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The Benefits of Music: An Exploration of Music in Core-Curriculum Classrooms

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THE BENEFITS OF MUSIC:
AN EXPLORATION OF MUSIC IN CORE-CURRICULUM CLASSROOMS

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HONORS PROJECT

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The Benefits of Music

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An Exploration of Music in Core-Curriculum Classrooms

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Introduction

DEVELOPMENT & BACKGROUND

When I was in high school, I remember how often I used to hear my peers state their distaste for or disinterest in the required courses such as English and math, or, as my peers put it, “the classes we have to take.” In my personal experience, too, I remember feelings of confusion, frustration, or disinterest in the math and science areas; yet, these core-curriculum subjects are required courses in the school system. Often times, the rigorous academic requirements for core-curriculum subjects exclude or limit opportunities for students to be involved in music or the arts during the school day. As a high school student, I was unable to participate in choir--a class I had grown to really enjoy throughout middle school--during my freshman year due to blocked scheduling for my advanced math-science courses. What is more, any arts- or music-related after-school programs are in competition with the academic extracurricular activities as well. I felt considerably troubled by the idea that students would be lacking in exposure to/experience in the arts and concerned by how quickly music and art programs are being cut in schools. Not only does the decision to eliminate these programs seem to suggest that the arts and music are somehow less significant or less valuable than other academic subjects, but this view is also a tremendous loss to the students and their education. With my prior experiences as a student and goals as a future music educator in mind, I wanted to develop lesson plans that would incorporate and connect music to the core-curriculum classrooms.

The following questions developed from these reflections and formed the direction of my research for this guidebook: In what ways and to what extent/depth of study does music influence cognition and brain development? What are the implications and benefits of music for general education and student learning/brain development? How can music and non-music educators utilize music in their classrooms to make students more engaged in course content and to enhance cognitive development? Guided by these questions and after extensive research, I decided to create a guidebook of musical information and activities designed for core-curriculum (non-music) and music courses at the elementary, junior high, and high school levels.

As I conducted research for the guidebook, I found an abundance of articles and research containing supportive evidence of the countless benefits of music related to development of the brain. In his article, Weinberger, founding member of the Center for the Neurobiology of Learning and Memory, explains the benefits of and the relationship between music and (a) behavior, (b) the synapses of the brain, (c) reading comprehension, and (d) reasoning; he writes, “Learning and performing music actually exercise the brain--not merely by developing specific music skills, but also by strengthening the synapses between brain cells” (Weinberger, 1998, p. 38). He continues to list the major functional systems of the human brain, stating that all of the following systems are engaged when practicing music: the sensory and perceptual systems (auditory, visual, tactile, kinesthetic), the cognitive system (symbolic, linguistic, reading), planning movements (fine and gross muscle action and coordination),

feedback and evaluation of actions, the motivational/hedonic (pleasure) system, and learning memory (Weinberger, 1998). Professor Weinberger's words provide insight into the physical areas of the brain being developed through music and offer support for including music in the general school curriculum because music enhances cognitive and sensorimotor abilities, critical-thinking and problem-solving skill-development, as well as information-processing and memory systems. Furthermore, the use of music in the classroom supplies benefits beyond the physical and mental development of the brain and its systems, extending into social and academic applications and advantages.

Incorporating music in the classroom, in addition to brain development, further improves social skill development and academic performance. This idea is supported once again by Professor Weinberger, who wrote, "Music has the ability to facilitate language acquisition, reading readiness, and general intellectual development; to foster positive attitudes and to lower truancy in middle and high school; to enhance creativity; and to promote social development, personality adjustment, and self-worth" (Weinberger, 1998, p. 36). Sylwester stated, "The arts are highly integrative, involving many elements of human life" (Sylwester, 1998, p. 32). Lucas explained it is possible "...to use music to help your child retain information and enhance learning" and that "sounds can help to hold our attention, evoke emotions, and stimulate visual images" (Lucas, 2013). Music offers an opportunity for students to practice collaboration and team-building within the classroom, as well as creative thinking and coordination of mind and motor skills. The significant role music plays in brain development is academically applicable to other subject areas and helps with learning, memory, and retention. What is more, music helps make learning--even learning about a subject in which the student is less interested--more enjoyable for the student, as music activates the pleasure center of the brain; this pleasure center, the idea that music is a reward, is largely what I believe will make my Honors Project Guidebook effective in my aim to engage students in other subjects through musical study and activity.

ORGANIZATION & STRUCTURE

This book is divided into two main sections of collaborating subject areas: (1) music & English, and (2) music & math. Each of the larger sections contains specific, complementary lesson plans connecting the two subject areas and is organized by grade ranges applicable to the lesson. For instance, the first section of the guidebook, "Music & Math," is split into two subsections: (1) Plans for Grades K-5, and (2) Plans for Grades 5-8. Some activities and lesson plans can be adapted to apply to multiple grades/grade ranges.

While some of these activities are of my own design, the rest of the lessons and activities are adapted or come from outside sources, including observations of more experienced teachers, research resources, and academic articles. Furthermore, some of my own lesson activities are general, generic lessons used by many teachers in public domain that are not directly attributed to any one individual or organization; I have tried to add my own ideas/flavor to these widely-used and familiar activities and then compile, combine, and arrange them in ways that are complementary, drawing connections to the core subject areas.

This guidebook provides samples of possible activities and ideas, rather than whole lesson plans. By providing smaller ideas as starting points, the guidebook enables teachers to not only implement the provided activities, but will also encourage and equip teachers with tools to develop their own creative activities and lesson plans. The purpose behind these musical activities to use within the classroom will be to facilitate and improve student participation and interest in core-curriculum subject areas. Students will gain access to a different kind of creative outlet to engage in dialogue with their teachers as well as a more naturally relatable and understandable medium (music) through which to learn and comprehend the content presented in the classroom while developing areas of their brain through music.

Challenges in developing this project arise from the fact that many non-music teachers will have little-to-no musical knowledge or experience; therefore, I needed to ensure that the guidebook, designed to develop the students' brains and assist learning in the classroom, is a resource that the teacher will be able to understand and confidently utilize in his or her classroom. Since many of the articles provide supportive evidence that indicates the benefits of formal musical instruction in other subject areas, some of the activities in the guidebook will be, by necessity, of a more challenging and formal musical nature. Most of these higher-level activities will be designed specifically for the music classrooms and teachers; however, benefits exist within these more advanced activities for non-music classes and teachers as well, even if some teachers or students lack the education or knowledge to immediately understand. The guidebook can offer some explanation and sample exercises to guide teachers, but can also appropriately challenge the students and teachers in an area with which they are not as familiar and enable them to work together. These more advanced musical exercises will require teamwork, critical thinking, creative thinking, and problem-solving, but for students who do have the musical background and capabilities to comprehend these more advanced exercises, they can test their own understanding further by being a guide to their classmates (and even their teachers!). Another obstacle to overcome involves time; classroom time is already very limited, and much of it is already accounted for. Thus, since the guidebook will require teachers to modify their own lesson plans and incorporate musical activities (with which they may have little or no prior experience or knowledge), a significant goal for this project will be to ensure that the musical activities do not deviate too much from core subject matter, taking into great consideration the time and abilities of the non-music teachers as well as state requirements these teachers are expected to meet.

The goal of this guidebook is to facilitate teaching and learning in order to engage learners; to develop their brains, interest, and investment in each subject through a more approachable medium; and to aid teacher's pre-existing lesson plans through efficient and effective exercises directly related to certain, non-music subject areas. Through this guidebook, I will explore various grade levels (elementary, junior high, and high school) and subjects (English, math, and music) with the ultimate goal of developing students' brains, skills, and knowledge, and engaging them in subject areas in which they may not typically find interest or capability.

- Courtney Froehlich, 2013

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Part One: Music & Math

Grade Ranges →	**Grades K - 5**			**Grades 5 - 8**		
Related Concepts ↓	Complete-the-Measure	Musical Equations	Addition/ Subtraction Song	Counting	Playing Fraction Pies	The Memory Songs
Addition/ Subtraction/ Mathematical Operations	✓	✓	✓	✓		✓
Counting/ Counting Music	✓	✓		✓		
Fractions				✓	✓	
Length/ Measurement				✓		
Memory			✓			✓
Note Values	✓	✓		✓	✓	
Rhythm	✓	✓		✓		
Rhythm Syllables				✓		
Time Signatures	✓			✓	✓	

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Part Two: Music & English

Part One: Music & Math

PLANS FOR GRADES K - 5

Related Concepts: Rhythm, Counting, Time Signatures, Note Values, Addition/Subtraction
Use In: Music classrooms
Lesson Activity: Complete-the-Measure

Activity Description: **Complete-the-Measure**

Purpose: Teaching/reviewing time signatures and note values. Hand out worksheets (work in small groups/individually) or project on the board and complete as a class.

Directions: Students must fill in each measure with the correct note values to make the measure complete. For example, you provide an incomplete measure in 4/4 time that contains a dotted half-note, and the students must fill in a quarter note (or two eighths, a quarter note rest, etc.). Use addition math skills to explain/facilitate completion.

Example:

Complete this measure in 4/4.
Which note gets the beat? (Circle one): ♩ ♪ (correct answer: ♩)

How many beats per measure? (Circle one): 1 2 3 4 (correct answer: 4)
Which note value finishes the measure? Draw the note value at the end of the measure:

♫ ♩ ♫ ___ (correct answer = ♩)

Expanding/Connecting: Utilize the students' mathematical abilities by having them assign numerical values to each note value. For instance, in a measure of 4/4, a quarter note would be 1, and an eighth note would be .5. With this "mathematical code," have students write the numerical value under each note value; place addition signs between each note value, and instruct students to complete the addition equation by adding all of the numerical values beneath each note value. Ask critical thinking questions: What should our note values add up to in a measure of 4/4? If we add the three note values we already have, can we figure out how much we still need to reach that number? To increase difficulty, change the time signature, or increase the number of measures to be completed, or include other note values, such as sixteenth notes.

*Great activity to connect units or to review content/skills between grade levels!

MUSIC & MATH: PLANS FOR GRADES K - 5 (continued)

Related Concepts: Rhythm, Counting, Note Values, Addition/Subtraction
Use In: Music classrooms
Lesson Activity: Musical Equations

Activity Description: **Musical Equations**

Purpose: Teaching/reviewing note values and counting. The purpose is to help students practice/apply their understanding of how the note values relate to each other and how the mathematical operations relate in music as well as how the operations of addition/subtraction function in general.

Directions: Give students (or have students create) pictures/cut-outs of eighth notes, quarter notes, half notes, whole notes, dotted notes, etc., as well as subtraction and addition symbols. Using these visuals, have students arrange "equations" on the floor to apply their knowledge of addition/subtraction and relative note values. You can also lead this activity a few times first by asking students to create equations that equal a specific note value or set of notes. For example, you might ask students to create an equation that adds up to a whole note (so, use addition symbols only), or an equation that equals a half-note plus a quarter note. Answers will vary, as students could choose two half notes to equal a whole note or choose four quarter notes, etc.

Example: (sample equations)

♫ (or ♩) - ♪ = ♪ (1 - .5 = .5) *in 4/4

♬ + ♪ = ♩ (.25 + .25 + .5 = 1) *in 4/4

Expanding/Connecting: For an added challenge, give students examples of incomplete or incorrect measures and ask them to use addition or subtraction operations as needed to fix the measure. For example, if a student has a measure of 4/4 with only three quarter notes in it, the student would need to use addition and add one quarter note to complete the measure. If the same 4/4 measure had five quarter notes this time, the student would need to use subtraction to remove the extra quarter note, correcting the incorrect measure.

Another extension of this activity could be to have students work in pairs to develop equations. For example, as one student writes an equation, the other solves the equation, or as one student writes and solves his own equation, his partner writes her own equation that is equal to the same amount. Students could also switch off and "decode" equations: One student writes the numerical values while the other student decodes the numbers and writes the equivalent musical note values that correspond with the numbers in the equation.

MUSIC & MATH: PLANS FOR GRADES K - 5 (continued)

Related Concepts: Memory, Addition/Subtraction (rules)
Use In: Music and/or Math classrooms
Lesson Activity: Addition/Subtraction Songs

Activity Description: **Addition/Subtraction Song**

Purpose: Teaching/reviewing steps in addition/subtraction operations; memory and information-processing tool.

Directions: Using the rules for addition/subtraction operations as taught by the class teacher (math teacher), create words to a familiar melody already known by the students. The tune can come from a song previously learned in music class, or it can be a folk or popular children's song, such as the alphabet song or "Twinkle, Twinkle, Little Star." You can add physical gestures/motions to the song to get students actively engaged and involved in the singing and to increase memory. Holding up symbols and signs to correspond with certain phrases of the song can be helpful to students as well, particularly for visual learners.

Example: (to the tune of "Twinkle, Twinkle, Little Star")

A plus sign means ad - di - tion;
Mi - nus sign means sub - trac - tion.
With a plus, we add to - get-her.
With a min - us, take a - way.
A plus sign means ad - di - tion,
Mi - nus sign means sub - trac - tion.

Expanding/Connecting: Added creativity: Have students compose their *own* song/write their own words to help them remember the rules!

MUSIC & MATH: PLANS FOR GRADES 5 - 8

Related Concepts: Fractions, Length/Measurement, Note Values, Rhythm Syllables, Rhythm, Addition/Subtraction, Counting/Counting Music, Time Signatures
Use In: Music classrooms
Lesson Activity: Counting

Activity Description: **Counting Music**

Purpose: Increase students' understanding of fractions and note durations by drawing connections and using visuals between the two concepts.

Directions: You can complete this activity using either the source website (http://www.philtulga.com/counter.html) or by drawing on the board/creating your own ruler display. The objective is for students to better understand measurement lengths and note value durations, drawing connections between the two concepts. Provide students with a variety of note values (quarter note, dotted quarter, eighth, sixteenth, etc.) and multiple cards of each note value. Have students take turns placing a note value of their choice on the ruler, where every inch is equal to one measure. The challenge increases as students reach the end of the measure and need to calculate how many beats are left! (See the website for examples and more detailed explanation of the activity; also, use of the website is highly recommended because it provides and reads aloud four different kinds of counting system syllables: numbers, Kodaly, Gordon, and French).

Source:
Tulga, P. (1998). Music activities and arts integration lessons: Connecting music to reading, math and science. Retrieved from http://www.philtulga.com/counter.html

MUSIC & MATH: PLANS FOR GRADES 5 - 8 (continued)

Related Concepts: Fractions, Note Values, Time Signatures
Use In: Music and/or Math classrooms
Lesson Activity: Playing Fraction Pies

Activity Description: **Playing Fraction Pies**

Purpose: Teaching/reviewing fractions, counting, and note values.

Directions: Add fractions to make rhythms. Give students (or have students create) pieces of pie labeled with fractions (1, 1/2, 1/4, 1/8, 1/16, 3/4, 3/8, 3/16). Have students arrange patterns on the floor, then transcribe these pie pieces into note values on the board. Students clap and count the rhythm, then compose melodies to fit.
*Also, play and compose melodies on website using different time signatures and instrument sounds: http://www.philtulga.com/pie.html
Great visual!

Source:
Tulga, P. (1998). Music activities and arts integration lessons: Connecting music to reading, math and science. Retrieved from http://www.philtulga.com/pie.html

Related Concepts: Mathematical Operations, Memory
Use In: Math classrooms
Lesson Activity: The PEMDAS Song/Pop Goes the Quadratic Formula/Memory

Activity Description: **The Memory Songs**

Purpose: Aid students in memorizing the order of operations. Provide auditory learners with an avenue for learning and a mnemonic device for remembering the order of operations.

Directions: Teach students the following songs to help them remember the order of operations (PEMDAS) and the quadratic formula, or have the class create their own song together. (This idea can be applied to other mathematical concepts, such as formulas to memorize, steps to solving equations, or other facts/rules.)

Examples:

(PEMDAS to the tune of "Twinkle, Twinkle, Little Star")

P is for par - en - the - ses,
E is for the ex - po - nents,
M means we must mul - ti - ply,
D means we have to di - vide,
A is left for ad - di - tion,
S is last for sub - trac - tion.

(Quadratic formula to the tune of "Pop! Goes the Weasel")

x e - quals ne - ga - tive b
plus or mi - nus the square root
of b squared mi - nus fo- ur a c
all o - ver 2 a.

Part Two: Music & English

PLANS FOR GRADES K - 5

Related Concepts: Reading/Literacy, Melody, Memory, Rhythm & Meter
Use In: Music and/or reading classrooms
Lesson Activity: Story Sing-Along

Activity Description:

Story Sing-Along

This activity works especially well with younger elementary students in the beginning stages of learning how to read. The music and/or non-music teacher can sing a storybook to the children, attaching a familiar tune such as "Twinkle, Twinkle Little Star" to the words in the story. If enough materials are available, it would be useful for all of the students to be able to see and follow along with the words as they sing.

In the non-music classroom, the teacher could ask students to point to certain words after the class has sung through the story/page a few times. The idea is that attaching the familiar melody to the new words will help students with recognition and memory as they learn to read and understand language/sounds.

In the music classroom, one possible extension of this activity is to go back-and-forth between the teacher and the class taking turns singing parts of the story. For instance, using the story Brown Bear, Brown Bear, What Do You See? by Bill Martin, Jr., the students could sing the questions in the book and the teacher could sing the answers.

In both classrooms, the singing is meant to be a tool to engage students and to help them remember the sounds of new words, connecting the visual word with the aural sound of the word in the context of a familiar musical tune.

Sources: (adapted from)
Converse, J. (2013, Sept 9 & 23). Personal communication/observation
Lucas, C. (2013). Boost memory and learning with music. Retrieved from http://www.pbs.org/_parents/education/music-arts/boost-memory-and-learning-with-music/

Related Concepts: Reading/Literacy, Melody, Memory, Rhythm & Meter, Syllables
Use In: Music classrooms
Lesson Activity: Matching Rhythms

Activity Description:

Matching Rhythms

Designed for younger elementary students (or novice musicians), this exercise provides a great way for music teachers to introduce, practice, and review note values, notation, and rhythmic patterns.

Project/write on the board the text to a story students are reading or the words to a familiar song/a song learned in music class. Review the rhythmic syllables used in the music classroom (such as, quarter notes = "ta" and eighth notes = "ti-ti"). After reading and singing through the words (if the text comes from a story, attach the words to a familiar tune), have students try to match the correct note value with each word. For example, the teacher and/or entire class would clap through each line of text and try to put together each line's rhythmic pattern. Students can take turns coming up to the board to paste the correct note value above each word or syllable. Once complete, have the entire class clap and count the whole text (clapping on each syllable to match the rhythm), then sing through the text on its accompanying melody or on a familiar tune. Through this activity, students are making connections between reading words and reading music, developing an understanding of different types of languages, and adding layers of complexity to their understanding as they practice reading words as well as notation through rhythm and song.

<u>Adapted from:</u>
Converse, J. (2013, Sept 9 & 23). Personal communication/observation

Related Concepts: Reading/Literacy, Writing, Melody (listening), Comprehension, Engagement
Use In: Music classrooms
Lesson Activity: Reading & Writing through Songs

Activity Description:

Reading & Writing through Songs

Using popular songs, folk tunes, or even old pop songs unheard of by the students, create worksheets containing fill-in-the-blank lyrics to each song. Leave out simple words that the students have recently learned and should be able to spell correctly or are learning to spell. (You can provide students with a word box if you do not want spelling to be the focus of the lesson.) Then, once each student has a sheet and has had a chance to read through the first song, play the first song and ask students to listen, filling in the blanks as they go with the correct (and correctly spelled) words. Play each song a few times before moving on to the next one.

Not only are students actively engaged, they are developing listening skills as well as practicing reading, spelling/writing, and problem identification/solving. This is also a great way to start a new vocabulary lesson, as you can introduce words from the word box (if you provided one) or even words that were already on the sheet and not a blank.

For added fun, make up your own songs or implement this activity into a particular unit! If, for instance, students are learning about the different seasons, they can write the lyrics in reading/English class, and then compose a melody to their creation with the music teacher. Then, both teachers can have the class sing the song and write certain words on the board or on pieces of paper.

Related Concepts: Writing/Composing, Melody, Rhythm & Meter, Syllables, Poetry: Haiku, Engagement
Use In: Music and/or English classrooms
Lesson Activity: Musical Haikus

Activity Description:

Musical Haikus

These musical activities are a great way to connect poetry units in English classrooms with a music classroom unit on meter or changing meters! Start by having students write their own haikus in the English classroom, then have the students bring their personal haikus with them to music class. In the music classroom, the students can do one or more of the following activities:

- Compose their own melody to go along with their haiku.
- Match the number of syllables in each line of their haiku with appropriate note values, creating rhythmic patterns to fit specified time signatures (introduces changing meters).
- Incorporate rhythmic movements (clapping, walking, patting, etc.) into their poetry to feel the meter of the haiku and to practice rhythm.

MUSIC & ENGLISH: PLANS FOR GRADES 5-8 (continued)

Related Concepts: Writing/Composing, Melody, Rhythm & Meter, Symbolism, Mood/Emotion, Engagement, Poetry, Reading/Literacy
Use In: Music and/or English classrooms
Lesson Activity: Matching the Moods

Activity Description:

Matching the Moods

The purpose of this activity is to help students understand the symbolism and deeper meanings of texts as they read increasingly more complex and sophisticated literature in English classrooms. After reading a new chapter or a few poems, play (through a recording or on a piano, if available) several distinct melodies portraying a variety of different moods and ask the students to select which sound(s) they think best represent what they just read. Have students rationalize and explain their selections by answering critical thinking questions, drawing specific connections to the text, identifying aspects of the music with appropriate terminology, and making comparisons between the different melodies played.

As an added exercise, have students draw a scene from the chapter or poetry to help establish an image in their mind of what is taking place in the text; have students complete this activity while listening to the music they have chosen as the most fitting for the particular chapter or scene.

Finally, students can develop a list of the "sounds" they hear in the music and match them up with possible moods in the literature. Write the words students come up with to describe the music on the board, then present the terms used to describe the mood of the text and have students match or discard certain words.

**Flip it around*: In English class, play an instrumental piece unknown to the students and have them write a creative story based on what they hear and feel.

*This lesson is also applicable at the 9-12 grade levels.

MUSIC & ENGLISH: PLANS FOR GRADES 5-8 (continued)

Related Concepts: Writing, Symbolism, Mood/Emotion, Engagement, Comprehension, Reading/Literacy
Use In: English classrooms
Lesson Activity: A Musical Journey through Novels

Activity Description: **A Musical Journey through Novels**

This lesson comes from middle school teacher Roger Caswell and his article, "A musical journey through John Steinbeck's *The Pearl*: Emotion, engagement, and comprehension," and is a great model for how to incorporate music into core curriculum classrooms.

Caswell's main purpose is to help students understand and connect to the story on a deeper, more emotional level, moving beyond comprehending the plot and details of the novel, and he achieves this through music.

Select key passages from the novel that are particularly emotional and carry a distinct mood or that are difficult to comprehend and connect with for students. The teacher should bring in songs (pop songs and folk tunes--music that students will be able to easily relate to emotionally) that describe the mood or emotional context in the novel; however, teachers can also assess student understanding of the themes and moods in the story by asking students to bring in their own songs that fit well with the novel once a particular passage has been discussed in class.

*This lesson is also applicable at the 9-12 grade levels.

Source:

Caswell, R. (2005). A musical journey through John Steinbeck. Journal of Adolescent & Adult Literacy, 49(1), 82-87. Retrieved from http://0-apps.webofknowledge.com.maurice.bgsu.edu/full_record.do?product=WOS&search_mode=GeneralSearch&qid=17&SID=3ElfffOoiLod8l3j7PH

References

(This list of references contains the sources from which certain activities and lessons within the guidebook were adapted or inspired, and the corresponding lessons are labeled by sources in the guidebook itself.)

Caswell, R. (2005). A musical journey through John Steinbeck. *Journal of Adolescent & Adult Literacy*, 49(1), 82-87. Retrieved from http://0-apps.webofknowledge.com.maurice.bgsu.edu/full_record.do?product=WOS&search_mode=GeneralSearch&qid=17&SID=3ElfffOoiLod8l3j7PH

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HNRS 4990

Purpose of Honors Project

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As a hopeful future music educator, one of the aspects of teaching for which I have been prepared is advocacy within the schools. When school systems are faced with budget cuts, one of the first areas to be cut or limited are the music and art programs. This information, along with my passion for teaching, learning about, and performing music, was one of the most significant motivators behind the development of my Honors Project. Not only was it necessary for me to fulfill the interdisciplinary requirements of the project, but it was additionally important to me that the nature of my project contribute to advocacy for music in our education systems. Thus, with the guidance of my advisors, I decided to create a practical guidebook of lesson plan samples and suggestions for use within the music classrooms and/or core-curriculum math and English classrooms, combining the disciplines of music and education into one tool for teachers to utilize with their students. In addition to meeting the interdisciplinary requirements and serving as a form of advocacy for music education within the schools, this guidebook project further outlines the numerous benefits of music in terms of student learning, memory, and engagement. Drawing from theories of educational psychology, the National Standards for Music Education, and research regarding the various ways in which music impacts and develops the growth and function of the brain, my Honors Project Guidebook will hopefully provide all music, math, and English educators at the K-8 grade levels with a useful aid to engaging students through unique, creative, and educationally-sound lesson plans. The following paper will outline

the organization and development of the guidebook as well as explain the theories, standards, and research behind the project.

First, a description of the format and structure of the guidebook will be beneficial and give insight into the application of the research involved in the project. The guidebook is divided into two main parts: Music & Math, and Music & English; then, each part is split into two sections based on grade ranges. The grade ranges for both parts include kindergarten through fifth grade (K-5) and fifth grade through eighth grade (5-8), and some of the English & Music lessons can be applied at the high school (grades 9-12) level as well. These grade ranges were selected based on the lesson plans I created, researched, adapted, and cited from other sources, while the lesson plans were designed or chosen based on the type and quantity of related concepts involved or applicable to the lesson. Each grade range contains a certain number of lesson plan samples and ideas for extension, and for every lesson, related concepts pertaining to music and/or math or English are identified and marked in the table of contents. In terms of the selection of the related concepts, these were developed through connections between subject areas; for instance, math and music are interrelated through concepts such as counting, addition and subtraction, and fractions, because both subjects make use of these concepts in similar ways and can enhance student understanding of these concepts by studying their applications in two different subject areas. However, the connections between subject matters were not the only contributing factor in the choosing of related concepts for the guidebook.

The selection of the related concepts was also influenced by the theories of educational psychology, National Standards of Music Education, and the research providing evidence for the multiple benefits of incorporating music into education. Not only did each of these components

provide insight into possible related concepts between math and music as well as between music and English, but the theories, standards, and research also guided the development of lessons and helped to satisfy the interdisciplinary requirements of the project. By including educational psychology theories with national standards for music, the fields of music and education were equally represented within my project. What is more, the incorporation of research offering support for keeping music education in the school systems along with evidence for the benefits of music in terms of brain development and learning proved to strengthen and complement these theories and standards. For instance, in the field of educational psychology, memory and information-processing systems involve the short-term and long-term memory; as teachers, I imagine we would like for our students to process and store information from our lessons into their long-term memories. Some of the ways to activate and store information in the long-term memory include through mnemonic devices, by associating with schemas, or with priming or emotional conditioning (Woolfolk, 2011). In my guidebook, I have included some ideas for using familiar songs to help students remember mathematical operations or formulas; through these previously learned and stored songs, students are engaging and adding to their long-term memory in order to learn new information (the mathematical operations and formulas). Yet, perhaps what is more interesting is that research (Lucas, 2013; Weinberger, 1998; Asmus, 1986) shows the ways music activates the pleasure centers of the brain, and, if students especially enjoy the familiar tunes set to mathematical formulas or just have fun singing or listening to music, their brain's pleasure center will make the learning more enjoyable and rewarding for the students. While the theories, standards, and research are certainly interrelated to and influential on one another, they each offer their own value to the guidebook as well.

Particularly crucial to the development of this project are some of the theories of educational psychology, including information-processing and memory systems. The "Memory Songs" in the *Music & Math* part of the book serve as a memory device that connects prior knowledge (a familiar song, like "Twinkle, Twinkle Little Star") with new information (addition/subtraction mathematical operations), activating the information in schemas students have already developed in order to store the new math information in the long-term memory more quickly, easily, and securely. Additionally, the guidebook was influenced by the National Standards for Music Education; specifically, standards (5) reading and notating music; (6) listening to, analyzing, and describing music; (7) evaluating music and music performances; and (8) understanding relationships between music, the other arts, and disciplines outside the arts (National Association for Music Education (NAfME), 2014). Standard 5 appears in the "Musical Equations," "Complete-the-Measure," and "Playing Fraction Pies" lessons, as students are required to make use of their knowledge about rhythms and note values. Through the English lessons, especially "Musical Haikus" and "Matching the Moods," and "A Musical Journey through Novels," students must listen to, analyze, and describe music, as well as evaluate music, in terms of what the music portrays emotionally and technically, and how music is used as a form of text expression. The final standard listed above is evident throughout the entire book, particularly in these lessons just mentioned; the purpose of this guidebook is to help both students and teachers understand and make use of connections between music and other disciplines (math and English) in order to enhance learning and teaching.

Lastly, the research in favor of music within school systems is plentiful and was essential in devising this project. During my first semester of planning, I read and learned about the

various benefits of music as far as thinking, learning, memory, and brain development are concerned (Bahr & Christensen, 2000; Gaser & Schlaug, 2003; Helmrich, 2010; Hyde, et al., 2009; Lucas, 2013; Weingberger, 1998). Music provides an emotional outlet, offers an enjoyable and potentially more easily understandable medium through which students can learn, and enhances learning by activating the pleasure/reward center of the brain and engaging more areas of the brain at one time. With this supportive research, combined with National Standards for Music Education and theories and concepts of educational psychology, this guidebook serves as an aid for teachers developing lesson plans and as a form of advocacy for music in the school systems by drawing connections between music and the core-curriculum subjects of math and English.

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