reminds music teachers that comprehension happens before language.[38] Young children understand words such as "milk," "grandma," "walk," "banana", etc. long before they can babble words. Reading and writing those words will require more years of cognitive development. It will take a few years before children are expected to read and write. Their inability to speak, read, or write in most cases does not represent their level of comprehension. Children's actions indicate that they understand what people in their environments around them are saying prior to speaking.

It is common to study a foreign language by going abroad and experiencing communication in context with its people and culture. Immersion is a more effective method of learning than classroom study.[39] In his book *Musical Literacy: Reading Traditional Clef*

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[36] Sheila, C. Woodward, *Reflections and Dialogues – Early Childhood Music Education*, edited by David J. Elliott. (New York, NY: Oxford University Press, 2005): 253.

[37] Janet Mills and Gary E. McPherson, *The Child as Musician,* (New York, NY: Oxford University Press, 2015), 177.

[38] Jarrod Richey, *Bach to the Future*, (Monroe, LA: Retune Publications, 2017), 20.

[39] Anthony Shook, Marian Viorica, Scott R. Schroeder, "Bilingual Two-Way Immersion Programs Benefit Academic Achievement." *National Institute of Health, Biling Res J*., No. 36(2), (2013): 168. doi:10.1080/15235882.2013.818075

Notation, Gary McPherson likens foreign language competence to music competence.[40] Just like learning to be bilingual means engaging with people who speak a different language, learning to be a musician means engaging with other musicians.[41] Evan Feldman and Ari Contzius, in their book *Instrumental Music Education*, reflect on Shinichi Suzuki's discovery of the mother-tongue approach, saying, "young children learn to comprehend and speak complex languages without formal training."[42] The constant presence of the language provides children with sufficient knowledge to implement the tenses, endings, inflections, and other linguistic nuances correctly, making it easier to transition into reading and writing. Similarly, immersion in this spoken verbal language of music should naturally lead to the development of written verbal language.[43] Children acquire command of spoken language in home environments where they easily engage in conversations and where caring adults read to them who are fluent in that language. When students read a book, make inferences from pictures, hear the words, and match them to the unknown letter symbols on the page, they start making connections and understand how language is expressed through symbols.[44] Adriana Weisleder and Anne Fernald, in their article "Talking to Children Matters," present a study that suggests that "richer language experience strengthens processing skills that facilitate language growth."[45] Other studies pertaining to written verbal language development also suggest that children should have an adequate

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[40] Janet Mills and Gary E. McPherson, *The Child as Musician,* (New York, NY: Oxford University Press, 2015), 178.

[41] Ibid.

[42] Evan Feldman and Ari Contzius, Instrumental Music Education: Teaching with the Musical and Practical in Harmony. (New York, NY: Routledge, 2011), 8.

[43] Janet Mills and Gary E. McPherson, *The Child as Musician,* (New York, NY: Oxford University Press, 2015), 178.

[44] Ibid., 179.

[45] Adriana Weisleder and Ann Fernald, "Talking to Children Matters," *Psychological Science*, Vol 24, No. 11, (2013), doi: 10.1177/0956797613488145.

command of spoken language before written language is addressed.[46] In 1983, Howard Gardner proposed the Theory of Multiple Intelligences, introducing eight different types: linguistic, logical/mathematical, spatial, bodily-kinesthetic, musical, interpersonal, intrapersonal, and naturalist.[47] If music is perceived as auditory learning, then the first intelligence Howard Gardner mentions, linguistic intelligence, is directly connected to and dependent on music intelligence. Rollin Potter, in his article "Musical Intelligence – the Final Frontier," writes that "the nurturing and development that takes place in musical learning is autonomous and on par with the processes that take place in studying languages."[48] Lev Vygotsky, a Russian psychologist and educator, emphasized in his socio-cultural theory of learning that it is via the application of language that thinking, reasoning, reading, and writing develop.[49] He wrote, "Understanding of written language is first affected through spoken language."[50]

Student Frustration

Norman Doidge, in his book *The Brain that Changes Itself*, discusses neuroplasticity and brain mapping as he addresses a quote by another neuroscientist. Carla Shatz famously said that "Neurons that fire together wire together."[51] How one perceives learning matters to how brains store the information consumed. Positive emotions connecting to a well-suited challenge for the

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[46] Janet Mills and Gary E. McPherson, *The Child as Musician,* (New York, NY: Oxford University Press, 2015), 178; Ibid., 180.

[47] Michele Marenus, "Howard's Gardner's Theory of Multiple Intelligences," Simply Psychology, last modified February 9, 2023.

[48] Rollin R. Potter, "Musical Intelligence – the Final Frontier", *National Forum on the Arts*; Baton Rouge, LA. Vol. 77, No. 3, (Summer 1997): 7.

[49] Linda S. Neff, "Lev Vygotsky and Social Learning Theories," Educational Technology 547, 10/7/22, https://jan.ucc.nau.edu/lsn/educator/edtech/learningtheorieswebsite/vygotsky.htm

[50] Lev Vygotsky, *Mind in Society: Development of Higher Psychological Processes*, (USA: President and Fellows of Harvard College, 1978), 116.

[51] Norman Doidge, *The Brain That Changes Itself.* (New York, NY: Penguin Books, 2007), 50.

appropriate set of skills will leave a lasting memory in the brain, connecting the action and emotion. This is what Mihaly Csikszentmihalyi refers to as the "state of Flow."[52] If Doidge's claim about the neuroplasticity of the brain is tenable, then life learners of music can be nurtured with proper learning sequences, creating an optimal ground for neurons to work together.

The music teacher needs to facilitate a balance between skill and challenge because of the state of flow in beginning strings lessons. A few challenges that a beginner string player encounters include holding an instrument with healthy posture and appropriate hand positions, plucking with the right amount of strength, learning the names and sounds of the strings, discovering the right amount of weight and speed of the bow for good tone production, and applying the correct angle and proximity of the elbow to keep the bow on one string at a time. These are just the skills needed to produce an appropriate tone on open strings. With the addition of the left-hand fingers, matters become more complicated, and ear-training becomes necessary for students to play correct notes, resembling the songs they are learning. The skills needed for this would require an average student a few weeks to accomplish. Ivan Galamian, a master pedagogue and teacher of many grand musicians, includes a list of necessary skills in his book *Principles of Violin Playing and Teaching*: body and instrument posture, left arm, wrist, hand, fingers, thumbs, movements of the left hand, crossing of strings, intonation, timing, holding the bow, drawing the straight bow stroke, tone production, and bowing patterns.[53] For the teacher to add the skill of decoding musical notes to the list of the above-mentioned challenges creates unnecessary frustration and possibly deters students from pursuing instrumental study entirely.

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[52] Mike Oppland, "Eight Traits of Flow According to Mihaly Csikszentmihalyi," Positive Psychology, Scientifically reviewed by Melissa Madeson, Ph.D, 16 Dec 2016, https://positivepsychology.com/, last modified March 9, 2023.

[53] Ivan Galamian, *Principles of Violin Playing and Teaching*, 3rd ed., (Ann Arbor, MI: SHAR Products Co., 1985), vii-viii.

McPherson cautions music educators against introducing music reading too early since consideration should be applied to sound production.[54] He reiterates, "Rather children should be encouraged to experience and enjoy music first so that the acquisition of formal musical skills can occur inductively as a natural outcome of this process.[55]

McPherson reminds that commonly music teachers become students' first consistent musical encounters and influence students' perceptions of musicians. Oftentimes the well-meaning music educators leave students with a false perception that music cannot be played unless it has been decoded from the page.[56] Such singular focus on music's symbolic representation distracts students from listening, refining, and enjoying the sounds they produce, as they are expected to "simultaneously decode staff notation."[57] Taught from this perspective, improvisation, harmonizing, and any other creative performance that is not written down in a standard notation form becomes a difficult task for a student. Many students achieve a level of proficiency in traditional learning methods and become good musicians. McPherson points out that there are many students who failed in the traditional method of learning to play their instrument and read music simultaneously and quit playing altogether. He writes, "exclusive concentration on reading has held back the progress of countless learners while putting many others off completely."[58]

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[54] Janet Mills and Gary E. McPherson, *The Child as Musician,* (New York, NY: Oxford University Press, 2015), 180.

[55] Ibid.

[56] Ibid., 179.

[57] Ibid.

[58] Janet Mills and Gary E. McPherson, *The Child as Musician,* (New York, NY: Oxford University Press, 2015), 189.

Traditional methods may still work with some scaffolding steps that complement the brain's innate ability to learn. McPherson refers to this transition as moving from "symbol to sound to action as opposed to symbol to action to sound."[59] This is the same cognitive process Gordon calls audiation by which the brain gives meaning to musical sounds.[60] In the beginning strings class it is a technique of focusing on listening, inner hearing, and sound comprehension before placing a finger on the string to play a note. This additional step in the process of decoding music would require the following sequence: read the symbol, interpret it into sound in the inner hearing, and then produce the sound on the instrument. Gordon suggests that audiating should be the foundation of learning to play any instrument if students want to achieve "good intonation, rhythm, tone quality, expression, and interpretation."[61] In contrast, learning only through decoding a symbol by assigning it a finger number can cause further confusion when fingers and sounds are not in accord. For example, written staff music does not necessarily appear or move in the same direction as the fingers on the fingerboard and can lead to confusion for young musicians who do not possess sufficient discrimination knowledge to make proper inferences.[62] Gordon insists that the difference lies in relationships.[63] If students audiate, they associate musical notation with a concrete sound. If students decode without comprehending the sound first, they relate symbols to abstract "definitions, explanations, and rules."[64] To develop

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[59] Janet Mills and Gary E. McPherson, *The Child as Musician,* (New York, NY: Oxford University Press, 2015), 85.

[60] Edwin E. Gordon, Learning Sequences in Music – A Music Learning Theory, (Chicago, IL: GIA Publications Inc. 2003), 4; Edwin Gordon, "Audiation," The Gordon Institute for Music Learning, accessed January 20, 2023, https://giml.org/mlt/audiation/

[61] Ibid., 278

[62] Edwin E. Gordon, Learning Sequences in Music – A Music Learning Theory, (Chicago, IL: GIA Publications Inc. 2003), 280.

[63] Ibid., 49.

[64] Ibid., 102.

connections to concrete experiences students should try to read and perform based on what is in their inner hearing instead of separate symbols on the page.[65]

The Depth of Knowledge

The term "literacy" is often misunderstood, narrowly defined as the ability to read and write. However, a broader picture should be considered, as in the definition of literacy according to United Nations Educational, Scientific, and Cultural Organization: "literacy is the ability to identify, understand, interpret, create, communicate and compute, using printed and written materials associated with varying contexts."[66] It is the same with music. The meaning, the application, and communication, receiving and sending of messages cannot be achieved by simple decoding.

Donald Hodges, teacher, author and the director of the Music Research Institute at the University of North Carolina wrote in his article, "How and Why Does Music Move Us?" when musicians perform, they engage in a whole-brain activity "with neural pathways connecting multiple regions throughout the brain."[67] To encourage musical insight, creativity, memorization, and the quality of sound, students should learn to read music in the process of music making and not separate from it.[68] String students can be taught to respond to visual symbols and place fingers on the correct stickers on their instrument. However, student understanding is limited

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[65] Janet Mills and Gary E. McPherson, *The Child as Musician,* (New York, NY: Oxford University Press, 2015), 184; Jarrod Richey, Bach to the Future, (Monroe, LA: Retune Publications, 2017), 27.

[66] United Nations Educational, Scientiic and Cultural Organization, Accessed on 10/08/22, https://uis.unesco.org/en/glossary-term/literacy

[67] Donald A. Hodges and Robin W. Wilkins. "How and Why Does Music Move Us? Answers from Psychology and Neuroscience." *Music Educators Journal 101*, no. 4 (2015): 44. http://www.jstor.org/stable/24755599.

[68] Janet Mills and Gary E. McPherson, *The Child as Musician,* (New York, NY: Oxford University Press, 2015), 178.

since much is missed in this pattern of learning. Insufficient cognitive attention is given to learning to listen and manipulate their instrument. This affects the intonation, and any future work students would attempt outside of music staff, like improvisation.

McPherson suggests that when students begin to audiate, the process of learning to read and write traditional musical symbols is easy and evenly affecting both, rhythm and pitch.[69] Successful sight-reading, for example, involves comprehending both the pitch and rhythm that is to be performed and therefore requires the musician to inwardly hear or audiate prior to playing the passage on their instrument.[70] Gordon explains it by saying that "because an instrument is actually an extension of the human body, students learn to audiate intonation, rhythm, and style by listening and singing, and then by playing many pieces before they ever learn to read music notation."[71]

To foster musicianship in students, teachers first need to work on increasing students' aural sensitivity through listening and learning to manipulate their instruments. Then students will be able to respond to nuances indicated on the page and match various expressive details.[72] This element is noticed with many Suzuki students where the ability to decode is behind the ability to play by memory, technically correct and with proper style and phrasing. McPherson writes about Suzuki's approach, explaining that children seem to develop a sound image of the phrases they memorized, so once they start reading "they're moving from symbol to sound

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[69] Janet Mills and Gary E. McPherson, *The Child as Musician,* (New York, NY: Oxford University Press, 2015), 181.

[70] Ibid., 182.

[71] Edwin E. Gordon, Learning Sequences in Music – A Music Learning Theory, (Chicago, IL: GIA Publications Inc. 2003), 275.

[72] Janet Mills and Gary E. McPherson, *The Child as Musician,* (New York, NY: Oxford University Press, 2015), 185.

image to action," positively affecting long-term deep understanding of music.[73] Suzuki's method, however, is not suitable to the heterogeneous structure of public schools' orchestras. Still, there is an optimal approach to teaching strings in a traditional setting.

Optimal Learning

Based on above mentioned literature by Edwin Gordon, Donald Hodges, and Gary McPherson, the first element students need prior to starting instrumental lessons is a sound foundation. Because modern generations of children generally possess an inadequate musical background developed in their homes, Gordon suggests music teachers assume responsibility for providing the readiness students used to bring to school, such as listening and singing.[74] Gordon recommends spending the first ten minutes of a lesson on audiation exercise, tonal and rhythmic patterns.[75] Likewise, Feldman and Contzius advocate for the development of ear-training skills, audiation, and musical vocabularies before introducing students to music notation.[76]

Students should be exposed to various concrete musical experiences in a way similar to language acquisition, starting with listening, playing, reflecting, and manipulating, before naturally leading to writing and reading the staff notation.[77] After saturating students in listening and opportunities to make music, teachers should try to extend students' prior knowledge. Just

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[73] Janet Mills and Gary E. McPherson, *The Child as Musician,* (New York, NY: Oxford University Press, 2015), 186.

[74] Edwin E. Gordon, Learning Sequences in Music – A Music Learning Theory, (Chicago, IL: GIA Publications Inc. 2003), 273.

[75] Ibid., 276

[76] Evan Feldman and Ari Contzius, Instrumental Music Education: Teaching with the Musical and Practical in Harmony. (New York, NY: Routledge, 2011), 15.

[77] Sheila, C. Woodward, Reflections and Dialogues – Early Childhood Music Education, edited by David J. Elliott. (New York, NY: Oxford University Press, 2005): 253.

like in language, children first learn to read words they already know.[78] Students begin to decode predictable patterns when they read music with which they are experientially familiar, anticipating the flow and building fluency.[79] McPherson also suggests encouraging students to invent their own symbols for music notation to represent familiar songs or patterns.[80]

Education Through Music (ETM) of Richards Institute of Education and Research has been an educational approach to teaching music based on principals of Zoltan Kodaly's and Helen Richard's collaborations since 1968.[81] ETM teachers encourage students to create their own symbols for melodic and rhythmic notation in their general music classes preparing the child's aptitude for reading. Such exercise as well Curwen hand signs help students gain a relational understanding of symbols. A symbol is abstract and to have a meaning, it should be related to a concrete experience. If so, teaching singable patterns in solfege instead of individual letter notes on F A C E staff anchors children's understanding to a tonal pattern, that can be retrieved or manipulated for future application.[82][83]

A significant amount of music-making should occur between steps in reading familiar and unfamiliar music. To prepare the students for unfamiliar patterns, teachers need to help build

[78] Janet Mills and Gary E. McPherson, *The Child as Musician,* (New York, NY: Oxford University Press, 2015), 180.

[79] Ibid., 181.

[80] Ibid., 180.

[81] Peggy Bennett, "From Threshold to Music to Music Education," (Texas Music Educators Association Clinic-Convention, San Antonio, TX, February 11-14, 1987).

[82] Edwin E. Gordon, Learning Sequences in Music – A Music Learning Theory, (Chicago, IL: GIA Publications Inc. 2003) 283-284.

[83] Janet Mills and Gary E. McPherson, *The Child as Musician,* (New York, NY: Oxford University Press, 2015), 184.

a connection between what students see, hear, and execute.[84] The connection is made through aural recollection of sound in students' minds after seeing the symbol but before playing it on the instrument.[85]

McPherson addresses an example of a girl who demonstrated musical fluency without formal music training. She played in her father's folk band, developed musical memory, played familiar songs by ear, and participated in regular music-making with older musicians, improvising freely and expressively.[86] Such musical fluency laid the foundation for making the necessary musical inferences in the future that could lead to note-reading with comprehension – musical literacy. Gordon concurs by stating that if students are able to audiate, the process of learning to read and write traditional music notation becomes faster and more intuitive.[87]

Conclusion

Conclusions could be made regarding music literacy having reviewed the works of scholars in neuroscience, psychology, and music education. It is mistakenly associated with only reading and writing. Music teachers should develop a full understanding of important processes leading to reading and writing traditional notation. These include hearing, reflecting, singing, playing, reflecting, manipulating, creating, speaking about and listening to music, forming judgments, comprehending, reading, writing, and interpreting.[88] Based on the available literature,

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[84] Janet Mills and Gary E. McPherson, *The Child as Musician,* (New York, NY: Oxford University Press, 2015), 181.

[85] Ibid.

[86] Ibid., 179

[87] Edwin E. Gordon, Learning Sequences in Music – A Music Learning Theory, (Chicago, IL: GIA Publications Inc. 2003), 103.

[88] Janet Mills and Gary E. McPherson, *The Child as Musician,* (New York, NY: Oxford University Press, 2015), 177.

the cognitive transition point between learning an instrument and reading music notation while playing lies in the auditory to visual relationship that students develop while in the process of music making, transitioning from familiar to unfamiliar.

Piaget, Elliott, Csikszentmihalyi, Gordon, Azarra, Kraus, Mills, Hodges, McPherson, Kodaly, Helen Richards, and Suzuki all made significant contributions to music education field, insinuating, as Mills writes, that "no child needs to be able to decode staff notation accurately before starting to learn to make the sorts of music where staff notation is used customarily."[89] To put their theories into practice in public school setting, this sound-based applied curriculum research will test the cognitive transition point of developing the relationship from sound to symbol.

[89] Janet Mills and Gary E. McPherson, *The Child as Musician*, (New York, NY: Oxford University Press, 2015), 178.

Chapter III: Methods

Overview

The purpose of this applied research was to investigate the connection between a specific sound-based learning sequence and the student's ability to read music in beginning string lessons, leading to optimal learning and student engagement. To maximize the rationality of the direct influence of the sound-based curriculum on student learning, this applied research implemented a multimethod design consisting of quantitative and qualitative approaches. Because students' perceptions of their own learning were considered, the constructivist framework guided the qualitative portion of the study.[90],[91] After data was collected, the research included an investigation of the comparison and connection between the findings. The independent variable comprised a specific learning sequence applied in the beginning strings classes. This sequence presented sound before symbol, teaching ear training while introducing instrument technique, and writing music symbols while learning to read the standard music notation. The dependent variable was the students' performance on stringed instruments. The performance was evaluated in the forms of observation, playing and reading tests, and rubrics.[92]

Design

A multi-method design was implemented for this applied research study to compare and then integrate the main finding into the optimal teaching sequence for beginning strings classes. The rationale for using diverse methods was to "develop a complete understanding of a research

[90] Leonard Bickman and Debra J. Rog. *Applied Research Design: A Practical Approach - The SAGE Handbook of Applied Social Research Methods*, 2nd ed., (Thousand Oaks, CA: SAGE Publications, Inc., 2009): 12, https://dx.doi.org/10.4135/9781483348858.

[91] John W. Creswell and J. David Creswell, *Research Design*, 5th ed., (Los Angeles, CA: SAGE, 2018), 8.

[92] Denis, John M. "Assessment in Music: A Practitioner Introduction to Assessing Students." *Update: Applications of Research in Music Education* 36, no. 3 (June 2018): 22. https://doi.org/10.1177/8755123317741489.

problem by comparing quantitative and qualitative results from the two databases."[93] Quantitative and qualitative data was collected in parallel, analyzed separately, and then merged, specifically via the convergent method to consolidate the findings.[94] To collect qualitative data, the researcher collected surveys regarding formal music background, parents' motivation questionnaires, students' confidence surveys, and classroom observation notes. To collect quantitative data, the researcher administered assessment tests and self-assessing rubrics, as well as gather weekly practice charts from students.

Applied research as a concept dates back to late nineteenth-century discussions by scientists such as Henry Rowland and Sir William Thomson. They were discussing ideas of abstract science and theoretical science in comparison to applications of science and practical science.[95] Although there was an ethical concern about mixing knowledge with commerce, scientists like Alexander Graham Bell believed that research could be authentic, calling it, "genuine and useful."[96],[97] In the educational field, the application of data that helps solve real-life problems is especially beneficial.[98] One such applied study was used to determine the best teaching practices in the third-grade reading program. It provided instructional support for teachers and reduced the number of students who needed reading intervention support.[99] In an

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[93] John Creswell and David Creswell, Research Design, (LA: SAGE, 2018), 127.

[94] Ibid., 127.

[95] Paul Lucier, "The Origins of Pure and Applied Science in Gilded Age America," *The History of Science Society*, The University of Chicago Press Journals, Vol 103, No. 3. (September, 2012), 528.

[96] Ibid., 531.

[97] Paul Lucier, "The Origins of Pure and Applied Science in Gilded Age America," *The History of Science Society*, The University of Chicago Press Journals, Vol 103, No. 3. (September, 2012), 531.

[98] John Gaber, ed by Neil J. Salkind, "Applied research," *Encyclopedia of Research Design*, (SAGE Publications, Inc., 2010), 36. https://dx.doi.org/10.4135/9781412961288.n13

[99] Valeree Ellis-Barnes, "Improving the Quality of Teaching," (PhD diss., University of Mississippi, January 2019), 9-10, https://egrove.olemiss.edu/etd/1749

applied research study the researcher investigates the problem with the intent of offering possible methods of solution. In music education, pedagogy and performance are applied fields, concerned with the improvement of practice and of materials."[100]

Research Questions

RQ1: How does the sound-based curriculum affect students' motivation to practice, attend lessons, or seek more musical experiences after school?

RQ2: In what specific areas can the depth of knowledge be observed in classroom performance, using rubrics, auditory exercises on guessing the music, and improvisation?

RQ3: In the process of music making, in what ways do students find themselves in the state of flow per Csikszentmihalyi, engaged and motivated to keep learning?

RQ4: How does this study of sound-based learning sequence help to explain the connection between auditory development and performance observed in decoding unfamiliar music?

It was hypothesized that 1) there was a direct connection between auditory training and students' ability to read and understand musical symbols; 2) sound-based teaching sequence positively affected students' perception of their own learning; 3) there was an interdependence between students' perception and level of achievement in the area of reading and playing an instrument. It was hypothesized that there would be a significant difference between traditional and sound-based methods in the areas of students' engagement and decoding musical symbols while maintaining the quality of music-making.

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[100] Liora Bresler, "Basic and Applied Qualitative Research in Music Education." *Research Studies in Music Education*, 6, No. 1, (1996), 6. https://doi.org/10.1177/1321103X9600600102

Participants and Setting

The participants were comprised of fifth and sixth-grade elementary school students enrolled in beginning strings classes in four Northern California public schools. In 2020 the district where the four schools were located reported a population comprising students demographics representing 4% African American, 19% Asian, 24% Hispanic, 3% other (Filipino, Pacific Islander, American Indian/Alaskan Native), and 50% White. Twenty-five percent of students in the district are students with a native language other than English, 8% of all students receive English Language services, and 25% of all students qualify for free or reduced lunch. Forty-seven percent of all students are female and 52% are male.

This study comprised two participant groups. The control group had instruction based on the traditional string method book. The intervention group received sound-based string instruction. The schools in this district just started offering one year of general music classes prior to the fifth-grade instrumental program. The sample was drawn from a stratified group of students with no formal music background or instrumental music lessons prior to fourth grade.

Initial stratification occurred to establish the available sample of students based on one characteristic: students with no formal music training prior to fourth grade. Once the population was stratified, the sample was determined as 71% female, 29% male, 10% African American, 5% Asian, 14% Hispanic, 5% other (Filipino, Pacific Islander, American Indian/Alaskan Native), and 81% White. 19% of students' native language is other than English.

Ninety-six students qualified to participate in the study based on stratifying factor. Convenience sampling from four elementary schools was chosen as a method of sampling due to their convenience and availability.[101] 11 students from two of the schools were chosen for the

[101] John Creswell and David Creswell, Research Design, (LA: SAGE, 2018), 150.

traditional method book curriculum, the control group, of which 55% are female, 45% are male, 9% African American, 18% Hispanic, and 73% White. 36% of students from the control group are English language learners, whose native language is other than English. 10 students from the other two schools were chosen from the sound-based curriculum, the treatment group, of which 90% are female, 10% are male, 10% African American, 10% Asian, 10% of students who chose not to identify their race, and 70% White. 100% of the intervention group students claimed English as their native language.

The final participants of this applied study mentioned in Table 1, were twenty fifth and three sixth-grade students enrolled in beginning strings classes. Two of the fifth-graders opted out of the study. Convenient sampling divided students into two groups, controlled and intervention groups. To maintain student confidentiality, the participants were identified by their assigned group and their instrument.

Table 1: Participants

Student 1	CGCello1 (Controlled group cello student 1)
Student 2	IGViolin1 (Intervention group violin student 1)
Student 3	IGBass1
Student 4	CGViolin1
Student 5	CGCello2
Student 6	IGViola1
Student 7	IGViolin2
Student 8 – stopped participating in the study	IGViolin3
Student 9 – parents opted out	IGViola2
Student 10	IGViolin3
Student 11	IGViolin4

Student 12	IGViolin5
Student 13	CGVioiln2
Student 14	CGViolin3
Student 15	CGCello3
Student 16	IGViolin6
Student 17	IGViolin7
Student 18	CGCello4
Student 19	IGViolin8
Student 20	IGBass2
Student 21	CGCello5
Student 22	IGViola3
Student 23	CGViolin4

Instrumentation and Intervention

A questionnaire about musical background was given to parents as a first step to stratifying the qualifying student population. Besides the questions about the presence of formal note-reading lessons, questions about demographics were included to represent diverse samples in the study (Appendix B). The rationale behind using this instrument was to find diverse groups of subjects that would allow the researcher to test the methods instead of testing the demographic difference or the family's previous investment in music. Similar stratifying questionnaire instruments were used in numerous studies.[102]

[102] "Standards and Guidelines for Statistical Surveys", Office of Management and Budget, (September 2006), 9.

A variety of instruments were administered to strengthen the validity and confirm the findings of this applied research. Open-ended questionnaires providing text information would provide the researcher with subjects' perceptions of their own learning (Appendices K, L and M). Closed-ended questionnaires provide empirical data such as minutes practiced at home, and whether the students performed for their families (Appendix E). Performance rubrics filled out by the teacher (Appendix G), and students' self-assessment rubrics (Appendices H and J) were administered to ascertain both content and motivation of the students.

The researcher and the students of both control and intervention groups spent time at the end of class in a discussion about what they observed in the lesson. (Appendix I). The teacher-researcher recorded students' observations on things such as Csikszentmihalyi's concept of "flow": did the time seem to fly by, or did the lesson seem too long? Teacher's and students' observations about interest and motivation – did the class stay engaged? Observations about task challenge – did the students feel confident playing or singing in group, or as a solo? Observations about the quality of tone – did the sound of a group improve? After students volunteered their answers, the teacher-researcher shared her short thought which she wrote down in their presence. Turning observation into an open discussion offered security to minors who are being observed, assuring them that everything was done in the open. Such observations were administered to help address questions about students' accuracy of playing an instrument and overall confidence in playing without looking at fingers, a skill necessary for the ability to maintain focus on the music and read the notation. Corroborating the findings by triangulating the empirical data from the questionnaires and descriptive data from observations and open-ended questions would provide more accurate results for the study.

The intervention in this applied research was the proposed sound-based curriculum in which the learning sequence is generally defined by rote, playing and creating, encoding, and then decoding music. During the rote stages when students play by ear, they put together melodies and basslines, work with secret songs and rhythms, and create variations. The curriculum instruction for the treatment group is included in this proposal (Appendix Q). The control group received minimal rote instruction and began with the traditional method book called *Sound Innovations*, where the symbols were introduced at the same time as the instrument instruction.[103]

Researcher's Role

I was the researcher and the teacher of record who conducted the curriculum intervention, collected surveys and questionnaires, assessed the students, and implemented the tests and rubrics. I also filled the role of a participant observer, watching students' response to playing, reaction to encoding and decoding as it occured.[104] My role could have had an influence on the study as I was familiar with some of the families in the district and have built a rapport with their children. My contribution to the study might be more useful than harmful. My understanding of sound-based curriculum has been formed by my personal experiences. My music education began at a music school in the Ukraine, where ear-training lessons were taught at the same time as the violin. Twenty years later, I studied with John Fiereband at the Hartt School of Music and other teachers who promoted Edwin Gordon's approach to improvisation.[105] Since then, I worked

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[103] Bob Phillips, Peter Boonshaft, and Robert Sheldon, *Sound Innovations* (Van Nuys, CA: Alfred Music, 2010).

[104] Uwe Flick, *Introduction to Qualitative Research*, (London: Sage, 2006), 219.

[105] Christopher D. Azzara and Richard F. Grunow, *Developing Musicianship through Improvisation*, (Chicago, IL: GIA Publication Inc., 2006).

with Suzuki and traditional string teachers on the East and West coasts of the United States as I examined various teaching styles based on beginning methods, quality of tone and intonation, and the long-term music involvement. I also had a privilege working with El Sistema-inspired community orchestra outreach in Southern California and evaluated the program based on the traditional method and the immersive nature of the program. I am currently exploring Education Through Music courses, a neuroscience approach to teaching children with a focus on auditory development.[106] These various experiences help broaden my understanding of the context and enhance my awareness of the challenges of a chosen learning sequence. To remain non-judgmental and control my biases I performed the following functions: solicited a peer to review the process of analyzing the data, recorded observation field notes soon after the observed lessons, documented all surveys, administered playing tests and rubric evaluations, and ensured the research is replicable.[107]

Procedures

The researcher first sent a permission request to the director of Elementary Studies at Davis Joint Unified School District due to the small number of schools involved (Appendix S). A synopsis of the research study and a copy of the initial stratifying questionnaire was attached to the permission request email (Appendices A and B). After the concerns, benefits, and data collection questions were answered and permission was granted, the documentation was sent to Liberty IRB for approval (Appendix T).

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[106] Richards, Mary Helen Richards, *Aesthetic Foundations for Thinking, Rethought*, USA: Richards Institute of Education and Research, 1984.

[107] John W. Creswell and J. David Creswell, *Research Design*, 5th ed., (Los Angeles, CA: SAGE, 2018), 201.

The research began with a survey, administered to all fifth and sixth-grade beginner strings students at four schools to solicit the sample for the study (Appendix B). The stratifying factor was the absence of formal music lessons prior to this year. Once the sample was identified, the consent and assent forms were sent to each family (Appendices C and D). The synopsis of the study was provided and questions from the families were answered (Appendix A). There were no adjustments that needed to be made based on families' responses. The researcher established dummy coding to ensure anonymity. The consent documents were separated from the research data and maintained in a locked cabinet.

All students were encouraged at the beginning of instruction to submit weekly practice logs with questions about their practice, such as minutes spent practicing and whether they performed for others (Appendices E and F). An informal assessment rubric (Appendix G) was administered pertaining to students' ability to sing in tune and find the appropriate notes on their instruments. Students filled out a self-assessment rubric to gauge their perception of their own learning (Appendices M and N). Observation notes were recorded shortly after the lessons (Appendix I). Later the assessments increased in difficulty as students in the sound-based curriculum group practiced playing in harmony, guessing secret songs, and creating a variation on the theme. A questionnaire was administered to students in class and sent to parents soliciting information pertaining to the students' motivation to, practice, perform for others, and ask for more opportunities to hear/learn more about music (Appendix K). After six weeks of instruction, the students from the sound-based curriculum sample began writing the note symbols in the form of familiar basslines and melodies. Then students were asked to read familiar melodic and rhythmic patterns (Appendices N and O). This is followed by two formal assessments in reading familiar and unfamiliar music (Appendix P). The same assessment, questionnaires, and surveys

were administered to the sample of students experiencing the traditional method book approach (Appendices E-P).

Methods and Data Analysis

The purpose of this applied research was to investigate the connection between the proposed sound-based learning sequence and the student's ability to read music in beginning string lessons. To collect data that would be implemented comparing the teaching methods, a multimethod design was going to be implemented comprising quantitative and qualitative approaches. To collect quantitative data, the researcher utilized rubrics aimed to measure the depth of knowledge and accuracy in playing, as well as students' record of minutes practiced at home, and a final test measuring the rhythmic and melodic accuracy while decoding familiar and unfamiliar patterns. To collect qualitative data, the researcher recorded weekly observation notes, collected parent and student surveys and questionnaires, and examined the motivation, engagement, and confidence of young musicians. The rationale behind the mixed methods was to collect data from various sources and triangulate the findings to accurately compare the teaching methods.

Qualitative Data

One of the qualitative data instruments was a questionnaire administered to parents to measure students' engagement and motivation to practice outside of class. Closed and open questions such as why the children signed up for instrumental lessons, how motivated they were to practice at home, where at home did they practice,how confident were they playing their instrument, whether or not the children were asking for more music-making opportunities outside of home and school, and how often they performed for the family were some of the questions on the questionnaire (Appendix L). This questionnaire was administered to parents at

the beginning of the study. The questions provide the researcher an opportunity to learn about students' engagement after school, their confidence level, and their interest in music and performing in general. A study survey comprised of closed and open questions asked students to grade their confidence level at performing various songs on their instruments; a survey with follow-up questions on what students think affected their confidence and their level of interest was administered (Appendices M and N). By reviewing the students' surveys, the researcher gained insight into students' perceptions of their own learning. Another instrument to collect qualitative data was a weekly observation form that the researcher-teacher and students collaboratively completed in the last few minutes of class (Appendix I). Questions about engagement and state of flow, confidence, and perceived quality, were some of the aspects considered. Students volunteered their insights and the teacher-researcher shared hers, so students know the observations are conducted with their knowledge.

Sequential steps were taken to analyze the qualitative data.[108] First, the open-ended questions in surveys and questionnaires, as well as observation notes were typed and sorted. After the data was read, the researcher highlighted the chunks representing a category to be coded. The coded categories were then generated into themes. Finally, the researcher wrote a narrative representing the findings (found in Chapter Four).

Quantitative Data

The teacher-researcher collected weekly practice charts to begin collecting quantitative data and recorded the number of minutes students practiced at home and how many times they performed for their families (Appendix E). In addition to the practice chart, the teacher-

[108] John W. Creswell and J. David Creswell, *Research Design*, 5th ed., (Los Angeles, CA: SAGE, 2018), 197.

researcher completed a rubric assessing consistency in students' playing technique as well as singing and naming correct notes and finger numbers. Students likewise completed their own rubric and assessed their own posture, playing positions, and playing technique (Appendices H, J, L and M). The final test was decoding familiar and unfamiliar musical patterns (Appendices N, O and P). Students sang and played in small groups familiar and an unfamiliar patterns, and the teacher-researcher assessed their performance and the correct notes decoded.

To perform statistical analysis of the two groups the researcher employed independent sample *t*-tests, paired samples *t*-tests, and measured correlation coefficient. Some of the elements measured and compared were practice minutes, times performed for family, singing in tune at the beginning and in the middle of the year, the accuracy of decoded notes in familiar and unfamiliar patterns, and notes played in tune. To determine if the means of the two groups differ from each other, independent sample t-tests were performed. The paired-sample *t*-tests were performed to determine if there was statistical proof showing mean difference between paired observations significantly different than zero.[109] To measure the association between the variables, for example, to check if the minutes practiced on the instrument affected the number of notes with which the student was familiar, the researcher measured correlation coefficients. After six weeks of study, the statistical results could determine a potentially significant difference between the methods. The qualitative analysis could potentially reveal a relationship. SPSS and thematic analysis were used as mixed research data analysis software and technique.

[109] "Paired Samples t-Test," IBM SPSS Statistics, last modified October 5, 2022, https://www.ibm.com/docs/en/spss-statistics/saas?topic=tests-paired-samples-t-test

Statistical Assumptions

The researcher used a Box and Whisker plot for each of the groups to establish outliers. If the sample is not large, the presence of outliers can have a significant effect on the mean and variance sample.[110] To make sure the data is reliable and the correct conclusion is drawn during data analysis, Box and Whisker plot can label such outliers in the form of a graphical representation. To confirm the assumption of normality, the researcher can perform either the Shapiro-Wilks test if the sample is less than fifty subjects, or the Kolmogorov-Smirnov test if the sample is fifty subjects or more. The multivariate normal distribution checks for the normal distribution of means and variances of the individual variables as well as the correlations between those variables.[111] To look for a linear relationship between each pair of dependent variables, the researcher can plot a scatterplot matrix for each group.

Checking for correlations and equality among the dependent variables, the assumption of homogeneity of variance-covariance matrices is tested using Box's M test in SPSS software. If data fails this assumption ($p < .05$), the researcher can perform Levene's test of homogeneity of variance to determine where the significance lies. The dependent variables should all be moderately related, but any correlation over .80 presents can present a concern for multicollinearity, affecting the reliability of statistical inferences.[112]

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[110] Kandethody M. Ramachandran and Chris P. Tsokos, *Mathematical Statistics with Applications in R*, 3rd ed., (Academic Press, 2021), 574. https://doi.org/10.1016/B978-0-12-817815-7.00014-2.

[111] Chiraz Labidi, *Multivariate Normal Distribution*. Ed by N. J. Salkind, "Encyclopedia of research design," SAGE Publications, Inc., 2010), 863. https://dx.doi.org/10.4135/9781412961288.n258

[112] Adam Hayes, "Multicollinearity," Investopedia, January 04, 2022, https://www.investopedia.com/terms/m/multicollinearity.asp

Trustworthiness

Credibility

The aim of this applied research study is to compare and establish the most optimal teaching sequence leading to music literacy. The study is not funded by a third party and therefore the objectivity of funding is not affected. The sample of students in both control and intervention groups is taken from a population of students with no formal music background. The sample size is as large as possible considering the stratifying category. The secondary data is used to establish the demographic information for diverse sampling. For the sake of validity, if it is possible, the sample size was equalized between the groups.[113]

Transferability

This applied study can be transferred to a context like this Northern California school district. With no auditory background, music literacy may need a different teaching sequence to ensure student success. Although there might be variations for specific schools and districts, the main content of the research regarding literacy acquisition can be applied to other contexts.

Dependability

The consistency of the data collection can be reproduced using the same variables, and the same elements to be compared. However, the results may vary based on the general music program in the district. If the musical foundation starts before the fourth-grade program, in early elementary grades, then auditory development may provide different results to the same study.

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[113] John W. Creswell and J. David Creswell, *Research Design*, 5th ed., (Los Angeles, CA: SAGE, 2018), 221.

Confirmability

One of the strategies implemented to enhance the confirmability of the study was having an external auditor, in this case, the Liberty University Thesis committee who could oversee the process and ensure that the qualitative data interpretation is made objectively. The researcher also solicited a peer to review the process of analyzing the data, and recorded observation field notes soon after the observed lessons The researcher also maintained a reflection journal, recording notes right after observations have occurred.

Ethical Considerations

The researcher obtained permission from the Assistant Superintendent to conduct the study prior to beginning the applied study. The researcher also obtained consent forms from the parents and assent forms from the students to begin conducting the research study (Appendicies C and D). These forms informed the participants and their guardians of the voluntary nature of the study, ensuring they understood their rights to withdraw at any time and informing the participants of the confidentiality of the information, and storage security of the information collected. All the paper copies associated with this research are stored in a locked file cabinet, and all of the electronic information is stored on a password-protected computer accessible only by the researcher. Along with the consent and assent forms, the researcher sent home a synopsis of the study informing the families of the reasons for the study and the potential benefits to the community if an optimal learning sequence is found. The observations occurred in class and students were aware of the teacher recording notes and will also contribute their own insights to the observation notes.

Summary

The goal of this applied study was to compare two teaching sequences to find one that would suit the needs of the specific district. This study implemented a multimethod approach to investigate the potentially significant differences between the two teaching methods. This convergent method collected qualitative and quantitative data in parallel and merged the results to check for significance. The researcher used IBM SPSS Statistics software to analyze the data.

Chapter IV: Research Findings

This applied study investigated the connection between an auditory-based learning sequence and the student's ability to read music in beginning strings classes. The issue is that the current teaching sequence may not be utilizing the most optimal learning sequence. Furthermore, there is a gap in instrumental music literature and teaching applications supporting the learning sequence concerning music literacy. The researcher implemented a multimethod design comprising quantitative and qualitative approaches to provide what has been termed a "comprehensive analysis by triangulating multiple data sources."[114] During the implementation of the intervention curriculum, the researcher surveyed students and parents, observed the groups to look for engagement, assessed students' confidence in performing, and tested students' knowledge of standard musical notation.

Assumptions

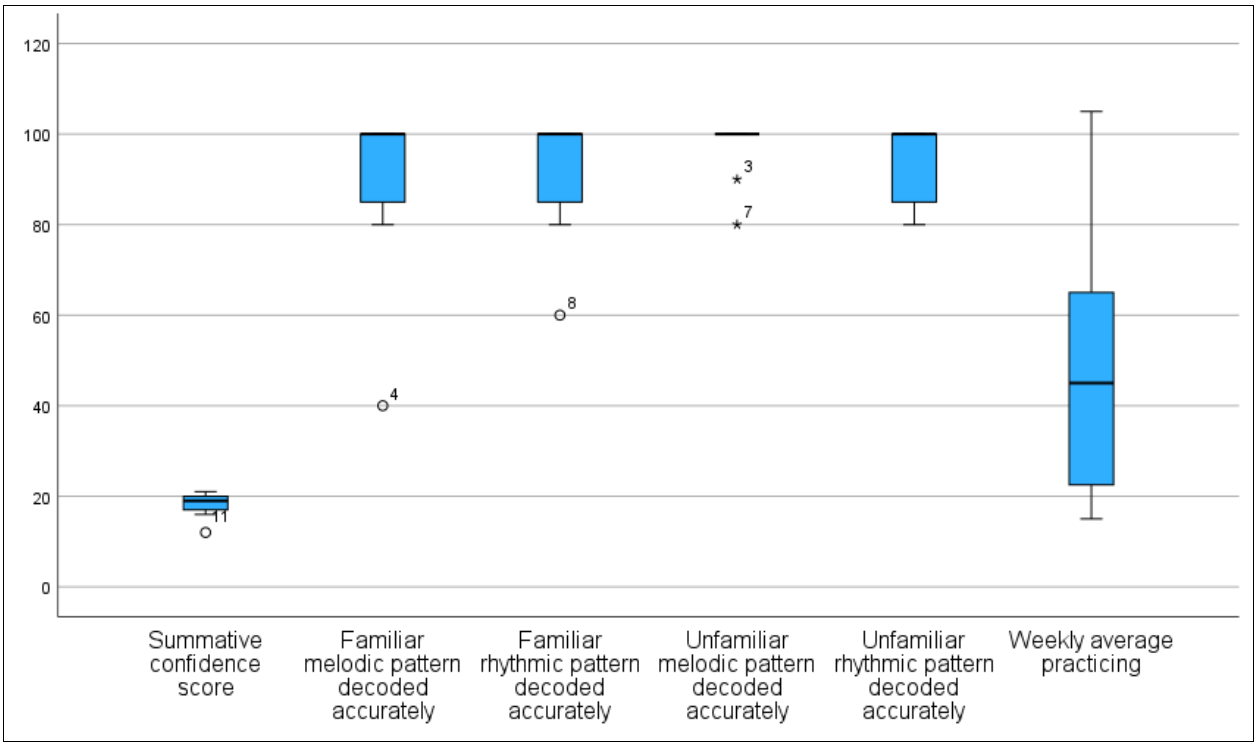
Assumptions of Bivariate Outliers

The researcher constructed a box and whisker plot for each of the groups. Since the sample was small, the presence of outliers significantly affected the mean and variance sample.[115] To ensure correct conclusions, the box and whisker plot identified outliers as a graphical representation. Extreme outliers appear in the matrix, signifying that the assumption of bivariate outliers is not tenable.

Figure 1: Intervention Group Box and Whisker Plot 1.

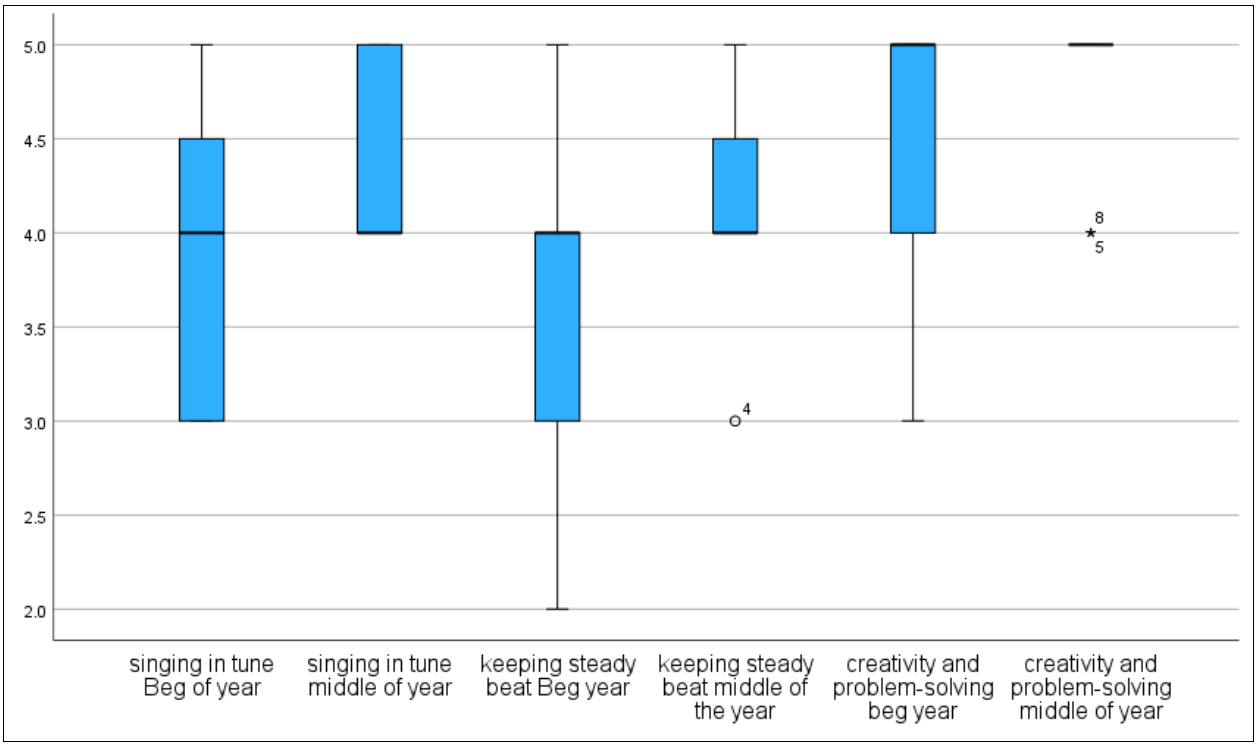
[114] John W. Creswell & J. David Creswell, Research Design, 5th ed., (Thousand Oaks, CA: SAGE Publications, 2018), 15.

[115] Kandethody M. Ramachandran and Chris P. Tsokos, *Mathematical Statistics with Applications in R*, 3rd ed., (Academic Press, 2021), 574. https://doi.org/10.1016/B978-0-12-817815-7.00014-2.



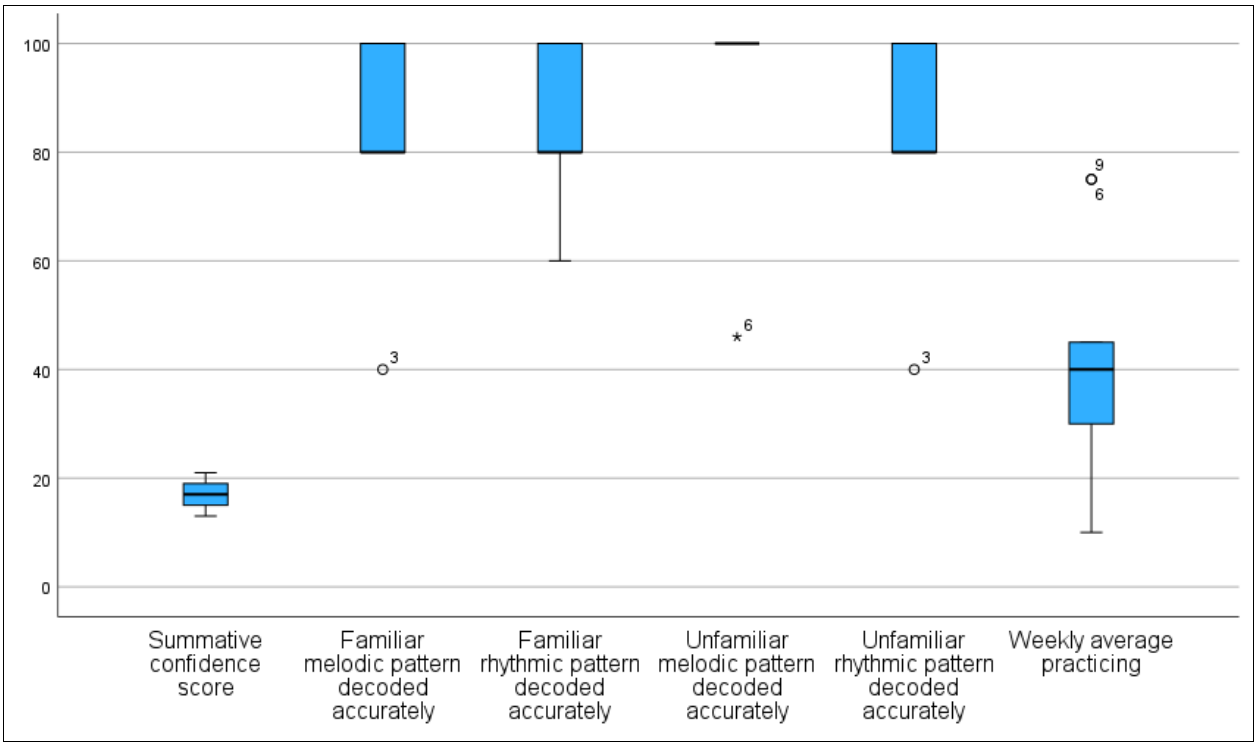
Source: The data were analyzed using IBM SPSS Statistics (Version 26) predictive analytics software.

Figure 2: Intervention Group Box and Whisker Plot 2.



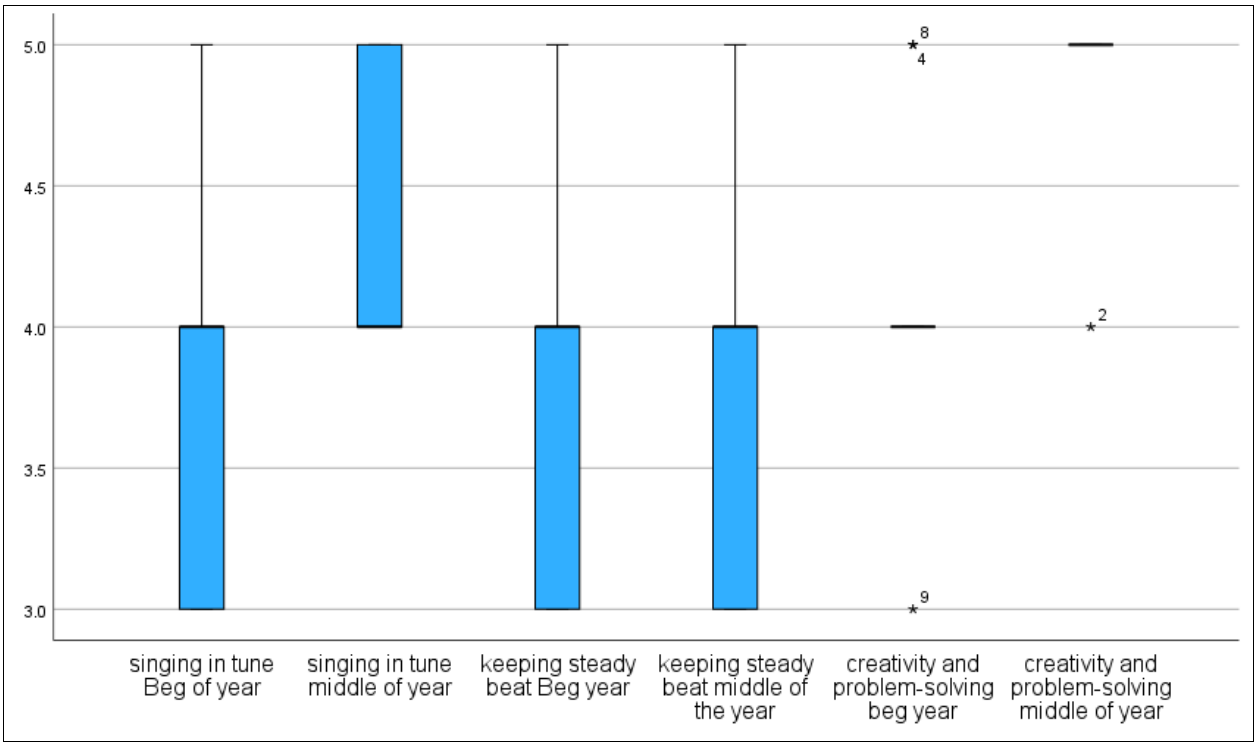
Source: The data were analyzed using IBM SPSS Statistics (Version 26) predictive analytics software.

Figure 3: Control Group Box and Whisker Plot 1.



Source: The data were analyzed using IBM SPSS Statistics (Version 26) predictive analytics software.

Figure 4: Control Group Box and Whisker Plot 2.



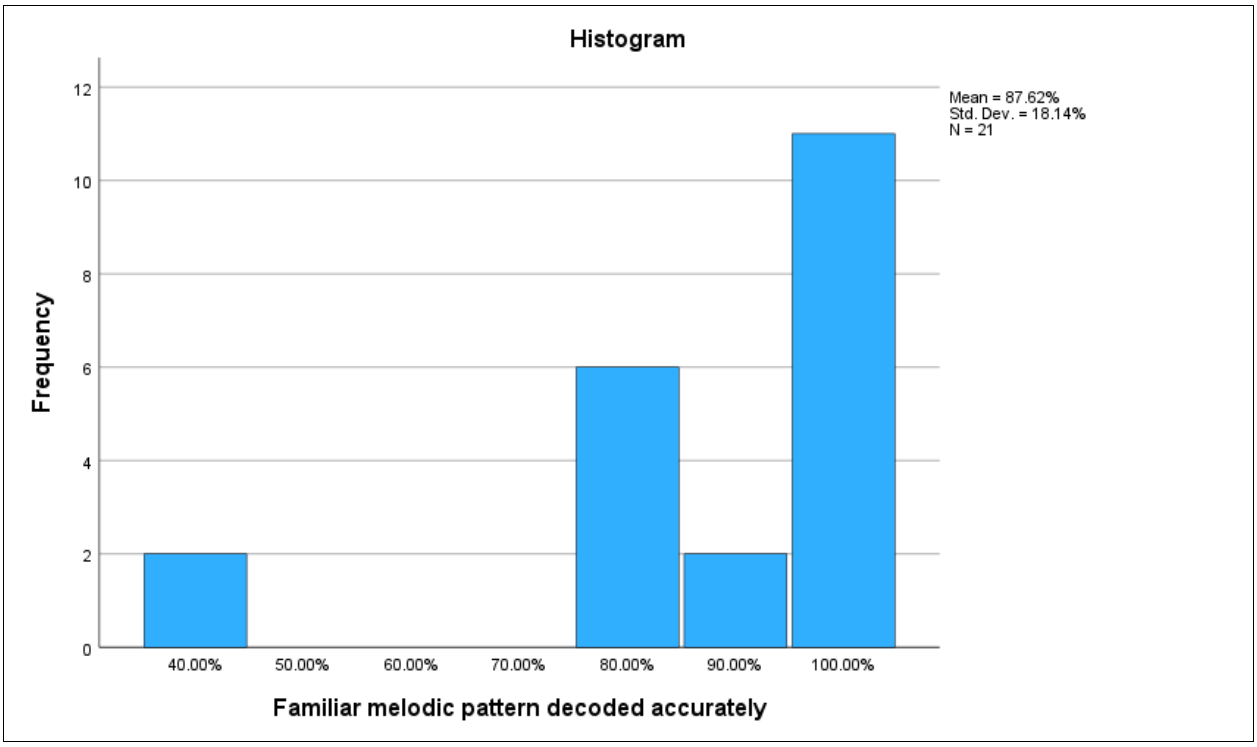
Source: The data were analyzed using IBM SPSS Statistics (Version 26) predictive analytics software.

Assumption of Normality

The normality assumption is required to ensure the variables are normally distributed due to the small population. To confirm the assumption of normality the researcher performed the Shapiro-Wilks test.[116] The test determined that the results were not normally distributed. The results demonstrated that the distribution varied significantly from normality, familiar melodic pattern decoding $W(20) = .681$, $p < .001$, familiar rhythmic pattern decoding, $W(20) = .799$, $p < .001$, unfamiliar melodic pattern decoded $W(20) = .390$, $p < .001$, unfamiliar rhythmic pattern decoded $W(20) = .720$, $p < .001$, and average practice time $W(20) = .918$, $p = 0.90$. The assumption of normality is untenable.

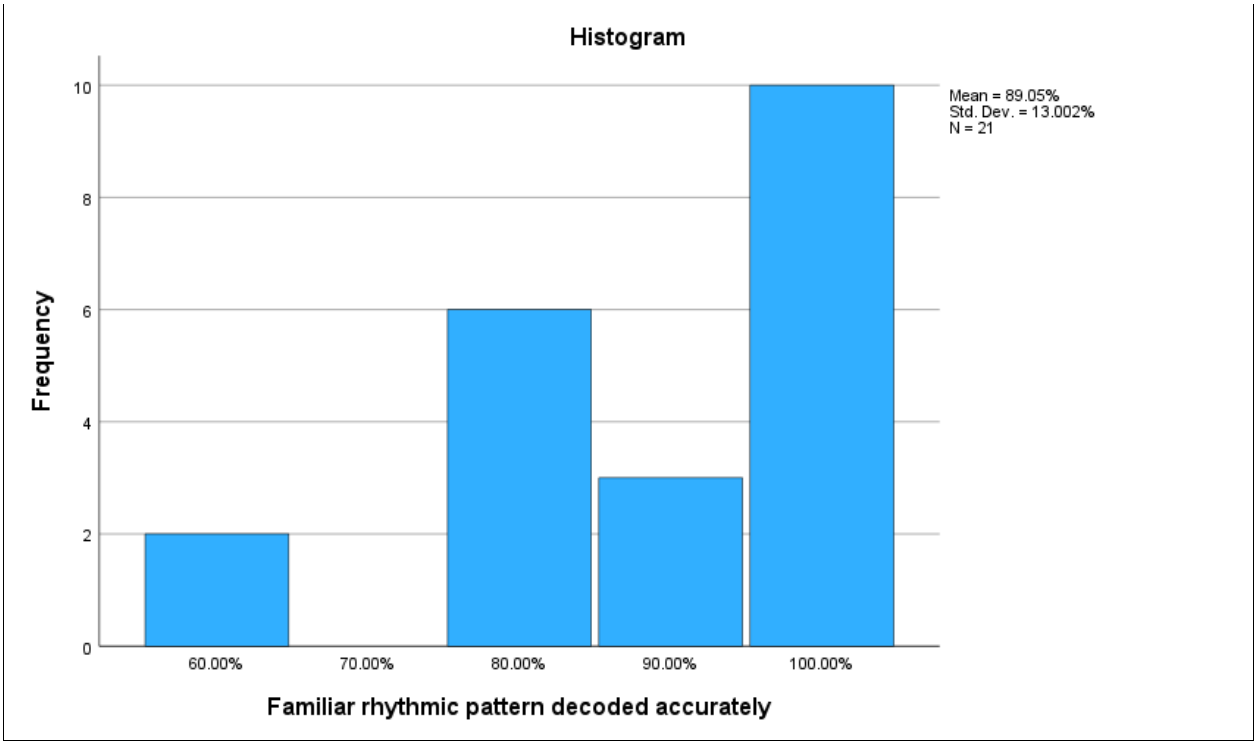
Figure 5: Histogram of Familiar Melodic Pattern Decoded Accurately.

[116] Nornadiah Mohd Razali and Bee Wah, "Power Comparisons of Shapiro-Wilk, Kolmogorov-Smirnov, Lilliefors and Anderson-Darling Tests", *Journal of Statistical Modeling and Analytics*, 2(1), (2011), 22.



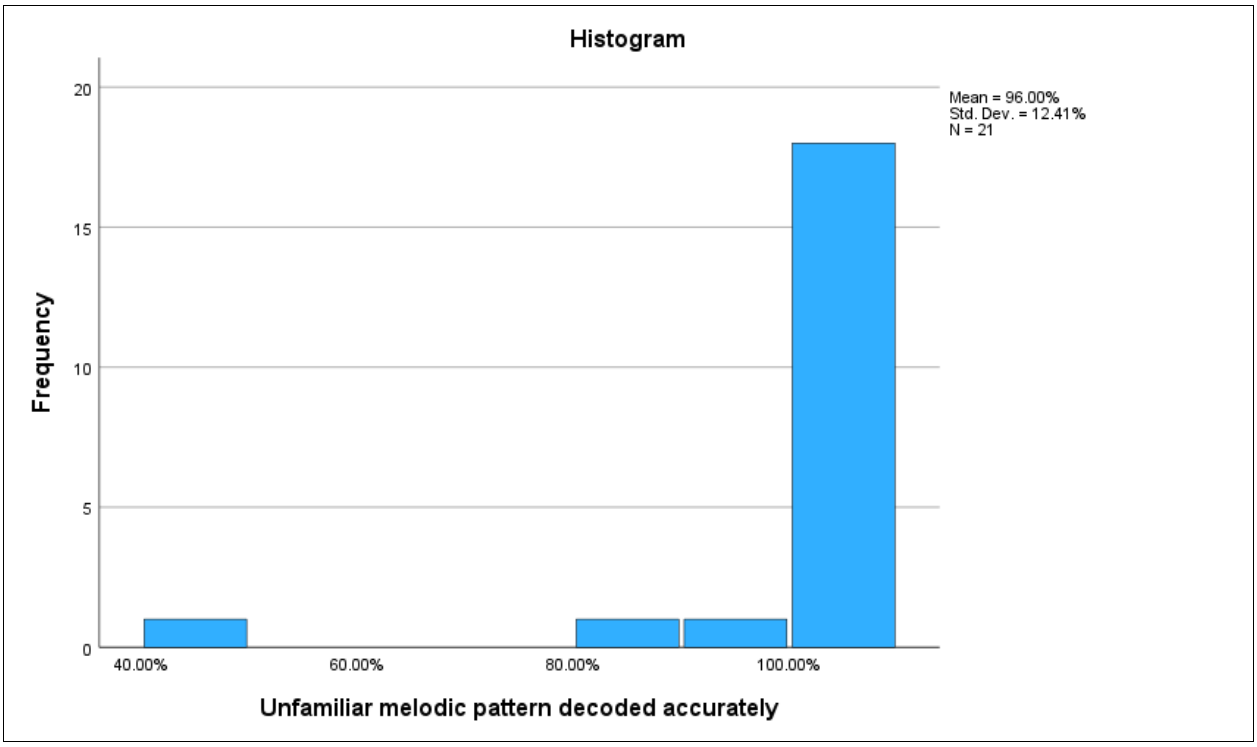
Source: The data were analyzed using IBM SPSS Statistics (Version 26) predictive analytics software.

Figure 6: Shapiro-Wilks Histogram of Familiar Rhythmic Pattern Decoded Accurately.



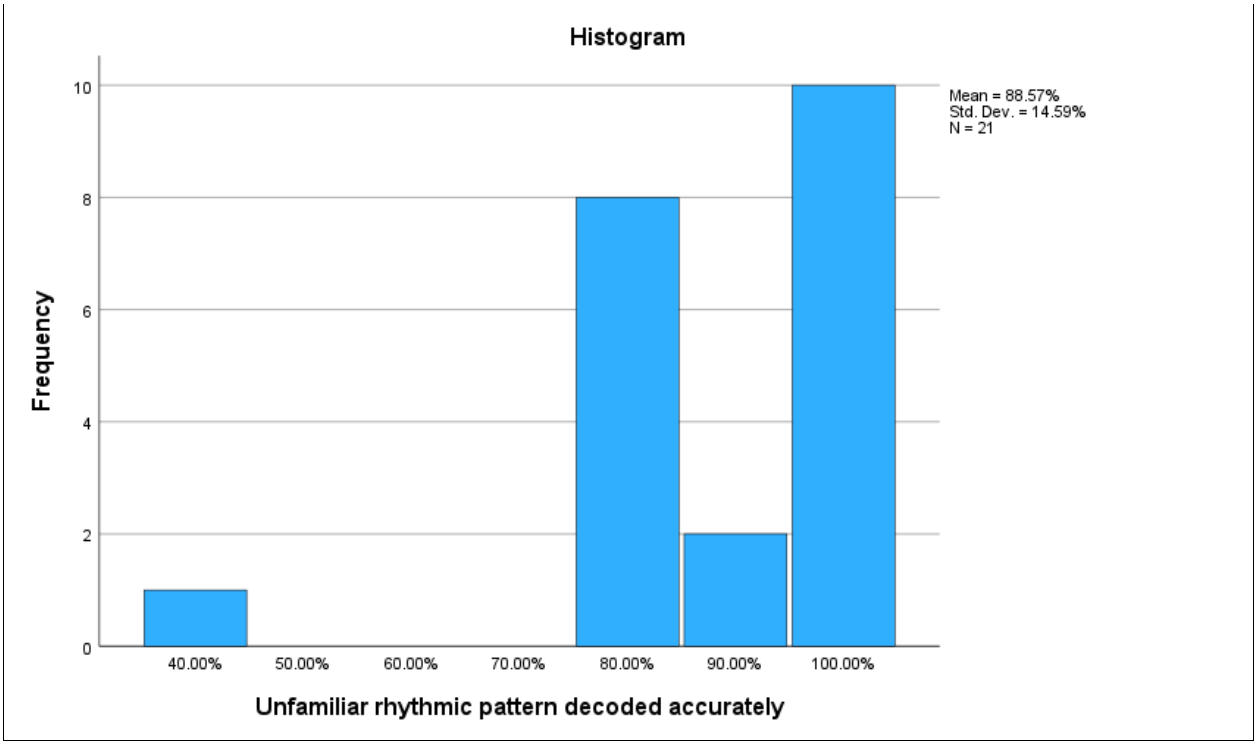
Source: The data were analyzed using IBM SPSS Statistics (Version 26) predictive analytics software.

Figure 7: Histogram of Unfamiliar Melodic Pattern Decoded Accurately.



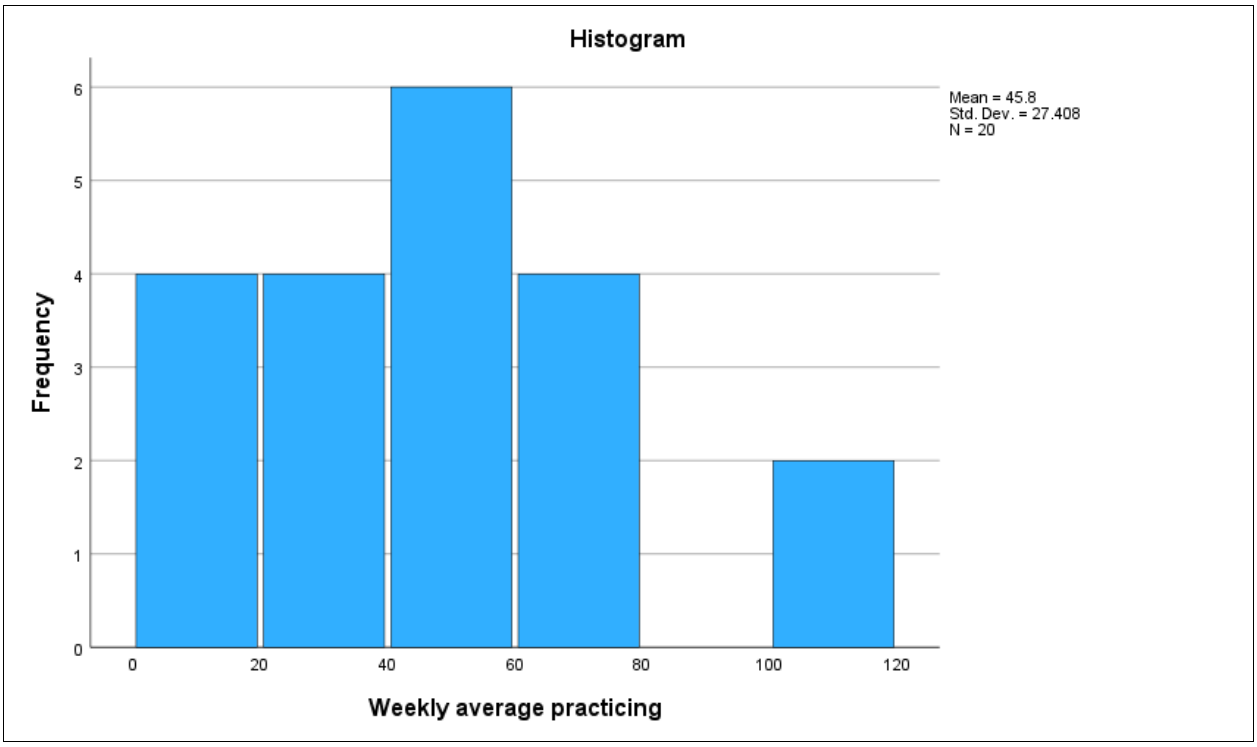
Source: The data were analyzed using IBM SPSS Statistics (Version 26) predictive analytics software.

Figure 8: Histogram of Unfamiliar Rhythmic Pattern Decoded Accurately.



Source: The data were analyzed using IBM SPSS Statistics (Version 26) predictive analytics software.

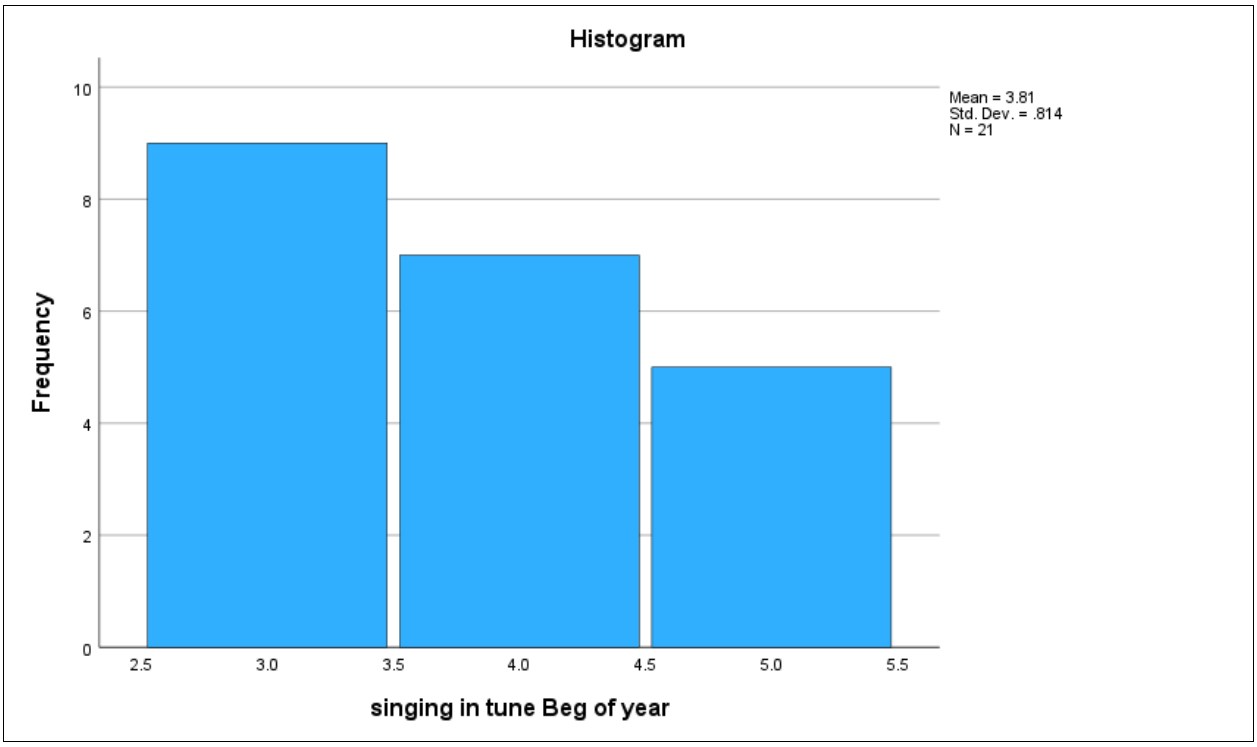
Figure 9: Histogram of Average Weekly Minutes Practicing.



Source: The data were analyzed using IBM SPSS Statistics (Version 26) predictive analytics software.

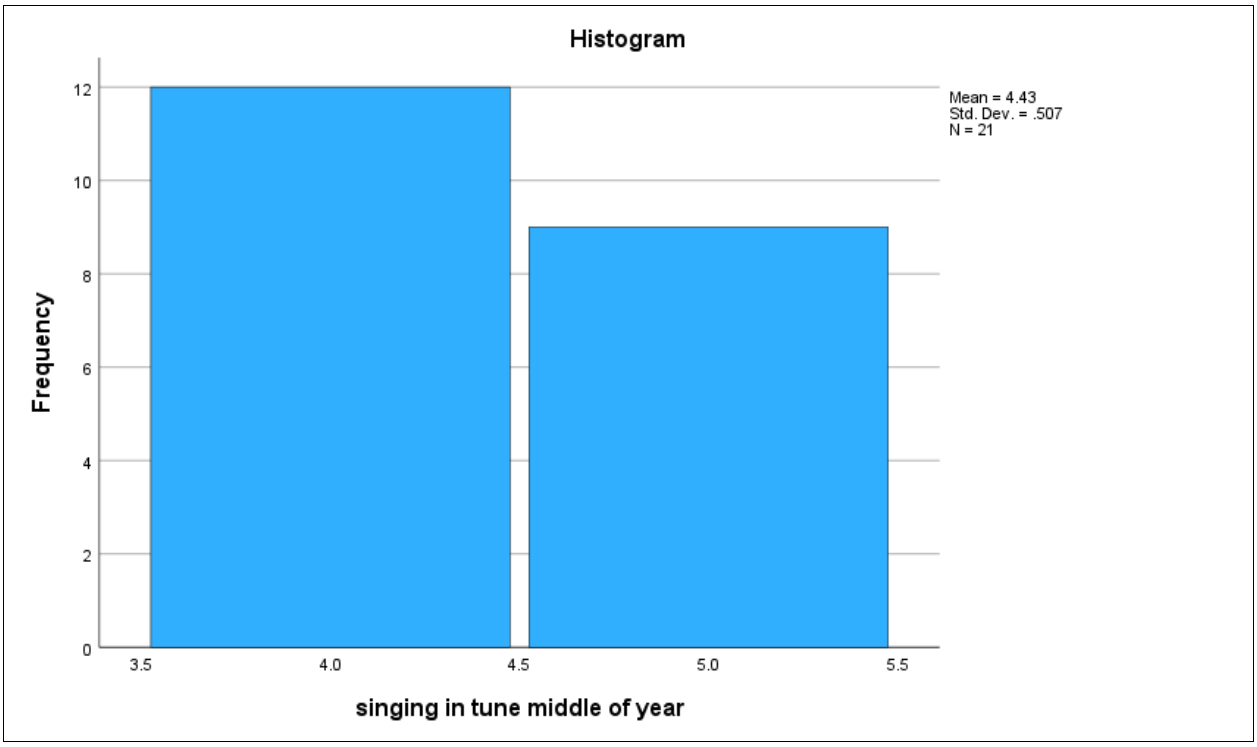
The following variables also departed significantly from normality: singing in tune beginning of the year $W(21) = .788$, $p < .001$, singing in tune middle of the year, $W(21) = .633$, $p < .001$, keeping steady beat the beginning of the year $W(21) = .865$, $p = .008$, keeping the steady beat middle of the year $W(21) = .800$, $p < .001$, creativity and problem-solving beginning of the year $W(21) = .765$, $p < .001$ and creativity and problem-solving middle of the year $W(21) = .422$, $p < .001$. The assumption of normality is untenable.

Figure 10: Histogram of Singing In Tune Beginning of the Year.



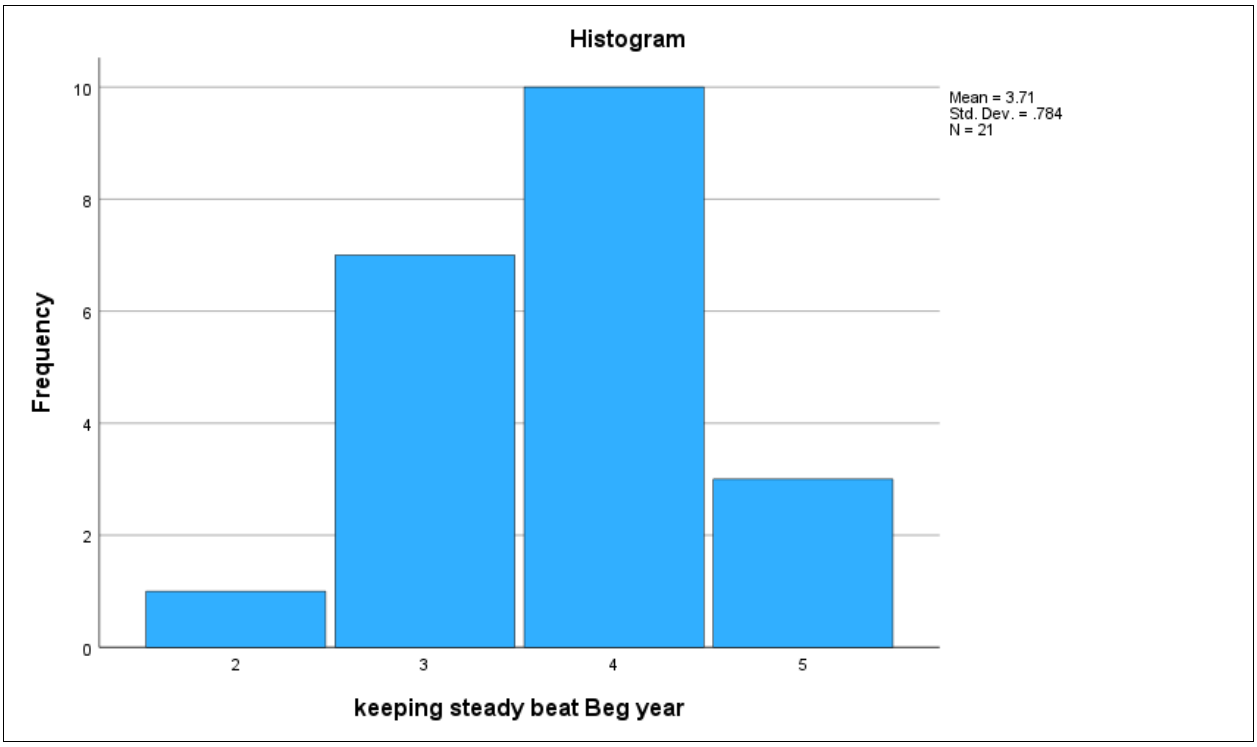
Source: The data were analyzed using IBM SPSS Statistics (Version 26) predictive analytics software.

Figure 11: Histogram of Singing In Tune Middle of the Year.



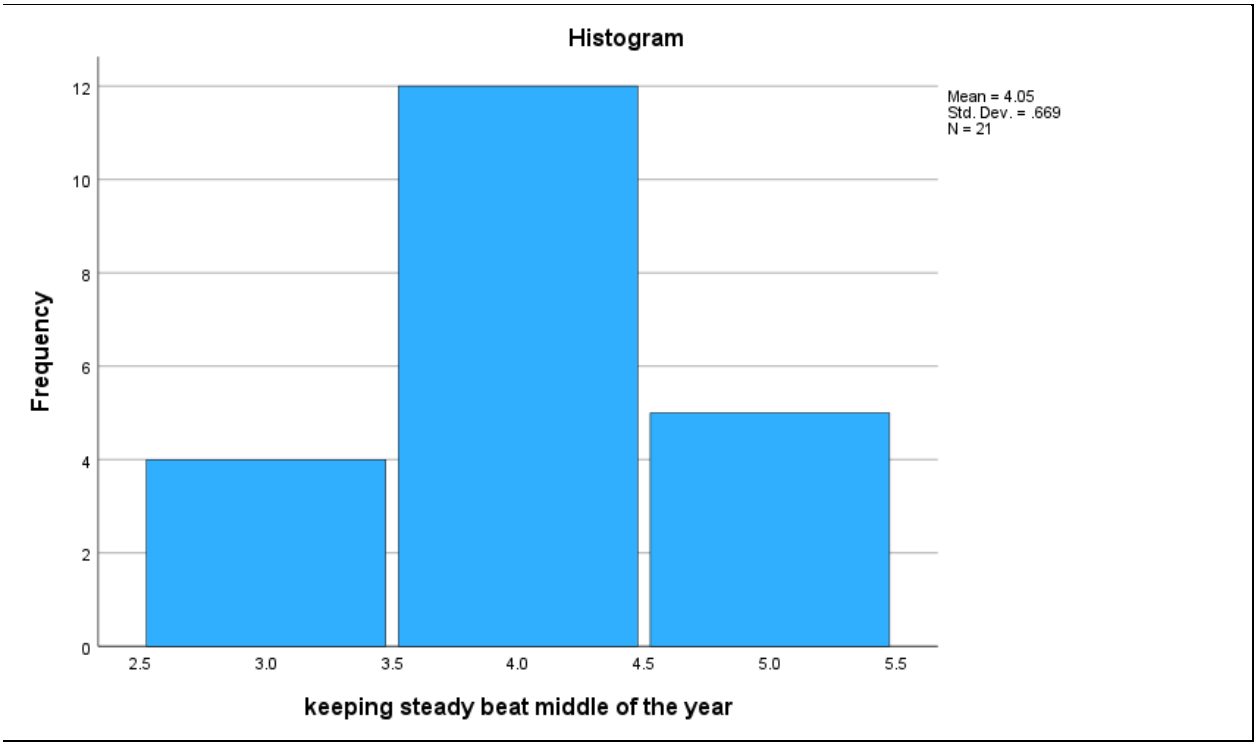
Source: The data were analyzed using IBM SPSS Statistics (Version 26) predictive analytics software.

Figure 12: Histogram of Keeping the Beat Beginning of the Year.



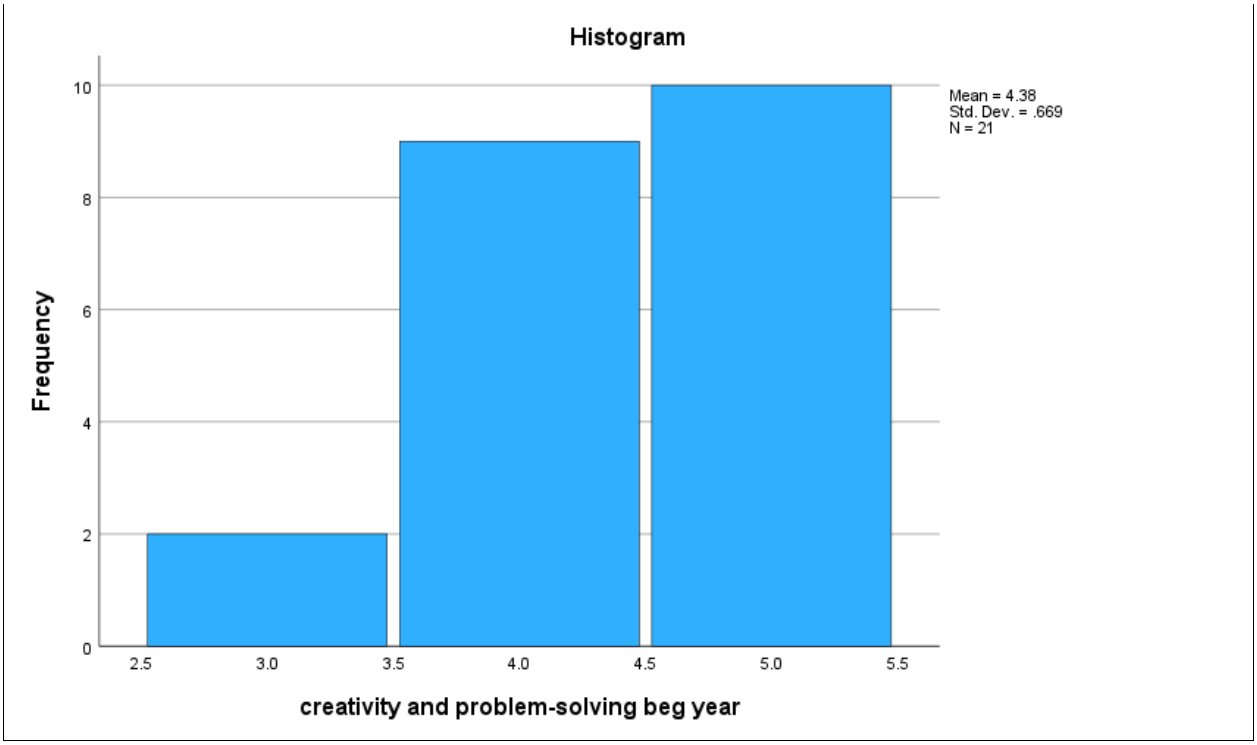
Source: The data were analyzed using IBM SPSS Statistics (Version 26) predictive analytics software.

Figure 13: Histogram of Keeping the Beat Middle of the Year.



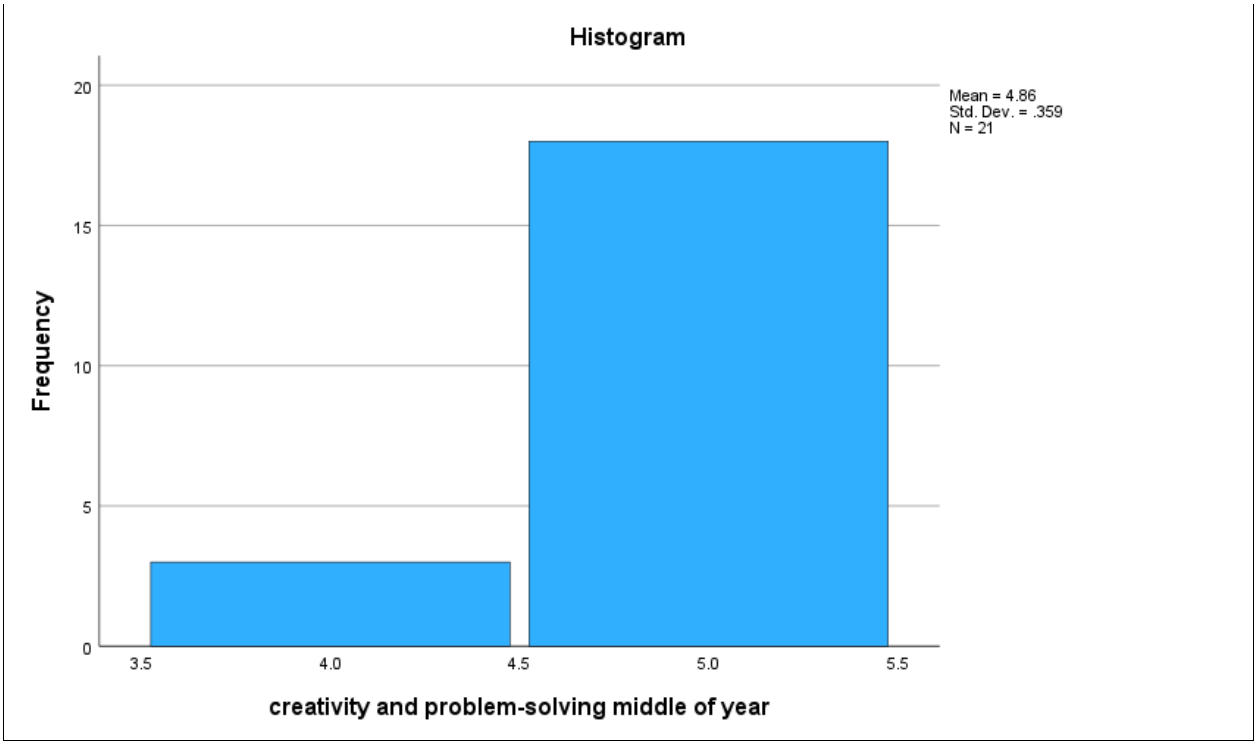
Source: The data were analyzed using IBM SPSS Statistics (Version 26) predictive analytics software.

Figure 14: Histogram of Creativity and Problem-Solving Beginning of the Year.



Source: The data were analyzed using IBM SPSS Statistics (Version 26) predictive analytics software.

Figure 15: Histogram of Creativity and Problem-Solving Middle of the Year.



Source: The data were analyzed using IBM SPSS Statistics (Version 26) predictive analytics software.

Assumption of Equal Variance

The researcher performed Levene's Test of Equality of Variance to assess the assumption of homogeneity of variance. A multivariate normal distribution assesses means and variances of the individual variables as well as the correlations between variables.[117] For the summative confidence score, Levene's test confirmed the equal population variances of $F(1,19) = 0.04$ and $p = .950$. For familiar melodic patterns decoded, Levene's test confirmed the equal population of variances of $F(1, 19) = .224$ and $p = .642$. For familiar rhythmic patterns decoded, Levene's test confirmed the equal population of variances of $F(1,19) = .124$ and $p = .729$. For unfamiliar melodic patterns decoded, Levene's test confirmed the equal population of variances of $F(1,19) = 1.213$ and $p = .285$ For unfamiliar rhythmic patterns decoded, Levene's test confirmed the equal population of variances of $F(1,19) = 1.316$ and $p = .266$. For average weekly practicing, Levene's test confirmed the equal population of variances of $F(1,18) = 1.923$ and $p = .183$.

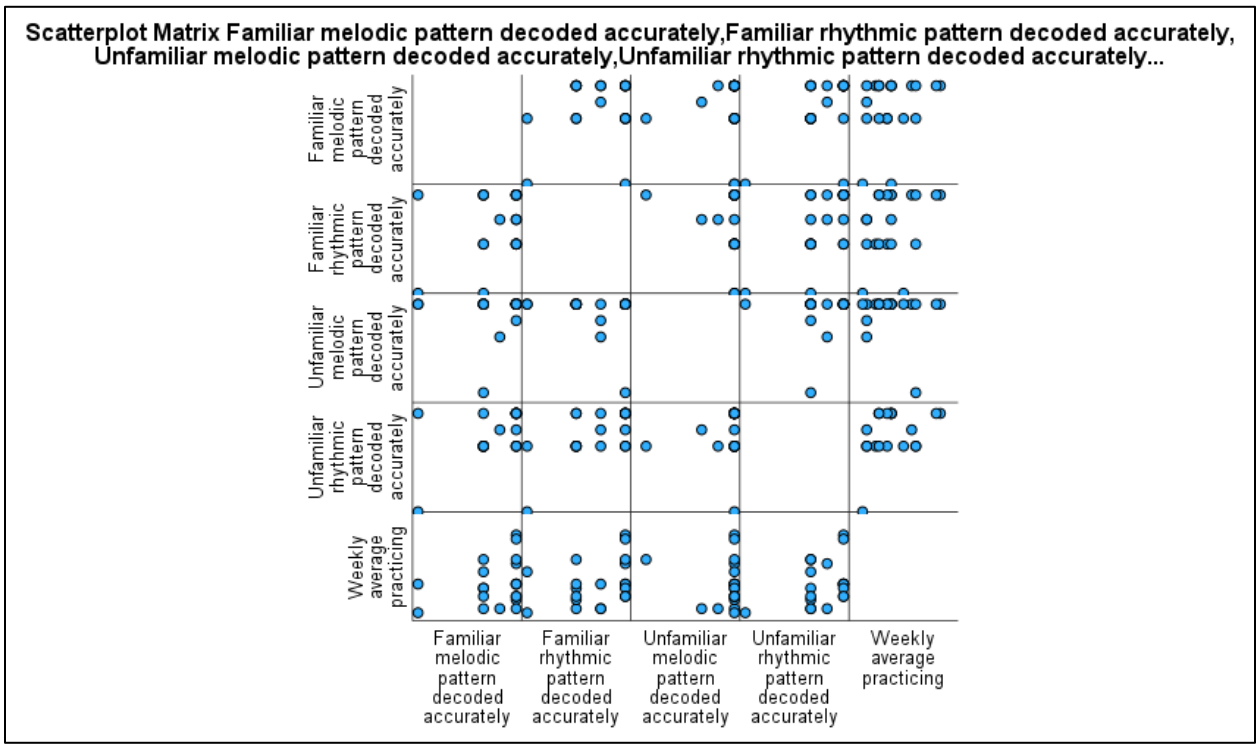
However, for the following three variables, $p < 0.05$, indicating that although most of the variables were equal these three violated the assumption. Familiar melodic pattern decoded accurately $F(2,18) = 3.76$, $p = .043$. Teacher's assessment of students' posture $F(2,18) = 1.30$, p = .018. The left-hand shape strong round fingers $F(2,18) = .831$, $p < .001$.

The assumption of linear relationships between each pair of variables is performed via a scatterplot matrix. Figure 16 demonstrates the limitations. The assumption is untenable. The insufficiency of the sample size likely contributed to the untenability of the assumptions. Still,

[117] Chiraz Labidi, "Multivariate Normal Distribution," ed by N. J. Salkind, *Encyclopedia of Research Design,* SAGE Publications, Inc., (2010), 863. https://dx.doi.org/10.4135/9781412961288.n258

the Pearson product-moment correlation is sufficiently robust in such situations, albeit severe limitations will exist.[118]

Figure 16: Scatterplot Matrix for Decoding and Practicing.



Source: The data were analyzed using IBM SPSS Statistics (Version 26) predictive analytics software.

Quantitative results

Research questions one and four are addressed via quantitative results, and questions two and three are addressed by qualitative data. An independent samples *t*-test was conducted (Table 2), to compare students' confidence levels and average weekly practice at home between control and intervention groups.

[118] "Pearson Product-Moment Correlation", Laerd Statistics, accessed May 7, 2023, https://statistics.laerd.com/statistical-guides/pearson-correlation-coefficient-statistical-guide.php

Table 2: Descriptive Statistics for Summative Confidence and Weekly Practicing

	Control 1 Intervention 2	N	Mean	Std. Deviation
Summative confidence score	1	9	17.11	2.619
Summative confidence score	2	12	18.08	2.678
Weekly average practicing	1	9	42.89	21.275
Weekly average practicing	2	11	48.18	32.425

Source: The data were analyzed using IBM SPSS Statistics (Version 26) predictive analytics software.

There was not a significant difference in confidence scores between the control group (M = 17.11, SD = 2. 619) and the intervention group *(*M = 18.08, SD = 2.678); $t(19) = -.831$, p = .416. There was not a significant difference in average minutes practiced at home between the control group (M = 42.89, SD = 21.275) and the intervention group (M = 48.18, SD = 32.425); $t(18) = -.420$, p = .679.

An independent samples t-test was performed to compare students' confidence level in teaching family members to play their instrument between control and intervention groups. (Table 3). There was not a significant difference in confidence scores between the control group (M = 3.29, SD = 1.496) and the intervention group (M = 3.58, SD = 1.084); $t(17) = -.503$, p = .622.

Table 3: Confidence Teaching Family Member.

	Control 1 Intervention 2	N	Mean	Std. Deviation
Beginning of the year: how confident teaching family	1	7	3.29	1.496
Beginning of the year: how confident teaching family	2	12	3.58	1.084

Source: The data were analyzed using IBM SPSS Statistics (Version 26) predictive analytics software.

The researcher performed an independent samples *t*-test to address the second research question to compare students' ability to play in tune between control and intervention groups. There was not a significant difference in the scores between the control group (M = 2.22, SD = .833) and the intervention group (M = 2.58, SD = .515); $t(19) = -1.226$, $p = .235$.

Table 20: Playing In Tune.

	Control 1 Intervention 2	N	Mean	Std. Deviation
Playing in tune	1	9	2.22	.833
Playing in tune	2	12	2.58	.515

Source: The data were analyzed using IBM SPSS Statistics (Version 26) predictive analytics software.

The researcher also performed an independent samples *t*-test to compare students' creativity and problem-solving at the beginning of the year and in the middle of the year between control and intervention groups (Table 4). There was not a significant difference in creativity scores between the control group (M = 4.11, SD = .601) at the beginning of the year and the intervention group (M = 4.58, SD = .669); $t(19) = -1.671$, $p = .111$ at the beginning of the year. There was not a significant difference in creativity scores in the middle of the year between the control group (M = 4.89, SD = .333) and the intervention group (M = 4.83, SD = .389); $t(19)$ = .344, $p = .735$

Table 4: Students' Creativity and Problem-solving.

	Control 1 Intervention 2	N	Mean	Std. Deviation
Creativity/problem-solving beg year	1	9	4.11	.601
Creativity/problem-solving beg year	2	12	4.58	.669
Creativity/problem-solving mid-year	1	9	4.89	.333
Creativity/problem-solving mid-year	2	11	4.83	.389

Source: The data were analyzed using IBM SPSS Statistics (Version 26) predictive analytics software.

The researcher conducted observations and discussions to address research question three (Appendix I). According to Mihaly Csikszentmihalyi, the state of flow describes the moment when one is "completely absorbed in a challenging but doable task, which occurs when one's skill level and the challenge at hand are equal."[119]

The control group remained during weeks one and two, engaged based on observation notes and discussions, and a few students expressed that the lesson's time "flew by too fast." During week three, a few students in the control group looked at the clock throughout the lesson time and did not track with the rest of the class. During week four, one student in the control group reflected, "This was a harder lesson," and four other students agreed. In week five, working on pages 8 and 9 in the book and reading notes on the A string, a few students commented, saying, "This lesson seemed to drag on forever."

The researcher, based on the same observation notes and discussions with the intervention group, observed students engaged in the class activity and being surprised to learn when the lesson was finished. "Is it time to go already?" was one of the comments. In week five,

[119] Mike Oppland, "Eight Traits of Flow According to Mihaly Csikszentmihalyi," Positive Psychology, Scientifically reviewed by Melissa Madeson, Ph.D, 16 Dec 2016, https://positivepsychology.com/, last modified March 9, 2023.

one student reflected, saying, “She was bored because all of this was easy, and she was ready to learn more songs.”

The researcher conducted an independent samples *t*-test to address research question four to compare students’ ability to decode familiar melodic and rhythmic patterns between control and intervention groups (Table 5). There was not a significant difference in decoding familiar melodic patterns between the control group (M = 84.44 %, SD = 19.44%) and the intervention group (M = 90%, SD = 17.58%); $t(19) = -.685$, $p = .501$. There was also not a significant difference in decoding familiar rhythmic patterns between the control group (M = 85.56%, SD = 13.3%) and the intervention group (M = 91.67%, SD = 12.7%); $t(19) = -1.070$, $p = .298$.

Table 5: Decoding Familiar Melodic and Rhythmic Patterns Accurately.

	Control 1 Intervention 2	N	Mean	Std. Deviation
Familiar melodic pattern decoded	1	9	84.44	19.44
Familiar melodic pattern decoded	2	12	90.00	17.58
Familiar rhythmic pattern decoded	1	9	85.56	13.33
Familiar rhythmic pattern decoded	2	12	91.67	12.67

Source: The data were analyzed using IBM SPSS Statistics (Version 26) predictive analytics software.

An independent samples *t*-test was performed to compare students' ability to decode unfamiliar melodic and rhythmic patterns between control and intervention groups (Table 6). There was not a significant difference in decoding unfamiliar melodic patterns between the control group (M = 94%, SD = 18%) and the intervention group (M = 97%, SD = 6.22%); $t(19)$ = -.630, p = .536. There was also not a significant difference in decoding unfamiliar rhythmic patterns between the control group (M = 82%, SD = 18.6%) and the intervention group (M = 93.3%, SD = 8.88%); $t(19)$ = -1.825, p = .084.

Table 6: Decoding Unfamiliar Melodic and Rhythmic Patterns.

	Control 1 Intervention 2	N	Mean	Std. Deviation
Unfamiliar melodic pattern decoded	1	9	94.00	18.00
Unfamiliar melodic pattern decoded	2	12	97.5	6.22
Unfamiliar rhythmic pattern decoded	1	9	82.22	18.56
Unfamiliar rhythmic pattern decoded	2	12	93.33	8.88

Source: The data were analyzed using IBM SPSS Statistics (Version 26) predictive analytics software.

Correlations

A Pearson product-moment correlation coefficient was conducted to determine the relationship between singing at the beginning and middle of the year, the confidence level in singing, and playing in tune (Table 7). The results indicate a significantly strong positive relationship between singing in tune beginning of the year and the middle of the year ($r = .814$, $p < .001$). The results also indicate a significant moderate positive relationship between singing in tune in the middle of the year and teachers' assessment of students singing in tune alone and with others ($r = .483$, $p = .026$). There exists a significantly strong positive relationship between how confident students felt singing and the teacher's assessment of students' singing alone and with others ($r = .758$, $p < .001$).

Table 7: Correlations Between Singing and Playing in Tune.

	1	2	3	4	5
1. Singing in tune beg of the year					
2. Singing in tune mid-year	.814				
3. Teacher assessment - singing in tune	.28	.483			
4. Beg of the year: how confident singing	.29	.31	.758		
5. Playing in tune	.25	.31	.42	.44	

Source: The data were analyzed using IBM SPSS Statistics (Version 26) predictive analytics software.

Quantitative Results

Themes

Students' perceptions of their learning affect motivation and engagement. To investigate students' motivation, the researcher conducted surveys, questionnaires, and open-ended classroom discussions to explore students' perceptions of their own learning experiences. Appendix I includes an example of weekly observation notes during the last few minutes of the lessons. Students discuss, and the teacher-researcher writes their observations along with her own.

From these classroom discussions and parent questionnaires a deductive approach was implemented to create the initial codes:

Code 1 – Engagement

Code 2 - Being captivated

Code 3 – Asking for more music opportunities after school

Code 4 – Difficulty tracking music

Code 5 – Disengaging from learning

Code 6 – Difficulty to keep students engaged

Code 7 – Comfortable playing

Code 8 – Feeling confident

Code 9 – Sound quality

Code 10 - Phrasing

Those codes were then grouped into the following themes: student engagement or "flow," learning challenges, confidence, and playing musically. When comparing the student engagement in both groups, the control group tended to be less engaged. One student (CGCello2) noted that the time seemed to "drag on forever." More students tended to check the clock in the control group. The parents of two students in the control group (CGCello1 and CGViolin1) and the parents of six students in the intervention group (IGViolin2, IGViolin3, IGViolin4, IGViolin5, IGViolin7, and IGViola3) have reported that students are asking for more opportunities to engage in music, such as listening more, performing for the family, attending concerts, signing up for tutoring programs, and taking private lessons. When comparing learning challenges, the researcher found that the student in the control group had a harder time tracking the music with their eyes while playing (Week 1, control group). When comparing the theme of confidence in both groups, intervention students had more instances where they reported feeling confident playing their instruments. Students from the control group reported feeling confident when playing by memory (Week 5, control group). When comparing musicality between the two groups, the intervention group that was learning by rote and playing by memory showed more expressive phrasing in their playing without compromising the basic hand positions (Week 5, in the control group, Weeks 1, 4, and 5 in the intervention group).

Conclusion

This applied study has failed to reject the null hypothesis for the quantitative results, showing no significant difference between traditional and sound-based methods in the areas of

students' engagement and decoding of musical symbols while maintaining the quality of music-making. The qualitative results appear to suggest the intervention group were more often in Csikszentmihalyi's state of flow, engaged and motivated to continue learning as compared to the control group. It also suggests that the intervention curriculum positively affects students' motivation to practice and seek more musical experience after school. Since the qualitative data provided different results, this study may lead to future research and interesting conversations among music educators about music literacy considering student engagement.

Chapter Five: Conclusion and Recommendations

Overview

There needs to be an additional scaffolding step connecting the auditory and technical skills of playing a stringed instrument with note-reading skills. This applied research aimed to investigate the relationship between a specific sound-based learning sequence and the student's ability to play and read music in beginning strings lessons. The progression included ear training, playing by rote, creating variations, inventing personal sound symbols for high, medium, and low notes, writing in standard notation, and finally reading familiar and unfamiliar melodic and rhythmic patterns. The purpose was to test the learning sequence considering music literacy and to document the student's perceptions concerning their experience. A multi-method design was implemented to collect quantitative and qualitative data to measure accuracy in playing, the average number of minutes practiced, correctly decoded rhythms and notes, parent surveys, and student observations. After analyzing the data, a null hypothesis failed to be rejected, indicating the current small sample of participants demonstrated no significant difference between those learning via the sound-based teaching sequence and those with the traditional method book sequence.

Restatement of the Problem

This research originated from a personal desire to find an ideal method for students to obtain music literacy while learning a stringed instrument. The early introduction to musical symbols often discourages students from continuing. By providing a learning sequence that supports a child's natural cognitive development, a teacher could avoid the discouragement with note-reading which is often found in the beginning phases of learning an instrument. Consequently, musically literate young musicians might stay involved in a lifetime of music-

making. The concrete operational stage of Piaget's theory of cognitive development which is widely applied in language development is not applied in the beginning string classes in public schools. This project has challenged the traditional sequence of learning a stringed instrument using the method book in group lessons. There is a possibility that there exists a heavy reliance among music educators on the method books, which enables them to not explore the auditory approach to teaching. A review of the existing literature by James Zull, Edwin Gordon, David Elliott, and Gary McPherson confirmed the recommendation to start with sound and move to symbols only when the abstract sound becomes a concrete experience for students. A review of this literature along with the data collected through this applied research study creates an interesting problem for music educators to consider in future research.

Discussion

It was hypothesized that a sound-based teaching sequence would positively affect students' perception of their own learning, motivating them to practice, attend lessons, and seek more musical experiences after school. Statistically, the sample data provided no evidence to support this hypothesis. Qualitatively, however, parent questionnaires indicated that more students from the treatment group asked for more musical opportunities outside of school such as tutoring and private lessons, listening to more music, and attending live performances as compared to the students from the control group.

It was also hypothesized that there would be a significant difference between traditional and sound-based methods in the areas of students' self-perception of learning and positive classroom engagement. According to themes that emerged from observations and end-of-the-class discussions, the control group tended to be less engaged in class, monitoring the clock and commenting on the slow time. Conversely, the intervention group students operated in a state of

flow, “completely absorbed in a challenging but doable task, which occurs when one’s skill level and the challenge at hand are equal.”[120] It is probable that students who spent more time learning to play their instrument enjoyed the lesson’s challenges because the tasks matched their level of skill. Whereas the students in the control group were challenged beyond their skill level, decoding music prior to feeling comfortable with their instrument.

It was also hypothesized there would be interdependence between the sound-based curriculum and decoding musical symbols while maintaining the quality of music-making. This hypothesis failed to be rejected since the qualitative data collected did not demonstrate a significant correlation between the curriculum and the quality of playing. The thematic analysis, however, did reveal that the intervention group of students who implemented the sound-based method played with greater attention to phrasing and with more accurate finger placement compared to the control group who learned via the traditional method.

It is possible that students who spent more time on the basic skills of playing an instrument can learn to manipulate it before their attention is directed toward the decoding of the symbol. According to James Zull’s writing which examined the brain’s regions responsible for obtaining knowledge, the students first used their sensory cortex, rooting their learning in a concrete experience – playing by rote and experimenting with bass lines and melodies. Students then spent much needed time on ear-training and memorization for the integrative cortex to absorb, reflect, and finally comprehend the new information.[121] At this stage students began to discriminate among various sounds, melodic and rhythmic patterns, moving from discrimination

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[120] Mike Oppland, “Eight Traits of Flow According to Mihaly Csikszentmihalyi,” Positive Psychology, Scientifically reviewed by Melissa Madeson, Ph.D, 16 Dec 2016, https://positivepsychology.com/, last modified March 9, 2023.

[121] James E. Zull, "Key aspects of how the brain learns." *New Directions for Adult and Continuing Education 2006*, no. 110 (2006): 6. Accessed May 20, 2023. https://doi.org/10.1002/ace.213.

process to inference process in learning, as described by Edwin Gordon in his publication of *Music Learning Theory*. Gordon wrote, “the more facts and ideas students can discriminate among, the more inferences they will be able to make.”[122] This was evident when students were creating their own variations and their own sound symbols. There was enough experience with the play of “Twinkle, Twinkle Little Star” for students to create their own version of the song. There was enough associative experience with playing high, medium, and low sounds for students to invent their own written symbols for these. Finally, students were able to actively test their knowledge by playing their own and somebody else’s variations, reading their own or somebody else’s non-standard, musical symbol, and reading and playing familiar and unfamiliar melodic and rhythmic patterns written in standard music notation. The final step, Zull wrote, “changes a mental idea to a physical event; it changes an abstraction once again into a concrete experience, thus continuing the learning cycle.”[123]

It was hypothesized that there would be a direct connection between auditory training and students’ ability to read and understand musical symbols. According to the quantitative results, the teaching sequence did not affect the accuracy of decoding rhythmic and melodic patterns. Students in both test groups were able to decode standard music notation accurately. These results appear to suggest that both teaching sequences help students learn to read music. McPherson cautioned music educators in his publication, *The Child as Musician,* saying, “exclusive concentration on reading has held back the progress of countless learners while

[122] Edwin E. Gordon, Learning Sequences in Music – A Music Learning Theory, (Chicago, IL: GIA Publications Inc. 2003), 87.

[123] James E. Zull, "Key Aspects of How the Brain Learns." *New Directions for Adult and Continuing Education 2006*, no. 110 (2006): 7. Accessed May 20, 2023. https://doi.org/10.1002/ace.213.

putting many others off completely."[124] In addition, John Feierabend wrote in his article, "*What Is "True Music Literacy?* "Identifying Δ as "delta" or ∑ as "sigma" or to know the location of those symbols on the keyboard does not enable one to understand the meaning of those words any more than the recognition of "letter names" or instrumental fingerings ensures an understanding of the musical meaning of those tones."[125] Music educators should not limit their students to the ability to read only but also to comprehend and communicate.

Limitations

Sample size and timespan have significantly affected this study. Out of 242 students, about 96 qualified to participate. Out of those, only twenty-one answered positively to participation in the research. The small sample size affected the results since it did not adequately represent the population. After analyzing the data, the researcher reported Cohen's *d* to determine the strength of the proposed curriculum's effect on the outcome. Students in the intervention group scored .54 standard deviations higher than the control group in playing in tune, indicating a medium effect. They scored .19 deviations higher on practicing indicating less than a small effect. They scored .30 higher on decoding familiar melodic patterns and .47 deviations higher on decoding familiar rhythmic patterns, indicating a small effect. Students likewise scored .81 deviations higher on decoding unfamiliar rhythmic patterns, indicating a large effect, and .28 deviations higher on decoding unfamiliar melodic patterns, indicating a small effect. Based on the effect size data it seems that a follow-up study with a larger sample is worth pursuing to confirm the findings of this research.

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[124] Janet Mills and Gary E. McPherson, *The Child as Musician,* (New York, NY: Oxford University Press, 2015), 189.

[125] John M. Feierabend, "What Is "True Music Literacy?", Feierabend Association for Music Education, Accessed May 20, 2023, https://www.feierabendmusic.org/conversational-solfege/

Time has significantly affected this study. One out of the four schools experienced Monday holidays for two consecutive weeks, and students finished their studies two weeks later than the rest. COVID restrictions are still enforced in this school district and students missed a significant amount of class time, making it difficult to track data if lessons are re-taught in the group class the following week. The original goal was to start at the beginning of the year and investigate for twelve to fourteen weeks, separating the two groups from the start. Because of various time obstacles, the groups were taught the same curricula until the middle of the year. Had students started independently at the beginning of the year, the difference between the control and treatment group could be greater.

Future Considerations

Based on those limitations, this research merits further research. A future investigation with a greater sample may yield different results. Research beginning at a different time in a year may reveal either a confirmation of the null hypothesis or a greater distinction between the groups confirming this thesis. This applied research measured students' ability to read standard music notation and both testing groups were successful at reading. However, this study did not thoroughly measure students' ability to understand. Perhaps more robust qualitative research with student's and parent's interviews, questionnaires, surveys, recorded performances, and students' self-reflections could delve deeper into measuring students' comprehension. Because of the themes that appeared pertaining to students' self-perception of their own learning, a longitudinal study investigating the correlation between the auditory approach and lifelong interest in music is also warranted.

Summary

Traditional method books have existed since 1851 and were implemented in training many good musicians.[126] As the results revealed, students do learn to decode music notation. The traditional method continues to be effective in training young musicians in public schools. Still, for teachers who only see their students for thirty minutes once a week, it is to everyone's benefit to find the most effective method of teaching. The week after the final assessment, the treatment group was taught via the method books and in two lessons the students successfully caught up with the control group's five weeks' progress in the book, while maintaining good quality sound and phrasing. If literacy is defined by UNESCO as "the ability to identify, understand, interpret, create, communicate and compute,"[127] then method books may be lacking in addressing all those literacy aspects. None of the methods were created to be followed verbatim without teacher's discretion.

If a teacher is to implement a scaffolding step prior to introducing the symbolic representation of music, it is important that he or she knows when it is appropriate to transition the students from rote to reading. This transition moment between discriminate and inferential learning, between concrete and abstract, is different for every group of students. All music educators must regularly question their approach and methods to ensure efficiency with each class. Every teacher must teach the child and not the method,[128] to inspire students for a lifetime of music enjoyment.

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[126] Ruth V. Brittin and Deborah A. Sheldon. "An Analysis of Band Method Books: Implications of Culture, Composer, and Type of Music." *Bulletin of the Council for Research in Music Education*, no. 161/162 (2004): 47. http://www.jstor.org/stable/40319237.

[127] United Nations Educational, Scientific and Cultural Organization, Accessed on 10/08/22, https://uis.unesco.org/en/glossary-term/literacy

[128] Marie Butler, "Education Through Music" (online lecture at Richard's Institute of Education and Research, September 15, 2022).

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Appendix A: Synopsis of the Study

The Effect of Auditory-Based String Curriculum on Music Literacy

When students start learning a musical instrument, strings in this case, often note-reading is introduced at the same time. This current method of teaching relies heavily on conceptual learning, either not spending enough time in the experiential stage or skipping it altogether. There exists a heavy reliance on method books, most of which introduce musical symbols to be decoded right away before students had a chance to explore the sound of their chosen instrument. According to Piaget, it is vital that the concrete operational stage takes place before the formal operational stage to ensure understanding and depth of knowledge. If music literacy is viewed in the same way as language literacy, then following similar steps to successful note-reading would involve a significant time spent simply using the language – talking, and in the case of music – playing an instrument. This missing step of music-making is what my research is about. If music literacy acquisition is similar to the acquisition of language, then spending more time in this experiential, music-making stage will allow the students to build a necessary connection between concrete and abstract thinking required for decoding musical symbols.

Existing literature points to the brain structure that supports the parallel between language and music literacy acquisition[129], as well as the depth of knowledge noted by students who learn by ear or by rote first[130]. The work of these scholars and others can be expanded through this research by examining and analyzing an approach mimicking the process of acquiring language skills. The aim of this research is to explore a method that will build students' auditory architecture, leading them to successfully decode notes and other musical symbols. As a result

[129] James E. Zull, The Art of Changing the Brain, (Sterling, VA: Stylus Publishing, LLC, 2002), 15.

[130] Edwin E. Gordon, Learning Sequences in Music – A Music Learning Theory, (Chicago, IL: GIA Publications Inc. 2003), 280.

of this research, the new method of learning might positively affect students' motivation to practice and pursue music-making opportunities, as well as students' perception of their own learning.

In this applied research project two groups will be compared. The control group will be taught using the traditional method of learning elementary strings in public schools. The intervention group will use a sound-based approach with a different teaching sequence, spending more time in the concrete stage of music-making before introducing the abstract symbol of note-reading. Parents and participating students in both groups will fill out surveys, questionnaires, and rubrics, and be assessed on their depth of knowledge as well as on the student's ability to decode musical symbols. The qualitative and quantitative data will be examined through thematic analysis and the use of a SPSS software. If a significant difference is shown between the methods, then further tests will be needed to determine which of the dependent variables carried the significance. If the significance is found then that particular teaching sequence will be the optimal method for teaching elementary strings in the future.

The limitations of this project lie in the specific district whose needs are addressed in this study. The lack of general music or ample amounts of auditory preparation prior to instrumental lessons in fifth grade plays a big role in how quickly students grasp the concept of music symbols while mastering the instrument. The same experiment tried in a different district may have a different result in how fast students' declarative knowledge is manifested. For reading development it is imperative that auditory processing is addressed.[131] For musical literacy, it is

[131] Kraus, Nina PhD; Anderson, Samira AuD, PhD. "Hearing Matters: For Reading Development, Auditory Processing Is Fundamental". *The Hearing Journal: September* 2013 - Volume 66 - Issue 9 – p. 40 doi: 10.1097/01.HJ.0000434625.54514.1d

equally important, to begin with auditory development before attempting to decode musical symbols.

Appendix B: Initial Survey

Child's Name: _____ Instrument: _____

Does your child have a musical background? (Please circle the appropriate answer) Yes No

My child can read music: (Please circle the appropriate answer) Yes No

What music does your child listen to? _____

What music is played in the house/car? _____

The questions below are present in order for a diverse number of students to be represented in this study.

Student's gender: (Please circle the appropriate answer) Male Female Prefer not to say

Does the student qualify for free or reduced lunch? _____

What is the preferred language in the home? _____

Which origin does the student closely identifies him/herself in - Hispanic, Latino, or Spanish? (Please circle the appropriate answer)

Yes No Other _____ Prefer not to say

How would student best describe him/herself? (Please circle the appropriate answer)

American Indian or Alaska Native Asian

Black or African American Native Hawaiian or Other Pacific Islander

White Other (Please specify) _____

Prefer not to say

Appendix C: Parental Consent

Title of the Project: Learning Sequence for Beginning Strings Classes

Principal Investigator: Lydia Cooley

Invitation to be Part of a Research Study

Your child is invited to participate in a research study. Participants must be current 5th and/or 6th graders enrolled in beginning strings (violin, viola, cello, or bass) classes. Participants must also not have had any formal music training and not have the ability to read music. Taking part in this research project is voluntary.

Please take time to read this entire form and ask questions before deciding whether to allow your child to take part in this research project.

What is the study about and why are we doing it?

The purpose of the study is to examine and analyze a learning sequence that will best lead to music literacy as well as positively engage the learner in music-making. While conducting this project, I hope to find a curriculum that is optimal for beginner musicians' introduction to note-reading, as well as explore students' understanding of their own perceptions of learning to play an instrument.

What will participants be asked to do in this study?

If you agree to allow your child to be in this study, I will ask him or her to do the following things:

1. Students will be randomly assigned to either the control group or the intervention group. Students in the control group will continue with the traditional method of learning over the course of seven weeks, which focuses on decoding the music symbols right away. Students in the intervention group will use the intervention

curriculum for seven weeks which focuses on experience and sound, learning by rote, before introducing the musical symbol.

2. Students in both groups will be asked to practice their instruments weekly and record their minutes. (10 minutes per day)
3. Students will participate in seven 3-minute discussions at the end of each class.
4. Students will fill out two short confidence surveys (5 minutes each) during the seven weeks.
5. Students will take two informal assessments (5 minutes each)
6. Parents will complete two 6-question motivation surveys about their students (5 minutes each)
7. At the end of the seven weeks, students in both groups will complete two tests from their string orchestra schoolbook (15 minutes each)
8. Lastly, students will make a short audio-recording of themselves playing their instrument using SmartMusic software (20 minutes)

How could participants or others benefit from this study?

Students in the control group should not expect to receive a direct benefit from participating in this study. Students in the intervention group may receive a direct benefit of increased music comprehension because of the different styles of teaching. Benefits to society at large include identifying the most optimal teaching method for accessing music literacy.

What risks might participants experience from being in this study?

The risks involved in this study are minimal, which means they are equal to the risks your child would encounter in everyday life. Participants may feel uncomfortable sharing personal practice experiences and opinions. To ensure the comfort of the participants, they can opt out of

the project at any time. They can also skip any questions they feel uncomfortable about answering. Their participation in the project is not connected to their academic or social standing in any way and such will not be impacted by participation or lack of participation. Your child may stop their involvement in this project at any time without penalty.

How will personal information be protected?

The records of this study will be kept private. Research records will be stored securely, and only the researcher and faculty sponsor will have access to the records. Data collected as part of this study may be shared for use in future research studies or with other researchers. If data collected from the participants is shared, any information that could identify them will be removed before the data is shared.

- Control and intervention groups will be randomly selected and consist of students who have been given consent to participate. All students will participate in a quality stringed music curriculum, rubrics, and surveys, but only those who have given consent will have their data collected.
- Participant responses will be kept confidential through the use of pseudonyms.
- Data will be stored on a password-locked computer or locked filing cabinet and may be used in future presentations. After three years, all electronic records will be deleted, and any hard copy data will be shredded.
- Audio recordings will be downloaded from SmartMusic and stored on a password-locked computer. Only researcher will have access to these recordings.

Is study participation voluntary?

Participation in this study is voluntary. Your decision whether or not to allow your child to participate will not affect your or his or her current or future relations with Liberty University

or Davis Joint Unified School District. If you decide to allow your child to participate, he or she is free to not answer any questions or withdraw at any time without affecting those relationships.

What should be done if a participant wishes to withdraw from the study?

If you choose to withdraw your child from the study or your child chooses to withdraw, please contact the researcher at the email address/phone number included in the next paragraph. Should you choose to withdraw him or her or should your child choose to withdraw, data collected from your child will be destroyed immediately and will not be included in this study.

Whom do you contact if you have questions or concerns about the study?

The researcher conducting this study is Lydia Cooley. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact Lydia at [redacted] or at [redacted]. You may also contact the researcher's faculty sponsor, Dr. Nathan Street at [redacted].

Whom do you contact if you have questions about rights as a research participant?

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, **you are encouraged** to contact the Institutional Review Board, 1971 University Blvd., Green Hall Ste. 2845, Lynchburg, VA 24515 or email at irb@liberty.edu.

Disclaimer: The Institutional Review Board (IRB) is tasked with ensuring that human subjects research will be conducted in an ethical manner as defined and required by federal regulations. The topics covered and viewpoints expressed or alluded to by student and faculty researchers are those of the researchers and do not necessarily reflect the official policies or positions of Liberty University

Your Consent

By signing this document, you are agreeing to allow your child to be in this study. Make sure you understand what the study is about before you sign. You will be given a copy of this document for your records. The researcher will keep a copy with the study records. If you have any questions about the study after you sign this document, you can contact the study team using the information provided above.

I have read and understood the above information. I have asked questions and have received answers. I consent to allow my child to participate in the study.

☐ The researcher has my permission to audio-record my child as a part of his/her participation in this study.

_____

Printed Child's/Student's Name

_____

Parent's Signature Date

Appendix D: Child Assent to Participate in a Research Study

What is the name of the study and who is doing the study?

The name of the study is Learning Sequence for Beginning Strings Classes, and the person doing the study is Lydia Cooley.

Why is Mrs. Cooley doing this study?

Mrs. Cooley wants to know the best way to teach note-reading to students that would make students enjoy the process of learning a new instrument.

Why am I being asked to be in this study?

You are being asked to be in this study because you are a fifth or a sixth grader enrolled in beginning strings classes.

If I decide to be in the study, what will happen and how long will it take?

If you decide to be in this study, you will be randomly put into the control or the intervention group. The students in the control group will continue with the way we have been learning music. Students in the intervention group will learn music in a different way. During the next seven weeks you will be asked to practice your instrument at home (10 minutes), fill out two rubrics after playing your instrument (5 minutes each), participate in seven end-of-the-class short discussions (3 minutes each), take two informal tests (5 minutes each). Then at the end of the seven weeks, you will take two tests in your string orchestra schoolbook (15 minutes each). Lastly, you will make one short audio recording of yourself playing your instrument (20 minutes). Your parents will also be asked to fill out two surveys about your practice time at home (5 minutes each).

Do I have to be in this study?

No, you do not have to be in this study. If you want to be in this study, then tell the researcher. If you don't want to, it's OK to say no. The researcher will not be angry. You can say yes now and change your mind later. It's up to you.

What if I have a question?

You can ask questions any time. You can ask now. You can ask later. You can talk to Mrs. Cooley. If you do not understand something, please ask Mrs. Cooley to explain it to you again.

Signing your name below means that you want to be in the study.

_____

Signature of Student Date

Liberty University Institutional Review Board

1971 University Blvd, Green Hall 2845, Lynchburg, VA 24515

irb@liberty.edu

Appendix E: Weekly Practice Log

Every week, students are given half sheet practice charts they need to bring back the following week with their parents' signature. They fill out their weekly assignment, and the number week for listening.

Practice Chart

Name:_____ Date:_____

Assignment:

Minutes Practiced:

Mon ____

Tue ____

Wed ____

Thur ____

Fri ____

Sat ____

Sun ____

Total Minutes (YAY!) _____

Listening list, week # _____

_

Signature of a Parent/Guardian:

_____

Audience's Initials if performed:

_____

Written in the back of the practice chart: *Every practice should include: 1) warm-up, 2) working on something new or challenging, (playing more than once to make sure it gets better and easier) 3) reviewing something familiar or easy, and 4) creating something new on your instrument.*

Appendix F: Listening Assignment

This listening list does not represent the multi-cultural requirements for suggested listening in elementary grades, only the list where the tone quality of a stringed instrument is specifically emphasized. Suggested sources: ClassicforKids.com, MyDSO.com, Carnegiehall.org, and parent-supervised YouTube.

Listening Week #:	**Composer:**	**Name of the piece:**
Week 1	T. Albinoni	Adagio in G minor
Week 2	J. S. Bach	Branderburg Concerto No 2 Concerto for 2 violins Cello Suite #1
Week 3	S. Barber	Adagio for Strings
Week 4	B. Bartok	Romanian Folk Dances
Week 5	L. V. Beethoven	Spring Sonata Quartet Op. 131
Week 6	L. Bernstein	West Side Story - Mambo
Week 7	G. Bizet	Carmen Suite No. 1
Week 8	J. Brahms	Symphony No.4
Week 9	B. Britten	Simple Symphony
Week 10	M. Bruch	Violin Concerto
Week 11	A Copeland	Hoe Down from Rodeo
Week 12	A. Corelli	Cello Sonata in D minor
Week 13	A. Dvorak	Serenade for Strings in E major
Week 14	E. Elgar	Enigma Variations – Nimrod Enigma Variations – Finale
Week 15	A. Glazunov	Violin Concerto, Op. 82
Week 16	E. Greig	Holberg Suite, Op. 40

Week 17	G. F. Handel	Water Music
Week 18	F. J. Haydn	String Quartet Op. 76
Week 19	G. Holst	St. Paul's Suite for String Orchestra
Week 20	D. Kabalevsky	Violin Concerto in C Major
Week 21	F. Mendelssohn	A Midsummer Night's Dream
Week 22	W. A. Mozart	Divertimento in D Major, K 136
Week 23	M. Mussorgsky	Pictures on the Exhibition – Baba Yaga and Great Gate of Kiev
Week 24	J. Pachelbel	Canon in D
Week 25	N. Paganini	Violin Caprice No. 24
Week 26	S. Prokofiev	Peter and the Wolf
Week 27	S. Rachmaninoff	Vocalise, Op. 34
Week 28	Rimsky-Korsakov	Capricio Espagnol Scheherezade
Week 29	G. Rossini	William Tell Overture – Full Finale
Week 30	C. Saint-Saens	Swan from Carnival of the Animals
Week 31	D. Shostakovich	String Quartet No. 8
Week 32	B. Smetana	String Quartet No. 1 The Moldau
Week 33	I. Stravinsky	Firebird Petrushka
Week 34	P. Tchaikovsky	Serenade for Strings
Week 35	Telemann	Sonatas
Week 36	A. Vivaldi	Violin Concertos Four Seasons

Appendix G: Informal Assessment

(Filled out by the teacher)

Student _____

3. Consistently demonstrates
2. Able to do with reminders or teacher/peer help
1. Needs more help or time

Skill:	3	2	1
Sings in tune, matching own voice to the pitch given by teacher's piano, voice, or stringed instrument.			
**Intervention group: Sings with correct solfege notes and Curwen signs, assigning each note a relational interval (higher, lower).			
** Control group: Sings with correct note names			
Assigns correct strings or finger numbers to the note names sung			
Plays in tune or shows ability to hear and adjust finger placement to the correct spot			

Appendix H: Teacher's Assessment of Student's Readiness

At the Beginning of the Year

Student's Name: _____

On the scale from 1 to 5 grade student's readiness in beginning strings.
1 = inaccurate/not open to creativity
2 = mostly inaccurate/not flexible
3 = slightly accurate/ open to trying something new
4 = very close to or adjusting/ can be creative after watching others first
5= spot on/"out of the box thinker" and problem solver

1. At the beginning of the year how accurate was this student at singing in tune? (circle the most appropriate answer)

1 *2* *3* *4* *5*

2. At the beginning of the year how accurate was this student at keeping steady beat?

1 *2* *3* *4* *5*

3. At the beginning of the year how accurate was this student at recognizing melodic patterns?

1 *2* *3* *4* *5*

4. At the beginning of the year how accurate was this student at recognizing rhythm patterns?

1 *2* *3* *4* *5*

5. At the beginning of the year how open was this student to creative expression and problem solving?

1 *2* *3* *4* *5*

In the Middle of the Year

Student's Name: _____

On the scale from 1 to 5 grade student's readiness in beginning strings.
1 = inaccurate/not open to creativity
2 = mostly inaccurate/not flexible
3 = slightly accurate/ open to trying something new
4 = very close to or adjusting/ can be creative after watching others first
5= spot on/"out of the box thinker" and problem solver

1. In the middle of the year how accurate was this student at singing in tune? (circle the most appropriate answer)

1 *2* *3* *4* *5*

2. In the middle of the year how accurate was this student at keeping steady beat?

1 *2* *3* *4* *5*

2. In the middle of the year how accurate was this student at recognizing melodic patterns?

1 *2* *3* *4* *5*

4. In the middle of the year how accurate was this student at recognizing rhythm patterns?

1 *2* *3* *4* *5*

5. In the middle of the year how open was this student to creative expression and problem solving?

1 *2* *3* *4* *5*

Appendix I: Weekly Observation Notes

For ethical reasons, the students help teacher complete this selective observation notes during the last three minutes of each class. Teacher-researcher will add her own thoughts as well.

Week # _____

1. Class engagement: we observed that our class stayed engaged in music during_____

   _____

Teacher notes/reflections: _____

_____

_____

2. We felt confident playing our instruments during these musical pieces: _____

   _____

Teacher notes/reflections:_____

_____

_____

3. We felt confident playing solos for each other _____

   _____

Teacher notes/reflections:_____

_____

_____

4. We felt comfortable singing with (circle) words, solfege syllables, note names, or finger numbers._____

Teacher notes/reflections:_____

_____

_____

5. We observed our sound as a group (circle one) improved did not improve.

Teacher notes/reflections:_____

_____

_____

6. The lesson time seemed (circle one) too long too short.

Teacher notes/reflections:_____

_____

_____

Appendix J: Self-assessment Rubric #2

Filled out by the Student

Criteria	**Points**
Body is balanced and centered; “Tall” posture	2
Left-hand wrist is straight	2
Left hand fingers are curved and over the strings	1
Bow hold is loose	2
Right hand thumb is bent	1
Bow is in a good tone spot	1
Even quality tone	1
Total points	

Appendix K: Motivation Questionnaire

Parent feedback

1. **At the beginning of the year, my children:** (Circle the appropriate answer)

   Were excited to start learning the instrument

   Signed up because of friends

   We made them sign up

2. **How motivated are your children to practice?** (Circle the appropriate answer)

   I don't even have to remind!

   Happy to practice with some reminders

   I have to employ one of the following to make it happen: nagging, pleading, bribing, threatening, or other means of motivation. 😖

3. **Where do your children practice in the home?** (Circle the appropriate answer)

   In the common space (where other family members can hear him or her)

   In their room

   Other

4. **How confident is your child playing their new instrument?** (Circle the appropriate answer)

   So confident, they are ready to collect tips after playing for the family!

   Confident enough to play for us

   Will only play in their room

5. **Is your child asking for more musical opportunities now that they take an instrument?**

   (Circle the appropriate answer) Yes No

Attending live performances

Private lessons

Tutoring opportunity

Other: _____

6. **How often does your child perform for the family?** (Circle the appropriate answer)

At least once a week

Less than once a week

My child is waiting for the winter concert to let me hear him/her play

7. **What is instrument practice like for your family?**_____

_____

_____

_____

8. **What motivates your child to practice his/her instrument or pursue music**? _____

_____

_____

_____

Appendix L: Student confidence survey

Indicate the level of confidence performing the following:	**Very confident**	**Unsure**	**Not confident at all**
Playing arco on one string at a time			
Playing Hot Cross Buns Melody			
Playing Mary Had a Little Lamb Melody			
Playing Monkey Song			
Playing Baby Shark			
Playing Twinkle, Twinkle Little Star			
Teaching my family members my songs			

What do you think would affect your confidence?

☐ More practice

☐ One-on-one help with teacher

☐ Slower pace in class

How excited are you to practice at home?

☐ Can’t wait to get home and play my instrument!

☐ I enjoy it once I start playing!

☐ My parents make me do it!

Appendix M: Assessment of Student's Confidence

Name: _____

On the scale from 1 to 5 grade your confidence in orchestra.
1 = not confident
2 = doubtful
3 = slightly confident
4 = moderately confident
5= highly confident

2 At the beginning of the year how confident did you feel about learning the string instrument? (circle the most appropriate answer)

1 *2* *3* *4* *5*

3 At the beginning of the year how confident did you feel about singing?

1 *2* *3* *4* *5*

4 When we first started, how confident did you feel about playing pizzicato?

1 *2* *3* *4* *5*

5 When we first started, how confident did you feel about playing arco?

1 *2* *3* *4* *5*

6 How confident did you feel teaching your family members?

1 *2* *3* *4* *5*

7 How confident did you feel preparing for the concert?

1 *2* *3* *4* *5*

8 How confident did you feel at the concert?

1 *2* *3* *4* *5*

9 How confident do you feel now?

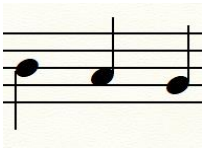
1 *2* *3* *4* *5*

Appendix N: Decoding Familiar Melodic Content

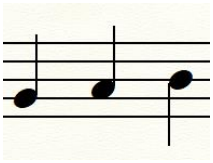
Melodic Patterns

Draw lines to match the notes to the melodic pattern.

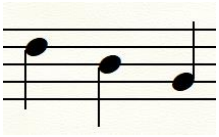
Do – Re – Mi



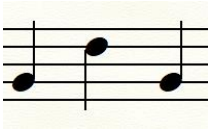
Do – So – Do



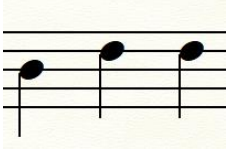
Mi – So – So



Mi – Re – Do



So - Mi – Do



Appendix O: Decoding Familiar Rhythmic Content

Rhythm Connection

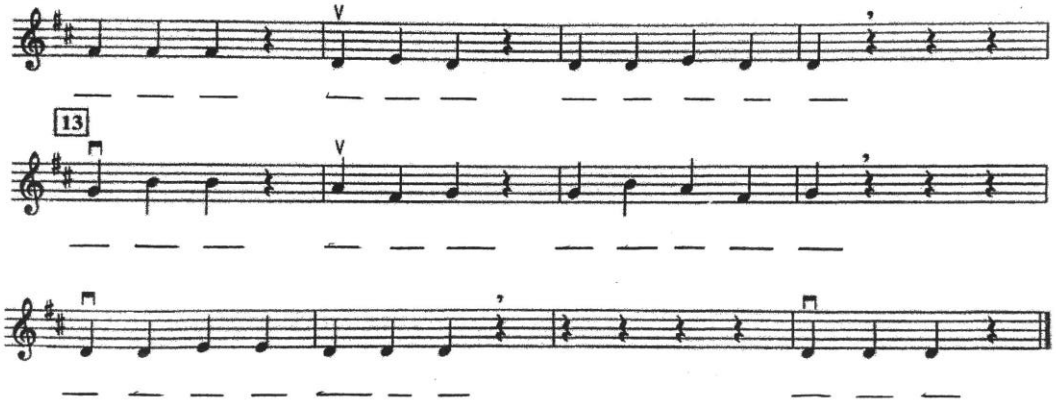
Draw lines to match the words to the appropriate rhythm

Mi-ssi-ssi-ppi, Mi-ssi-ssi-ppi	
Cat, Cat, Cat, Cat	
Very-very-fat-dog	
Pup-py, pup-py, Dog, Dog	
Pep-pe-ro-ni Piz-za	
Fat Dog, Fat Dog	
Run, pup-py, Run pup-py	
Dog Dog pup-py Dog	

Appendix P: Final reading assessment and playing test

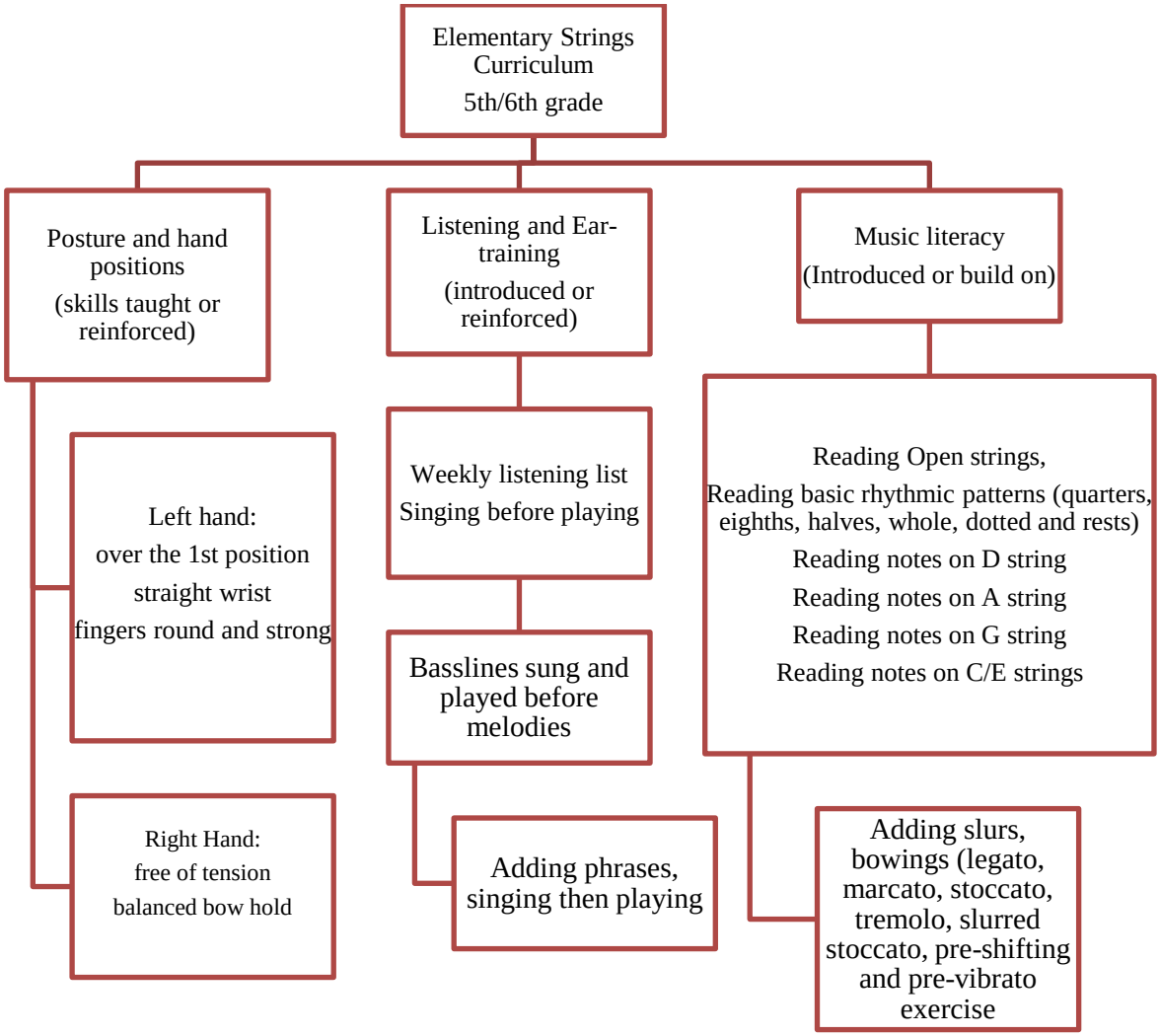
(Violin part example)

Name: _____



Appendix Q: Sound-based Curriculum

Curriculum conceptual graphic



Scope and Sequence for Elementary Strings in grades 5 and 6

Concepts	Grade 5	Grade 6
Instrument care	Safely unpack and pack the instrument in the case	Safely unpack and pack the instrument in the case Nomenclature
Posture and Instrument position	Rest position Playing position Healthy playing posture	Healthy playing posture, seated and standing
Left-hand	Natural curve Straight wrist Round and strong fingers All fingers down Accurate finger placement Tetrachords and Scales using different rhythms	Natural curve Straight wrist Round and strong fingers Accurate finger placement Individual finger-use Scales using different bowing style
Right-hand	Pizzicato Pencil bow hold Beginner's bow hold (balance or thumb on ferule) Professional bow hold – loose hold with flexible wrist and fingers	Good tone pizzicato Professional bow hold – loose fingers and wrist Differentiation in strokes
Tone Quality	Well-balanced weight on the bow. Strong left-hand fingers.	Well-balanced weight on the bow. Strong left-hand fingers Accurate finger placement Appropriate bow distribution.

Rhythm	Steady beat Micro/macro beat Meter Quarter note, quarter rest, eighth notes, half notes, dotted quarter notes and triplets in form of word rhythms 2/4, ¾, 4/4 time Various Tempi	Steady beat Strong beat/weak beat – Down and Up bows Sing, play, read, and write quarter notes, quarter rests, eighth notes, half notes, dotted quarter notes and triplets, four sixteenth notes, and whole notes - 2/4, ¾, 4/4, 6/8 time Conduct
Singing	Singing and audiating songs prior to playing them on an instrument. Ear-training exercise to connect singing and listening to left-hand finger placement.	Singing and audiating to build intonation and phrases prior to playing on an instrument. Continuing ear-training exercises to connect singing and listening to left-hand finger placement
Literacy	Understand the concept of symbols representing sounds. Recognize ascending/descending patterns. Identify, sing, and play familiar patterns in written music. Sing and decode notes in familiar songs Write notes to familiar songs on the staff.	Write familiar scales on the music staff Identify familiar notes and patterns in an unfamiliar piece of music. Sight-read an unfamiliar pattern

Articulation and Expression	Dynamics Legato/Staccato Tremolo	Bow distribution Legato Staccato Martele Slurs Slurred staccato
Listening and Analyzing	Patterns Repeat ABA form Harmony	AAB form Rondo Form 1st and 2nd ending repeats
Creating	Echo, call and response Create short songs on familiar notes Create rhythmic variations	Create Major and minor variations on familiar songs. Create different endings to familiar songs. Create rhythmic ostinato
Form/Harmony	Patterns Repeat	AB form ABA form Contrast Ostinato
Genre	Listen and play on instrument music from the following genres: Folk Song Classical Patriotic Seasonal/popular Jazz and Spirituals	Listen and play on instrument music from the following genres: Folk Song Classical Patriotic Seasonal/popular Jazz and Spirituals

	Latin	Latin Contemporary
Responding	Identify instrument families. Describe music and patterns. Identify skips and steps in music: aural and written. Find Mi-Re-Do patterns in familiar song. Identify the form, style, tempo and dynamics of aurally presented music. Recognize and respond with instruments to aurally presented changes in tempo, dynamics, and style.	Describe different styles of music. Identify skips and steps in music in written notation. Identify the form, style, tempo and dynamics in written music. Recognize and respond with instruments to written changes in tempo, dynamics, and style. Use proper vocabulary to identify the written symbols in music (notation and expression)
Evaluating	Compare and contrast: Beat, melody, rhymes, expression Identify types of music Identify rhythmic and melodic patterns Compare musical elements: dynamics, timbre, beat, pitch, rhythm, and form.	Identify intervals Distinguish between micro/macro beats, strong/weak beats. Identify musical style Identify musical elements heard in music.
Building connections	Look for patterns and contrasts. Create rhymes to support literacy.	Find ABA form in everyday life. Discuss historical and cultural implications

	Find ABA form in everyday life Build literacy connection – fluency in reading. Find story behind the song.	for patriotic, folk, classical, jazz and popular music.

5th-grade Strings Curriculum Map

	1st Trimester	**2nd Trimester**	**3rd Trimester**
Content: Instrument care and Playing positions	- Students will be able to demonstrate proper instrument care when packing, unpacking, and setting up their instruments in class. - Students will be able to demonstrate proper instrument posture while sitting and standing. MU:Cn11.0.T.5a	- Students will be able to teach their family members the proper instrument care. - Students will be able to teach their family members the proper instrument posture while sitting and standing. MU:Cn11.0.T.5a	- Students will be able to demonstrate proper playing posture for younger grades in a school assembly. MU:Pr5.3.E.5a
Basslines to familiar Folk Songs	- Students will be able to sing basslines to familiar folk songs using solfege and letter note-names. - Students will be able to pluck basslines to familiar songs while teacher plays melodies on the piano. MU:Pr6.1.E.5a	- Students will be able to play basslines arco with appropriate rhythm and quality tone alone and with accompaniment. MU:Pr6.1.E.5a	- Students will be able to play in harmony switching between basslines and melodies. - Students will be able to demonstrate basslines for younger grades in a school assembly. MU:Pr5.3.E.5a

Tone production	- Students will be able to produce a solid tone on their instruments while playing pizzicato, with left-hand fingers shaped round and strong on the string. MU:Pr6.1.E.5a	- Students will be able to produce a solid tone on their instruments while playing arco on open strings, with bow placed in the good tone spot. MU:Pr6.1.E.5a - Students will be able to explain and demonstrate all aspects involved in creating a quality tone on their instruments – hand positions, bow placement, and weight of the bow. - Combining two hands, students will be able to produce a quality tone on their instruments while playing familiar songs. MU:Pr6.1.E.5a	Combining two hands, students will be able to produce a quality tone on their instruments while reading unfamiliar songs. MU:Pr6.1.E.5a
Melodies to familiar Folk Songs	- Students will be able to recognize and sing melody lines to familiar songs using words, solfege, and letter names.	- Students will be able to sing melody lines to familiar songs using solfege, letter names, and finger numbers.	- Students will be able to audiate while playing secret song games. - Students will be

		- Students will be able to play melody lines to familiar songs pizzicato. - Students will be able to play melody lines to familiar songs arco.	able to play bass lines and melody lines to familiar songs in harmony at a school assembly. MU:Pr6.1.E.Ib - Students will be able to sing and identify major and minor patterns with solfege and finger numbers. MU:Pr6.1.E.Ib
Scales	- Students will be able to sing a scale with Curwen hand signs in solfege. MU:Cn11.0.T.5a - Students will be able to pluck tetrachords on every string. (Bass students will modify)	- Students will be able to sing D major scale in letter names. - Students will be able to play D major scale on their instruments pizzicato and arco. MU:Pr6.1.E.5b	- Students will be able to play D major scale in tune on their instruments accompanied by drone and in a round. MU:Pr6.1.E.5b
Rhythm	- Students will be able to create word rhythms on open strings - Students will be able to	- Students will be able to explain and demonstrate the difference in bow speed and distribution as	- Students will be able to match written rhythms to matching words (quarter note –

	recognize and demonstrate different rhythms in familiar basslines. MU:Pr6.1.E.5a	they play different rhythms on their instruments arco. MU:Pr6.1.E.5a - Students will be able to create rhythm variations on familiar songs, such as Twinkle or 12 Bar Blues using word rhythms and bow. MU:Re8.1.E.5a	"dog", two eighth notes – "pup-py", triplet – "blueberry", etc.) MU:Re8.1.E.5a - Students will be able to match familiar rhythm sound to rhythm written on the board. MU:Re8.1.E.5a
Note-reading	- Students will be able to sing familiar folk songs using words and solfege. MU:Re8.1.E.5a - Students will be able to sing basslines to familiar folk songs using solfege and letter names. MU:Re8.1.E.5a - Students will be able to recognize familiar patterns written on the staff on whiteboard. MU:Re8.1.E.5a	- Students will be able to sing and pluck familiar melodic lines on their instruments. - Students will be able to recognize familiar melodic lines on the staff. MU:Re8.1.E.5a - Students will be able to write familiar bass lines on the staff. MU:Re8.1.E.5a	- Students will be able to write a D Major scale on the staff. MU:Re8.1.E.5a - Students will be able to play familiar songs while reading notes on the staff. - Students will be able to sing the notes to unfamiliar melodies. MU:Re8.1.E.5a - Students will be

			able to read and play an unfamiliar piece of music. MU:Re8.1.E.5a
Musical Elements of Expression	- Students will be able to hear and identify different bowing styles presented by the teacher. MU:Pr4.3.E.5a	- Students will be able to identify and demonstrate down and up bows on their instruments. MU:Pr4.2.E.5a - Students will be able to identify and demonstrate legato and staccato bows on their instruments. MU:Pr4.3.E.8a - Students will be able to match the bowing style to the piece of music. MU:Pr4.3.E.8a	- Students will be able to identify and demonstrate martele and slurred staccato bowings on their instruments. MU:Pr4.3.E.8a MU:Pr6.1.E.Ib - Students will be able to demonstrate practical understanding of major and minor and adjust intonation for each. MU:Cr3.2.E.5a MU:Pr6.1.E.Ib
Form	- Students will be able to sing and identify repeats, and AB patterns in familiar folk songs they play.	- Students will be able to sing and identify ABA patterns. MU:Pr4.3.E.IIa - Students will be able to identify and perform	- Students should be able to create their own variations on familiar song. MU:Cr1.1.E.8a

	MU:Re8.1.E.5a - Students will be able to sing and identify I-IV-V-I pattern in 12 Bar Blues. MU:Pr4.3.E.IIa MU:Re8.1.E.5a	theme and variations on their instruments. MU:Pr4.3.E.IIa MU:Re8.1.E.5a	
Creating	- Students will be able to create short melodies using open strings. MU:Cr1.1.E.5a - Students will be able to create short melodies using tetrachords on one string. MU:Cr1.1.E.5a	- Students will be able to create rhythmic variations on D Major scale. MU:Cr1.1.E.8a - Students will be able to create rhythmic variations on Twinkle, Twinkle Little Star or similar piece. MU:Cr1.1.E.8a	- Students will be able to create rhythmic and melodic variations on Bile'em Cabbage Down or similar piece. MU:Cr1.1.E.8a - Students will be able to write their variations in a standard notation form. MU:Cr2.1.E.5b
Resources and materials	Beginner strings workbook part 1, containing basslines and melodies to familiar folk songs. Stringed instruments. Chairs and stands.	Beginner strings workbook part 2, containing writing pages with staff lines. Stringed instruments. Chairs and stands. Piano	Method book; Supplemental arrangements for spring concert; Stringed instruments. Chairs and stands. Piano

	Piano		

Unit Plan

Grade and Subject	5th grade Strings – 1st year
Unit Title:	Pre-literacy
Unit Length:	6 weeks
Standards	MU:Pr6.1.E.5a Demonstrate attention to technical accuracy and expressive qualities in prepared and improvised performances of a varied repertoire of music. MU:Re8.1.E.5a Identify interpretations of the expressive intent and meaning of musical works, referring to the elements of music, contexts, and (when appropriate) the setting of the text MU:Cr1.1.2a Improvise rhythmic and melodic patterns and musical ideas for a specific purpose. MU:Cr1.1.2b Generate musical patterns and ideas within the context of a given tonality (such as major and minor) and meter (such as duple and triple)
Objective(s)	1. Review - Students will be able to sing, pluck, and play with bow the melody lines to Hot Cross Buns, Mary Had a Little Lamb, Au Claire de la Lune, and 12 Bar Blues, Falling Leaves, Up and Down the Hill, We Will Rock You, and Baby Shark. 2. Students will be able to sing with solfege and letter names Twinkle Twinkle Little Star (TTLS) 3. Students will be able to play TTLS pizzicato and arco 4. Students will be able to create rhythmic variations on TTLS. 5. Students will be able to start building connections between sound and symbol 6. Students will be able to decode and encode familiar music patterns 7. Students will be able to decode unfamiliar patterns

Unit Vocabulary	ato, Arco; r notes and quarter rests, half notes, whole notes, eighth notes; y, bassline, harmony, accompaniment, tetrachord, scale. , staccato, tremolo, form, Repeat, 12 Blues form. e and variations
Connections	Music and oral traditions nd blues structure ions of expressions dings of Bessie Smith's "Mean Old Bedbug Blues" and Chuck Berry's "Johnny B. Goode." of Arezzo

ADDIE

ADDIE is an instructional design used by trainers in education and other domains as a big-picture approach. It stands for analysis, design, development, implementation, and evaluation. It is not linear, as evaluation and revision can enter during any step.

Analysis

Subject area	Beginning strings
Learners	The learners are fifth and sixth grade students from elementary public school, in their first year of their study on violin, viola, cello, or bass.
Identifying problem	In beginning elementary instrumental group lessons, when students first learn to play a musical instrument, the introduction to note reading happens too fast. Students need more time with an instrument prior to decoding notes.
Prior knowledge	Students have had a year of general music classes where they moved to the beat and sang in solfege using Curwen hand signs. Students are not familiar with reading music notation.
New desired behavior	Students will gain confidence in their instrument playing while involved in pre-literacy song games and activities.
Pedagogical considerations	This unit will focus on building the auditory architecture necessary for music literacy while addressing physical skills on a stringed instrument.

Delivery method	Students meet in person once per week for thirty minutes at their school, as a part of a pull-out program.
Learning theory	The learning theory used in this course is Experiental, where the students construct knowledge and meaning from their hands-on instrument lessons. In this inquiry-based method from a constructivist approach, students will discover the foundation of playing an instrument such as tone, positions, fingerings, pitch, rhythmic and melodic patterns, harmony, form, and phrasing.
Learning objectives	1. Repeat bass lines to the familiar folk songs singing and with an instrument.[132] 2. Identify the notes on your instrument using letters, solfege, and fingering. 3. Demonstrate proper playing posture. 4. Experiment and create rhythmic and melodic variations to familiar songs.[133] 5. Write music in various ways – drawing and standard notation. 6. Choose rhythmic notation for the appropriate variation. 7. Recognize how music is written in standard notation. 8. Recognize rhythmic and melodic patterns in unfamiliar music.

[132] Guilbault, Denise Marie. "The Effect of Harmonic Accompaniment on the Tonal Achievement and Tonal Improvisations of Children in Kindergarten and First Grade." *Journal of Research in Music Education* 52, no. 1 (April 2004): 64–76. https://doi.org/10.2307/3345525.

[133] Petzold, Robert G. "The Development of Auditory Perception of Musical Sounds By Children in the First Six Grades." *Journal of Research in Music Education* 11, no. 1 (April 1963): 21–43. https://doi.org/10.2307/3344529.

Course description	This is a second semester six-week unit, serving as part of pre-literacy activities, and a prerequisite to the traditional method book. This unit is designed to prepare students for music literacy by focusing on the physical and auditory development of young musicians. The material covered in this unit: proper playing posture, basslines and melodies, singing, playing pizzicato, theme and variations, arco and bowing styles, and rhythm.
Learning outcomes	Upon successful completion of this course, the student will be able to: A. Identify the notes on the instrument – letters, solfege, and fingering. B. Demonstrate correct playing posture: sitting and standing tall, holding an instrument without unnecessary tension, with round and strong fingers on strings, and loose bow hold. C. Identify a secret song, using solfege, letters and finger numbers. D. Experiment and create a rhythmic variation on familiar songs. E. Create own version of high, medium, low sounds – draw HCB melody using pictures and symbols. E. Choose rhythmic notation for the appropriate

	variation. F. Match familiar melodic patterns to the unfamiliar notation G. Write music in standard music notation H. Read unfamiliar melodic patterns written in standard music notation
Course requirements and assignments	1. Student workbook #2, instrument, and regular attendance 2. Weekly class performance – individual and in group 3. Weekly listening – students will participate in class discussions 4. Weekly practice charts signed by parents 5. Variation class project – students will create their own variation on familiar song. 6. Informal performance – living room concert. Students are to collect the comments of their audience on their performance. 7. Sight-read an unfamiliar piece of music while using previous knowledge of rhythmic and melodic patterns.

Design

Learning Outcomes	**Content**	**Learning/Training Activity**	**Assessment**
A. Identify the notes on the instrument – letters, solfege, and fingering.	**Week 1:** Review: playing Baby Shark on every string.	1) Students will review Baby Shark by ear and identify the notes to each of the strings with letters	Formative Assessment: - Teacher observation - Student feedback

B. Demonstrate correct playing posture: sitting and standing tall, holding an instrument without unnecessary tension, with round and strong fingers on strings, and loose bow hold. C. Experiment and create rhythmic and melodic variations to familiar songs.	Filling in letter names for finger bubbles on the board, naming all notes on the instrument in first position. Twinkle, Twinkle, Little Star – theme and variations	following music alphabet. (The pattern works a little different for bass than other instruments) 2) Students will confirm proper playing posture and hand positions while playing Baby Shark as a small and large group. 3) Students will fill in the bubbles on the board, naming the letters in place of finger placement on each string. 4) Students guess a secret song on the board. The song is Twinkle Twinkle Little Star (TTLS) written in solfege, only A and B parts with missing notes (Do-Do-So-So- _ - _ - So_, etc…) 5) After identifying the song, the student learn to	Formative Assessment: - Teacher observes students sing and play, alone and with others. Teacher observes students choose words for variations that will fill 4 beats. Homework: - Students are to create

E. Create own version		play by ear. They take home the written version with letters and solfege for practice. 6) Students create rhythmic variations on TTLS – wish I had a pup-py  , or wish I had a horse, replacing eighths with quarter note and a rest and such… Teacher writes the ideas in standard rhythmic notation on the board. Students review TTLS and share their variations with the class. Students sing HCB melody. Teacher prompts them to identify the 3 sounds of HCB – high, medium, and low. Students draw pictures and symbols representing	new variations at home. Summative Assessment: Practice Chart with recorded practice time and list.

of high, medium, low sounds – draw HCB melody using pictures and symbols. E. Choose rhythmic notation for the appropriate variation. F. Match familiar melodic patterns to the unfamiliar notation		high, medium, and low sounds in their workbooks. Students all play HCB melody following their own writing.	
C. Identify a secret song, using solfege, letters and finger numbers. E. Choose rhythmic notation for the appropriate variation. F. Match familiar	**Week 2:** pg. 1-2 in Workbook #2 Familiar melodic patterns: Mi-Re-Do	Teacher writes melodic and rhythmic patterns on the board: Do-Re-Mi and quarters and halves. Students guess which rhythm says dog or fat dog. Then the teacher asks students to guess her song: teacher plays Twinkle on her hand. Students try to guess then play the TTLS on their instruments. Teacher points to the	Formative assessment: - Discussion/observation: Students share the experience of learning a new song, and looking at new way of writing, and

melodic patterns to the unfamiliar notation G. Write music in standard music notation.	Do-Re-Mi Do-So-Do Familiar rhythmic patterns: Quarters and halves Guido d'Arrezzo Writing notes on the staff	board asking students to guess which notes say Do Re Mi. Then teacher tells the students about Guido d'Arrezzo – students sing finger version of We Will Rock. Teacher makes connection between 5 fingers and 5 lines on the staff. Students write the notes of open strings. Write HCB bassline with standard notation form. Students write the notes in between open string Listen to Going Home melody sung by boys choir. Teacher writes familiar melodic and rhythmic patterns on the board.	staying engaged in the class. - Teacher observes students' engagement in class. Summative Assessment: Practice Chart with recorded practice time and list. Formative assessment: - Teacher observes students making decision on how symbols should represent the sound. Discussion/observation: Students share their experience of creating - Teacher observes students' engagement in class.

C. Identify a secret song, using solfege, letters and finger numbers. E. Choose rhythmic notation for the appropriate variation. F. Match familiar melodic patterns to the unfamiliar notation G. Write music in standard music notation.	**Week 3:** - pages 4 in Workbook #2. Familiar rhythmic patterns: quarters and half notes, Familiar melodic patterns: Do-Re-Mi Do-So-Do	Students have to guess which notes say Do Re Mi Students guess rhythm – dog or fat dog Students guess the song which teacher plays on her hand. (Twinkle) Teacher tells the story of Guido d'Arrezzo and students sing the finger version of We Will Rock You Students write notes – open strings Students write notes in between open strings Write HCB bassline with standard notation Listen to Going Home melody sung by boys choir. Teacher taps the rhythm	Formative Assessment: Teacher observes whether or not the melodic and rhythmic patterns have been understood by students through students choices and the application of the rhythmic patterns on TTLS. Summative Assessment: Practice Chart with recorded practice time and list. Writing notation in workbook #2.

C. Identify a secret song, using solfege, letters and finger numbers. E. Choose rhythmic notation for the appropriate variation. F. Match familiar melodic patterns to the unfamiliar notation G. Write music in standard music notation.	**Week 4:** - pages 4-5 in Workbook #2. Familiar rhythmic patterns: quarters and eighths, and halves and sixteenth Familiar melodic patterns: Mi-So-So So-Mi- Do	on her palm, Students guess which rhythm says Dog Pup-py Dog, which one says Mississippi Hot Dog, and which one says Fat Dog Play Twinkle in these variations. Guess which notes say Mi-So-So and So-Mi-Do. Review the written standard notation and continue writing the familiar songs: pg. 6 in workbook – half notes, clefs, MHLL bassline and melody. Learn the words to Going Home.	Formative Assessment: Teacher observes whether or not the melodic and rhythmic patterns have been understood by students through students choices and the application of the rhythmic patterns on TTLS. Summative Assessment: Practice Chart with recorded practice time and list. Writing notation in workbook #2.
C. Identify a secret song, using solfege,	**Week 5:** - Workbook pg.4-5	Teacher taps the rhythm on her palm using	Formative Assessment: - Students fill out the note

letters and finger numbers. E. Choose rhythmic notation for the appropriate variation. F. Match familiar melodic patterns to the unfamiliar notation G. Write music in standard music notation.	Sixteenths note rhythm Major scale. Exploring strings on the instrument	sixteenth and eighth notes. Students guess the song and match it to the rhythm on the board. Students sing Do scale with hand signs, counting how many notes they can fit on one string. Students play D Major scale starting on D string. Violins, Violas, and Cellos play G Major scale starting on G string. Students write D Major scale in their workbooks.	name worksheet on pg. 9. Summative Assessment: - Practice Chart with recorded practice time and listening.
E. Choose rhythmic notation for the appropriate variation. F. Match familiar	**Week 6:** - Workbook pg.4-5 Concepts: sight-	Assessment: Students match the rhythm to the words and play the rhythms on their instrument. Students match the melodic patterns to the	Summative Assessment: - Practice Chart with recorded practice time and listening. - Written rubrics

melodic patterns to the unfamiliar notation G. Write music in standard music notation H. Read unfamiliar melodic patterns written in standard music notation	reading an unfamiliar passage while producing good tone and regarding phrasing on an instrument.	written standard notation patterns and play them on their instrument. Student sigh-read an unfamiliar passage from book.	- Observation and discussion notes.

Sequence

Learning Outcomes	Rational for Sequence
A. Identify the notes singing and playing on the instrument – letters, solfege, and fingering.	Similar to learning a language, students need to listen and copy, learning the first songs by rote. Auditory development is a primary focus in learning to play a stringed instrument. Singing is vital to ear-training. That is why the students are led to copy and sing with and without an instrument. As they do, new challenges are added: sing with solfege, sing with letters, sing with numbers, sing while air bowing, etc. The notes are discovered by students playing "body scale" visualizing pitch as well as using the Curwen

	hand signs. This gives students a concrete, rather than abstract feel and visual of the intervals between the notes. Then the pitch is discovered on an instrument and identified by the students. The simple songs using 3-4 notes are used.
B. Demonstrate correct playing posture: sitting and standing tall, holding an instrument without unnecessary tension, with round and strong fingers on strings, and loose bow hold.	Continuing practice of physical skill on the instrument is imperative to student's success. If the student has a solid foundation and is able to play properly without looking at his or her instrument or fingers, then adding note-reading will not present a hurdle to him or her.
C. Identify a secret song, using solfege, letters and finger numbers.	Used as an assessment and as an engagement activity, secret songs help teacher determine whether or not the music has been internalized by students. If it has teacher can proceed to the next step. If not, and the students are having a hard time identifying the piece of music then teacher should spend more time on that piece – practicing in different ways to solidify the form and the structure of the piece. It also captivates students to try to guess what piece of music is being clapped, played or is partially written on the board.
D. Experiment and create a rhythmic variation on familiar songs.	Through exploration, students discover for themselves new notes and rhythms which they will

	later encounter in written form.
E. Create own version of high, medium, low sounds – draw HCB melody using pictures and symbols.	Students draw the three pitches, demonstrating their understanding and creativity of how pitch is used to create songs.
F. Choose rhythmic notation for the appropriate variation.	Music is communication and if students can read the rhythmic patterns and associate them with certain words and phrases they will be able to translate symbols intosoundsd.
F. Match familiar melodic patterns to the unfamiliar notation	After singing and playing melodic patterns such as Mi-Re-Do, Do-So-Do, Mi-So-So, and such, and after drawing their own version of HCB, students have enough experience to make inferences to what those melodic patterns would look like in music notation.
G. Write music in standard music notation	If students spend time writing music notation and carefully identifying the lines and spaces in order to send the information, they will gain an understanding of how to read and decode such information as well.
H. Read unfamiliar melodic patterns written in standard music notation	After spending time with familiar patterns, recognizing, writing and reading, students can infer that knowledge to the unfamiliar patterns, recognizing, reading, and playing them on their instruments.

Development - Gagne's Nine Events of Instruction

1. Gain attention	A mystery song is on the board. While students get tuned and set up they try to guess the song. Mystery song is either written with solfege, letter names, finger numbers, graphs or missing notes, giving students extra challenge at thinking musically.
2. Inform learners of objectives	Teacher announces the "plan of the day" so students know what to expect and keep themselves motivated to finish the lesson's objectives.
3. Stimulate recall of prior learning	The mystery song always connects to what students learned in previous lessons.
4. Present the content	The content is presented visually, (on the board, teacher modeling), auditorily (through listening, singing, and playing), and through experiential hands-on playing. If students forget their instruments, there are extra bow sticks to use and PVC pipes to practice placing stickers on. Students regularly take turns pointing on the board.
5. Guide learning Participants	Teacher asks leading questions, guiding students to discover the answers through practice.
6. Elicit performance (practice)	Students are encouraged to perform for each other and play together as much as possible. When one students is chosen to do a solo, the rest either sing, or pluck, or airbow, or finger, or hand sign.

7. Provide feedback	Teacher provides immediate feedback, highlighting what went well. If time permits, teacher elicits feedback from musicians, leading them to the next step.
8. Assess performance	Teacher posts a rubric on the wall, where students can along with the teacher self-assess their own performance and that of their peers.
9. Enhance retention and transfer	Students have turn and talk moments in class. "Turn to your neighbor and talk for 30 seconds about what went well and what we should change… Now, let's do it again, but with you changing that one thing." Students have regular assignments to teach their family members new songs they've learned. Students earn extra points for teaching a family member to play.

Implementation Checklist

Instruments	Teacher makes sure every student has an instrument that fits them well. Teacher tunes the instruments every practice. Teacher brings her instruments to model.
Accessories	Teacher ensures that all students have the right accessories to support their instrument: correct size

	chairs for cellos and basses, end pin slippers, sponges or shoulder rests for violins and violas, rosins and pencils.
Piano	Piano is tuned and accessible.
Chairs and music stands	Correct size chairs for cellos and basses. Violins and violas stand to play but use chairs for spacers and to put their cases and music.
Classroom materials	White board, markers and erasers. Extra pencils, bow sticks and PVC pipes. Posters with playing rubric for assessment. Proper lighting and safe, uncluttered space.

Appendix R: Sound-Based Workbook

Strings Workbook

Book 2

Student's Name: _____

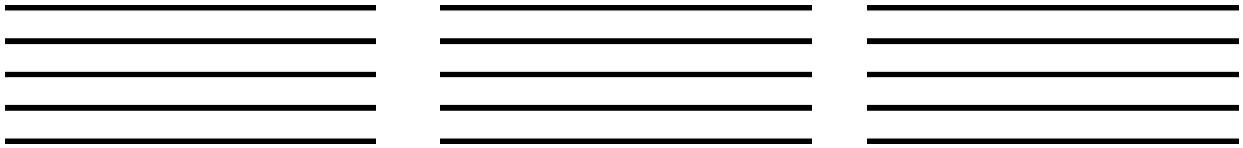
Sing Hot Cross Buns melody. Draw the sound pattern on this page.

What do you think Hot Cross Buns would look like? Which way does the music go?

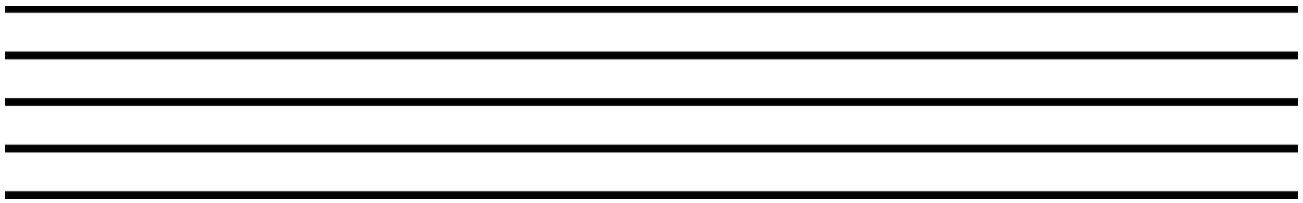
Sing Mary Had a Little Lamb melody. Draw the sound pattern on this page. What do you think it would look like when the notes go in steps? What would it look like if the notes go in skips?

Sing the melody to Twinkle Twinkle Little Star. Which way does the melody go? Do you hear a skip, a step, or a leap? Draw the sound pattern on this page.

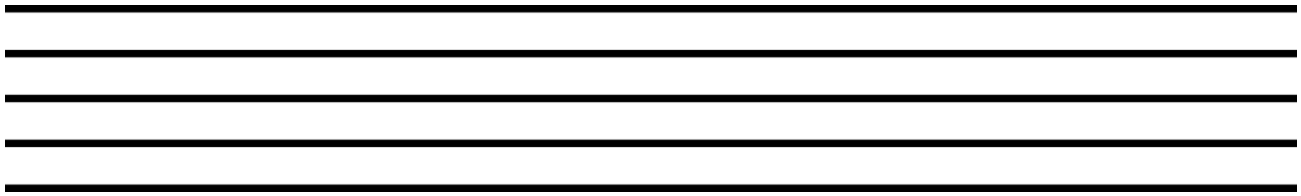
Draw a note:



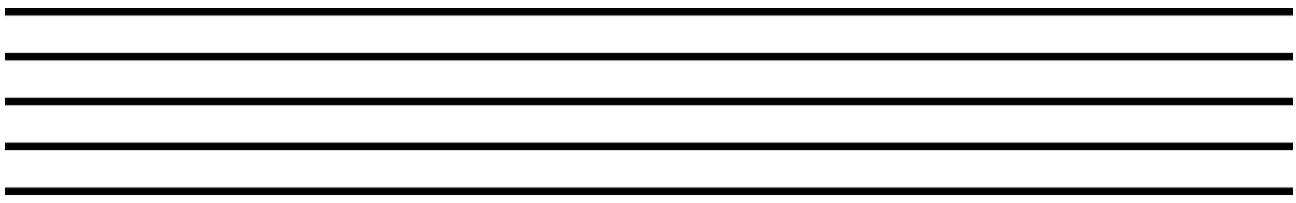
Write all open strings on your instrument:



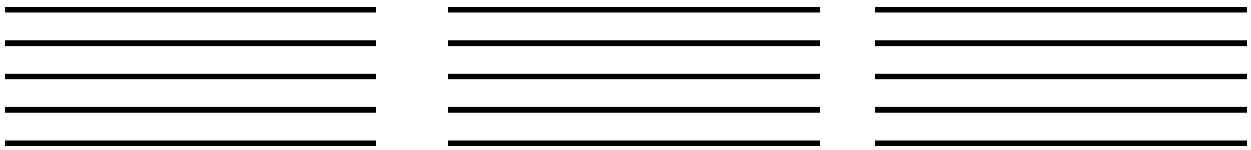
Write Bassline to Hot Cross Buns:



Write Melody to Hot Cross Buns:

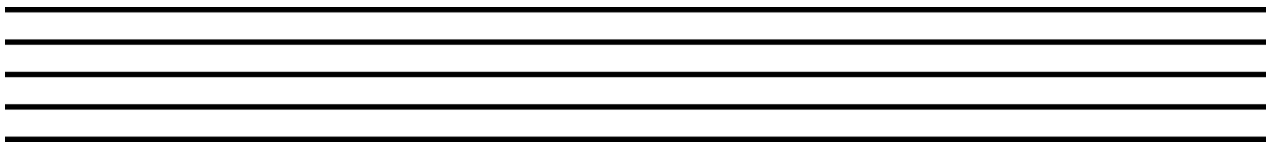


Draw your clef:

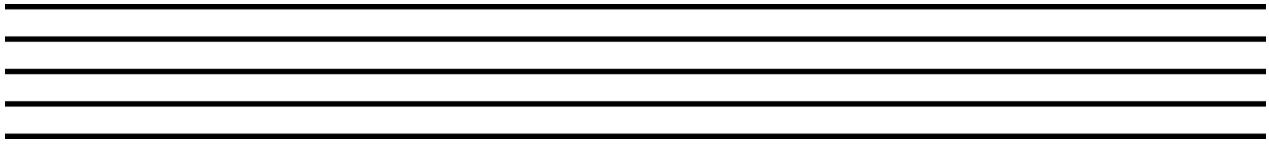


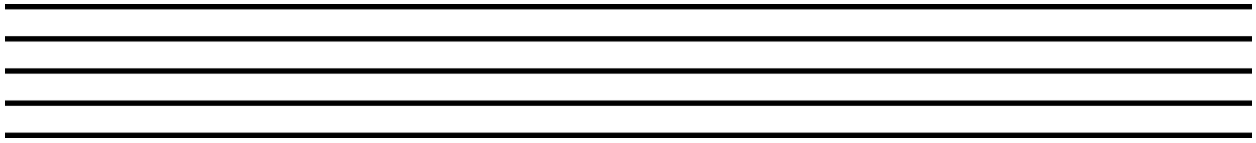
Write the name of your clef: _____

Write Bassline to Mary Had a Little Lamb:

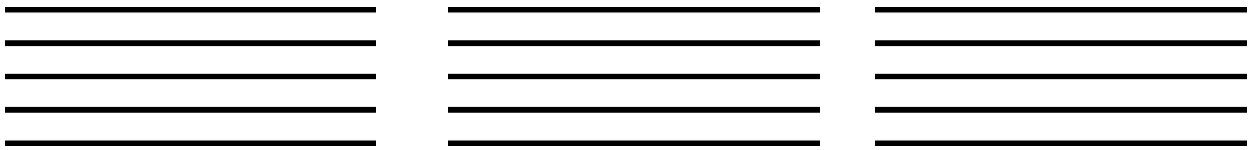


Write Melody to Mary Had a Little Lamb:



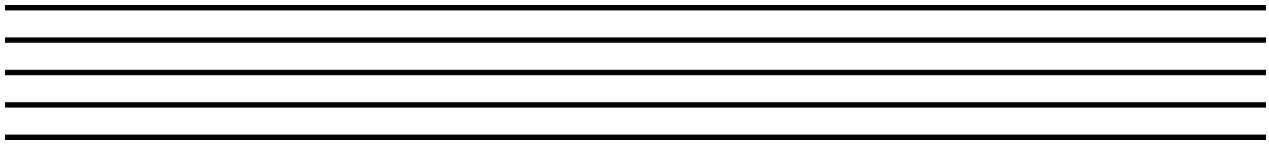


Draw different time signatures:

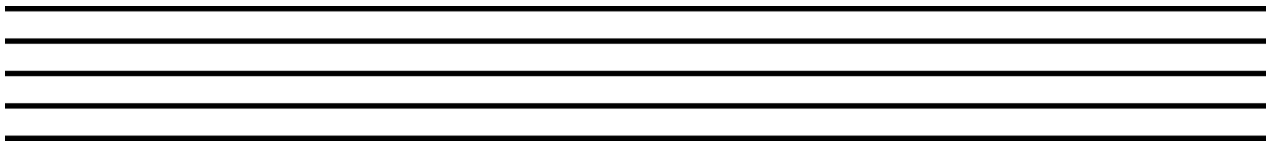


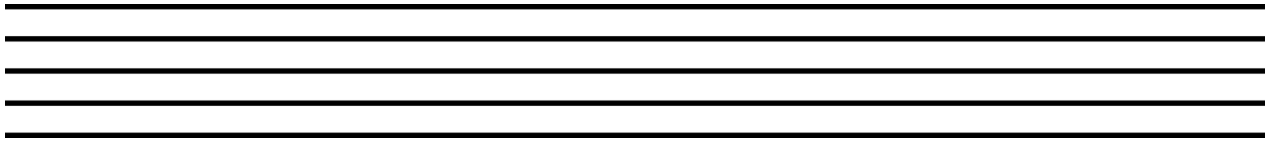
What does the top number represent: _____

Write Bassline to Au Claire de la Lune:



Write Melody to Au Claire de la Lune:

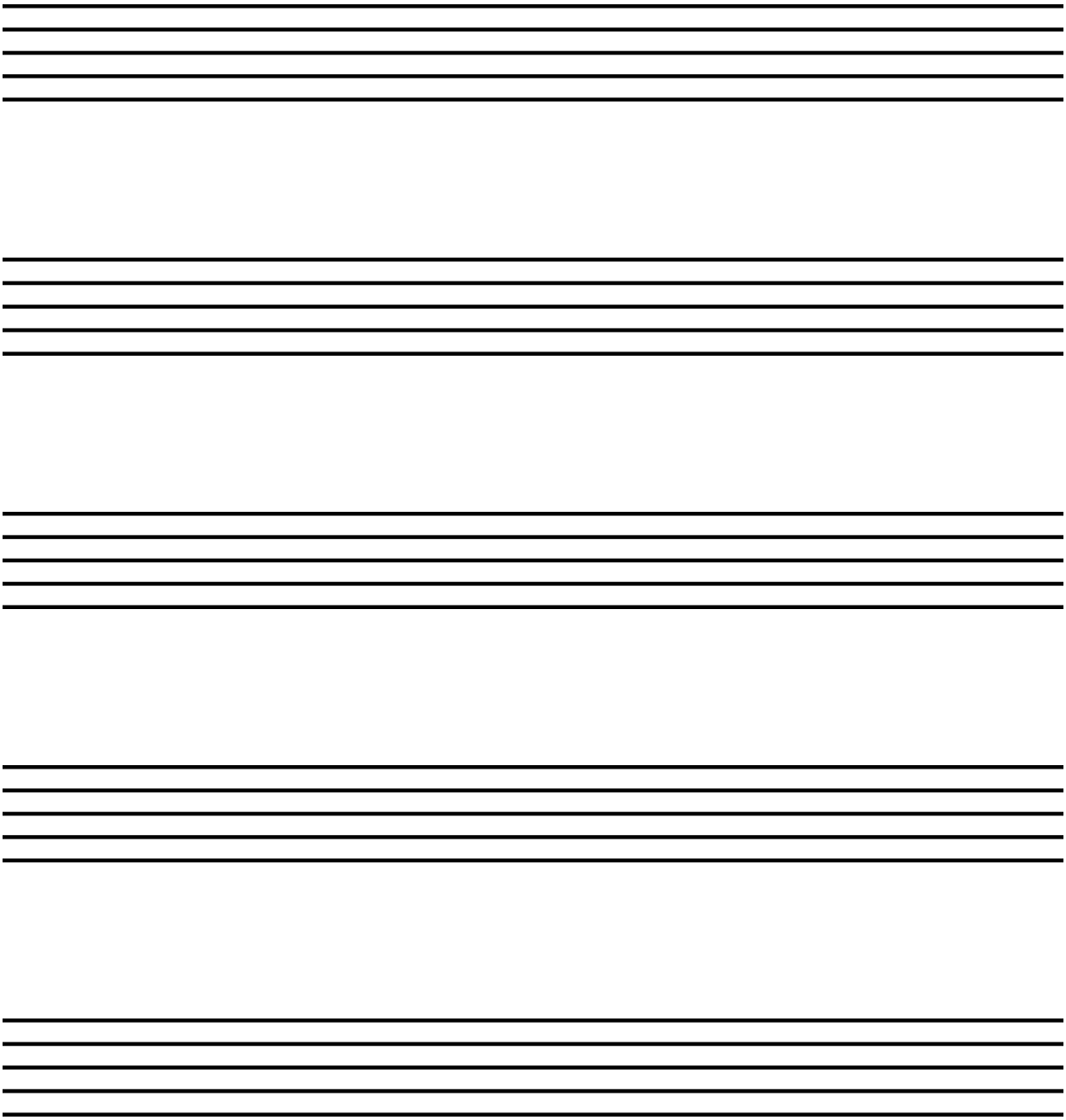




Write Twinkle, Twinkle, Little Star:

What is the form of the song? Use letters ABCD… to describe:

Write a D Major Scale:



What is a scale?

_____

Appendix S: Permission Request

Davis Joint Unified School District
526 B Street Davis,
CA 95616

To Whom It May Concern,

As a graduate student in the School of Music at Liberty University, I am conducting research to better understand the optimal sequence of teaching beginning instrumental music classes that would provide the best foundation for note reading. The title of my research project is Learning Sequence for Beginning Strings Classes and the purpose of the study is to examine and analyze a learning sequence that will best lead to music literacy as well as positively engage the learner in music-making.

I am writing to request your permission to conduct my research at Chavez, North Davis, Patwin, and Pioneer schools. In this research the participants will be current fifth or sixth graders, enrolled in beginning strings classes (violin, viola, cello, or bass), without any formal music background, and without the ability to read music. Participants, if willing, will be randomly assigned into either a control group or intervention group.

Students in both groups will be asked to practice their instruments weekly and record their munites (10 minutes), participate in seven 3-minute discussions at the end of each class, fill out two short confidence surveys (5 minutes each) and take two informal assessments (5 minutes each) over the course of seven weeks. Parents will be asked to complete two motivation questionnaires about their students during the seven weeks (5 minutes each). At the end of the seven weeks, students in both groups will complete two tests from their string orchestra schoolbook (15 minutes each) and make a short audio recording of themselves playing their instrument. (20 minutes).

Participants will be presented with informed consent information prior to participating. Taking part in this study is completely voluntary, and participants are welcome to discontinue participation at any time.

Thank you for considering my request. If you choose to grant permission, please provide a signed statement on official letterhead indicating your approval.

Sincerely,

Lydia Cooley
DJUSD Elementary Music

Appendix T: Liberty IRB Application Approval

IRB #: IRB-FY22-23-367

Title: The Effect of Auditory-based Strings Curriculum on Music Literacy

Creation Date: 9-30-2022

End Date:

Status: Approved

Principal Investigator: Lydia Cooley

Review Board: Research Ethics Office

Sponsor:

Study History

Submission Type Initial **Review Type** Expedited **Decision** Approved

Key Study Contacts

Member Lydia Cooley **Role** Principal Investigator **Contact** [redacted]

Member Lydia Cooley **Role** Primary Contact **Contact** [redacted]

Member Nathan Street **Role** Co-Principal Investigator **Contact** [redacted]

Appendix U: Qualitative observations

To answer the second research question about specific areas where the depth of knowledge can be observed in classroom performance, researcher used rubrics, auditory exercises on guessing the music, and improvisation, the teacher-researcher performed her assessment alongside the students' self-assessment of their skills, such as right- and left-hand positions and intonation.

Table 1: Teacher's assessment of basic foundation skills.

Posture	0.25	Favors intervention group
Left-hand fingers	0.27	Favors intervention group
Left-hand wrist	-0.31	Favors control group
Bow on one string at a time	-0.01	No notable difference
Even quality tone	0.18	Favors intervention
Summative score	0.38	Favors intervention

Source: Excel statistical data

The puzzle of the secret song revealed students' understanding of form. Besides leaving out a few notes, the mystery of the secret song on the board also left out the second A of the ABA part of TTLS, causing intervention group students to conclude themselves. Students understood the form of the piece by exploring and puzzling. Through this game, students memorized a new song's theme quickly.

The researcher observed that intervention group students easily connected to various rhythmic patterns after creating their variations on TTLS. One student suggested using "strawberry cheesecake" as a variation and flipping the words "cheesecake strawberry." Students successfully changed their rhythm from triplet eighths and two quarters to two quarters and triplet eighths.

For a familiar song review, the researcher/teacher played piano introductions, wrote a rhythm, or played part of the melody on her instrument to let the students guess the songs. If the students can guess the song and the music is internalized, additional tasks such as reading and writing should be easier to achieve. Most intervention students in week four could guess the pieces correctly, demonstrating their readiness for encoding and decoding the musical symbols that now had a concrete connection to sound.

The researcher observed that many students in the control group noticed that the two lines of music were similar. Students were so involved in decoding the notes of Boil Them Cabbage that no attention was paid to intonation or phrasing. The teacher-researcher also noticed that when the intervention group played by memory through TTLS, the attention was on quality sound and intonation. Students shaped the phrases the same way they sang the song. When one of the intervention group students made a mistake, she audibly started singing the letter names of the song until she found her spot and joined the group with her bow on the string. Another example of the music being internalized was observed when an intervention group student made a mistake playing the melody to Mary Had a Little Lamb; she switched to playing the bassline with open strings and finished the song together with the group.

According to final assessment results, the students who created their own symbols of the musical notation for Mi-Re-Do, Mi So, and Do-So seemed to identify melodic patterns easily, whether familiar or not. According to Table 3, control group students were better at performing pieces where notes moved in steps – Hot Cross Buns, and Monkey Song. According to the same table the intervention group students seemed to do better at performing pieces with skips and leaps – Mary Had a Little Lamb and Twinkle, Twinkle Little Star.

Table 2: Students' Rate of Confidence in Playing Familiar Pieces and Teaching Family Members.

Playing arco on one string at a time	0.08	Favors intervention group
Hot Cross Buns melody	-0.32	Favors control group
Mary Had a Little Lamb	0.22	Favors intervention
Monkey Song	-0.01	No notable difference
Baby Shark	-0.12	Favors control group
Twinkle, Twinkle Little Star	0.42	Favors intervention group
Teaching family member	-0.09	Slight difference favoring the control group
Summative score	0.45	Favors intervention

Source: Excel statistical data

Weekly Observations and Discussions

Week 1

The control group was introduced to note-reading by having the researcher/teacher point to her fingers as lines and sing familiar songs, like Hot Cross Buns and We Will Rock You. After the researcher introduced Guido d'Arezzo and explained the idea of placing notes on the staff lines, students began decoding open D and A strings on page 5 in the Sound Innovation Method book. Students observed that they were engaged in the lesson and successful at reading. The researcher observed a few students having difficulty tracking music with their eyes and not looking at their fingers.

The intervention group began with exploring the Twinkle Twinkle Little Star (TTLS) and its variations. TTLS was presented to them as a secret song written with solfege on the board. Only A and B out of the ABA parts were written, and some notes needed to be deduced. After puzzling it over, singing, and playing on instruments, students guessed the song and could play all ABA parts by ear. The researcher then introduced the idea of Themes and Variations. Students created various ideas of what they wished for: "wish I had a puppy," "wish I had more

sleep," and such. Researcher wrote the words and rhythmic notation representing students' ideas. Students observed that they were engaged in the lesson, and the time flew by too fast. One student said, "Is it time to go already?" Students also observed that they enjoyed creating and playing their own variations for others in the class. The researcher observed that students were captivated by the puzzle of the secret song. The researcher also observed that students who didn't quite get all of the notes of TTLS at first were victorious by the end of the class after playing all the variations.

Week 2

After reviewing the open strings page, the students in the control group worked through page 6, decoding the notes on the D strings. Students first sang, then plucked, then played with a bow. Students observed that they were engaged and successful at looking at more notes to decode. The researcher observed a couple of students looking at the clock in the middle of the class. The researcher also observed that a few students needed help following the music and playing their instruments simultaneously.

After reviewing the TTLS and variations, the intervention group students were prompted to draw the sound of Hot Cross Buns – high, medium, and low notes. Students used symbols, lines, and shapes to draw on the board and in their workbooks the high, medium, and low sounds. Students drew the HCB melody. Students then used their instruments to play the HCB melody looking at the symbols they created. Students observed that although they did not expect to draw sounds, they were engaged in the lesson and felt very proud of their masterpieces. The researcher observed that most students were captivated by their challenge to create their own. Some students who played piano and were familiar with note-reading found it more challenging to create their symbols.

Week 3

The students in the control group reviewed the notes on page 6 and moved on to page 7 – notes on the D string. A few more students checked the clock throughout the lesson. Although all students seemed to understand the concept of decoding the musical symbols, a few were slower at reading, getting lost in the music and not tracking the notes. The researcher also observed that although the reminders were given about the hand positions, the students' posture and technique were negatively affected by their focus on reading music.

The students in the intervention group reviewed TTLS. Each variation was spoken, and syllables were written in standard notation form on the board. The researcher then wrote a few different melodic patterns on the board: Mi-Re-Do, Do-Re-Mi, and Do-So-Do in a traditional musical notation and asked the students to pick the one that looked like Mi–Re–Do. Students did so successfully. The researcher then introduced the students to Guido d'Arezzo, the finger version of HCB, and We Will Rock you. Students then practiced writing their notations in their workbooks. Students observed that they were engaged in the lesson activities and felt confident playing for each other. The piano students who were less involved in the previous lesson found it "fun" to write their own. The researcher observed piano players helping others write the notes on the correct lines and spaces.

Week 4

The students in the control group reviewed page 7 in the method book. The teacher tried to engage the interest of the whole group by pointing to and demonstrating various variations on the *Boil Them Cabbage* tune that could be done at the end of this page. The researcher/teacher asked students to sing, pluck, and then play with a bow for each number. The researcher observed that students concentrated on decoding the notes and did not correct the out-of-tune

notes or try to shape a phrase. Students put the correct fingers down on the correct string in the wrong places. Two students commented that they were lost and disengaged during this lesson. The researcher noticed that some students were visibly discouraged by their playing. One student said this was a "harder lesson," and four other students agreed with him.

The students in the intervention group began by reviewing familiar songs. The researcher noted that some students needed to internalize the pieces and would require further practice. The researcher also noted one particular student in the intervention group who, when she made a mistake playing the melody, began to sing the letter names of the song audibly. In a few beats, she found her place and returned to playing. Another mistake was corrected by the intervention group student, who, after making a mistake in fingering while playing the melody to MHLL, switched to playing the bassline and finished the song.

The researcher wrote familiar rhythmic patterns on the board and asked students to guess which matched the sound: quarters and eighths, halves, and sixteenth. Most students were able to identify which one was which. Students observed that the lesson flew by too fast. The researcher observed that the students could still attend to their hand positions and postures while learning to interpret rhythmic symbols, as their attention was still on their instruments. The researcher had a visiting teacher that day, who observed students playing musically, shaping the phrases as they would sing them.

Week 5

Students in the control group have reviewed Boiling Cabbage Down from page 7 in the book. The teacher then explained the need for ledger lines and had the students sing while pointing to their five fingers as five lines of the staff: A, B, C#, and D. Then, students played

songs on page 8 involving the notes on the A string. The teacher observed that it took work to keep the students engaged. One student observed that the lesson seemed to “drag on forever.”

Students in the intervention group reviewed familiar notes and fill in the blank bubbles on the board with the names of the letters on the D and A strings. Students played D Major scale and down and in different rhythmic variations. The teacher observed that the students were engaged and played in tune. One intervention group student commented, “she was bored because all of this was easy, and she was ready to learn more songs.”

Week 6

For reading unfamiliar music assessment, three lines of music were taken from New World Symphony Theme by Antonin Dvorak, arranged by Michael Allen. Students were asked to write down the names of the notes, sing all three lines, then play them. The researcher assessed students’ ability to name the notes and quarter rests, sing in tune, play pizzicato, then finally play arco in tune and with appropriate phrasing. With one exception, all students were able to name the notes and expressed self-pride after they finished.

During the control group assessment, the teacher noticed that students needed to pay more attention to where they placed their fingers. They were focused on the paper. The researcher observed that one student who took piano lessons omitted all of the rests. Two students played by connecting the bows and creating short phrases as they played.

The researcher noticed that students sang in tune during the intervention group assessment. A few students looked at and adjusted their finger placement while reading the notes. When playing arco, two students played with staccato bows. The rest of the students shaped the phrase as they sang it. The teacher-researcher noted one intervention student connecting long bows even when crossing strings.

After the assessment, students in both groups sight-read the entire one-page arrangement of the New World Symphony Theme. They were visibly proud to play this piece. All students could track the music with their eyes without losing their spots. The same tendencies as in the three-line assessment were observed during the sight-reading of the entire page.

In the follow-up lesson with the controlled group, the teacher worked on intonation, singing, and placing fingers in the correct spots to match the sound. Two students needed help breaking the habit of just placing fingers on strings without listening and adjusting. In the follow-up lesson with the intervention group, the teacher asked the students to read pages 6 and 7 in the method book. Students were able to read the notes without looking at their fingers. All except one student played fairly in tune. The teacher then challenged the students to place their finger on the wrong spot on the string and, without looking at their hand, try to match the pitch played by the teacher. All students successfully adjusted their pitch to match the teachers. The one student who had played out of tune during sight-reading took longer to adjust. He did correct his pitch eventually and without looking at his fingers.