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Let's play it by-ear: learning piano in a college setting with an aural emphasis

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LET'S PLAY IT BY-EAR:

LEARNING PIANO IN A COLLEGE SETTING WITH AN AURAL EMPHASIS

by

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This project is dedicated to my greatest supporter, my father
Stanley S.T. Wong

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The person that had the greatest impact on my study of aural learning was my father who played almost entirely by-ear. I say “almost” because he could read notes if he had to but found it much more expedient and enjoyable to play by-ear. It was the ease and joy in which he played tune after tune that I admired most. I have many happy memories, dad.

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ABSTRACT

The primary purpose of this action research study was to find if there were any measurable differences between community college students learning piano with an integrated aural/reading approach and those learning piano with an all-reading approach. Specifically, I examined the differences in performance outcomes and sight-reading ability. Data were collected from pre- and post-test performance measures in note reading, playing of a familiar tune, sight reading, and performance of prepared pieces. As a secondary measure to assess student enjoyment and preferences, student journals were kept, and interviews were conducted for both the integrated aural/reading (aural group) and the all-reading group (reading group). The researcher-instructor also maintained a teacher journal to annotate and reflect on instructional activities and teaching strategies throughout the semester.

The study was conducted in two different phases over two consecutive fall semesters. Participants included students enrolled in two community colleges in California. Results showed that the aural groups had the largest pre-and post-test gains in reading notes in the grand staff for both phases. For sight reading music with limited preview time, the reading groups scored highest in both phases. For performance of

Prepared Pieces, the aural group outscored the reading group in Phase 1 but the reverse happened in Phase 2, consistent with higher pretest scores in playing of any familiar tune for each group. Most students in the aural group enjoyed the by-ear activities and felt that such activities should be included in a beginning piano course. Some students expressed they gained a deeper understanding of what they were playing and were able to self-check for mistakes. I found that by-ear activities seemed to work best for students in the first five weeks of instruction before playing pieces with hands together became more complex.

Based on my experience as a musician and teacher and the results of this study, I believe that an aural approach merits consideration as a core component of the piano course curriculum. Learning by-ear did not hinder reading development and may have helped it, consistent with extant research (Brown, 1990; Glenn, 1999; Haston, 2004; Musco, 2006). Integrating an aural approach with an existing reading-based approach may better suit the needs of today's community college students.

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SONG FOR MY FATHER

With a rousing chorus of "Hello, Dolly!" coming from the living room piano, I knew it was almost time for dinner. Dad always serenaded us kids as a prelude to our evening meal. He made easy transitions from one song to the next, never missing a beat. A jazz musician by hobby, he learned songs by-ear without sheet music. For years, we had a mutual respect for each other's skills—he praised my ability to sight read any music he put in front of me and I marveled at his ability to play tune after tune by-ear without any music. As a formally trained musician, I learned piano by reading first and had sheet music for nearly everything I played. Am I a better musician because I learned to play the piano by reading? Is playing by-ear not a valid approach to learning piano? Certainly, there are many fine pianists who do not read music fluently but are highly respected musicians. If a student could learn piano by doing both—play by-ear and read music—might that not be ideal?

The Problem

Learning to play the piano has been criticized as a mechanical process in which beginning students must correctly interpret the visual symbols on the page in order to play their first piece (Haston, 2004; McPherson & Gabrielsson, 2002; Musco, 2006; Woody & Lehmann, 2010). One cannot expect an individual's first playing attempts to have a strong feeling of tempo, pulse, or phrasing without an aural model. Most adult group method books follow the "sight before sound" approach—learning to read music notation before making sounds--and burden new learners with many visual elements—pitch, note values, fingering, counting, and dynamics. Some popular group methods

books that employ this traditional reading approach are *Group Piano for Adults* (Lancaster & Renfrow, 2008), *Piano for the Developing Musician* (Hilley & Olson, 2002), *Adult All-In-One Course* (Palmer, Manus & Lethco, 1995), *Piano for Adults* (Bastien, 1999), and *Piano 101* (Lancaster & Renfrow, 1999).

Little attention is given to hearing or making sounds because the learning of written musical notation is given priority over developing aural music-making skills. The books listed above begin with an introduction to note values after a brief introduction of hand and finger shape. Then, each pitch is introduced in a simple rhythm, with its corresponding position on the staff, and appropriate fingering. The very first notes played by students are read either on a five line-staff or an "unlined" staff (*Piano for Adults, Piano for the Developing Musician, Piano 101)* on which pitches are placed in a relative high-low position on the page. Typically, beginning students are instructed to keep their eyes on the music and not look at their hands. Usually, no mention is made of what to listen for. Reading and decoding musical symbols is what is emphasized. Paradoxically, these first musical experiences are visual, not aural. To support the idea of sound before sight (or hearing before reading from music notation), different theories of learning by Bruner, Elliot, and Gordon are reviewed.

Theoretical Basis of the Study

The art of music making is an aural endeavor. Asking beginning students to read music requires responding to a visual cue in an art form that is primarily aural in nature. For beginners, learning to play only through reading musical notation is neglecting music's aural essence. Bruner (1966) described learning in hierarchal stages: 1) *enactive*

representation, a set of actions appropriate for achieving a certain result, 2) *iconic representation*, a set of summary images or graphics that stand for a concept without fully defining it, and 3) *symbolic representation*, a set of symbolic or logical propositions drawn from a symbol system that is governed by rules or laws. According to Bruner, each stage, ideally, should be mastered in order and without omission of any stage. In effect, "the sequence in which a learner encounters materials within a domain of knowledge affects the difficulty he will have in achieving mastery" (p. 49). In learning the piano, whether individually or in groups, the beginning student may be missing the first critical stage of musical development-- the *enactive* stage or the ability to make sounds. Although the skill required to make a sound on the piano is comparatively easy (depressing a key), the ability to make a sound freely and "at will" is stifled in a typical beginning piano class. Does a student need to read the note before playing the pitch? According to most piano method books, that answer is yes. The traditional reading approach to learning piano ignores the critical first stage—the physical interaction with the piano and its sounds—and proceeds straight to the last stage, symbolic notation, as the first musical learning experience.

Perhaps an appropriate analogy would be a child learning to play on a balance beam (or see-saw). Initially, a young child learns to compensate for someone of a different weight on the other side of the beam by making adjustments to his/her seating position. In the second stage, a slightly older child knows that this can be represented more symbolically by a model with weighted rings or just a drawing. Finally, in the third stage, the concept of a balance beam can be described in words or in mathematical terms.

It stands to reason that if the concept of a balance beam is taught by verbal description first, the physical and conceptual nature of what it means to balance on a beam may be lost or misunderstood (Bruner, 1996).

It can be implied from Bruner's theory of instruction to music that playing music or making sounds should precede the introduction of music notation. Making sounds on the keyboard is the enactive representation of what is to be learned. The keyword is "action;" it is the act of playing. The paradigmatic discourse of Elliott (1995) can also be used to explain music and its practice. Similar to Bruner's notion of learning first by action, Elliott described the act of making music as *musicing*. The term serves to remind us that long before music composition and notation was developed, people engaged in music-making through improvising and performing from memory. When a musician is demonstrating musical knowledge or musicianship, it is demonstrated in actions and sounds, not words.

In fact, Elliott commented briefly on musical notation and defined it as "a knowledge of how to decode and encode musical sound patterns in staff notation, graphic notation, hand signs, or rhythmic syllables" (p. 61). But he did not equate this skill to musicianship. Reading skill was only one part of the formal and procedural dimensions of musicianship. According to Elliott, "literacy should be taught and learned parenthetically and contextually—as a coding problem to be gradually reduced within the larger process of *musical* problem solving through active music making" (p. 61).

Gordon (1980) developed a music learning theory that is a stage-specific approach to music learning. In his view, the concept of *audiation*, the ability to hear

music and understand music in the mind, was the foundation of music learning and musicianship. Audiation includes the ability to understand the hierarchical nature of tonal systems so as to determine how pitches function in relationship to one another. The development of audiation skills must precede any pictorial and verbal reference as well as any use of symbols or written notation. Defining meter, key signature, or musical form apart from audiation is musically irrelevant. According to Gordon, it is futile to try to precede audiation with theoretical understanding because to do so would prevent comprehensive musical meaning to a melodic pattern (p. 3). An example would be a piano student who cannot tonally audiate or sing what is seen in musical notation but is able to manipulate the correct keys on the keyboard as dictated by the symbols on the page. As for rhythm, the same student may be able to identify the different note values but not be able to play in accurate rhythm or tempo. Without rhythmic audiation, tempo and meter are not felt and conveyed through performing.

Gordon argued that "only when one can *audiate* tonal and rhythm notation can the names and definitions of music symbols become musically relevant" (p. 4). The ability to read music has been linked to aural skills and improvising. It may be unwise to introduce music notation before audiation abilities have developed. Aural skills and the ability to audiate may contribute to improved sight reading ability. If a student can audiate what is read in symbolic notation, then, sight reading may be improved by self-checking possible mistakes (Grunow, 2005).

The theories of both Bruner and Gordon referred to learning stages and the importance of sequence when introducing music notation; however, there appears to be

some disagreement among pedagogues as to the amount of time that should be spent in each stage or when to introduce reading. Like Bruner, Pace ("Comprehensive Musicianship," n.d.) stressed the importance of structure and sequence in learning, but with a balanced approach. He stressed learning all skills (rudiments, harmony, ear training, sight reading, dictation, and improvisation) "sequentially organized in both an upward and outward spiral" (para. 1). Materials should be specially sequenced so that a student can advance in repertoire while broadening musical understanding at each level. According to Pace, this is in sharp contrast to focusing on repertoire and delaying exposure to music fundamentals until later in the learning process. One of Pace's concerns was that students must develop adequate reading skills from the outset in order to be musically independent at each level. Pace rejected the idea of students learning difficult repertoire by "rote-memorization" which could produce "limited understanding and accumulation of knowledge" ("The Pace Approach," para. 3). These pieces, he claimed, are well beyond their reading level and could only be learned with much individual tutoring. Similarly, he observed that some students tried to play everything by-ear because they lacked appropriate reading skills. To follow Pace's comprehensive approach, an instructor would have to carefully sequence all material and activities to achieve an effective upward and outward spiral. All musical activities would have to be carefully monitored and sequenced within and between each musical concept in order to be successful.

In sharp contrast, Suzuki (1975) favored learning through imitation and modeling, or the "mother tongue" approach (applying the basic principles of language acquisition to

the learning of music) for young children. Ease of language, like music, comes with training and lots of repetition. "We simply have to train and educate our ability, that is to say to do the thing over and over again until it feels natural, simple and easy. That is the secret" (Suzuki, 1975, p. 51). The concept of rote learning and repetition is seen in the parable Suzuki quoted, *Repeat, repeat, repeat—The high-jumping ability of the Ninjutsu*:

> Hemp grows fast. To a person watching it daily it doesn't seem so, but the growth of the hemp goes on hourly without recess. By leaping over the hemp every day one's leaping ability grows together with the hemp. After a month or two of one's having not seen it for some time, the hemp will suddenly seem to have grown to a surprising height. If in the meantime one's jumping ability has not been trained, and suddenly one wants to jump over the hemp, it will prove to be impossible. But if one has worked hard together with the growing hemp, it will seem natural to leap over it easily. (Suzuki, 1975, p. 51)

The timing of learning events is important and different for each child. That can be said of any approach. In the beginning stages, the Suzuki Method focused on the study of repertoire by-ear and by imitation, rather than by reading (Eubanks, 2015). Of course, the danger in using this approach would be introducing reading and theoretical concepts too late in the learning process when students are playing advanced level repertoire. Pace (The Pace Approach, n.d.) noted that "students often tried to play everything 'by ear' because they lacked adequate reading skills" (para. 4). Again, the prudent instructor would have to carefully monitor and assess the readiness of each child for reading and exploring theoretical concepts.

In recent years, informal learning has been examined by music education researchers. The work of Green and others (2008, 2010) and others (Baker & Green 2013, Varvarigou & Green, 2014; Woody & Lehmann, 2010) have revealed value in examining the ways musicians learn by-ear outside of the classroom. This work demonstrated that enculturation or immersion in the music of one's environment is the most fundamental factor in music learning. This was most evident in folk music in which young musicians are assisted and trained by a community musical practitioner who guides and acts as a mentor. In jazz, this means that learners are allowed to "sit in" on a session of more experienced musicians who assumed roles as expert models with whom learners can exchange ideas and imitate. In Western popular music, young musicians relied on learning from their peers or through solitary learning by imitating recordings found on YouTube. In the absence of an expert musician, much popular music learning was accomplished through using what Green described as the "listen-copy-play" approach (Green, 2008).

For adults learning new skills, the large amount of new information given a learner may present challenges. Research in recent years has focused on the architecture of human cognition and the consideration of the relationship of cognitive load to learning. *Cognitive load theory* (CLT) is based on knowledge of human cognition (Sweller, 2011). In order to acquire complex cognitive skills, a store of working memory must be available. If the resources of working memory are limited, learning can be constrained and possibly, impaired. Because the task of learning an instrument places great cognitive as well as physical demands on working memory, many beginners can be overwhelmed if

too many demands are placed on the cognitive system at different stages of the learning process.

Sweller argued that there are three types of cognitive load: intrinsic cognitive load, extraneous cognitive load, and germane cognitive load. Each imposes a working memory load, with the effects becoming additive. Intrinsic cognitive load arises from the inherent complexity of information. This cannot be altered by the instructor; however, multiple schema may be developed, and elements can be taught in isolation to decrease intrinsic load. This has potential instructional value in teaching music. By isolating interacting elements such as reading pitch, clapping rhythm, or playing with correct fingering, cognitive load can be reduced. Extraneous cognitive load is that produced by instructional procedures. For example, consider the teaching of *legato* articulation. For an instructor to explain verbally how a *legato* phrase should sound and be played might impose a higher load than to merely demonstrate by playing a *legato* phrase. Finally, germane cognitive load refers to the cognitive schema constructed by the student during the learning process. Optimum levels of germane cognitive load, or processes that are directly relevant to learning can be achieved by keeping extraneous cognitive load as low as possible by eliminating the portion of load that does not contribute to the learning process (Sweller, 2005).

Adult learning theory or andragogy was developed by Shepherd Knowles and provides an awareness of the differences between the teaching and learning of children (pedagogy) and the teaching and learning of adults (Knowles, Holton, & Swanson, 1998). With children in the pedagogical model, learning is teacher-directed, and the student is

dependent on direct instruction. In the andragogical model, adult learners take more responsibility for their own learning and learning is more self-directed. The following are basic assumptions in the andragogical model: 1) adults need to know why they need to learn something, 2) adults maintain the concept of responsibility for their own decisions, 3) adults come with a larger variety of experiences, 4) adults have a readiness to learn things they need to know, 5) adults are more life-centered in their orientation to learning, and 6) adults are more internally motivated (Knowles et al., 1998, p. 72).

Students at community colleges come from a diverse pool of learners and tend to be those that do not matriculate to a four-year university immediately following high school. U.S. News (2014) identifies four types of learners who benefit from community colleges: 1) students who aren't prepared to leave the nest, 2) nontraditional students (adults who want to change career paths or need classes that fit their schedule), 3) students who need additional training or certifications, 4) lifelong learners (adult students who want to continue building skills or develop interests without leading to a degree). Typically, many of these students may be working adults or retired professionals.

For the purposes of this study, students who were of the last three types of learners were called *adult learners*. They were presumed to be more self-directed learners and came to class with specific goals and expectations for themselves. Many adult learners may have just wanted to play their favorite tunes on the piano. (A questionnaire was given out at the beginning of the course that provided valuable data in this area.) Because adult learners also come with an advanced level of verbal and analytical skills acquired over the course of their lifetime, one might presume that they prefer a more

verbally oriented approach to learning. Perhaps reading musical notation, and the logic involved with understanding it, may be presented at an earlier time and in a different way than with children. This seems to be the presumption of group method book authors who introduce reading from the very beginning. Fisher (2010), however, cautioned that "adult students should still experience a concept or skill before the symbol and name are given" (p. 194).

In summary, several factors made up the theoretical framework for this study. The learning theories of Bruner and Gordon both made reference to stages in which the sound and the act of playing must precede symbolic representation. Notable pedagogues Pace and Suzuki offered divergent points of view, with the latter known for delaying the reading of music notation until technique and basic playing skills are firmly established. Research by Green focused on the informally trained musician and on the possible benefits of incorporating learning by-ear in the classroom. Cognitive load theory suggested that the role of working memory, and the various cognitive load effects must be considered when presenting material with a high intrinsic cognitive load. Finally, Knowles offered a profile of the adult learner and the principles of adult learning theory that will complement and enhance understanding of what is taking place in the classroom with adult learners. All these theories suggest that a traditional notation-based method may not be the only or best approach to beginning piano. This study attempted to show that incorporating an aural-based approach into the traditional notation-based classroom can produce an effective and perhaps more enjoyable learning experience.

Rationale and Purpose for the Study

A review revealed that most group piano method books currently in use do not employ an aural approach. The "sight before sound" approach, or the use of musical notation before the ability to make sounds, was found to be the prevailing approach to instruction that is presented in the majority of methods used in adult piano classes. Notes were immediately introduced on the grand staff before anything was played. After a brief introduction to the instrument, rhythm (Lancaster & Renfrow, 1999;) or pitch notation (Palmer, Manus & Lethco, 1996; Bastien, 1977) or both pitch and rhythm notation (Hilley & Olson, 2002) were presented. New notes were introduced on the staff as a visual entity, not connected to any sounds. Fingerings were also presented with each note to further complicate the visual array. Essentially, music was presented as a visual art, with the aural product functioning as an afterthought.

What if beginning piano instruction also included learning to play by-ear? For me, this is a compelling notion and led to the purpose of this study: to investigate if learning by-ear can be successfully incorporated into a traditional note-based approach in a beginning piano class at a community college. The study also examined if there were potential benefits to this dual approach in the areas of reading and performance of pieces.

Research Questions

The specific questions that guide the study were:

1) Are there measurable differences in music reading between students in a community college piano class learning piano with an added emphasis on aural skills and similar students learning piano with a pure notation-based approach?
2) Are there measurable differences in performance outcomes between students in a community college piano class learning piano with an added emphasis on aural skills and similar students learning piano with a notation-based approach?
3) Do students enjoy learning to play piano by-ear? Do they think learning to play by-ear should be included in a beginning piano course? If so, why?
4) What observations did the researcher make regarding the effectiveness of strategies and techniques used to teach playing by-ear? How might these strategies be modified and/or improved?

Table 1.1. Definition of Terms

Term	Definition
Adult learner	In the context of this proposed study, the adult learner is a community college student who is not enrolled in the class for degree credit but taking the class for personal enrichment.
Audiation	The ability to hear music with understanding "through recall or creation, the sound not being physically present" (Gordon, 1980, p. 2).
Aural approach or aural emphasis	An approach in which playing an instrument is taught through hearing.
Aural skills	The demonstrated ability to play by-ear (pitch and rhythm), play a familiar tune without the aid of notation, or describe/identify what is heard (form, melodic contour, harmonic interval, etc.).
By-ear call and response	Teaching musical phrases or patterns by-ear in tempo. The teacher plays a phrase or pattern and the students play it back immediately, in tempo.
Cognitive load theory (CLT)	An instructional theory based on our knowledge of human cognition
Cognitive load	The amount of mental effort held in working memory in order to perform a task.
Extraneous cognitive load	In cognitive load theory, an instructional procedure that imposes unnecessary heavy working memory load that interferes with learning
Germane cognitive load	In cognitive load theory, cognitive schemata constructed during the learning process
Intrinsic cognitive load	In cognitive load theory, the intrinsic complexity of information. Multiple elements of information must be simultaneously processed through working memory.
Isolated elements	Under high intrinsic cognitive load, presenting interacting elements as though they are isolated can decrease intrinsic load.
Modeling	Based on the *Merriam-Webster Collegiate Dictionary, Eleventh Edition*, definition, "to construct or fashion in imitation of a particular model." As it applies to music learning, "an aural model of a musical performance

	presented to the students by the instructor, as an example that they are to emulate" (Haston, 2004).
Mother tongue approach	Realizing that all children learn to speak their native language with ease, Shinichi Suzuki applied the basic principles of language acquisition (modeling, repetition) to the learning of music (Suzuki Association of the Americas, 2014).
Playing by-ear (or by-ear playing)	The process of playing a phrase, melody, or harmony after hearing and without the aid of notation. It can also refer to the ability to "reproduce a song on an instrument by drawing upon one's memory of the song" (Haston, 2004).
Sight before sound	The teaching approach in which reading musical notation precedes making sounds
Working memory	In cognitive load theory, working memory is a system for temporarily storing and managing the information required to carry out complex cognitive tasks.
Visual approach	An approach in which playing an instrument is taught through reading music notation.

CHAPTER 2
THAT OLD FAMILIAR TUNE (SETTING THE STAGE)

In reviewing the literature, six areas of research emerged that gave impetus to the current study: aural approaches to learning music for children, aural learning in the classroom, adult piano methods with aural skills elements, vernacular musicians and informal music training, cognitive load theory, and adult learning theory. Because much of the literature regarding aural music learning involved methods for children, literature on adult method books and how adults learn were also included. Literature on vernacular musicians and informal music training was reviewed because of its aural-based form of learning without music notation.

Aural Approaches to Learning Music for Children

Although this study was primarily concerned with teaching using an aural approach for adults, much more literature regarding aural instruction for children was available. Consequently, the review of literature focused on instructional approaches designed for children. Of these approaches, very few were aural-based compared to those that were reading-based in Western culture. The literature on aural-based instruction primarily consisted of learning: 1) by rote or imitation, 2) through singing followed by other musical activities, 3) through a comprehensive study of multiple areas of music (singing, playing, reading, writing) specially sequenced in a timely relationship to each other.

One of the most popular teaching methods to use learning by imitation was the Suzuki method (Suzuki, 1975). The method was based on the "mother tongue" approach—the application of the basic principles of language acquisition to the learning

of music--to teach music to young children. It was first applied to violin instruction and later to other instruments, including piano. Children learned to play through aural instruction—a technique that involves modeling, listening, repetition, and memorization. With the Suzuki method, some children were able to play advanced level repertoire which was often considerably above their reading ability. A major criticism of this type of approach has been that it can result in poor or underdeveloped reading skills (The Pace Approach, n.d.). Suzuki did not specify a precise time when reading should be phased in, as this is left up to the teacher. Because of this delay, some students have experienced difficulty and frustration in closing the gap between their reading and playing ability. A contrasting view was presented by Pace who argued that reading should be phased in much earlier to avoid this issue. As with any philosophy or method of instruction, a method's success was largely dependent on the learning sequence and student readiness as determined by the teacher and situation.

The Suzuki approach recognized the potential in all children. Suzuki pointed out that it was not a child's heredity but their environment that shaped ability. "The destiny of children lies in the hands of their parents. . . it is a superior environment that has the greatest effect in creating superior abilities" (Suzuki, 1975, p. 22-23). Like the initial learning of a language, learning music must be nurtured by the home environment. Listening to music was a big part of the Suzuki method as well as memorization. Suzuki called it *memory training*—"the ability to memorize is one of the most vital skills and must be deeply inculcated" (p. 103). The Suzuki method employed modeling and rote instruction for its young students and some can memorize and perform advanced music at

a very young age. Reading was phased in as the child progresses. This aural approach has implications for the current study because playing by-ear relies on an aural memory for patterns and melody. To be able to reproduce a melody after hearing does require memorization of that melody first. Although the Suzuki method was designed for the young child, the idea of playing (and memorizing) after hearing is important to any aural approach even for adults.

Another method with an aural emphasis was the Kodaly approach to music learning. Kodaly created a method of music education that revolved around a child's natural development rather than one based on subject-logic (Choksy, 1999). The subject-logic approach was one in which the subject is presented and organized according to content rather than in a way that children learn easily. For example, when teaching rhythm, the subject-logic approach would begin with the long values of whole notes and then proceed to halves and quarters. This logically made sense, but the problem is that young children would have not felt or experienced the basic beat prior to being taught a concept. Learning quarter notes as the basic pulse should be taught first because it is like a child's heartbeat, followed by eighth notes which would be like a child running. This learning sequence made more sense because children naturally feel the moving patterns of quarter notes and eight notes instead of longer sustained ones (Choksy, 1999).

The first melodies a child sings were patterns related to the interval of a minor third. According to Kodaly, the descending minor third incorporated the tones a mother uses to call a child to dinner. It was also easily within a child's vocal range. The "movable do" system of solmization was used (solfege syllables remain the same in

every key) and hand signs were incorporated to reinforce intervallic feeling. Unique to this method was singing folk songs learned through repetition and memorization. Once a repertory of folk songs was established, teaching reading and writing followed (Choksy, 1999). Like Suzuki, the Kodaly method employed an aural approach to playing or singing through modeling, repetition, and memorization. This all occurred before children were taught the names of notes on the music staff.

Gordon's Music Learning Theory had many characteristics in common with sound-before-symbol methods such as those developed by Suzuki and Kodaly. Like Suzuki and Kodaly, Music Learning Theory (MLT) was based on the belief that a child's musical aptitude is developmental during the early years of life. This aptitude can fluctuate until about age nine depending on the richness and diversity of musical experience (Dalby, 2017). Sequence in MLT followed the model of a child's language acquisition. When learning a language, children were surrounded by the sounds of their language and begin to imitate. Words and phrases became increasingly meaningful. After learning how to "improvise" in language, they can engage in conversation. Following several years of developing the skills to think and speak, reading and writing were introduced. Like language, music in MLT followed a similar learning sequence. Students began by imitating and memorizing pitch and rhythm patterns on neutral syllables. Solfege syllables were then introduced and used as labels for singing tonal and rhythmic patterns. By assigning a unique name for each pattern through solfege syllables, a musical vocabulary was acquired and expanded as more patterns were learned. Typically, five to eight minutes of class time was devoted to such patterning activities that were

sung in solfege (moveable "do") using a call and response approach. The current study also employed a sequenced set of melodic patterns to develop a vocabulary of basic sound combinations in a call and response style. The process of hearing patterns and reproducing them were similar to the Gordon approach but involved the keyboard instead of the voice and letter names instead of solfege syllables.

The Yamaha Music Education System (Yamaha Music Foundation, 2008) also used solfege but with "fixed do" instead of the "movable do" solfege system. The idea behind using fixed do was that each pitch had a unique and permanent name that did not change, even when the melody is transposed to a different key. Part of Yamaha's philosophy in its Junior Music Course for young children was to emphasize ear training and to help learners acquire absolute pitch. Absolute pitch is the ability to identify a note by name without the need for a reference pitch.

In the Yamaha classroom, the melody of a keyboard piece was first learned and memorized by singing it in solfege. Children then learned to play it on the keyboard, phrase-by-phrase, in a call and response style between teacher and students. Once all phrases were learned, the melody was played in its entirety. An entire piece was learned in this manner. By singing the melody of a keyboard piece in solfege first, children had already learned and memorized the sequence of notes before attempting to play it on the keyboard. They had also memorized the sound of that melody. The pitch labels and sounds were thereby mutually reinforced. Some of these teaching techniques were utilized in the current study with letter names sung instead of solfege syllables.

Levitin & Zatorre (2003) referred to associating labels to pitch as "tone-label

mapping" and argued that this association is critical to the acquisition of absolute pitch in the developing child. Although the acquisition of absolute pitch was not a goal of the current study, singing notes with letter names was used to reinforce the name of the note and its pitch. The idea was that participants in the current study would be able to construct a tonal map of the relative distance between pitches by singing before playing them. For example, take the notes, C-D-E-C. The notes were sung first with letter names. Through singing, students discovered that the notes got progressively higher in their voices, then returned to the first pitch. When played on the keyboard, the sound of the pitches C-D-E-C was reinforced, the labels of the keys were reinforced, and the direction of the keys going left to right and returning to the original pitch were correlated with the melodic shape the students just sung. For both the Yamaha method and Gordon's Music Learning Theory, singing in solfege was an important component that came early in the learning sequence. Instead of solfege syllables, this study used letter names.

The topic of how and when to introduce music reading to beginning piano students was addressed by Pace (1979, 1983) and Kendall (1988). Pace offered a "comprehensive approach" (rudiments, harmony, ear training, sight reading, dictation, and improvisation) to teaching piano to children but not through repetition or memorization like Suzuki. In the first lesson of *Music at the Piano Bk. 1* (Pace, 1979), "the child makes music without the attention to symbols by using what s/he *can* do—singing, clapping, responding to high and low by 'shaping' the melody in the air" (p. 2). In one such melody, the right hand fingers were to move in order 1-2-3-4-5, ascending in the air, and then descending, 5-4-3-2-1. Students would sing the finger numbers as they

moved their fingers in the air making their first playing experiences tactile (shaping the melody in the air) as well as aural. After learning the melody beginning on C, transposition to other keys and a variation were played before the first musical symbols were introduced with music notation presented a few lessons later. The notion of using tactile as well as aural representations of sounds by using finger numbers was intriguing. The current study incorporated this type of aural/tactile activity in a classroom setting.

Petzold (1960) suggested that the process of reading music notation involved perceptions on three different levels: 1) the auditory perception of musical sounds; 2) the visual perception of musical symbols; and 3) the integrative, internalized process through which the individual applied previous auditory and visual perceptions of given stimuli to other stimuli in new learning situations (p. 271). To address these different perceptions, Kendall (1988) compared a modeling mode of instruction (aural and kinesthetic) with a comprehensive mode of instruction (aural, kinesthetic, and visual) and found that they were both effective in assisting 5th grade beginning instrumental students in the development of aural skills. However, Kendall found the comprehensive mode was more effective because the introduction of music reading also reinforced aural and kinesthetic learning through association. In this sense, the musical learning sequence was cyclical or spiral. Kendall believed that "students should first hear melodic and rhythmic patterns to develop aural and kinesthetic familiarity" (Kendall, 1988, p. 216). Previous aural and kinesthetic experiences created a vocabulary from which reading notation could be developed by association. Students experienced notes while performing patterns already memorized "so that the meaning of notation became increasingly apparent and [was] not

simply an attempt to produce music from abstract symbols" (p. 218). This was similar to Gordon who believed, "reading music is a process of recognition rather than decoding" (Dalby, 2017). The notion that learned melodic patterns could become a vocabulary from which one could draw could make reading from music notation easier because of the recognition of patterns previously learned.

Aural Learning in the Classroom

Although playing by-ear and reading music notation were often cast as opposite approaches, evidence suggested that they might be related (Woody & Lehmann, 2010). Based on the notion that playing by-ear is the most fundamental of all performance skills (Mainwaring, 1951), McPherson, Bailey, & Sinclair (1997) undertook a three-year longitudinal study of 101 instrumentalists to examine relationships between five different aspects of performance. The results of the study suggested that "instrumentalists' ability to sight read may be influenced by how well they are able to play by-ear" (p. 103). A significant relationship between sight-reading and by-ear playing was also found in a study of 98 high school instrumental students (Luce, 1965). The researcher suggested that ear-playing may be more important in developing musicianship than sight reading. However, Luce cautioned that the time devoted to sight reading should not be reduced, but that ear-playing be increased. The current study took a similar approach. McPherson (2002) suggested that the skill of playing by ear helped student musicians learn to coordinate ear, eye, and hand when reading music but cautioned that "emphasizing notational skills too early can lead to a decreased sensitivity to the unified patterns that children spontaneously observe when listening to music" (p. 18).

A study by Musco (2006) investigated the effects of learning songs by-ear in multiple keys has on pitch accuracy. Participants were twenty-eight 7th and 8th grade brass and woodwind students. Most students had three or four years of study on their instruments. Students in the experimental group (*n*=13*)* improved significantly in playing songs by-ear in two of the three new keys. Musco observed that improvement on this task may be due to familiarity with the key prior to learning songs in that key and concluded that there are potential benefits to playing by-ear as preparation for sight-reading in new keys. Additionally, Musco contended *audiation* (hearing and comprehending in one's mind the sound of music) played a role in performing in new keys. Without audiation, using the correct fingerings when performing music from notation was analogous to "typing prose without understanding the meaning of the text being typed" (p. 3). According to Musco, audiation enabled musical prediction and anticipation, which facilitated sight-reading. It also enabled self-correction by recognizing errors in reading and performance. Audiation was an important step in the process of learning new music. Gordon (1980) explained that "in order to read and write music meaningfully, one must be able to *hear* music seen in notational form before it is performed" (p. 3).

Incorporating aural skills into first learning experiences could contribute to improvement of other musical abilities. At the first lesson, students brought deeply enculturated musical knowledge and tastes. Instructors needed to take advantage of this enculturation. According to a study by Haston (2004), teaching with a visual emphasis may not be as efficient as teaching with an aural emphasis because it failed to capitalize on these intuitions. He found that a group of 24 fourth-graders who had 15 weeks of

instrumental wind instruction with an aural/modeling approach scored significantly higher than the control group on measures of sight-reading using the Watkins Farnum Performance Scale and performance of a prepared piece. Among the participants were students with and without prior musical training. The study showed that students without prior musical training scored the highest overall in both areas. This suggested that an aural approach seemed to enhance the development of reading and performance skills especially in the beginner.

In another study, Glenn (1999) investigated two modes of beginning string instruction in two sixth-grade string classes over the course of a school year. The same teacher taught both groups. One group received rote instruction for the first three months and the other group was introduced to notation after two weeks. Glenn reported no significant difference in performance between the groups, including sight-reading; however, students who received the rote instruction over the extended period demonstrated a significantly higher rate of continuation (70%) compared to the notation-centered class (32%). Coincidentally, the teacher reported that the rote instruction group was more motivated and seemed to enjoy their playing more than the other group. Students appeared to encounter fewer obstacles in their playing since they did not have to deal with the difficulties of note reading early in the learning process. They were able to experience more time playing without the need to learn note reading, especially during the first three months of instruction. Glenn added, "even later, when music reading was introduced, a fair amount of time was still spent playing by rote, which allowed students having more difficulty with music reading to still feel a measure of success" (Glenn, p.

81).

In *Teaching Piano in Groups,* Fisher (2010) observed that many adult students came to study piano with high and sometimes unrealistic expectations. They desired to achieve as quickly as possible and to play pieces that may be beyond their immediate skill level. Often, they became impatient with the process. Fisher recommended that "teachers should employ pieces that are taught by-ear early on in the learning process" (p. 193) and that this will give students a feeling of success from the very beginning. In fact, research suggested teachers should recognize the importance of by-ear playing as an important facet of training that enhanced overall growth and that provided for more enjoyable and meaningful learning (McPherson & Gabrielssohn, 2002).

Several studies (McPherson, Bailey, & Sinclair, 1997; Musco, 2006; Haston, 2004, Glenn, 1999) demonstrated that aural learning in the classroom can be a valuable component to enhance reading and possibly, playing. Luce (1965) cautioned that sight reading should not be reduced but that ear-playing be increased. McPherson (2002) recommended that teachers should support a rote approach in the beginning to support ear-hand coordination before the introduction to reading.

Group Piano Methods with Aural Skill Elements

A survey of popular piano method books used for adults revealed very few activities that support aural skill development. Among those with no such activities were Alfred's *Adult All-In-One* Course (Palmer, Manus, & Lethco, 1996) and Bastien's (Bastien J. S., Bastien L., & Bastien, L, 1999) *Piano for Adults*. The front covers emphasized the topics covered in the books: theory, technic; and theory, technic, and

sight reading, respectively.

A few adult method books for non-music majors provided attention to developing aural skills, but no systematic approach to aural skill acquisition was apparent. Ear training activities such as identifying meter (Faber & Faber, 2009), interval size, and tonic or dominant harmony (Lancaster & Renfrow, 1999) were some of the activities that were found. For those majoring in music, playing by-ear and aural skill development were virtually absent in group methods books (Hilley & Olson, 2002; Lancaster & Renfrow, 2008). The focus for music majors seemed to be on reading more efficiently and reading music consisting of parts (score reading).

One group method that supported a playing by-ear experience for beginners was *Adult Piano Adventures: All-In-One Course* by Faber & Faber (2009). The method book included two familiar tunes to play by-ear in the first two units. *Amazing Grace*, a pentatonic melody, was shown with finger numbers and a diagram of the hand placement on the black keys. The song was prefaced by "let your familiarity with the melody help guide you" (p. 9). The second song was *Row, Row, Row, Your Boat*. The first phrase was musically notated in the book but the rest of the song was up to student to figure out--"Can you finish the melody to *Row, Row, Row, Your Boat?"* (p. 27). Students were to finish the song without the aid of music notation. The ability to play both melodies relied on students' familiarity and memory of the tunes. This was one of the few instances in formal method books asking students learning to play piano to use their ears, without the aid of notation. In almost all of sixteen units that made up Book 1, an ear training or improvisation activity appeared at the end. The ear training activities consisted of

identifying meter, identifying the melodic pattern, identifying articulation type (staccato or legato), interval, and chord type (major, suspended, or dominant seventh). Although not a comprehensive or systematic approach to aural skills, the consistent inclusion of ear training activities in the Faber and Faber (2009) adult method book was worth noting.

Vernacular Musicians and Informal Music Training

The way musicians learn outside of the traditional classroom or music studio provided insights to this study. Many popular musicians acquired musical skills by experimenting with the music they like, were familiar with, or heard around them. For many, this was done through copying recordings by-ear (Green, 2008). In addition to YouTube, streaming music apps were available to listen and copy: Spotify, Pandora, Apple Music, Slacker, etc. Listening to music has never been easier. When popular musicians copied recordings, it was mostly a solitary activity done largely without guidance (Green, 2008), although "group activities occurring in the absence of adult supervision or guidance are of great importance" (p. 7). This listening-based activity in which a musician taught him/herself to play with just the aid of a recording formed a part of a pop musician's skill set. In the current study, students recorded the instructor's performance of an otherwise unknown piano piece and tried to listen-copy as part of a class activity.

Woody & Lehmann (2010) examined the differences in ear playing ability in twenty-four college music majors. The "classical" group consisted of twelve undergraduate musicians whose musical development had occurred predominantly within formal instructional settings. The "vernacular" group consisted of twelve undergraduate

musicians who had significant past experience in jazz, pop, or folk styles, or in church bands. It should be noted that because musicians in the vernacular group were accepted as university students, they did not lack formal training. Each group was comprised of twelve students: one pianist, flutist, bassoonist, hornist, and mallet percussionist; two saxophonists and trombonists; and three trumpeters. Results showed that the vernacular musicians required fewer trials to play melodies back by-ear than formally trained musicians. The study concluded that vernacular musicians produced a more automatic response, or one without hesitation, drawing upon a larger musical knowledge base in informal learning settings (church or pop musician) than the musicians who had received only formal training. The study's melodies made extensive use of melodic and rhythmic patterns, prompting the vernacular musicians to describe them as predictable or typical. The vernacular musicians employed a "patterned listening" approach, more readily identifying similarities in rhythm and melody whereas the formal musicians more frequently described an interval-based or scale degree-based approach. The vernacular musicians had a more immediate and automatic response while the formal musicians described thinking of fingerings. Perhaps the formal musicians' reliance on reading skills and theoretical concepts instead of playing by-ear experiences in informal settings accounted for these differences. According to Woody and Lehmann (p. 113), by-ear playing has been historically undervalued in formal education. The results of the study seemed to indicate that musicians with vernacular experience tended to play back melodies by-ear with greater ease than the classically trained counterparts.

Green (2008) observed five fundamental characteristics of informal popular music

practices: 1) learners chose music for themselves, 2) skills were acquired through copying recordings by ear, 3) informal learning took place alone as well as alongside friends (in a band), 4) skills were learned in a holistic and haphazard way (no sequential progression or procedure), 5) learning involved a deep integration of listening, performing, improvising, and composing. The study was a pedagogical project involving 21 secondary schools, 32 classroom teachers, and over 1,500 pupils. It was devised to incorporate aspects of informal popular music learning practices into the realms of the school classroom.

Results from the quantitative and qualitative data collected from the project schools focused mainly on 13- to 14-year-olds. Green discovered that there were distinct benefits for students who first learned popular pieces of their choice by-ear. When the same students were presented with a classical piece to learn by-ear, the performances were precisely the same tempo as the original. Even when mistakes were made, the music flowed on, without interruption. Those tendencies were very different, Green concluded, when music is learned through notation in which "the performance is nearly always slowed down during the first stages of learning, and for many players continues to go along haltingly right through the latter stages as well" (p. 164). In a formal setting, the emphasis was on correctness when learning music through notation, and if a mistake was made, the novice classical player almost always stopped and interrupted the tempo to either correct or recover from it. Although more research needs to be done in comparing performances of classical pieces learned by ear verses by notation, Green suggested that there was a tendency toward "flow" and more "feel" in students who learned by-ear than

those who learned from notation.

Cognitive Load Theory

Cognitive Load Theory (CLT) (Sweller, Ayres & Kalyuga, 2011) suggested that learning is facilitated when instructional conditions are aligned with the architecture of human cognition. CLT became an important consideration to assist in the design of instruction. For the purposes of this study, the architecture of long and short-term memory was discussed as it related to instruction. Basically, long-term memory was a repository for information that can be drawn upon to solve problems and create schema. Schema was the reorganization of new information with information already stored in long-term memory (Sweller, 2011). New information was incorporated into preexisting schemas and modified as needed to become new schema. The creation of schema was critical to the learning process while the primary goal of instruction is to facilitate this process (Sweller, 1994).

Before new information was stored in long-term memory, that information had to be processed in a limited capacity and for a limited durational period in short-term memory or *working memory*. Working memory functioned as the conduit between the external environment and long-term memory. It had finite capacity and temporal limitations that were brought to bear when dealing with novel information from the external environment. According to Sweller (2016), the ability to process information in working memory differed between individuals. Each person had a limited amount of working memory which became severely taxed when dealing with novel information unfamiliar to a learner. An expert required less working memory to process information

because of the larger storage of previous information in long term memory. Sweller noted the following:

> Due to the environmental organizing and linking principle, an expert in a complex area with extensive information stored in long-term memory is likely to outperform a novice in a relevant domain irrespective of any differences in their working memories. (p. 364)

One purpose of instruction was to increase usable knowledge held in long-term memory. In order to accomplish this, short-term working memory had to function at higher levels allowing learners to engage in activities in their external environment that would have been difficult or otherwise impossible (Sweller, 2011). The application of CLT to instructional design resulted in the identification of cognitive load theory *effects* that created an increased burden on working memory. By reducing or eliminating the additional burden created by these CLT effects, working memory was able to function at higher levels. Two of these effects were *split attention* and *modality*. The split attention effect was caused by the unnecessary separation (in either time or space) of mutually referring sources of information. Cognitive load was reduced by physically integrating the disparate sources of information into the learning segment (Sweller, 2011). The modality effect occurred when a single mode for delivery of information was used, that is, either all-visual or all-audio. Sweller found that mental integration was better facilitated by presenting material using an audio-visual (dual mode) format rather than a visual-only format.

CLT identified three types of cognitive load: *intrinsic, extraneous*, and *germane*

cognitive loads (Owens & Sweller, 2008). The first of these, intrinsic cognitive load, referred to the complexity of the knowledge that was acquired without reference to how it was acquired. Intrinsic cognitive load was fixed and unalterable for any given information to be processed by learners (Sweller, 2011). In music, this might have referred to the different divisions of the pulse as one clapped the notes of a short rhythm phrase. Extraneous cognitive load was the unnecessary burden placed on working memory that resulted from instructional procedures. As educators, our goal has been to reduce the amount of extraneous cognitive load through efficient instructional design. Lastly, germane cognitive load was generated during the learning process. It facilitated the construction of schema and enabled schema to be converted into long-term memory.

With very little research on CLT and music instruction, a study by Owens and Sweller (2008) was notable. They investigated the application of two cognitive load effects, split attention and modality, to the materials of music. The hypothesis was that eliminating split attention and using dual modality would support the design of effective teaching formats within the domain of music. Two experiments were performed, one based on learning time signatures, and the other on the use of audio material. In the first experiment, the study found that the 11-12-year-old beginning music students scored better on integrated material showing explanations placed adjacent to the areas in the music notation to which it referred (integration) rather than a list of explanations placed below the complete musical example (split-attention). One possible reason for the lower scores on split-attention was that learners had to store the written notation in working memory while searching for the corresponding explanation below it. This placed an

undue burden on working memory creating an extraneous cognitive load. The first experiment also showed that students who received recorded verbal explanations while seeing the written explanation (dual modality) adjacent to the music notation (integration) performed better than the split-attention group in which the list of explanations was placed below the musical excerpt. Again, cognitive load was most likely reduced because less processing was needed in working memory for integrated and dual modality formats verses the split-attention and single modality formats.

The second experiment, and one perhaps more pertinent to the current study, involved recorded musical excerpts. Because music was primarily an auditory phenomenon, listening to recorded musical excerpts should be used for a better understanding because music was sound-based. In this experiment, recorded musical excerpts and explanatory text were present during all conditions. The variables were music notation (with or without) and presentation order (simultaneous or successive). The study found that simultaneous rather than successive presentation of recorded material and music notation produced higher scores. But the researchers also noted that for beginning music students, the presence of musical notation did not necessarily enhance learning, especially without sound:

> Incorporating the visual-auditory equivalent of musical notation and auditory musical excerpts not only stimulated two important modes of learning music, it also provided perceptually different but conceptually correspondent sources of information. Although there is potentially redundancy, many novice students find it difficult to form an accurate mental aural realization from musical notation

> alone (i.e., hearing without sound) . . . Altogether, it was believed that as these were novice music students, these related instructional elements did not create redundancy, a phenomenon that otherwise may occur for expert musicians. (p. 37-38)

In another study involving CLT and music instruction, Stambaugh (2013) investigated the effects of cognitive load during instrumental music practice involving university music students. Two styles of musical practice were studied: repetitive or blocked order, and random order. Stambaugh found that wind students performed better in trials on measures of accuracy, speed, and evenness when the practice regimen consisted of the random practice style rather than the blocked practice style. Performance trials were scored at acquisition, 24-hour retention, and one-week retention. On the other hand, brass players performed better on these same measures using the blocked practice style. Brass players seemed to benefit when practice consisted of repetition of the same example. The researcher suggested that brass players, unlike wind players, have more of a need to "hear" pitches internally and adjust embouchure while playing; therefore, the random practice regimen produced lowered performance accuracy for brass players, indicating cognitive overload. This result was consistent with Sweller's (2011) theory that cognitive overload inhibits schema formation or germane cognitive load. For wind players, Stambaugh (2013) cited the *contextual interference effect* as a possible reason why random practice produced higher performance scores. Contextual interference was defined as a learning phenomenon in which interference (several tasks learned and practiced together) during practice was beneficial to skill learning (Magill & Hall, 1990).

A similar finding by Stambaugh (2011) suggested that repetitive practice was not the best practice strategy for long term retention. That raised the question of *how* randomly ordered practice could produce better results and if there were other variables that contributed to this outcome.

Additional questions were raised by De Jong (2010) when dealing with research on CLT. De Jong noted that "cognitive load theory is constructed in such a way that it is hard or even impossible to falsify" and that "the theory can account for nearly every situation" (p. 125). If learners performed better, then cognitive load was more of the germane type; if learners underperformed, then cognitive load was more extraneous. It usually was not as simple as that. In regard to the aforementioned study on university wind and brass players, could the lower scores of wind players on the blocked practice condition also mean they experienced extraneous cognitive load? Could we measure cognitive load? Another issue raised by De Jong was that study conditions were often not realistic and did not offer learners enough time for deeper processing. Allowing learners more time to digest material, take notes, or ask questions was something that certainly could be (and must be) accommodated in a classroom situation.

These were valid questions regarding the application of CLT; however, as a theory applied to instruction, it brought unity amongst a set of diverse instructional design principles and provided a description of a cognitive basis underlying these principles (De Jong, 2010). As applied to music instruction, however, the work by Owens and Sweller (2008) and Stambaugh (2013) outlined the need to consider split attention and modality effects in designing instructional material.

Because the current study included non-traditional student participants, aging and its effects on working memory could be a factor in more mature learners. Cognitive load theory and aging was the topic of a study by Van Gerven, Paas, Van Merrienboer, and Schmidt (2002). The purpose of the study was to test whether the application of *worked examples* led to improved performance in mature learners. Worked examples, or demonstrated problem solutions, focused the learner's attention on problem situations and operations, rather than goals. Conventional problems, on the other hand, forced learners to apply a capacity-demanding means-ends analysis. For novices, problem solving of this sort demanded a high cognitive load because they had not yet developed the cognitive schemata required. The study showed that the mature learners did benefit comparatively more from worked examples than their young counterparts. Mature learners also achieved an equal performance level, or higher training efficiency, by investing less mental effort when studying worked examples. The study suggested that less mental effort or cognitive load also made more efficient use of available working memory.

In other studies involving CLT and mature learners, increased age was found to be associated with lower performance on tasks designed to assess working memory (Salthouse & Babcock, 1991). Processing speed might also have been reduced with age (Hartley, 2013; Fisk & Warr, 1996). Because the current study involved adult beginners and reading music notation, avoiding instructional procedures that would overtax working memory and require quick processing speed was critical.

Adult Education

In California, the community colleges saw a growing number of adults returning to school. *Adults*, in an education context, could be described as those whose lives exhibit characteristics of adulthood: earning a living, sexual partnership, parenting, citizenship, and retirement (Coffman, 2002). To determine the percentage of students enrolled as adults, the California Community Colleges Chancellor's Office website www.cccco.edu (2017) was used as a resource. According to its homepage, the California Community Colleges "is the largest system of higher education in the nation." Statewide, the California Community Colleges enrolled nearly 1.6 million students in each of the Fall 2015 and Fall 2016 semesters, the semesters under investigation in the current study. Because there was not a way to separate *adult*, as defined above, from *non-adult* enrollment, some assumptions had to be made. Age brackets, enrollment status, and unit load was considered to help approximate the percentage of adult enrollment. According to figures taken from the Chancellor's Office Management Information Systems Datamart (2017), 80% of all First-Time Students (a student enrolled in college for the first time after high school) were in the age group 24 and under bracket, while about 60% of all Continuing Students (a student enrolled in the current session and enrolled in the previous regular session) were in the same 24 and under bracket. In addition, a majority of students enrolled full time (12 units or more) stood at approximately 80% for this age bracket. If we looked at the age bracket of 24 and under as non-adult students and 25 and up as adult students (as defined above), we found the following percentage breakdowns below. Of course, there were limitations to these age breakdowns. For example, many

students older than age 24 may still live at home and not earn a living.

Table 2.1. Statewide Enrollment at Community Colleges

	Fall 2015	Fall 2016
Age 24 and under	59.28%	59.39%
Age 25 and up	40.73%	40.62%

If we looked closer at the Datamart statistics, we found that the age bracket of 50 and up comprised 8.38% (Fall 2015) and 8.24% (Fall 2016) of the overall student population. Mature adults represent a significant segment of total enrollment at the community colleges. Recognizing that this group and other adult students age 25 to 49 constitute a large percentage of the student population, a review of adult education and adult learning theories as they related to this study was necessary.

Research into adult education has taken several dynamic paths in recent years. An early adult learning theorist, Malcolm S. Knowles (Knowles, Holton, & Swanson, 1998), advocated the distinction between the teaching and learning of children, *pedagogy,* and the teaching and learning of adults, *andragogy*. In the pedagogical model, the learning was teacher-directed and the student was more dependent on instruction. In the andragogical model, adult learners took more responsibility for their own learning and learning was more self-directed. The following were basic assumptions in the andragogical model: 1) adults needed to know why they need to learn something, 2) adults maintained the concept of responsibility for their own decisions, 3) adults came with a larger variety of experiences, 4) adults had a readiness to learn things they needed to know, 5) adults were more life-centered in their orientation to learning, and 6) adults

were more internally motivated (Knowles et al., 1998, p. 72).

The andragogy model had deep roots in humanistic principles (Merriam, 2001). The focus was on adults directing their own learning with self-development in mind. Merriam and Bierema (2013) posited that in addition to the andragogical model, there were two other major theories in adult learning with roots in humanistic psychology: self-directed learning (SDL) (Merriam, 2001; Merriam, 2008), and transformative learning (TL) (Mezirow, 1997; Mezirow, 2003; Taylor, 2008). In the SDL model, the role of the instructor was more of a facilitator rather than a center of knowledge or content expert. In the course of one's life, many SDL experiences had taken place. In fact, chances are that most adults were engaged in at least one self-directed learning project at any given time. According to a study of lifelong learning by Livingstone (2007), 91% of Canadian participants were involved in some sort of informal, self-directed learning project that they identified as significant. Among those projects, most were computer skills related to employment, while others ranged from home improvement projects to general interest.

The propensity to be a self-directed learner could be a product of an individual's age and maturity, a major assumption taken by Knowles (1998); however, not every learner in the classroom was endowed with this attribute. Clear conclusions about who was best suited for SDL are elusive. The Self-Directed Learning Readiness Scale (SDLRS) developed by Guglielimino (1977) had been used to measure readiness for self-directed learning. Because every class had a different mixture of students, personal attributes, and learning styles, employing an instructor as the only facilitator for SDL might have worked for some but not all students. To succeed in SDL, a student had to be

reflective in practice and to self-monitor (Merriam & Bierema, 2013). In the context of aural learning in a music classroom, playing notes or melodies by-ear gave immediate aural feedback, allowing students to self-monitor and succeed in the simplest tasks. Various strategies for developing the ability to play a melody by-ear came into play. In the current study, students were asked to reflect on what strategies worked for them. All students might not be able to develop aural skills at a high level, but to learn an elementary level or familiar melody by-ear could be enjoyed by all.

The third and most recent theory to emerge in adult education was transformative learning (TL). It was defined as learning that transformed problematic *frames of reference* to make them more inclusive, discriminating, open, reflective, and emotionally able to change (Mezirow, 2003). A frame of reference was a structured set of assumptions made through which we understood our experiences. A frame of reference involved cognitive, conative (the part of mental life having to do with striving, will, and desire), and emotional components. In order for TL to take place, it had to be through discourse (examining evidence, arguments, and alternative points of view) and critical reflection of one's own assumptions. The latter was the most difficult to achieve but indispensable if a transformation in a frame of reference was to take place (Mezirow, 1997). According to Taylor (2008), the teacher, in addition to the learner, had to be willing to transform in helping students transform. In the context of the current research study, a transformative learning experience might be to see if piano students, by the end of the semester, thought learning piano by playing by-ear could be used as a valid approach for beginners. The same question might be asked of instructor.

Most research in adult education and music involved adult musicians participating in community musical organizations. Relatively few studies have sought to validate aspects of adult education and development theories directly (Coffman, 2002). A study that showed that music training can improve cognitive function, mood and quality of life in older adults was conducted by Seinfeld, Figueroa, Ortiz-Gil and Sanchez-Vives (2013). Although the study did not attempt to validate any theories, it did suggest that musical training, specifically group piano training, "could be an effective intervention toward battling depression and promoting a positive mood in older adults" (p. 10). Subjects in the treatment group were given a series of tests before and after the 4-month weekly piano lessons. Subjects in the control group were given the same tests before and after participation in other leisurely activities for the same time period. The age range of all participants was 60 to 84 years. A total of 20 tests measured attention, executive function, and motor ability. The researchers found significant effects in cognitive abilities related to attention and executive function. In other measures of mood and quality of life asked in a questionnaire, the treatment group had an edge in enhancement of mood and certain aspects of quality of life, especially related to psychological well-being and physical health. At the end of the study, both groups showed a significant decrease in depression symptoms. Although the study seemed to suggest important benefits for older adults, the study also had its limitations. Participants were not randomly selected but were recruited based on a voluntary commitment by the treatment group to practice 45 minutes per day, five days a week. In addition, the psychologist who administered the tests was not blind to the membership of individuals in the two groups. These were

important limitations to the validity of the study. The current study will have blinded evaluators scoring performance tasks and whole classes as participants in the treatment and control groups. Although questions of cognitive and quality of life benefits for mature adult learners were not asked in the current study, participants wrote in their journals about their enjoyment or lack of enjoyment of various class activities. The current study also examined student perceptions related to progress and achievement of learning goals and what kinds of learning activities, if any, they thought were successful and why.

In summary, the review of literature revealed more research in aural approaches for children than for adults. This might be attributed to the success that many of these approaches—Suzuki, Kodaly, Yamaha, Gordon—have had in training young musicians. Other research showed that aural learning could thrive among young adults in the classroom (Musco, 2006; Haston, 2004; Glenn, 1999) although the research could not conclusively show that aural training led to improvement in other areas such as sight reading and performance. Very little research existed for aural approaches to learning music for adults who were a large part of the student population at the community colleges. The study of how adults learn and the cognitive processes that needed to be considered in teaching adults were also reviewed here.

The current study focused on aural learning activities than could be incorporated into a traditional reading-based piano classroom. It attempted to show if there were benefits to incorporating an aural approach within a community college beginning piano class. The intent was not to supplant the current reading-based approach which is in use

today, but merely to supplement it. By integrating aural-based materials into the traditional reading-based curriculum throughout the course of the semester, an instructor might see students develop aural skills that could enrich other areas such as note reading and performance. The current study attempted to show the possible benefits of such an integration.

CHAPTER 3
THE GAME PLAN

The investigation consisted of a pilot study completed in Spring 2015 and a main study conducted in two phases, one in the Fall of 2015 and the second in the Fall of 2016. Participants in the study were from two community colleges in California. In accordance with IRB at Boston University, the BU Charles River Campus IRB approved the protocol for the pilot study and main study. Approval of requests to conduct research was given by the IRB at both community colleges. For the main study, a letter of consent with permission to audio record was signed and returned by participants.

Pilot Study

Purpose and Description

The purpose of the pilot study was to work out the teaching and testing protocols, and to provide a good practice run for the instructor as researcher. Adjustments were also made to lesson planning and the suitability of the by-ear learning materials. Because this was an action research study, the aural instruction treatment and subsequent testing had to be carefully and meticulously planned.

Two classes participated in the pilot study; fourteen students volunteered from Bayside College and six students volunteered from Mountain View College. These names are both pseudo-names created to protect the identity of subjects in this study. (Initially, nine students from a third college participated in the pilot study. But, after considering the large difference in student demographics from this third college and the two other colleges, the third college was omitted from the pilot study.) The aural group (treatment) was from Mountain View College and the reading group (control) was from Bayside

College. The colleges were the same two colleges that participated in the main study. Before instruction began, the Beginning Piano Questionnaires were filled out and returned and pretests were conducted to provide a baseline for comparison between the two groups.

The pretest was comprised of playing of a familiar tune (FT) and note reading (NR). For all groups, the researcher offered the titles of two familiar tunes as suggestions, *Row, Row, Row Your Boat* and *Merrily We Roll Along*. Students were also given the option of playing anything else they knew. The NR example consisted of four notes in the grand staff, two in the treble clef and two in the bass clef. Both FT and NR measures were retained as pretest measures for the main study as well; however, the same NR test was also added as a post-test measure in the main study.

The pilot study post-test consisted of sight reading (SR) and the performance of two prepared pieces (PP). The SR example included dynamics, articulation, and tempo indications. Melodic intervals of a 2nd, 3rd, 4th, and 5th were used in each of two sight reading examples. For PP, two pieces were selected by students from a pool of seven pieces. Each piece had dynamic, articulation, and tempo markings, and were in the keys of C major, C minor, F major, D minor. All pieces were from the textbook and learned through music notation with one exception--the aural group was taught, *Vivace,* by-ear. Five of six aural students chose to perform this for the post-test recital.

Two adjudicators evaluated the four performance measures. Both evaluators were selected because they were trained in the Music Teachers' Association of California Certificate of Merit evaluations for piano students and took continuing classes to ensure

scoring consistency. The MTAC scoring scale of 1 to 5, 5 being the highest rating was used. A score of "0" was added to indicate no attempt was made. The same two evaluators were used in the main study.

To understand student perceptions of the aural treatments and the aural group's overall view of the course, student journals were kept. Entries into the journals occurred at five different points in the semester: 2 weeks, 4 weeks, 8 weeks, 12 weeks, 16 weeks. In their journals, students responded to questions about specific classroom activities, perceived progress, enjoyment, expectations, and difficulty. Their last journal entry asked if they thought learning to play by-ear should be included in a beginning piano class and why.

The instructor also kept journal notes on each class session and the activities that seemed to work better than others. This helped solidify lesson plans that would be used in the main study. Audio recordings were made of the classroom aural activities for later reference.

Group and individual interviews were conducted at the end of the last class. Volunteers stayed for the individual interviews. Questions were posed about the perceived interaction, or lack thereof, between by-ear playing and performance, and by-ear playing and reading. During the individual interview, students were asked what strategies they used in the playing by-ear learning segments. They were also asked if they preferred learning by playing by-ear or by reading music notation.

Testing and Scoring Procedures

The researcher was the test proctor and recorded all performance measures. All recordings were done in the classroom and, with the exception of the PP, were performed on the student's individual electronic keyboard. Because the recording device (Zoom Handy Recorder H4n) was portable, it was easy to record students at their individual keyboards. Since this college course is for beginning piano students, some students made no attempt when asked to play a familiar tune or read music notation in the pretest. Some had never touched a keyboard before. A score of "0" was used to indicate that no attempt was made to play on these pretest measures.

For post-test SR, two different examples were used to help prevent seeing or hearing the example in advance. All students were given 15 seconds to preview the example before playing. Again, individual audio recorded tracks were created for each student with their number announced at the beginning. The PP test was done in a recital format in which each student performed two pieces in front of the class. The whole recital was recorded.

Each evaluator received a tabbed binder with an introductory letter explaining the research study, two CDs (one for each college), an index to the audio tracks, musical examples as reference, and scoring sheets. Scoring instructions were printed on the top of each scoring sheet. If necessary, evaluators were free to listen to recordings multiple times. Neither evaluator knew which students were from the aural or reading groups and scoring was done without contact between evaluators. All materials were returned to the researcher after evaluation. The scores between evaluators were remarkably close. Out of

110 scoring opportunities, 76 were identical, 33 were one point apart, and one was two points apart.

Results of the Pilot

Because the pilot study was conducted to test the efficacy of the research procedures for the main study, these preliminary results informed the study but are not included in the main investigation. Pretest NR scores suggested that the Mountain View students possessed greater skills than did the Bayside classes at the beginning of the course. However, in the post-test, the Bayside reading group slightly outperformed the Mountain View aural group in SR. In PP, the aural group outpaced the reading group by a large margin. Because of the extremely small sample size, no generalizations can be made. (See Appendix T for Raw Scores of the Pilot Study.)

In comparing performance scores, it was more difficult to assess actual sight reading improvement over the course of a semester because of the nature of the pretest and post-test. The NR test cannot be directly correlated to the SR measure because the NR test did not have a rhythm or tempo component. The NR test asked students to identify the four notes in the grand staff by playing them on the keyboard. To improve the reliability of the NR measure, the same NR test was repeated in the post-test for the main study. A 10-week Sight Reading (SR10) test was also added in the main study to provide more reliably in evaluating sight reading skill. This additional four-measure SR10 example included rhythm as well as pitch.

When comparing the PP scores between the two groups, one interesting observation was made. The aural group learned one piece by-ear, *Vivace*. (All other

pieces performed by the aural group were learned by reading.) *Vivace* was selected and performed by five of six aural students for the post-test recital. From the reading group, seven of sixteen students selected and performed *Vivace* learned by reading notation. Neither evaluator knew that one group had learned the piece by-ear. The averages of student scores by evaluator are below.

Table 3.1. Evaluator Results for *Vivace* and PP2

	Evaluator 1		Evaluator 2	
	Vivace	PP2	*Vivace*	PP2
Mountain View Aural Group (*Vivace* by-ear, PP2 by reading)	4.60	4.14	5.00	4.71
Bayside Reading Group (both pieces learned by reading)	4.13	4.17	4.00	4.04

PP2=Prepared Piece 2

Although this pilot group represented a very small sample size, it seemed that the students in the aural group preferred to perform *Vivace* and played it better than the second piece learned by reading. For students in the reading group, *Vivace* was also a preferred selection, not to the extent as the aural group, and not played any better than the second piece.

Could there be a possible correlation between learning by-ear and performance outcomes? I wrote in week 10 in my journal that for "songs learned by-ear; they remember the longest." The entry was written in reference to another piece learned by-ear, *Circus,* that the aural group seemed to particularly enjoy. Their enjoyment of *Circus* is discussed in Chapter 5.

Students wrote in their journals using an online journal through Blackboard. I

found that not all students took the time outside of class to do this, even after offering extra credit for their time. This was problematic because I was not getting full participation. Consequently, the student journal entry format was revised for the main study.

Main Study

The primary purpose of this investigation was to find if there were any measurable differences between community college students learning piano with an integrated aural/reading approach and those learning piano with an all-reading approach. Specifically, I examined the differences, if any, in performance outcomes and sight-reading ability. The secondary purpose was to determine if students enjoyed the by-ear activities, if they thought such activities enhanced learning, and if they thought such activities should be included in a beginning piano course. As the researcher-instructor, I also wanted to explore which techniques and strategies employed in teaching by-ear worked best and what can be improved to enhance teaching practice. I defined *playing by-ear* as the process of playing a phrase, melody, or harmony after hearing and without the aid of notation. It could also refer to the ability to "reproduce a song on an instrument by drawing upon one's memory of the song" (Haston, 2004).

Research Design

Because playing by-ear is not emphasized in college level piano courses, finding a suitable class to observe and research was impossible. I decided that action research, or research in which I teach the class, was the best way to conduct this study. Action research is defined as inquiry conducted by practitioners in their own educational settings

in order to advance their practice and improve their students' learning (Efron & Ravid, 2013). Because of my background and interest in teaching by-ear, I approached this inquiry as a constructivist, that is, a generator of knowledge about teaching rather than an observer.

The curriculum for beginning piano classes at the two colleges was prescribed by the college's course outline; therefore, only a limited amount of modification to the course content could be made to conduct this study. As dictated by the course outline, the beginning piano course at the community college level was primarily a course built on acquiring the reading skills necessary to progress through the curriculum. Acquisition of reading musical notation at the beginning level was a specified learning outcome or learning objective at each institution.

The amount of instruction time for the aural treatment was limited. For the purposes of this study during the course of the 16-week semester, 20 minutes per week (or 13% of the total instruction time) was used for instructional treatment for the Bayside aural group and 15 minutes per week (12% of the total instruction time) was used for the Mountain View aural group. In this way, a sufficient remainder of time was left to meet the requirements of the course while spending a substantive amount of time exploring an approach to aural learning.

I selected a mixed methods design to produce both quantitative and qualitative data. I believed that an integrated approach provided a better understanding of the research problem than either approach alone. By using more than one method of data collection, confidence in the findings was increased through triangulation (Heale &

Forbes, 2013). Another consideration had to do with the way educational decisions are made in California. At the California Community Colleges, decisions regarding educational content and administration are data driven. Administrators need measurable data to make any modifications in curriculum or design.

To provide a baseline for comparing groups before instruction, students filled out the Beginning Piano Questionnaire that asked about their ethnicity, age group, musical background, interests, reasons for taking the class, and their expectations of the class. The information gleaned from the Questionnaire could provide valuable information for inter and intra-group comparisons.

To answer the first two research questions, a pre-post-test control group experimental design was used. For this study, students were tested at three different points in the semester: 1) before instruction (pretest), at the 10-week point, and 3) at the end of the 16-week semester (post-test). Each participant was individually tested during class and audio recorded for later evaluation.

The pretest was given to all participants to determine musical abilities prior to instruction. The pretest measured skills in two areas: note reading of four notes (NR) and playing a familiar tune of their choice (FT). For NR, students were asked to play four notes written as half notes in the grand staff, two in the treble clef and two in the bass clef. Then, they were asked to play either a familiar tune like *Row, Row, Row Your Boat* and *Merrily We Roll Along,* or any other song of their choice without the aid of musical notation. The data collected in the pretest provided a baseline for comparison between the two schools and between the treatment and control groups.

At the 10-week point in the semester, students were asked to play a sight reading example of four measures (SR10). This 10-week sight reading checkpoint was added to the main study as an intermediate sight reading measure. The purpose was to see if an intermediate score near the middle of the semester could better explain the post-test result at the end of the semester. To ensure similarity of difficulty between SR10 examples, all sight reading examples, including post-test SR16, were from the Music Teachers' Association of California (MTAC) Certificate of Merit evaluations (Prep Level and Level 1) for piano. Permission from MTAC was granted for the use of all sight reading examples. For SR10, both examples were in 4/4-time and in the key of C major. Only quarter and half note values were used. The example had mostly stepwise motion and one or two intervals of a third. No dynamics or articulation was indicated. A finger number was provided for the first note in each hand.

The post-test was the final round of testing that occurred at the end of the semester. The post-test consisted of NR, SR16, and performance of two prepared pieces (PP) learned in class. Each of the two post-test SR16 examples had intervals of a second, third, fourth, and fifth. Unlike the SR10 test, dynamics (***p*** and ***f***), and articulation (*staccato* and slurs) were also indicated. Both post-test SR16 examples were in the key of C major with a 4/4 time signature.

The PP test took place in a recital style format in which students performed for each other. The recital also functioned as the final exam for the semester. Each student was given two weeks to prepare two pieces of their choice from a list of five pieces. Students in the aural treatment group were taught one of these five pieces by-ear without

the aid of musical notation two weeks before the final. Like the pilot study, I wanted to see if there were any differences in performance outcomes by students in the aural group who learned the piece, *Vivace,* by-ear and students in the reading group who learned it through music notation.

To answer research questions 3 and 4, I used qualitative methods. At four different points in the semester, the aural students wrote in journals in response to open-ended questions such as: 1) if by-ear or reading activities were difficult or easy, 2) how they would assessment their progress, 3) if by-ear activities helped reading or not, 4) if they had any other comments. The reading students wrote in journals at two different times during the semester. They were prompted to write about their enjoyment of the class and if reading music notation was easy for them. Unlike the pilot study, all journal entries were written by students during class time to obtain more complete data.

At the end of the semester, group interviews (aural and reading group students) and individual interviews (aural group students only) were conducted and audio recorded. The interview questions focused on student perceptions of the by-ear activities and if the activities facilitated learning. The aural students were also asked what they thought about learning to play piano by-ear, if they thought it should be included in a beginning piano course, what strategies they used to play by-ear, and what the instructor could do to facilitate learning in the areas of playing and reading music.

Participants – Phase 1

Participants were from two different community colleges in California, Bayside Community College and Mountain View Community College. The colleges were located 25 miles from each other in adjacent counties in California. The participants were assigned according to a convenience sample of students enrolled in the beginning piano classes for the fall semester in which the research took place. Three classes (one class from Bayside, two classes from Mountain View) participated in this study. The assignment of treatment/control groups was made before the start of the semester to avoid teaching the treatment group and control group on the same day. Because two classes were from Mountain View, one was assigned as treatment and the other as control. The assignment of a treatment and control group from the same school eliminated the issues of differences in instruction time and enrollment demographics between the two colleges.

Initially, data was collected from sixteen students in the Bayside treatment group, five participants from the Mountain View treatment group and seven participants from the Mountain View control group. Unfortunately, because of student attrition and incomplete data, only two whole groups could be included in this study, one from each school. The incomplete data were from four Bayside aural group students who missed SR10 tests and had to be excluded from the study. Four others dropped the class after the tenth week and several students were ineligible because they were under 18 years old. As a result, all students from the Mountain View treatment group were excluded because the number of eligible participants became too small.

Consequently, 14 students participated in Phase 1 of the main study--the aural

group from Bayside Community College and the reading group from Mountain View Community College. Two classes and 14 students participated in Phase 1:

- Bayside Aural Group – 7 participants
- Mountain View Reading Group – 7 participants

Participants - Phase 2

Because of the relatively low number of participants with complete data in Phase 1, research was conducted for another semester at the same two community colleges. Like Phase 1, it was conducted in the Fall semester but in the following academic year. Again, students from three whole classes (one from Bayside and two from Mountain View) were invited to participate in the study. The treatment and control groups were assigned the same way as they were in Phase 1. The number of participants significantly increased for Phase 2 primarily because more focus was placed on obtaining complete data from all students over the course of the semester. Student attrition and age restrictions were also less of a factor.

For Phase 2, three classes and a total of 34 students participated in the study:

- Bayside Aural Group – 18 participants
- Mountain View Aural Group – 7 participants
- Mountain View Reading Group – 9 participants

Bayside and Mountain View Colleges are located in Southern California. (Student demographics for the Fall of 2016 and 2017 are displayed in Appendix T.) Both colleges enroll music majors and non-majors in their beginning piano classes, in addition to adult learners taking piano for personal enrichment.

Except for the pretest at the beginning of the semester, all sight reading and performance measures were part of regular graded work. Because this research was a significant part of the instruction for both groups, points earned for performance tests contributed to their final grade in the class.

Procedures

To ensure fidelity of treatment for both phases of the study, detailed lesson plans were created and used for Phase 1 and duplicated for Phase 2. As with teaching any two different classes, instruction is not an exact science. An instructor may instinctively modify lessons to fit group or individual student responses. As the researcher-instructor, I tried to minimize any differences in lesson content, teaching technique, and effort between groups and between phases by adhering to the lesson plans and consulting my journal notes.

At the start of the semester, all students were given the Beginning Piano Questionnaire that asked about their musical background, musical interests, reasons for taking the class, and expectations. Students then took the two performance pretests in Note Reading and Playing a Familiar Tune. To ensure confidentiality, each student was assigned a random three-digit number. This number was announced at the beginning of each audio recording. The same number was announced at the beginning of all subsequent recordings at the 10-week mark and on the post-tests.

Treatment for the aural groups began in the first week of class. This consisted of learning two tunes on the black keys by-ear, *Hot Cross Buns* and *Merrily We Roll Along*. Students sang finger numbers before playing (see Appendix E). After each song was

learned on the black keys, it was transposed to C major and G major in the second week. Students also learned the 8-measure Finger Exercise #1 by-ear that consisted of alternating melodic seconds using all five fingers in C major (see Appendix D). All by-ear work was learned one measure or one phrase at a time in call and response style. In the first week of instruction, students in the aural groups learned the two tunes and Finger Exercise #1 by-ear (hands separately and together playing the same notes an octave apart) and were assigned them as homework for the first week.

Rhythm patterns of eighth, quarter, half, and whole notes were also taught in the first week by clapping in call and response style without any music notation. They were all one-measure patterns that were clapped while foot-tapping the quarter note pulse (see Appendix F). Later in the lesson, students in the aural groups learned the proper rhythm notation for what they just clapped and copied the patterns in their manuscript books to clap for homework.

The second week of class continued with the same treatment of playing Finger Exercise #1 and playing the two familiar songs in the transposed keys of C and G. Reading was also gradually phased in during the second week. The homework for the second week was identical to the control group except for the additional tunes and exercise learned by-ear.

In the third week, the 8-measure Finger Exercise # 2 was introduced by-ear. The exercise consisted of mostly intervals of a third (see appendix D). The Supplemental Packet (Appendix C) was given out and students sang the letter names in rhythm before playing. Then, they sang moving the fingers that corresponded to the fingering of the

notes in the air. The third step was to play the example. The Supplemental Packet begins with short 4 to 8 measure examples focusing on notes in middle C position (both thumbs on middle C or C4) and the C major 5-finger pattern (left hand 5th finger on C3, right hand thumb on C4). At the same time the Supplemental Packet was introduced to the aural groups, Bastien's Sight Reading, Level 1, was introduced to the reading group.

The aural treatment continued in similar fashion into the fourth week, adding another finger exercise and more examples in the Supplemental Packet. In the fifth week, *The Swing* was introduced by-ear as a repertoire piece. It was their first repertoire piece taught by-ear. They have already played three pieces by reading them from their textbooks by now; however, these reading pieces used only three different notes up to this point. *The Swing* used all five notes in C position and employed hands playing different notes simultaneously for the first time (see Appendix G). In all, during the course of the semester, three repertoire pieces were taught by-ear (*The Swing, The Circus, Vivace)*, in addition to the familiar tunes played at the beginning of the semester.

The study of four different finger exercises learned by-ear continued up to the 12th week in the semester. Each one was transposed to several different keys. The remaining two repertoire pieces learned by-ear were learned at the 8th and 14th week marks. The Supplemental Packet for additional reading support continued until the 15th week of the semester.

In sum, the treatment period lasted for 15 weeks, twice a week for the Bayside aural group and once a week for the Mountain View aural group. Even though the Mountain View aural group had less instruction time per week, the smaller class size

seemed to mitigate this deficit. Consequently, homework assigned each week was nearly identical between all aural groups in Phase 1 and Phase 2 of the study. All performance tests were given in the same weeks for both aural and reading groups.

The Schedule of Instruction chart below lists when each aural treatment item was introduced. For simplicity, textbook items that were duplicated in each lesson between the aural and reading groups were not listed.

Table 3.2. Schedule of Instruction

Pre-Instruction	Letter of Introduction/Consent Beginning Piano Questionnaire PERFORMANCE PRETESTS (NOTE READING, FAMILIAR TUNE)	
Week	AURAL GROUP	READING GROUP
1	Finger Exercise #1 in C major *Hot Cross Buns, Merrily We Roll Along* in Gb major (black keys) Rhythm clapping/tapping	Textbook black keys pieces (simplified staff) Textbook rhythm reading
2	Finger Exercise #1, #2 *Hot Cross Buns, Merrily We Roll Along* in Gb, C major, G major Rhythm clapping/tapping Textbook rhythm reading Reading in grand staff notation	Reading in grand staff notation Writing notes in grand staff F2-G5
3	Finger Exercises #1, 2 transposed to G major Supplemental Packet for singing/reading Student Journal Entry #1	Note flashcards for C3-G4 Bastien's *Sight Reading Level 1* Student Journal Entry #1
4	Finger Exercise #3 in G major Supplemental Packet	Finger Training in rhythms* Bastien's Sight Reading Level 1
5	Finger Exercise #3 in G minor (preparation for textbook piece in G minor position) *The Swing* (in C major) Supplemental Packet Student Journal Entry #2	Finger training in rhythms* Bastien's *Sight Reading Level 1*
6	Finger Exercise #3 in G minor, #4 in D major (preparation for textbook piece in D position) *The Swing* writing notation in notebooks Supplemental Packet	Finger training in rhythms in G major* Bastien's *Sight Reading Level 1*
7	Review Finger Exercise #3 in G minor, #4 in D major *The Circus* (in D major) Supplemental Packet	Five-finger patterns in C, D, E major Finger training in rhythms in G major* Bastien's *Sight Reading Level 1*

Week	AURAL GROUP	READING GROUP
8	Midterm exam Play and write five-finger patterns in C, D, E, F, G, A, B major in grand staff Finger Exercise #4 in D *The Circus*	Midterm exam Play and write five-finger patterns in C, D, E, F, G, A, B major in grand staff Bastien's *Sight Reading Level 1*
9	Finger Exercise #3 in G minor, #4 in D, A, E major *The Circus*	Play five-finger patterns in C, D, E, F, G, A, B major, *Sight Reading Level 1*
10	Finger Exercise #4 in D, A, E major *The Circus* Supplemental Packet Student Journal Entry #3	*Dance* from textbook introduced by listening first, then reading Bastien's *Sight Reading Level 1*
	PERFORMANCE 10-WEEK TEST (SIGHT READING)	
11	Finger exercise #4 in F major *The Circus,* transposed to C and G major Supplement Packet	Bastien's *Sight Reading Level 1*
12	Finger Exercise #4 in B major Supplemental Packet Student Journal Entry #4	Bastien's *Sight Reading Level 1* Student Journal Entry #2
13	Supplemental Reading Packet	Bastien's *Sight Reading Level 1*
14	*Vivace* learned by-ear Supplemental Reading Packet	*Vivace* learned by reading Bastien's *Sight Reading Level 1*
15	Preparation for final exam concert Supplemental Reading Packet	Preparation for final exam concert Bastien's *Sight Reading Level 1*
	PERFORMANCE POST-TESTS (NOTE READING, SIGHT READING, TWO PREPARED PIECES)	
	Interviews	

*Phase 2 only

Students wrote in their journals at four different points in the semester. The journals were the last page of each of four quizzes given during the semester. The journals were not graded. The main purpose of the journal was to get feedback during the semester about the various by-ear playing and reading activities they had just experienced. The reading group also wrote in their journals at two points during the

semester about their perceived progress in reading music and playing (see Appendix I).

On the last day of class and after the final exam, the aural group students stayed for a short 10-minute group exit interview. The interview was audio recorded for later transcription. After the group interview, volunteers were asked to remain for individual interviews of an additional 5-10-minutes. These interviews were also audio recorded. Each student individually interviewed received a Starbucks gift card for their participation.

Treatments

Over the semester, students from the aural groups learned two familiar tunes, four finger exercises, and three repertoire pieces by-ear. As an example of the by-ear learning process, the procedure for teaching the finger exercises is described here. The finger exercises were learned in call and response style, two-measure phrases at a time. After learning each phrase, the instructor played the entire exercise without interruption from beginning to end while students listened, trying to commit it to memory. Then, students played the exercise, as it was heard, in its entirety. The finger exercises were designed to be easy to play and memorize in one session. They began learning the right hand first, then left hand, then hands together. After it was memorized, it was transposed to other keys (see Schedule of Instruction).

Students from the control/reading group practiced from notated finger exercises, drills and interval studies in their textbooks. One of the textbook songs that the aural group learned by-ear, *Vivace*, the reading group learned through notation. The reading group learned everything through notation, except for an interval study learned by-ear in

Phase 2 (see Appendix H). Bastien's Sight Reading Level 1 was selected to supplement reading for the reading group. The book consisted of graded sight reading examples in the keys of C, G, and F major.

For the aural groups, the primary purpose of the finger exercises learned by-ear was twofold—to develop the ear and to develop finger technique. A secondary purpose was to develop familiarity with new keys through transposition. It is my belief that patterned finger exercises help the ear by reinforcing intervals and the finger combinations that create them. The keyboard is unique in the sense that distances between pitches can be seen and fingered spatially. Generally, the larger the interval between two pitches, the larger the distance between the keys on the keyboard and the corresponding distance between the fingers. This visual-spatial element can affect the strategies to learning a melody by-ear for keyboardists (Woody & Lehmann, 2010).

The three repertoire pieces that the aural group learned by-ear over the semester were *The Swing, The Circus,* and *Vivace*. Both *The Swing* and *Vivace* were in C major, and *The Circus* was in D major. The first time the pieces were introduced, students recorded a performance by the instructor on their cell phones. Through a combination of repeated listening and call and response style instruction (phrase by phrase), students learned the pieces by-ear complete with dynamics and articulation. In composing *The Swing* and *The Circus* for by-ear learning, I emphasized melodies within five-finger patterns and harmonies using tonic and dominant. They were designed to be learned over a two to three-week period. After the piece was learned, students wrote the pieces out in music notation with guidance from the instructor. *Vivace* was an exception. It was a piece

in the textbook. The piece was revealed to them in their textbook only after they learned to play it. As a side note, the actual title of the piece was unknown to them so they would not be tempted to look in their textbook. I asked them to provide a title that best suited the character of the piece.

Measures

Pretreatment data collection consisted of the Beginning Piano Questionnaire and two performance tests, familiar tune (FT) and note reading (NR). During the semester, students wrote in their journals in response to different prompts asking them about perceptions relating to progress, difficulty/ease of certain activities, and learning preferences. At the 10-week mark, a sight-reading (SR10) performance test was given. Posttreatment data collection also included NR, sight reading (SR16), and performance of prepared pieces (PP). Other posttreatment data included group and individual interviews in which participants were asked to reflect upon their learning experiences during the semester.

Beginning Piano Questionnaire. The answers to the researcher-authored BPQ provided descriptive information regarding course expectations, musical style preferences, musical background, age range, ethnic background, and learning preferences. Because this study was based on participants from pre-enrolled whole classes, participants could not be reassigned to different groups. Consequently, the BPQ data provided a benchmark profile for each group taken at the beginning of the semester.

Note Reading (pretest). To address Research Question 1, four notes were selected in the grand staff to assess pre- and post-instruction reading skill. The same four notes were given to both aural and reading groups.

Familiar Tune (pretest). To address Research Question 2, a pre-instruction performance test was used to assess overall playing ability of all participants prior to treatment. This performance test was not used to assess by-ear playing ability. The tunes, *Row, Row, Row Your Boat* and *Merrily We Roll Along* were suggestions. Students could play those tunes or anything else they knew that demonstrated their playing ability prior to treatment.

Sight Reading at 10 Weeks. This assessment was taken slightly after the mid-semester mark. Its purpose was to track the progress of sight reading skill from 10 weeks into the 16-week semester. The data collected at this point might partially address and explain Research Question 1. This was a four-measure example in 4/4 time signature, notated in quarter and half notes, and used mostly stepwise (interval of a second) melodic motion in C major. No dynamic, tempo, or articulation markings were indicated. This sight reading example was notated on a quiz the class took. Because the example was notated on a quiz that was handed out to all students at the same time, some students were able to preview the example for up to twenty minutes while waiting for their turn to play.

Note Reading (post-test). To address Research Question 1, the same four notes used in the pretest were presented in the protest.

Sight Reading at 16 Weeks (post-test). This post-instruction test was used to address Research Question 1 by measuring sight reading skill at the end of the semester.

There were two examples, both used by permission from the Music Teachers' Association of California Certificate of Merit Level 1 Examinations (2010-2011). Students were asked to play one of the two different examples. Each example was four measures long in 4/4 time signature, notated in quarter and half notes, and employed intervals of a second, third, fourth, and fifth with changes in melodic direction (see Appendix K). Also included were dynamic, tempo, and articulation markings. Students were able to preview the example for only 15 seconds. The testing conditions of post-test Sight Reading at 16 Weeks were under stricter conditions than Sight Reading at 10 Weeks.

Performance of Prepared Pieces (post-test). To address Research Question 2, students selected two pieces of their choice (from five qualifying pieces) as their final examination performance in a recital format. All pieces were learned by reading musical notation, with the exception of those students from the aural groups who chose *Vivace* as one of their two pieces. Students had two weeks to prepare the pieces for performance. Pieces were performed with music notation unless students preferred playing by memory.

Performance Testing Procedures.

All performances were recorded in stereo using the Zoom H4n Handy Recorder. A random three-digit number, assigned to each student, was announced at the beginning of each performance. The same number was used throughout the study to identify that student.

The researcher served as test proctor and recorded all performance tests. Except for the performance of two prepared pieces, students were recorded individually on a

separate audio track at their own keyboards within their classroom setting.

For the post-test performance of two prepared pieces, a recital format was used. The whole recital was recorded on one track. A program was issued listing the order of performance and title of pieces. All student names were replaced with numbers for evaluation.

The recorded sound files were moved into iTunes and a compact disc was prepared for each group. The evaluators received compact discs, one for each group, and a binder with scoring sheets tabbed and organized by group. Scoring sheets for each performance test listed CD track numbers and student identification numbers for reference. A scale of 1-5 (5 being highest) was used with the exception of a score of zero meaning that no attempt was made by the student.

Evaluators. Two evaluators were selected based on their experience as private piano instructors and evaluators for the Music Teachers' Association of California (MTAC) Certificate of Merit examinations for piano. Evaluators for these examinations must take workshops to ensure consistency of evaluation and scoring. The scoring system of 1 to 5 for this study is the same system used by MTAC. The pilot study served to check consistency of scores. For the main study, if scoring was two or more points different for any test, evaluators were asked to rescore the test. Evaluators did not confer with each other during the evaluation period. The same two evaluators were used for both phases of the main study and for the pilot study. Evaluators were blind to the participants' identity, group, and school.

Student Journals. To address Research Question 3, students in the aural group were asked to respond to prompts in their journals at four points in the semester: week 3, week 5, week 10, and week 13. They were asked about their learning preferences by-ear and by-reading notes. They were also asked to reflect on their progress in the areas of reading and playing. The final question in week 13 was if they thought playing by-ear should be included in a beginning piano course. In each journal, they were encouraged to write any other comments they had. Students in the reading group responded to prompts during two points in the semester, weeks 5 and 13. Their journal writing was much more brief than the aural group. The reading group was asked to write if they thought reading was easy and about their progress in reading and playing.

Group and Individual Interviews. To address Research Question 3 and 4, the aural group students were asked if the by-ear sessions were enjoyable and how these sessions might have helped them play or read better. They were asked both in a group and individually if they thought playing by-ear should be included in a beginning piano course. The reading group was also asked if they thought by-ear activities should be included in a beginning piano class. To help address Research Question 4, the individual interview asked aural students to elaborate on what strategies they used for playing back melodies learned by-ear and their thought processes behind it. All interviews were audio recorded and transcribed. Email addresses were collected to contact students if any clarification was needed.

Instructor Journal. To address Research Question 4, an instructor journal was kept to record reflections on class activities and student response. The instructor journal

took the form of handwritten annotations in the lesson plans and general comments written after the conclusion of each class. Specific observations were made regarding learning activities that were effective or not effective. Notes were also made on how to follow-up or modify learning activities for the next lesson. As additional data for review, many of the aural instruction segments were audio-recorded during class.

Plan for Analysis

Performance scores were collated by three-digit ID number for each participant within their respective group. Scores between the two evaluators were averaged (sum divided by two) to give each student a single score for each performance test. The plan was to compare variance around the mean of both the reading and aural groups to determine if the groups were somewhat similar in nature, that is, if they started in a similar place. The a priori significance level of the study was established at α=.05. To examine the differences between groups in the pretest, unpaired t-tests were run between groups for NR and FT.

To answer Research Question 1, t-tests were run for SR10 and post-test SR16 between groups. To answer Research Question 2, t-tests for FT and PP were run between groups. To measure improvement made within groups, I ran unpaired t-tests within groups for the same measures as between groups. In addition, because of the small sample sizes and anticipated low statistical power, I also used Cohen's *d* test which measures deviation in difference between groups. The results of the statistical analyses should only be interpreted considering the small sample size.

The Beginning Piano Questionnaires produced valuable data that helped explain

some differences between the groups. The data were collated by group. Answers to multiple choice questions were tallied. Answers to questions asking for ranking, were tallied in order of preference. Of particular interest were answers to questions on musical/piano background and whether the student was a declared music major. This information was important in explaining the differences between groups in the Discussion section.

The responses and reflections from the student journals gave an overall picture of student perception of enjoyment of the learning experience. Direct quotes from students provided the richest form of qualitative data. I looked for any consistent themes and any specific strategies that worked for students learning to play by-ear.

The interviews, both group and individual, were transcribed for analysis. The interviews were another rich source of information and provided the interviewer with the opportunity to probe even further to get more complete answers. Again, the plan was to look for consistent themes and strategies employed in learning using an aural approach. Of special interest were the answers to Research Question 3—if students thought learning by-ear should be included in a beginning piano course and why. Direct quotes from multiple students contributed valuable data to this study.

Summary

This study compared learning piano with an added emphasis on aural skills and learning piano with a traditional notation-based approach. Students were from beginning piano classes at two community colleges. Treatment consisted of 12-13% of instruction time within the 16-week academic semester. Before and after instruction, performance

tests were given in note reading (Research Question 1), and playing a familiar tune and prepared pieces (Research Question 2). Additional tests were given for sight reading at the 10-week and end-of-semester intervals (Research Question 1). Students also responded to journal prompts and interview questions designed to gauge enjoyment of learning experience and viability of the aural emphasis in a beginning piano course (Research Question 3). Finally, observations from the instructor 's journal were used to help evaluate the effectiveness of strategies used to teach by-ear and how they might be improved (Research Question 4).

CHAPTER 4
LET'S GET REAL

The action research study compared two instructional approaches in teaching beginning piano. Participants in the treatment group learned pieces by-ear and through reading, finger exercises by-ear, and sight reading exercises in an integrated by-ear and notation-based approach while participants in the control group learned pieces and sight reading exercises from their textbooks in a notation only-based approach. Data were collected over a period of two consecutive fall semesters. The first semester of data was Phase 1 and the second set, Phase 2. For Phase 1, participants were from a convenience sample of two classes from two community colleges. For Phase 2, participants came from a convenience sample of three classes from the same two community colleges.

At the beginning of the semester, students filled out the Beginning Piano Questionnaire which was used to collect demographic information as well as data on musical background prior to treatment. Performance tests measured pre- and post-instructional note reading (Research Question 1), and performance of a familiar tune and two prepared pieces (Research Question 2). A sight reading test at the 10-week and end-of-semester mark provided additional data on reading. To obtain data on student enjoyment and attitudes toward instruction, student journals were maintained throughout the semester and interviews were conducted at the end of the semester (Research Question 3). Reviewing the instructor journal that I kept throughout the study enabled me to modify teaching strategies that could be used to improve practice (Research Question 4).

Results – Phase 1

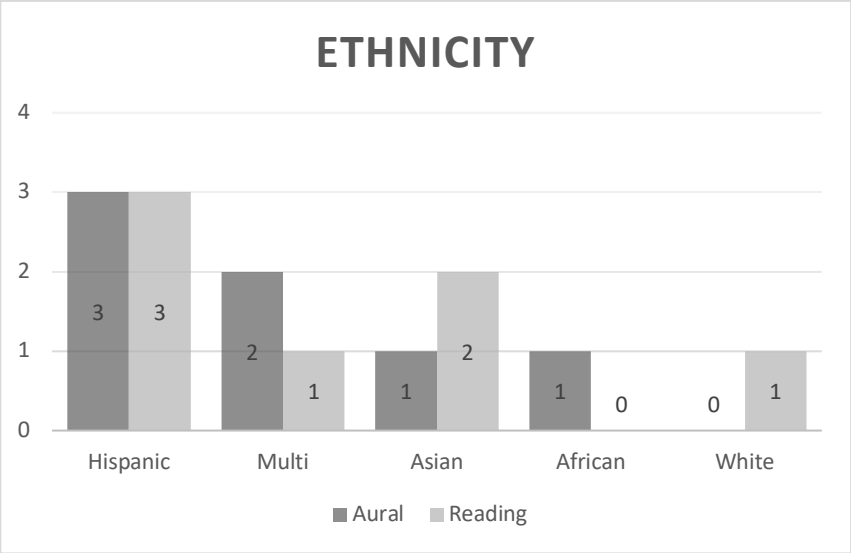
The following reports data collected from the Beginning Piano Questionnaire, performance test scores, journal entries, and interviews from Phase 1 of this study.

Beginning Piano Questionnaire

The purpose of the questionnaire was to collect demographic information on the participants and take a closer look to see if participants in both aural (treatment) and reading (control) groups were similar in musical background at the beginning of the study. Because the study uses a convenience sample of students who enrolled in the class, the self-reported background information cannot represent typical backgrounds of a beginning piano class, but only the participants in this study.

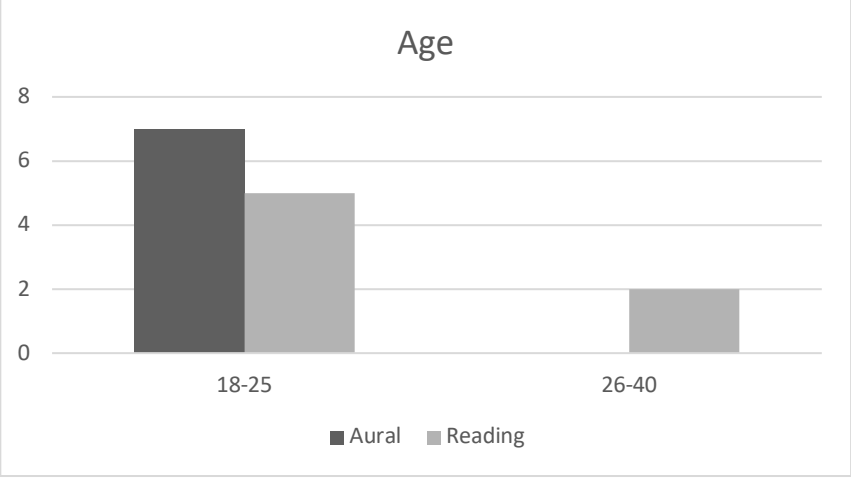
A total of fourteen students participated in Phase 1 of the study. Seven participants from the aural group considered themselves from the following ethnic groups: Hispanic (3), Multi-Ethnic (2), African-American (1), and Asian (1). The seven from the reading group reported themselves as Hispanic (3), Asian (2), Multi-Ethnic, (1) and White/Non-Hispanic (1).

Figure 4.1. Ethnicity - Phase 1



For age demographic, all participants from both groups reported themselves from the age 18-25 group except for two from the reading group who reported from the age 26-40 group. This may or may not be an issue in interpreting results as it pertained to mature learners.

Figure 4.2. Age - Phase 1



Another purpose of the questionnaire was to discover musical background and see if the groups were similar before instruction. For how participants would classify their musical background, they responded as having little or no musical training (1 point), some musical training (2 points), or several years of musical training (3 points). The aural group self-reported an average of 1.857 while the reading group self-reported 1.833. Both groups seemed pretty evenly matched in musical training.

Another question asked how participants would classify their *piano* background. Participants rated themselves as having little or no piano training (1 point), some piano training (2 points), or several years of piano training (3 points). The aural group self-reported an average of 1.286 while the reading group averaged 1.167. Again, the two groups were close, with the aural group having a slight advantage in piano background.

Descriptive Data: Performance Tests

Evaluator results were compiled for fourteen students: seven students from the aural group and seven students from the reading group, N=14. Although data was collected from more participants, only students who tested in all performance measures were included in the study.

Scores were collected on the following measures: one pretest performance and one pretest reading, one mid-semester (at week 10) reading, two post-tests reading, and two post-test performance. An average of both evaluator scores was used as the final score for each participant in each subject. A group average was also calculated for the group score in each subject.

The following chart shows the average of two evaluators scores for each performance test. The last column is the average score of two prepared pieces.

Table 4.1. Raw Scores – Phase 1

		Pretest			Post-test				
	Part ID	FT	NR1	SR10	NR2	SR16	PP1	PP2	PPA
Aural Group (Bayside)	108	0	1	2.5	4	3.5	3.5	2.5	3
	133	5	3	5	5	5	5	5	5
	167	5	3.5	5	5	3.5	4	5	4.5
	123	0	0	5	4.5	3	5	5	5
	153	2	0.5	4	3.5	1.5	4.5	3.5	4
	144	4.5	4.5	4.5	5	4	5	5	5
	107	5	5	5	5	4	4.5	5	4.75
Average		3.07	2.50	4.43	4.57	3.50	4.50	4.42	4.46
Reading Group (Mountain View)	323	4.5	3.5	4	4	3	4.5	4.5	4.5
	391	0	5	5	5	5	5	5	5
	357	5	3.5	5	5	4	5	5	5
	396	0	0	5	3.5	4	2.5	3.5	3
	389	0	0	5	3.5	2.5	4.5	4.5	4.5
	313	5	4.5	5	5	4	4.5	5	4.75
	347	5	3.5	5	3	3	4	3	3.5
Average		2.79	2.86	4.86	4.14	3.64	4.29	4.36	4.32

FT = Familiar Tune, NR = Note Reading (4 notes), SR10 = Sight Reading at 10 weeks, SR16 = Sight Reading at 16 weeks, PP = Prepared Piece, PPA = Prepared Piece Average

To determine if both groups were similar in reading and playing skill in the pretest, the variance around the mean was calculated for the pretest on Note Reading 1 (NR1) and Familiar Tune (FT). For NR1, I found the aural group M= 2.5 and SD=2.00. The reading group measured M=2.86 and SD=2.04. In the pretest for FT, the aural treatment group measured M=3.07 and SD=2.35 while the reading group was M=2.79 and SD=2.61. A slight advantage was demonstrated by the reading group in Note Reading

and by the aural group in Familiar Tune.

Table 4.2. Pretest Descriptive Data and Confidence Intervals – Phase 1

	Aural Group				Reading Group			
	M	*SD*	Lower Limit	Upper Limit	*M*	*SD*	Lower Limit	Upper Limit
NR 1	2.50	2.00	0.98	4.74	2.86	2.04	0.65	4.35
FT	3.07	2.35	0.90	5.25	2.79	2.61	0.37	5.20

Limits represent 95% confidence levels

Comparison between the two groups in the post-test yielded interesting results. Average scores for performance of prepared pieces were higher for the aural group on both pieces, although not significantly higher. For the post-test Note Reading 2 (NR2), the aural group had a slight edge over the reading group, although not statistically significant at averages 4.57 and 4.14, respectively. The Performance Piece Average (PPA) was 4.46 for the aural group and 4.32 for the reading group. At the 10-week mark, scores for both groups in Sight Reading at 10 weeks (SR10) were higher than the scores for Sight Reading at 16 weeks (SR16), most likely due to the difference in musical examples and testing conditions. The difference between the two groups in SR10 was slightly more than the difference in SR16. This was an interesting finding because most of the aural treatment took place in the first ten weeks of class; however, no generalizations can be made because of the extremely small sample set. At the end of the semester, SR16 scores were lower than SR10 but by a smaller margin at 3.500 for the aural group and 3.643 for the reading group.

Table 4.3. Post-test Descriptive Data and Confidence Intervals – Phase 1

	Aural Group				Reading Group			
	M	*SD*	Lower Limit	Upper Limit	*M*	*SD*	Lower Limit	Upper Limit
NR 2	4.57	0.61	4.01	5.13	4.14	0.85	3.36	4.93
PPA	4.46	0.74	3.78	5.15	4.32	0.77	3.61	5.04
SR 10	4.43	0.93	3.57	5.30	4.86	0.38	4.51	5.21
SR 16	3.50	1.08	2.50	4.50	3.64	0.85	2.86	4.43

Limits represent 95% confidence levels

The SR10 scores were higher than the SR16 scores probably because of the amount of preview time allowed (up to 20 minutes for SR10, and 15 seconds for SR16) and the increased difficulty of the SR16 example (added dynamics, articulation, all melodic intervals up to a 5th). As I reflected on the decision to include a sight reading test at mid-semester, I should have replicated the same test conditions and a similar difficulty level to get a more accurate measure of sight reading skill acquisition over the period of week 10 to week 16 (end of semester). The lower post-test SR scores for both groups did not necessarily indicate a regression in sight reading skill. Rather, each testing point—10 weeks and 16 weeks—should be considered separately. At both points, the reading group demonstrated higher sight reading scores which was consistent with a higher pretest note reading score (NR1).

To assess playing ability at the beginning of the semester before any treatment, both groups were asked to play a familiar tune (FT) of their choice. The aural group performed slightly better with an average score of 3.07 compared to 2.79 for the reading

group. For the post-test measure of performance of Prepared Pieces (PP), two pieces were evaluated on a scale of 1 to 5, then summed between the two evaluators and averaged for Prepared Pieces Averaged (PPA). Participants in the aural group scored slighted higher for PPA in the post-test; however, that advantage was not statistically significant.

Research Question 1: Differences in Music Reading Achievement

To answer the research question of finding measurable differences in reading music notation between the aural and reading groups, I ran t-tests within groups for pre-post-test parameters. The t-tests within groups produced the most interesting and unexpected findings for Phase 1 of the study. The aural group had a *statistically significant* improvement in note reading scores from the pretest (NR1) to the post-test (NR2) ($p = .0223$). The scores of the reading group, although improved, were found to be not statistically significant ($p = .1491$). This finding suggested that the aural group had a larger and statistically significant improvement in the reading of four notes in the grand staff from the pretest to the post-test while the reading group had only a modest improvement. The aural group also started at a lower average pretest note reading score but still outscored the reading group in the post-test. Could it be that the aural group relied more on understanding the aural meaning and spatial relationship of symbols on the staff instead of memorizing its visual appearance? This and other possible reasons are discussed in the next chapter.

Another interesting finding was for Sight Reading at 10 weeks and 16 weeks (SR10, SR16). Both groups, on average, had *lowe*r scores from SR10 to SR16. This decline in scores, although unexpected, may be due to the difficulty of the sight reading

examples themselves and the testing conditions, not a regression in sight reading skill. A closer look revealed that the *decline* in scores for the aural group was lower but not statistically significant ($p = .1107$), but the scores for the reading group were found lower and *very statistically significant* ($p = .0048$). The negative gain scores of -0.93 and -1.21 for the aural and reading groups, respectively, suggested that the aural group, might have benefitted from an integrated aural approach to reading and note reading. Perhaps the reading group relied only on visual cues (placement of note on staff, direction, interval) and not aural ones (singing, internal singing, singing with fingers). Again, statements made for a small sample size cannot be generalized to a larger population.

Although the two sight reading tests were spaced only six weeks apart (10th week and 16th week), SR16 was a more difficult example with dynamics, articulation, and a much shorter preview time. During this five-week period, both groups began reading in multiple keys and hand positions (G major, F major, a minor, d minor) which may have led to some confusion in reading in C major again. Other possible reasons for the decline in scores will be examined in detail in the Discussion.

Table 4.4. Reading Achievement Gain Scores – Phase 1

	Aural Group				Reading Group			
	Pretest	Post-test	Gain	*p*	Pretest	Post-test	Gain	*p*
NR1/NR2	2.50	4.57	2.07	.0223*	2.86	4.14	1.28	.1491
SR10/SR16	4.43[1]	3.50	-0.93	.1107	4.86[1]	3.64	-1.21	.0048*

*statistically significant
[1]SR10 was not given prior to instruction, but at 10 weeks

Another way to look at the note reading and sight reading scores was to study the four data points: NR1, NR2, SR10, and SR16. The reading group began at higher pretest scores than the aural group but gained less on both post-test scores. These findings suggested that an aural approach can assist in developing note reading and sight reading skill among beginning piano students.

Research Question 2: Differences in Performance Outcomes

In an analysis of performance outcomes, there were no significant differences between the two groups, nor was there any significant improvement within groups. Although the aural group had slightly higher pretest and post-test scores (FT, PPA), gains were made by both groups with the reading group slightly higher at 1.53 gain compared to 1.39 gain for the aural group. However, the aural group began with a higher FT pretest score and finished with a higher post-test PPA score. The results seemed to indicate both groups improved at nearly the same rate with instruction over the semester.

Table 4.5. Performance Outcome Gain Scores – Phase 1

	Aural Group				Reading Group			
	Pretest	Post-test	Gain	*p*	Pretest	Post-test	Gain	*p*
FT/PPA	3.07	4.46	1.39	.1611	2.79	4.32	1.53	.1616

Bear in mind that the pretest FT scores were based on participants selecting a tune of their choice. Some participants declined to play and received a score of "0." This could have skewed the result lower as seen in the number of "0s" received by five participants (see Raw Performance Scores); however, both groups demonstrated similar gains despite

the five "0s" in the pretest FT.

A comparison of pretest and post-test scores demonstrated that the aural group had a larger gain and a smaller deficit (or negative gain) in both reading measures and nearly the same amount of gain in the performance measure. The aural group also scored highest on the post-test on note reading and performance outcomes but slightly under the reading group in sight reading; however, in the sight reading measure, the aural group started at a much lower pretest score. Although the number of participants was very small, this study seemed to indicate that an integrated aural approach helped develop reading skills more than a reading-only approach and produced a similar amount of improvement in performance ability.

Research Question 3: Student Enjoyment and Perceptions of By-Ear Training

Student journals. Students from the aural group wrote in their journals four times during the course of the semester. For each journal entry, they were given two questions to write about. Most of the questions had to do with reading and playing by-ear. In the first journal entry in week 3, most students stated that they liked learning by-ear but that it was challenging. Carrie wrote that she liked learning by-ear because "my goal is to develop better ears. Having better ears will help me improvise over keys and notes." Ed stated that "learning by-ear is a little harder than by reading but it's a good skill to learn." Curiously, by the fifth week, most students wrote that they preferred learning the piece *Money Can't Buy Ev'rything* by reading instead of learning *The Swing* by-ear. This may have something to do with the pieces themselves rather than learning by-ear in general. *The Swing* was their first tune to play by-ear in which both hands do not play the same

notes and rhythm. In *Money Can't Buy Ev'rything*, both hands play different notes in the same rhythm. Kory wrote, "I prefer playing songs by reading the notes, as that gives me something a bit more tangible to work with, and it's easier to learn more complicated songs by having the notes to read." This statement seemed to show that Kory, a student with several years of musical training (according to his Beginning Piano Questionnaire), felt more comfortable reading because of his background. However, Rena, a student who marked "little or no musical training in the BPQ, wrote, "I like reading the notes. It's hard for me to differentiate between the notes by-ear."

Perhaps learning patterns or pieces by-ear at the five-week mark was challenging, especially without any visual cues. Reading, aural, and finger technique skills were developing and aural alone was difficult without much keyboard experience. Think of Rena who had little or no musical training. Unlike private lessons, in which the student is in very close proximity to the instructor, class piano students are seated at a considerable distance from the teacher's instrument and usually cannot see the teacher's fingers and which notes are being played. I began to discover how much the "visual" played in "aural" learning. In a private or small group learning situation, students could more easily model the instructor and were able to see not only the instructor's fingers but could observe which keys were depressed as the sound is produced.

By the tenth week, or a little past the middle of the semester, students had recognized that progress was taking place. In response to a question about learning *Circus* and finger exercise #4 by-ear and if it helped playing, all students responded overwhelmingly, "yes." Rena wrote, "Yea, because when I have a little trouble reading, I

just listen and I'm able to get it." Ed, who usually preferred reading from notation, wrote, "it has improved my playing" while Michael wrote, "they definitely help coordinate my hands." Michael wrote, "My fingers have become a little less awkward and my reading is getting a little better. Yes!" Kory wrote, "Yes, *Poppin' Feather Fanfare* [another title for *Circus* learned by-ear] made C chord essentially second nature to me now and Finger Ex. #4 has helped with finger flexibility."

When asked about whether they thought playing by-ear should be included in a beginning piano course, six out of seven answered "yes." Kory wrote "I believe it should be included for beginners. It allows beginners to start to distinguish notes in another way, other than just visually reading the notes." Rena, who had previously felt more comfortable reading at week 5, entered, "Yes, because it trains the ears for mistakes. I'm able to correct myself faster now." By the way, Rena was as student who received more than one "0" on her pretest and finished with at least one "5" on the post-test.

The reading group was not taught finger exercises or pieces by-ear. There was a minimal number of brief finger technique exercises which we did in the textbook. I saw that the reading group struggled a little more in learning new pieces. In my journal for the reading group in week 8, I wrote, "I noticed Elizabeth had weakness in her fingers for eighth notes [uneven rhythm and lack of clarity]—something finger exercises by-ear could have helped strengthen." It is difficult to withhold teaching material that I knew would benefit students. There is a teaching instinct always at work and it is hard for me to let students to continue to do poorly when I know I could help them. More about this later in the Phase 2 Discussion section.

Interviews. A group interview with the entire aural group was conducted on the last day of class. Most of the answers confirmed what students wrote in their journals. Some expressed that learning to play by reading was better because one could learn to play on their own. Another added that learning by-ear helped him find the notes for playing and that he knew when he "messed up" more so than if he learned by reading only. Another student stated that learning by-ear helped her write music because "when you hear what you play, you write better." I would add that the reverse is also true that when you can play what you hear, you are able to write it easier. When asked if learning to play the piano by-ear was enjoyable, the same student answered, "Yes, because the songs I want to play, I want to play without music sheets." This was an interesting comment. This student felt that playing without sheet music seemed enjoyable, perhaps more enjoyable than playing while reading.

A similar sentiment became apparent in the individual interviews. These were interviews of students who voluntarily stayed after the last class to offer feedback. Tim said, "when reading music, I just concentrate on reading the staff, but [when learning by-ear] I'm already knowing it and enjoying the piece." This was another revealing statement. Students should experience playing the piano as fun and enjoyable without the burden of learning to read at the same time. Playing without reading could be liberating and help you focus on *making* music and not *reproducing* notes on a page.

Michael said the same thing in a different way. He said that learning a piece by ear makes it easier to memorize and that it "sticks better." He added that learning by reading makes it more difficult to memorize and that you "have to have a photographic

memory." Again, this referred to the visual internalization of music, and almost turning off the aural sense. Kevin added another revealing comment. In response to the question if they thought playing by-ear helped performance of pieces, he said, "Yes, it helped performance because I can recognize dynamic changes." There may be more to learning music by-ear than just playing the notes. I would add that by learning a piece by-ear, one would not only recognize dynamic changes, but may also recognize other detail such as articulation and phrasing.

The reading group was also asked questions about by-ear activities. When asked if learning to play by-ear would have been beneficial, the answers were "always beneficial," "maybe not at first," and "I would have liked some by-ear." The reading group as a whole placed a "medium" value on ear training activities and said that "a little" by-ear activities should be included in a beginning piano class "but not too much because of the difficulty and stress." Four students in the reading group said they had prior experience in playing by-ear and that it had helped them in this class.

Research Question 4: Teaching Strategies

Playing by-ear. As I read through the aural group's journals in the tenth week, I wrote in my journal the next day, "I wonder how much finger agility/technique plays a role in playing by-ear, reading, and learning pieces. The more finger facility students have (finger exercise learned by-ear), the easier everything may seem. Fingers find the notes quickly because they have been there before!" It was difficult to separate the motor skill involved with the aural and visual skills required to make music. However, I thought that the *motor and the aural needed to be associated for reading to be successful*. Then,

students could work on pure reading. They were not looking down at their hands to see if they are playing the correct notes. (Students who look down at their hands frequently lose their place on the page.) For the aural group, I spent at least five minutes each class period on patterned exercises which were learned by-ear and transposed. Each exercise was taught in call and response style while maintaining a steady tempo. Does finger technique play that large a role in playing by-ear, reading, and playing pieces? This was something that I did not expect to discover coming out of this research. According to Musco (2006), students who learned new songs by-ear in multiple keys improved significantly in playing by-ear in newly learned keys compared to the control group who only played exercises in those same keys learned through reading. Although no significant effects were found in sight reading improvement, the Musco study suggested that learning songs by-ear may benefit student musicians overall. The question I asked is, "if it does not hinder reading progress, and it may help other musical areas, then why *not* include by-ear learning?" Ear learning must be an essential component of music education.

I thought that the three songs that the aural group learned by-ear, *The Swing, The Circus, Vivace,* were successful in giving students a complete piece to perform and enjoy. *The Circus* was probably the most successful because coordination between the hands was easy (mostly playing in octaves). *The Swing* was probably a little too difficult for everyone to feel confident in learning by-ear as the first piece. Putting hands together presented challenges because the hands played different notes and rhythm. However, I felt everyone was ready for *Vivace* closer to the end of the semester. It had enough

repetition to memorize and coordinate between the hands. The articulation (slurs, staccatos in the right hand) was the most difficult to play correctly. Some students were able to hear and reproduce the articulation and some had to be guided to the exact hand and finger motion. This was where sitting closer to see the instructor's hands might have been helpful.

Using their cell phones, students audio-recorded my performance of each of the three by-ear pieces for listening and practice. I taught each piece in two to three lessons by going over each hand, phrase by phrase, in call and response style. A few students requested to record my performance on video of which I hesitated at first. Because students never got a chance to see my hands when I taught, I decided to honor their request.

At the beginning of the course, finger exercises were introduced to the aural group before any reading pieces. The first exercise focused on a simple stepwise pattern and an abundance of repetition so that students could learn and memorize it easily (see Ch. 5: Discussion). All finger exercises stayed within the C major five-finger pattern (C-D-E-F-G). Later exercises progressed to intervals of a third and fifth, then in mixed interval patterns and rhythms (see Appendix D). Transposition to different keys provided additional facility around the keyboard.

Reading music notation. To better associate names of the notes within a new five-finger position, I sang three notes at a time using letter names. They responded in tempo by playing the three notes. For example, if I sang C-D-E, they responded by playing in C position, C-D-E. Other patterns would include: E-F-G, E-G-G, F-E-D, E-C-

C, E-D-C, etc. I found this activity very useful as an intermediary step before reading notes from the staff. I observed that students needed to know the note names beneath their fingers before they could play them from music notation.

For supplementary note reading practice, I created the Beginning Piano Supplementary Packet, a supplement of 43 short reading exercises, again mostly in five-finger patterns. In the first six weeks, students were taught each example in a structured learning sequence: 1) sing the names of the notes while tapping their foot to the pulse, 2) do the same while moving the correct fingers in the air as if playing an imaginary keyboard, 3) play the notes on their keyboard while tapping their foot. The singing step was eventually taken away and the process was reduced to two steps. They were still to move fingers in the air to preview the example (while imagining the sound of the notes), then play the notes while tapping their foot to the pulse. This strategy seemed to work well overall but was cumbersome for some students who could not identify the names of the notes quickly enough.

From my journal notes, I observed that attendance became a problem from about week 10. Unfortunately, this is somewhat typical in my experience as a community college educator and its impact on this study is unknown. Because by-ear playing was done from the very first week, learning to play by-ear was easy for them. By-ear activities were progressing well (finger exercises, by-ear pieces), but class reading skill was a problem at week 13. Reading from music notation had to be regularly visited to maintain what they had and improve. Some students mixed up bass and treble clef notes which is common mistake among beginning piano students. I noticed this especially after

learning the higher notes in the treble clef (C5 and higher). After recognizing the problem and focusing more on reading, reading improvement was observed.

Summary of Results – Phase 1

To answer Research Question 1 on reading from music notation, the pre- to post-test Note Reading scores indicated that there was improvement in both aural and reading groups, but that the aural group had significant improvement. For Sight Reading at 10 weeks and 16 weeks, both groups showed declining scores, but the reading group had a very significant drop. The two sight reading tests and testing conditions were very different and one should not infer that there was a decline in *sight reading skill* from the 10th to the 16th week. If we look at only SR16, sight reading at the end of the semester, the Mountain View reading group scored slightly higher than the Bayside aural group.

To answer Research Question 2 on performance outcomes, both groups improved in the area of performance from the pretest to the post-test. Although the aural group had a slight advantage over the reading group in the post-test performance of Prepared Pieces, the aural group also began slightly higher in the pretest measure of Familiar Tune.

For Research Question 3 on student enjoyment and perception of the aural approach, interviews and journals indicated that students in the aural group seemed to enjoy the by-ear playing activities in the first three weeks. In the fifth week when the first by-ear piece, *The Swing,* was introduced, some students wrote that that playing by-ear was challenging and that reading seemed easier. By the tenth week, most students recognized the benefits of learning by-ear and saw progress being made in their playing overall. Some wrote that playing by-ear helped reading and that fingers had an easier

time finding notes. At the end of the semester, most concluded that by-ear playing should be included in a beginning piano course curriculum and that it made self-correction easier because they can hear wrong notes. The interviews reinforced the enjoyment of learning to play by-ear without the burden of reading at the same time. One student said that it was easier to memorize a piece learned by-ear and that it remained in the memory longer. By contrast, although the reading group felt there was value in ear training activities, they thought just "a little" and "not too much" should be included in a beginning piano class.

To help answer Research Question 4, teaching strategies, I found that finger exercises learned by-ear helped students familiarize their ears and fingers to the notes in a five-finger position. This, in turn, facilitated playing and reading. I also found that *The Swing,* a piece the class learned by-ear, might have been too difficult to put hands together easily so early in the semester. *Vivace,* a piece learned by-ear, was much more successful, perhaps because it was presented closer to the end of the semester. Introducing reading by singing the pitches and moving corresponding fingers in the air seemed to reinforce reading skills, at least at the beginning of the semester.

Results – Phase 2

The number of participants in Phase 2 increased primarily due to my extra efforts to collect complete data from all students during the semester. As an action researcher, the burden of collecting data while maintaining a rigorous teaching schedule made it difficult to follow up on uncollected data because of a student absence, tardiness, or missing information (unsigned consent form, missing questionnaire or journal). In Phase 2, complete data was collected on 34 participants: Bayside Aural Group (18), Mountain

View Aural Group (7), Mountain View Reading Group (9).

Beginning Piano Questionnaire

Participants in Phase 2 were given the same questionnaire as Phase 1. The ethnic and age demographic data broke down as follows:

Figure 4.3. Ethnicity – Phase 2

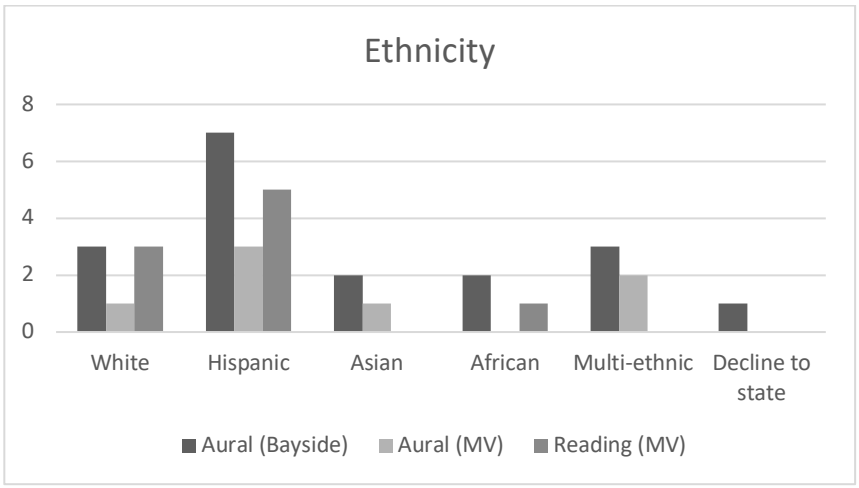
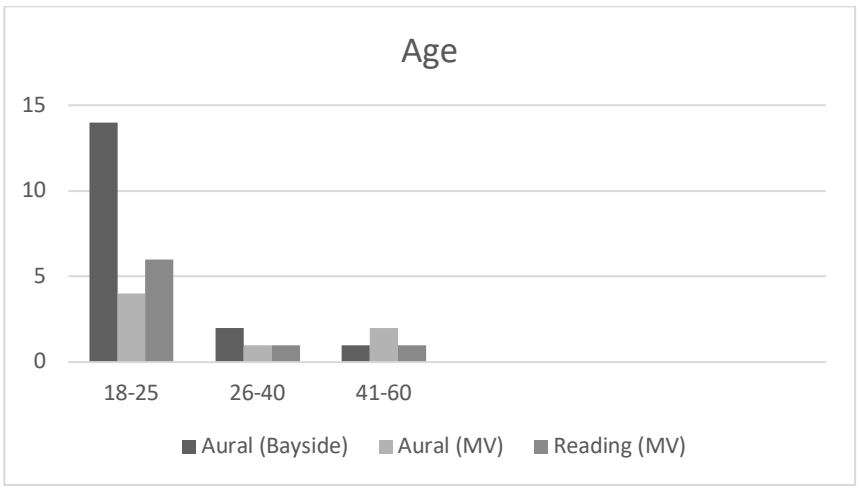


Figure 4.4. Age – Phase 2



The questionnaire also provided valuable data on a student's musical and piano training prior to treatment. The Bayside aural group reported an average musical training score of 1.84 (1 point=little or no training, 2=some musical training, 3=several years of musical training). The Mountain View aural group reported a score of 2.43 and the Mountain View reading group, 2.00. These were all self-reported answers but were similar to pretest scores below for Note Reading in which the Bayside aural group performed the lowest (1.00) and the Mountain View aural performed the highest (2.79).

For previous piano training, the average questionnaire scores were closer in range: Bayside aural group, 1.45; Mountain View aural group, 1.29; Mountain View reading group, 1.33. All three groups seemed to be more evenly matched in previous piano training.

Other notable data collected from the questionnaire included the number of music majors in Phase 2 who had *little or no* previous musical or piano training. Again, these were

self-reported answers. The Bayside aural group reported five music majors with three who had little or no musical training. The Mountain View reading group reported three music majors with one who had little or no musical training.

Descriptive Data: Performance Tests

Raw data was collected for 34 participants, *N*=34. Only students with complete data were included in Phase 2. Like Phase 1, the zeros in the pretest indicated the student declined to try.

Table 4.6. Raw Scores – Phase 2

	PRETEST				POST-TEST				
	ID	FT	NR1	SR10	NR2	SR16	PP1	PP2	PPA
AURAL GROUP (BAYSIDE)	701	5	0	4.5	5	4.5	4.5	4	4.25
	703	0	0	4.5	4.5	4	2	2.5	2.25
	707	5	1	5	4.5	3	5	5	5
	708	0	0	5	4	4.5	3.5	3	3.25
	709	0	0	5	3	4	1	1	1
	710	0	0	5	5	3	5	5	5
	712	0	0	5	5	4	4	5	4.5
	715	5	5	5	5	5	5	5	5
	720	0	0	5	3	3	5	4	4.5
	725	0	0.5	4	5	2.5	3.5	4	3.75
	737	0	0	5	5	4	4	4	4
	748	4.5	4	5	5	5	4.5	5	4.75
	760	5	5	5	5	5	4.5	5	4.75
	762	0	0	4.5	4	4	2	1.5	1.75
	764	0	0	5	4	5	5	5	5
	778	5	0	5	1.5	4	0.5	3.5	2
	786	5	0	5	3	3.5	3.5	4	3.75
	791	0	2.5	4	5	5	3	1	2
Average		1.92	1.00	4.81	4.25	4.06	3.64	3.75	3.69
AURAL GROUP (MOUNTAIN VIEW)	822	0	0	5	5	4	4.5	4.5	4.5
	823	0	0	4.5	3	2.5	2	2.5	2.25
	839	5	4.5	5	4.5	3.5	3.5	3.5	3.5
	850	5	4.5	5	4	2.5	5	5	5
	857	0	4	5	5	4.5	4.5	5	4.75
	859	5	3	4.5	2.5	3	5	5	5
	864	4.5	3.5	5	5	4.5	5	5	5
Average		2.79	2.79	4.86	4.14	3.50	4.21	4.36	4.29

Table 4.6. Raw Scores – Phase 2 (continued)

		PRETEST			POST-TEST				
READING GROUP (MOUNTAIN VIEW)	ID	FT	NR1	SR10	NR2	SR16	PP1	PP2	PPA
	903	5	4	5	4.5	5	5	5	5
	906	4	3	5	4	4.5	4.5	4	4.25
	913	5	5	4	4	5	5	4.5	4.75
	916	1	0	4.5	5	4.5	4	5	4.5
	948	5	5	5	5	5	5	5	5
	953	0	1.5	5	4	4.5	5	5	5
	971	4.5	0	4.5	4	2.5	5	4	4.5
	986	5	5	5	5	5	3.5	4	3.75
	992	4.5	0	5	3.5	3.5	4.5	5	4.75
Average		3.78	2.61	4.78	4.33	4.39	4.61	4.61	4.61

Similar to Phase 1, the students from Bayside College began the class with lower pretest scores than students from Mountain View. For the Bayside aural students, FT = 1.92 and NR1 = 1.00, while the Mountain View aural group scored FT = 2.79 and NR1 = 2.79, and the Mountain View reading group scored FT = 3.78 and NR1 = 2.61.

Table 4.7. Pretest Descriptive Data and Confidence Intervals – Phase 2

	Aural Group (Bayside)				Aural Group (Mountain View)			
	M	*SD*	Lower Limit	Upper Limit	*M*	*SD*	Lower Limit	Upper Limit
NR1	1.00	1.81	0.10	1.90	2.79	1.98	0.96	4.61
FT	1.92	2.48	0.69	3.15	2.79	2.61	0.37	5/20

	Reading Group (Mountain View)			
	M	*SD*	Lower Limit	Upper Limit
NR1	2.61	2.26	0.87	4.35
FT	3.78	1.91	2.31	5.24

I set out to compare groups between two colleges including the treatment group from Bayside and the control group from Mountain View but realized I had a problem. Because of the unequal number of participants between the groups and the great difference in pretest scores between the Bayside and Mountain View Colleges, comparing groups from the two colleges could not be made like I had done in Phase 1. I decided that descriptive data could only be run within groups and that t-tests between groups could only be made with careful consideration of the differences between groups on pretest scores.

Research Question 1: Differences in Music Reading Achievement

For Phase 2, there were considerable gains in Note Reading for the Bayside aural and Mountain View reading groups and a modest gain for the Mountain View aural group. The note reading pre- and post-test consisted of identifying four notes on the grand staff. I ran a t-test on two dependent means on data for Note Reading and Sight Reading for the all three groups. A statistically significant improvement was found for the Bayside aural group, p=<.00001, in Note Reading (NR1 to NR2) for the pre-post-test measure. The results indicated that reading of four notes in the grand staff showed a very statistically significant improvement from the beginning of the semester to the end of the semester. Although the improved reading of four notes in the grand staff did not necessarily indicate improved ability to perform by reading from music notation, it did suggest an improvement in recognizing individual pitches on the grand staff.

Table 4.8. Reading Achievement Gain Scores – Phase 2

	Aural Group (Bayside)				Aural Group (Mountain View)			
	Pretest	Post-test	Gain	*p*	Pretest	Post-test	Gain	*p*
NR1/NR2	1.00	4.25	3.25	<.0001*	2.79	4.14	1.35	.1330
SR10/SR16	4.81[1]	4.06	-.75	.0009*	4.86[1]	3.50	-1.36	.0018*

	Reading Group (Mountain View)			
	Pretest	Post-test	Gain	*P*
NR1/NR2	2.61	4.33	1.72	.0413*
SR10/SR16	4.78[1]	4.39	-.39	.2285

* statistically significant

[1]SR10 was not given prior to instruction, but at 10 weeks

The Mountain View aural group had a more modest improvement in note reading, *p*=.1330, while the Mountain View reading group exhibited statistically significant improvement, *p*= .0413. For each group, improvement was observed; however, the Bayside aural group showed the most improvement, at least in part because it started at a lower pretest level.

Another t-test on two dependent means was run for Sight Reading (SR10-SR16) for all three groups. A negative gain was recorded for all three groups, perhaps indicating a design flaw in the methodology, test examples and/or testing conditions for SR10 and SR16. It is my conclusion that the measure did not adequately track skill development in sight reading from week 10 to week 16. A statistically significant decline in scores was noted for the Bayside aural group, *p*=.0009.

It is interesting to note the comparison of the aural and reading groups from Mountain View because they were more of similar sizes (N=7, N=9), note reading pretest levels (2.79, 2.61), and student demographics. If the two groups were compared pre- to post-test for Note Reading (NR1-NR 2), the reading group had the slight advantage. For Sight Reading (SR10-SR16), the reading group produced a smaller *decline in scores* than the aural group from the same college, but for this measure, *significantly* so. I cannot identify a specific reason why the reading group was able to do better in SR16 than the treatment group; however, I offer some factors that could have contributed to this scenario: 1) the use of Bastien's Sight Reading, Book 1 for the control group that might have better prepared students for the Sight Reading examples in this particular phase, 2) the introduction of some finger exercises (by-ear) in about the 5th week—not as much as the treatment group but enough to see some immediate playing improvement, 3) the extra time devoted to ear training activities for the treatment group that could not be devoted to other areas of the curriculum including reading.

Because these were very small sample sizes, one student could make a large difference in statistics in any measure. Looking at the raw performance scores for SR10 and SR16, all students in the Mountain View aural group demonstrated a decline in scores, but in the reading group one student demonstrated a gain and four remained the same. Like Phase 1, the decline in scores from SR10 to SR16 may not be a good indicator of sight reading progression (or regression). The results of SR16 showed a stronger sight reading ability for the Mountain View reading group (4.39) than the aural group (3.50) at week 16, the end of the semester.

Research Question 2: Differences in Performance Outcomes

The three groups had considerably different pretest scores for playing a Familiar Tune (1.92, 2.79, 3.78). The Familiar Tune evaluation was based on the participant performing any tune of their choice. A wide range of ability was evident from opting not to play, to playing an entire pop tune from memory. The difference in average scores suggested that the reading group might have had greater playing ability overall, at least initially. Although the two groups from Mountain View were nearly equal in Note Reading ability from the beginning, the reading group might have had an advantage in playing by-ear before the class started. According to the raw scores, two students in the Mountain View reading group scored "zero" for NR1 (they could not identify any notes on the grand staff) but scored 4.5 for FT. This suggested to me that these students had not much, if any, experience in reading notation, but could play a tune fairly well---a tune that they might have learned by-ear on their own. I cannot say with any certainty that students had learned the familiar tune by-ear or had any aptitude for playing by-ear because I did not have a measure for that.

Overall, Prepared Pieces (PP) scores were higher for both Mountain View groups with the reading group scoring slightly higher than the aural group. This result was not surprising considering the higher pretest FT scores. The following chart shows each groups' score on Familiar Tune and Prepared Pieces. For the Prepared Piece score, each student performed two pieces in a class recital. Students selected two pieces out of five that were eligible for the recital. The Prepared Piece Average (PPA) is an average score of the two performances. Although no direct correlation could be made between higher

Familiar Tune and higher Prepared Piece scores, there did seem to be a relationship between the two measures. The gain in scores was interesting to note because it showed that the Bayside aural group had the most room for improvement based on lower pretest FT scores. It appeared that the lower the pretest FT scores, the higher the gain from FT to PPA. Several of the participants from both aural groups scored "zero," meaning that at the beginning of the semester, they could play very little of a tune on the keyboard or opted not to try. From the Bayside aural group, 11 out of the 18 participants scored "zero," from the Mountain View aural group, 3 out of 7 scored zero, while only one scored zero from the Mountain View reading group.

Table:4.9. Performance Outcomes Gain Scores – Phase 2

	Aural Group (Bayside)				Aural Group (Mountain View)			
	Pretest	Post-test	Gain	*p*	Pretest	Post-test	Gain	*p*
FT/PPA	1.92	3.69	1.77	.0111*	2.79	4.29	1.50	.1837

Reading Group (Mountain View)			
Pretest	Post-test	Gain	*p*
3.78	4.61	.83	.2183

*statistically significant

Research Question #3: Student Enjoyment and Perceptions of By-Ear Training

Student journals. Like Phase 1, the journal questions for Phase 2 were the same prompts used at the same points in the semester (3 weeks, 5 weeks, 10 weeks, 13 weeks). In the third week, both aural groups found reading easy (17 to 8) and liked learning exercises by-ear (22 to 3). Donald wrote, "I like learning exercises by ear because I get to hear music. When I hear music it gets me excited." At least in the beginning, learning to play by-ear seemed an easier task than reading. Jose wrote, "I do [like learning by-ear] because you just have to worry about putting the right finger in the right position instead of trying to read and play at the same time." This statement seemed to support the work of Gordon (Gordon, 1980) and Kendall (1988). Kendall believed that "students should first hear melodic and rhythmic patterns to develop aural and kinesthetic familiarity" (Kendall, 1988, p. 216). However, a few students did express difficulty in playing by-ear as Jessica wrote, "I'm not the biggest fan of it [learning exercises by-ear] because I am not good at recognizing a note when it is played."

When asked in the fifth week about preference for learning *The Swing* by-ear or *Money Can't Buy Ev'rything* by reading, 10 participants wrote that they preferred learning by *reading*, one participant preferred by-ear, and 12 students had no preference. The preference for reading in response to this journal question was similar to the response in Phase 1. Again, I attributed this to their first hands-together experiences in which both hands played different notes and rhythms at the same time. Perhaps this is what Louis meant when he wrote, "reading notes is much more easier for me because I can actually see where my finger will land instead of guessing." This suggested that the ear and hand

were not yet "mapped together."

There were two students in the class who could play advanced level pieces they learned from YouTube. This told me that these students were able to learn complex pieces without the aid of music notation and most likely through a combination of by-ear and visual cues from the videos. One of them wrote, "in the beginning, I preferred to learn by ear but I want to prefer reading to make myself more advanced." Matthew saw some benefit in learning by-ear, "I find it easier to sight read but I feel like I understand the music more when listening by ear." Two students seemed more comfortable learning by-ear, although Joe wrote that he had no preference, "I really do not have a preference; however, it is more time consuming for me [his emphasis] to play by reading the music." Tom added, "by ear, it just feels less stressful."

In the tenth week, aural group students were asked to assess their progress in the class. Most students rated their progress as expected or greater than expected. Four students stated that progress was below expectations and attributed that assessment to lack of practice. When asked if playing by-ear had helped their playing, all responded "yes." Cecilia wrote, "Yes, they both have helped me, especially by practicing and getting my hands and fingers familiar with each note." Two students were not sure or did not know if by-ear playing helped playing.

The fourth and final journal entry asked if they were progressing as quickly as they wanted to in three areas: playing, reading, by-ear. Responses were mostly positive, but more so in the area of reading. Once the concepts of reading were learned, students saw results in learning pieces on their own. Joe wrote, "Considering I couldn't sight read

at all, I am very happy with my music reading ability," however, he continued, "playing by ear is pretty tricky but fun; nonetheless, I would rather play by ear than to sight read." Perhaps students like Joe recognize the merits of being able to play by-ear but still acknowledge that reading is important.

Interviews. During the group interview of the Bayside aural group at the end of the semester, students were asked to comment on a learning preference--reading or by-ear. When asked if playing by-ear helped them play better, one student said he "had trouble catching up" and "it was hard for me to listen." Another student said it helped with "retention" and "placement of the notes." As one student wrote in their journal at the fourth week of the semester, "I prefer reading notes because I am more of a visual learner." These were insightful comments into how learners listen and respond to aural cues. For those students who indicated a preference for reading, playing note patterns by-ear in tempo seemed to pose a daunting task. On the other hand, the students who seemed more comfortable with aural learning seemed to find playing by-ear easier to remember and were able to relate it directly to the keyboard. Is there more going on than just an aural memory when listening for patterns? Perhaps the aural learner can hear melodic patterns of high and low pitch and immediately apply that to the geography of the piano keyboard.

In the individual student interviews, Kent, described himself as someone who prefers learning a piece by hearing it first rather than reading it first. This was his strategy for playing back a melodic pattern learned by-ear: "I would focus on how many notes there are, then figure out the first one and then figure out the rest--if they are high or low.

I visualize it." Perhaps Kent is able to translate aural cues into spatial and/or visual shapes and then apply them to the keyboard. Kent stated in his interview that he had played the keyboard for one year but that it was just "fooling around." He admitted that the internet and YouTube also helped. How much did "fooling around" on the keyboard help prepare him to play by-ear in this class? By “fooling around,” one would certainly become familiar with the patterns of black and white keys and the concept of high and low. Perhaps a prerequisite or a first assignment for a beginning piano class might be just that--to fool around and get acquainted with your keyboard with no specific assignment in the beginning. In other words, to become familiar with the keyboard, or "your new voice."

Students who felt uncomfortable with the aural approach also had revealing things to say about learning to play piano by-ear. Steve thought that learning to play by-ear should not be included in a beginning piano course. He self-reported some musical training but not in piano. "I didn't know piano as a base. I don’t come from a music major background so it's just another thing to worry about or concentrate on. It's easier for me to read notes and then connect them with certain notes on the keyboard." Jessica had this to say, "I was not able to recognize the notes so it [playing by-ear] didn't help me." These responses seemed to reflect a learning style preference or a preference based on previous training. The study by Korenman and Peynircioglu (2007) found that, for music, learning efficiency and recognition memory were better served when materials were presented in the learners preferred presentation modality--auditory or visual. They added that "even though music is intrinsically 'auditory,' especially for non-musicians who are not

proficient music readers, auditory or visual learning styles still play a role in effective learning and subsequent remembering" (p. 61). We could conclude that the aural approach would not be the best for everyone just like the reading approach would not be the best for everyone. Perhaps the best approach is incorporating both reading and aural approaches, and this is what the current study attempted to show. McPherson and Gabrielsson (2002) also advocated an integrated approach for children where "performing music by ear serves as preparation for literacy development in the beginning stages of musical involvement" (p. 18).

When asked if aural group students thought playing by-ear should be included in a beginning piano course most students answered "yes." One student from the Mountain View aural group said, "Yes, good in the beginning. Gives you a sense of accomplishment." Another said, "yes, for musician development and to have the choice." Two students mentioned that playing by-ear helped them understand the music better. For those whose preferred reading as the mode of learning to play, playing by-ear "was just another thing to worry about," or "did not help."

The reading group was also asked in the group interview if learning to play by-ear would have been beneficial in the class. The answer was "probably not right now" because we are "just starting out." When asked about what value they would place on ear training activities, they responded that it was important for listening and a "good secondary skill after reading." Finally, when asked if they thought by-ear activities should be included in a beginning piano class, the answer was "yes, it should be talked about" and "yes, but not like rigorously or professional."

Research Question 4: Teaching Strategies

In Phase 1, I observed that by-ear finger exercises seemed critical not only for ease in playing but also in reading. For Phase 2, I wanted to be more aware of which activities seemed to work best with students.

Singing. For teaching reading in the beginning stages, I emphasized singing letter names while "activating" fingers in the air on an imaginary keyboard like I did in Phase 1. Before the current study, I had never used this teaching technique in college classes. Several years ago, I taught classes for young children in the Yamaha system. We sang in solfege syllables to introduce new pieces. Sometimes I had children move their fingers while singing. This reinforced the name of the note to the pieces before playing them. I had never before tried this teaching technique with adults. One of the benefits of action research is to more deeply examine and reconceptualize teaching methodologies that, until now, you have mostly taught the same way. In the second week of the Bayside aural class, I wrote, "I made students really move finger muscles in the air while singing letter names. Seemed to help! More successes on first playing!" In the third week, I wrote "reading is improved with finger activation." The strategy of singing the notes and activating the correct finger made it possible to play better in tempo. Connecting the visual (notational symbols) with the aural (singing the pitch with everyone else) and the physical (activating fingers) at the very beginning seemed like an early breakthrough. The reading material was simple enough, and at a tempo slow enough for students to be successful as a group. I believe early successes are important motivation for students of any age in learning a new skill like reading music. This seemed to instill confidence and

the will to continue to build on previous successes. Eventually, students would not need these preparatory steps (singing, moving fingers in air) when they are able to sight read with very little preparation.

Playing by-ear. For playing by ear in the first few weeks, the Bayside aural group was quite strong. Two students had particularly good ears, due to pre-class experiences (according to their answers to the BPQ) and could play back most everything they heard. The finger exercises were going so well that we transposed them to G major in the third week and G minor in the fourth week. *The Swing* was introduced in week 4. Just like Phase 1, I performed *The Swing* in its entirety while they recorded it on their cell phones. They learned hands separately first (the right hand, then the left hand) then both hands together. By the following week, week 5, three students were able to perform the whole piece with both hands. I recorded each of them playing *The Swing* for the class. I was impressed that learning took place so quickly. Although teaching strategies changed very little, if at all, the results were different because students are different every semester. Each group of students has its own strengths and motivations as I witnessed from the Phase 1 and Phase 2 aural groups at Bayside.

At the 11-week mark at Bayside, I noticed a lapse in practice habits and a dip in motivation. I wrote, "a raise of hands showed only Sally practiced over the weekend. Reading *Dance* was not very good." Also in the eleventh week, "David was reading in the wrong [hand] positions. Phyllis also weak." It is around this point in the semester where new keys and hand positions are emphasized, and students become confused about reading notation.

In the last week of class, I made this notation in my journal, "We played through all solos and did sight reading review of all learned keys. The page in C major, the key of the post-test example, was most effective in preparing for sight reading. Something interesting happened when I administered the post-test—so interesting that I wrote, "Why do some students do much better on musical example [SR16] than on Note ID [NR]? Seven students scored worse on note ID than musical example!" Perhaps it was because a musical example has musical context and the note reading does not. The most striking case was Betty. She was probably one of the lower-scoring students in the class. The evaluators scored "1.5" on NR but "4" on SR. I asked her afterward and had her play NR again—basically the same result. She said that if she knows the first note then she can figure out the rest by interval. I wrote, "Wow! I was impressed by her reading by interval—so pure!"

The aural group at Mountain View began with only nine students. One student had a documented learning disability that required an in-class tutor and another student had a profound vision deficit that required special enlargement equipment to read. A third student had a mild learning disability but was able to function in class without special accommodation. After the fourth week, the student who required a tutor dropped the class because it became too difficult. Most of my journal notes for this class consisted of how to teach these special students. I wrote the journal entry in the fifth week, "Everyone did well. Melissa dropped [the class]. However, Thomas has a slight problem with reading and comprehension. He uses an iPad for textbook (downloaded) instead of a real book. Howard uses "VisioDesk" to enlarge quizzes to accommodate a vision disability. In the

seventh week, I wrote, "Howard can play *The Swing* hands together perfectly." Not surprisingly, Howard's ear ability was the strongest among the students in this class.

The control group. For the Mountain View reading group, I made what I thought was a big change in the teaching strategy. It began with the third week of class. I wrote in my journal:

> "I can already see some problems in reading compared to the Mountain View aural group. More mistakes and confusion on p. 35-37 [first reading pieces: *One Step at a Time* in treble clef, *Skip Around* in bass clef, *Waltzing Alone* in alternating bass and treble clef]. Slow progress recognizing which finger to play. Several were writing letter names in books. . . Interesting that they already had more trouble reading at this early stage compared to the aural group."

I could see that progress was much slower in the reading group compared to the aural group from the same college and yet I tried to avoid the temptation of giving them additional finger training exercises by-ear that I had only given to the aural groups. I had a hunch that the finger exercises would help them with reading and playing. By week 6, I felt it was unethical to stand by and withhold something I knew could help struggling students. So I decided to give them a finger training exercise, one that emphasized intervals and rhythms. It was an embellishment of an interval study in the textbook, the embellishments of which they were taught by-ear (see Appendix H). I was so excited with the response to the activity that I wrote in Week 6, "Excellent finger training in C and G positions. I think this helped with reading and playing! For example, *Miniature Waltz* was good, even hands together after finger training!" At this point, I was excited

but conflicted. I had integrated some aural activities with the reading group and knew that the results may be affected because of this action. This particular finger exercise was continued for four weeks and the improvement in reading and playing seemed almost immediate. Doing this seemed to support combining aural and reading approaches.

Like the Bayside aural group, the Mountain View aural group also had problems in reading in the 12th week. "Need to work more on reading. Gave them Bastien's Sight Reading book for first time today. Raymond had problem with bass clef. Thomas was lost." Week 10 to week 12 seemed to be a tough spot in the semester for reading because of the introduction to different hand positions and keys in the curriculum. By emphasizing reading and doing more of it at this point seemed to help them get through this part of the semester.

Summary of Results – Phase 2

The results for Phase 2 showed the most post-test gains in note reading and performance for the Bayside aural group. This was perhaps due to the lower pretest scores. To answer Research Question #1, reading music notation, all three groups scored in a similar range (Bayside aural, 4.25; Mountain View aural, 4.14; Mountain View reading, 4.33) for NR with the Bayside aural group having a statistically significant gain and the Mountain View reading group, a statistically significant gain. For SR10 to SR16, all three groups demonstrated lower test scores, most likely due to the differences in the examples themselves and testing conditions. On this measure, the Mountain View reading group had the least amount of decline while the Bayside aural and Mountain View aural groups demonstrated very significant lower declines, respectively.

There was one thing I did differently in Phase 2. After observing that the Mountain View reading group was having particular difficulty with reading compared to the Mountain View aural group, I made the "in-the-moment" decision in week 6 to teach the reading group an intervallic finger training exercise that was mostly taught by-ear (the basic intervals were in the textbook). They played it in the keys of C major and G major. Although I cannot correlate improved post-test results for reading and playing to this activity, I wrote in my journal that I strongly felt that this group needed this type of activity at a point in the semester in which they were struggling.

To answer Research Question #2, performance outcomes, all three groups scored in the same ranking for PPA as their pretest FT scores with the Mountain View reading group highest and the Bayside aural group lowest; however, the Bayside aural group had the largest gain by a significant margin.

To answer Research Question 3, student enjoyment and perceptions, an overwhelming majority thought learning by-ear was easy and enjoyable in the first few weeks. At the fifth week, however, their preferences changed when asked about specific by-ear and reading pieces. Most preferred the reading piece, perhaps because the music became more complex with both hands playing different notes at the same time. Most students thought learning by-ear should be included in a beginning piano course because it promoted a deeper musical understanding although some thought it was easier to learn through reading or that by-ear learning did not help.

For Research Question #4, teaching strategies, I continued the technique of teaching reading by singing note names while activating corresponding fingers in the air.

Around the 11th and 12th weeks, I observed a problem in reading proficiency, so I re-emphasized sight reading practice in class during this point in the semester. As mentioned above, I found that an intervallic finger training exercise that I previously only reserved for aural groups in Phase 1 seemed very useful when introduced to the reading group at week 6 (see Appendix H). This activity seemed to improve reading and playing almost immediately for the reading group. Technical facility that they may have obtained from this activity might have also played a role in reading and playing later on.

Summary of Results - Phase 1 and Phase 2

Although Phase 1 and Phase 2 were conducted as separate studies, collating the results of both phases can be useful to see a possible trend. Caution, however, must be used when comparing or generalizing the results because of the differences in college populations and small sample sizes. For both phases of this study, data collection consisted of answers to the Beginning Piano Questionnaire, performance scores, journal entries, and interviews. In Phase 2, there was another aural group added to the study, the Mountain View aural group.

In comparing performance scores, it should be noted that the Bayside group had lower pretest scores overall in both phases with the exception of a slightly higher score for Familiar Tune in Phase 1. For note reading, the Bayside aural group had the most significant improvement in both phases of the study, although the Mountain View reading group outscored the Bayside aural group slightly in the post-test in Phase 2. For actual sight reading skill in which the example was given with limited preview time, the Mountain View reading group scored highest in both phases. For performance of

Prepared Pieces, the Bayside aural group outscored the Mountain View reading group in Phase 1 but the reverse happened in Phase 2, consistent with higher Familiar Tune pretest scores for each group.

Most students seemed to enjoy the learning by-ear activities, especially those who had some familiarity with playing by-ear in their background. Some students felt that it was more difficult than reading and preferred reading from music notation instead, especially in the fifth week. Almost all felt that an aural approach was useful in a beginning piano course especially in the beginning stages.

The reading groups, however, had a slightly different opinion. The students in the reading groups did not have exposure to by-ear activities except for the interval exercise in Phase 2. They thought learning to play by-ear would not be beneficial starting out. Although they thought the ear training activities were important, they considered it a good secondary skill after reading.

Most by-ear activities (pieces, exercises) were taught in a call and response style format. To learn whole pieces by-ear, students in the aural groups recorded teacher performances to be listened to outside of the classroom. To prepare for sight reading, students sang musical examples using letter names while activating corresponding fingers in the air on an imaginary keyboard. Finger exercises seemed the most useful to introduce and confirm five-finger positions. Reading and playing also seemed to improve by playing these exercises. All exercises were taught by-ear and were designed to be memorized easily.

Pooled Results from Phase 1 and Phase 2

Results from both phases were combined into a single aural and single reading group to determine the difference in gains (average mean) in Note Reading, Sight Reading, and Familiar Tune/Performance of Prepared Pieces over the course of a semester. By conventional criteria ($p = 0.05$), the difference in gains in SR ($p = 0.9073$) and FT/PP ($p = 0.4795$) are considered not statistically significant while the difference in gains in NR is considered "not quite" statistically significant at $p = 0.0602$.

N=48 (Aural Group – 32, Reading Group – 16)

Table 4.10. Difference in Learning Gains for Note Reading – Phase 1 and 2

Aural Group	Reading Group	Difference in Gains	*p*-value
2.609	1.531	1.078	0.0602

Table 4.11. Difference in Learning Gains for Sight Reading – Phase 1 and 2

Aural Group	Reading Group	Difference in Gains	*p*-value
-0.906	-0.875	-0.031	0.9073

Table 4.12. Difference in Learning Gains for Performance – Phase 1 and 2

Aural Group	Reading Group	Difference in Gains	*p*-value
1.6328	1.1406	0.4922	0.4795

CHAPTER 5
FINDING A NEW GROOVE

Description of the Study

The main purpose of the study was to compare two instructional approaches in teaching beginning class piano at the college level. Both approaches covered the same curricular material. However, one approach emphasized aural development of skills whereas the other adhered to the traditional notation-based development of skills. The two areas evaluated were reading music notation and performance of prepared pieces. A secondary purpose of the study was to explore student perceptions of learning by-ear and find which teaching strategies seemed most effective.

The study was conducted in two phases in two consecutive fall semesters. Because the sample size in the first phase was quite small, a second phase was added to provide a larger sampling of participants with additional data. Originally, a spring semester was to serve as the second phase but a technical problem during post-test data collection prevented inclusion in this study. Participants were beginning piano students from two different community colleges. Whole classes provided a convenience sample of students enrolled for that semester. In phase one, two classes participated: an experimental group from Bayside College and a control group from Mountain View College. Phase two replicated the same study at both colleges in an effort to provide more data from a larger participant base. Three classes participated in Phase 2: one experimental group from Bayside College, and one experimental and one control group from Mountain View College.

The investigator served as instructor for all classes in this action research study. In

addition to the reading-based curriculum, students in the experimental group learned finger exercises and pieces by-ear. They also learned from a sight reading supplement provided by the researcher. This supplement contained 43 reading exercises in various keys. Students in the control group learned pieces by reading from the main textbook and a sight reading supplement, Bastien's Sight Reading, Level 1. This book contained 93 exercises in various keys. The period of treatment was one whole semester.

To assess note reading skills, each student was asked to play four notes in the grand staff at the first class meeting and on the last day of instruction. To assess sight reading skills, students performed two examples, one at mid-semester and the other, after instruction. To assess performance skills, each student performed a familiar tune of their choice at the first class meeting and two prepared pieces from the textbook as part of the final exam. Two independent evaluators scored the recorded performances of each student. Qualitative data from student journals and interviews were analyzed for student perception of the two approaches that were used. A teacher's journal was maintained throughout the semester to reflect on teaching strategies that seemed to work best.

Summary of Results

Research Question #1: Music Reading

Were there any measurable differences in reading due to teaching approach? Two different music reading measurements were taken, Note Reading (at week 1 and week 16) and Sight Reading (at week 10 and week 16). Note Reading measured the ability to identify four notes written on the grand staff by playing them on the keyboard. Sight Reading measured the ability to play four measures of music at first sight with preview

time before playing. The Bayside aural treatment group in each of the two phases demonstrated the most improvement (gain) among all groups in the study. However, they also had the lowest pretest scores in week 1 for note reading. This seemed to indicate that the groups that received the most benefit were the groups that began with the lower pretest scores. However, the Bayside aural group in Phase 1 also outscored all groups on the week 16 post-test in note reading. For sight reading at week 10 and week 16, the smallest decline was seen in the Bayside aural group in Phase 1 and the Mountain View reading group in Phase 2. The decline in sight reading scores for all groups from week 10 to week 16 was most likely due to the difficulty of the test and the change in testing conditions, and not an indication of a decline in actual sight reading skill.

Research Question #2: Performance Outcomes

Were there any measurable differences in performance outcomes due to teaching approach? At the end of the semester, students performed two prepared pieces learned in class. The average score of both pieces was used to measure performance outcomes. The performance of a Familiar Tune (any tune chosen by the student) before instruction was used as the pretest measure. In both phases of the study, only the Bayside aural group in Phase 2 showed a significant improvement (gain) in performance outcomes. The same group also had the lowest pretest and post-test scores of any group in both phases. All groups showed an improvement in scores on the post-test. The Mountain View reading group had the highest pretest and post-test scores in both phases but also the smallest improvement (gain) in scores. The results seemed to indicate that there was a relationship between lower pretest scores and a greater amount of improvement and higher pretest

scores and a smaller amount of improvement, regardless of instructional approach.

Research Question #3: Student Perceptions

Did students enjoy learning to play piano by-ear and did they think it should be included in a beginning piano course? A majority thought learning by-ear was enjoyable and that it was easy in the first few weeks. As the pieces became more complex with both hands playing together, most preferred learning by reading the notes instead of learning by-ear. At the end of the semester, most students thought that learning by-ear should be included in a beginning piano course because it promoted a deeper understanding of the music. One student mentioned a "tripod" of learning through tactile, sight, and auditory senses. Another student said that learning by-ear "trains ears for mistakes. I am able to correct myself now." Although some students thought it best to learn by reading, most likely due to personal learning style preference, almost all responded that an aural approach was useful in the beginning stages of learning piano.

Research Question #4: Teaching Strategies

What teaching strategies and techniques were the most effective in teaching by-ear and how might they be improved? The call and response style seemed an effective technique in a classroom format. Finger exercises and pieces were taught phrase-by-phrase in call and response, avoiding any pauses or loss of rhythmic pulse. Simple finger exercises were presented first for students to become familiar with notes of the five-finger pattern. These exercises, also transposed to other keys, seemed to reinforce keyboard mapping effectively. To prepare for sight reading, students sang pitch names while activating corresponding fingers in the air on an imaginary keyboard. This was

done every week for four weeks. Although time consuming, the strategy seemed useful for reading especially in the first few weeks. As coordination between two hands became more complex at approximately five weeks into the semester, several students thought learning by-ear with both hands was difficult and preferred reading instead.

Discussion of the Results

Phase 1

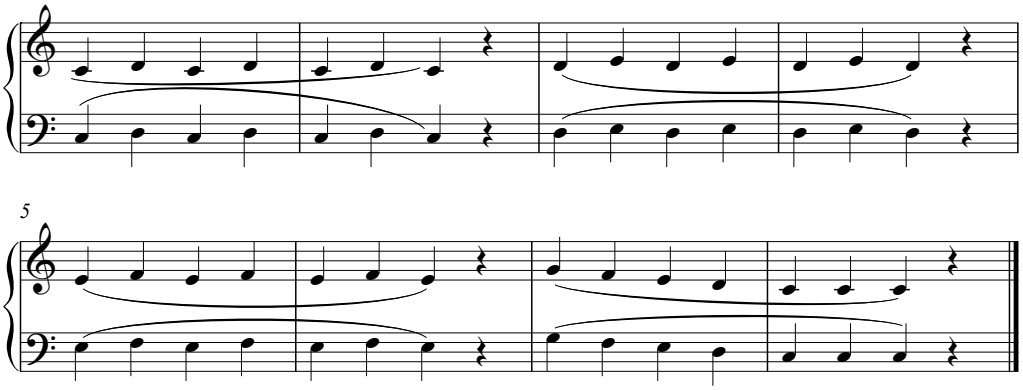
The results of this study show some interesting findings despite the small sample size. Because the aural group and reading group were from different colleges, the amount of class meeting time per week was different. To help account for this inequality in class time, effort was made to prepare the aural group and reading group with the same *proportional amount of time per student*--the reading group form Mountain View had 40 minutes less time per week than the aural group from Bayside but had one third less the number of students than the Bayside class. With the smaller group, I was able to spend more individual and small group time in preparing them for reading and playing. For the most part, I felt the larger class size offset the longer instructional time that the Bayside group had and, similarly, the smaller class size offset the shorter instructional time that the Mountain View group had. Identical pacing was used in both groups—we covered the same quantity of textbook material in the same amount of time. The textbook was the same for both groups.

By-ear training and performance. Of particular note were the higher scores of students in the aural group on performance of Prepared Pieces at the end of the semester. This suggests that some by-ear training may be helpful in performance of repertoire. The

correlation between by-ear playing and performance of prepared pieces seems to extend findings by McPherson (1997) and Musco (2006).

However, caution must be made in drawing any conclusions. Playing by-ear cannot be singled out as the only contributing factor. In the aural group, much of the by-ear teaching was in the form of patterned finger exercises constructed in sequential phrases. The focus was on hearing pitches that moved by step at first, and the direction in which the pitches moved. The first of these finger exercises is below.

Figure. 5.1. Finger Exercise #1



After teaching a series of finger exercises by-ear, it became apparent that improved finger technique might contribute in itself to better playing overall. As one student noted in week 10, "Finger Exercise #4 has helped with finger flexibility for me." Another student wrote in week 3, "It helps me a lot with finger speed and placement." Perhaps a reliable finger technique can be just as much a factor in contributing to performance skill as playing by-ear. This may indicate that multi-modal learning (ear and fingers) can be effective in developing performance skill. At week 10, I wrote in my journal, "the more finger facility students have through finger exercises by-ear, the easier everything may seem. Fingers can find the notes quickly because they have been there

before!" Several of the exercises were transposed by-ear to different keys which gave students the opportunity to play in the new five-finger positions before their introduction in a repertoire piece. Creating familiarity with a new key through by-ear transposition was found helpful in learning pieces in those keys and is supported by previous research (Musco, 2006; Delzell, Rohwer & Ballard, 1999).

Also notable in the pilot study, was the excitement surrounding *Circus,* a piece learned by-ear. After learning the piece in the original key of D major, the aural students wanted to challenge themselves by transposing it to remote keys such as Gb major and C# major. They enjoyed transposing the piece so much that I had to gently remind them that we had other things to accomplish that day. Their enthusiasm for transposition was a pleasant surprise.

Finger exercises and reading. Because I work with adult beginners who have had little or no keyboard or music training, I realized that much of reading and playing has to do with using fingers in coordination with reading. Wiggling fingers to a finger number prompt is easy and everyone is able to quickly grasp "wiggle finger number 4 of your right hand." Identifying a note name on the staff can be done with basic memorization and knowledge of the alphabet. But finding the correct finger to play the correct key while playing in tempo is quite a different matter.

By isolating some of the interacting elements of reading music (in this case, pitch and fingering), I was able to reduce the amount of intrinsic cognitive load that adults experience when learning how to read and play at the same time. Intrinsic cognitive load arises from the inherent complexity of information. According to Sweller (2011), each of

three types of cognitive load—intrinsic cognitive load, extraneous cognitive load, and germane cognitive load—all impose a working memory load with effects that become additive. By isolating two of these interacting elements through the use of repeated finger exercises, students seemed more prepared for reading in 5-finger positions. The issue of reading is not only being able to identify the notes on the music staff and know the key beneath each finger but being able to activate that finger instantly without hesitation.

The finger exercises that students learned by-ear were simple patterned exercises with a catchy rhythmic accompaniment that the teacher played. There were four finger exercises learned over the course of the semester that were transposed to other keys. It seemed that transposition to new keys assisted in learning pieces in those keys, a finding supported by Musco (2006). Perhaps transposition to other keys not only expands hearing new pitches but also promotes a tactile sense of "knowing your way around" new 5-finger patterns.

In the current study, the aural group learned each 8-measure exercise within minutes and memorized them. We played one or two exercises at the beginning of each class as a finger warm-up—spending about 5–10 minutes on this activity. Students seemed to enjoy them because I saw them moving to the music by tapping their foot or nodding their head to the pulse. The upbeat rhythmic accompaniment that I played also contributed to their enjoyment of the exercises. The exercises promoted good legato technique and focused on hearing and playing intervals of 2nds, 3rds, 4ths, and 5ths. They also moved at a good tempo either in quarter notes or eighth notes or a combination of both. Tempos ranged from quarter note = 96-132. At this tempo, students were able to

learn something in a moderate to fast tempo without slowing it down to just to read it. The exercise was easy to learn and play at a brisk tempo within minutes of being introduced. Students seemed to enjoy it more and feel successful in playing something they could memorize right away. As I reflect, providing students with the opportunity to own a more than adequate technique for pieces that they will eventually learn by reading was a great asset. I believed now that they would be able to find the notes quicker and more accurately than if they did not have this finger training. Because they are looking down at their fingers and the keys and not up on a page of music, the image of the keyboard is firmly fixed in the mind is important for reading too. When students were secure playing an exercise, I asked them to perform without looking at their hands. This is to develop keyboard mapping and get them ready to read music without having to look at their hands. In a similar way to prepare for sight reading, Sweetnam (2008) used the technique of playing in the lap as one step in the aural participation procedure for sight reading. This technique of playing in the lap was described as a way of "the mind performing an abstraction" (p. 117) while requiring an increased reliance upon imagery (visualization-like procedures).

Keyboard mapping and reading. I observed that learning finger exercises by-ear reinforced the connection between the keys on the keyboard (keyboard mapping) and the corresponding pitch. As one student wrote near the beginning of the semester about learning by-ear, "I like learning finger exercises by ear because it's helping me learn to identify the sounds to the notes." This is an interesting choice of words—identify the sounds *to* the notes. If a student learns to play from audible cues, the eyes are free to see

which keys produce which sounds. Watching the finger produce the sound also works to reinforce the tactile sense of finger on the key. *Audible* cues promote an *audible* response and focuses that response on sound and matching sounds. This may provide students with more immediate feedback as well as an important association with keyboard mapping and high and low melodic contours. Why is the association between the sound and the keyboard important? As one student said, playing by-ear "let me see what I am hearing. It helped me to remember and understand better." This may be a critical intermediary step to learning music notation.

Reading and playing from music notation is one of the most important yet complex skills a beginning piano student can take away from the first semester. In this study, note reading (NR), or the ability to play four notes in the grand staff was found significantly improved (p=0.497*)* in the aural group from the pretest to the post-test. This is just as interesting as the finding that the reading group had no significant improvement (p=0.1491) in NR from the pretest to the post-test. Again, both groups had substantial improvements in mean scores. Why did the aural group seem to have an advantage?

Kodaly argues that *singing* should be the foundation of all musical skills including reading (Choksy, 1974; Sheridan, 2015). When reading music notation, the eyes track a sequence of notes which in turn produce an association with the corresponding sound or series of sounds through singing. A similar association can be made from the position of the notes on the staff to the sounds they represent on the keyboard. By having aural students sing the notes first, they were more keenly aware of pitch because they had to produce the sounds with their own voices. Keyboard geography is a visual representation

of the relative high and low pitches; however, students must now determine the correct keys to depress in order to produce those sounds they just sung from music notation. This is where keyboard mapping is important—students need to instantly find the correct key and finger to produce the sounds represented in music notation.

To assist with mapping, students were taught to activate the corresponding fingers while singing the pitch labels, a step that was also included by Sweetnam (2008) for note reading. Presenting interacting elements in isolation can decrease intrinsic load (Sweller, 2011). Earlier, we discussed isolating the task of associating pitch with finger. The same can be done to isolate singing pitch and moving the corresponding finger. The procedure of singing pitch, singing pitch and moving the corresponding finger, then playing with correct pitch and fingers on the keyboard breaks down the task of reading notes on the staff into three steps. This reduces the number of variables students must manipulate to accomplish the task of reading music, thereby reducing the amount of information held in working memory.

Furthermore, Owens and Sweller (2008) found that in music instruction, all music understanding must be associated with the perception of sound. The study concluded that for novices, musical excerpts presented in dual-modality (visual plus aural) expanded working memory and offered an instructional advantage over the same materials delivered in a visual only format. Similarly, I believe that you cannot separate the music notational symbol from its sound when teaching beginners.

Without ample aural training which includes singing, self-correction for reading music notation is not reliable nor is it immediate because students have no frame of

reference in their short time as musicians to match and compare what they are reading to what they should be hearing. In fact, students are often instructed to *not* look down at their hands while sight reading music. If they do not possess mapping skills and the ability to sing and internalize pitch, how do they know if they are playing the right notes? I was pleasantly surprised to hear in the interviews that some were able to self-correct while reading because of the sound. Isn't that what trained musicians do anyway?

Sight singing before sight playing. (I make the distinction of *sight playing* here because the aural group first read the music by singing before they played.) The ear seems to play a key factor in learning how to read music. Documented relationships were found between sight reading and playing by-ear (Luce, 1965, McPherson, 1995) and evidence that suggested that playing by-ear did not encumber reading skills (Haston, 2004, Musco, 2006).

During the reading segments in class, we first recited note names (without singing pitch), then sang note names on pitch. I told aural students they got bonus singing lessons when they enrolled in this class. Nearly all pieces learned in the first half of the semester were learned by singing the letter names. Students were shy at first, but they became better as time progressed. I sang along with them because pitch is difficult to find in the beginning. Singing in a steady tempo was always emphasized. As students became comfortable with the note names, I had them move their fingers to the notes as they sang. The process of singing before playing and singing while moving fingers is very similar to a step in the aural participation procedure by Sweetnam (2008). In this study and the current study, students associate pitch with their fingers, an invaluable association. The

tactile sense of finger producing sound is what playing the piano is all about. Just like a singer finds the right muscles and parts of the anatomy to produce pitch and sound, the pianist has to find the right physical response to produce the desired pitch and sound.

Reading from notation on the piano without audiation is like typing prose without understanding the meaning of the text (Musco, 2006) or associating fingerings with notation rather than fingerings with sound (McPherson & Gabrielsson 2002). To be most efficient, the fingers have to know what keys (and the sounds they produce) are beneath them--without looking down--as a person reads notes on the piano. But, all pianists know that there is so much more to it than that. It is also the *way* the keys are depressed and at what time that produces the music. If we teach reading without a sense of music--an awareness of not only the pitch but the kind of sound that is produced--then we are not teaching music at all. I believe that first experiences in reading should be accompanied by an acute awareness of pitch *and* the kind of sound produced--that is music. Singing with a sense of phrasing, pulse, dynamics, and articulation—everything that makes music worth listening to—should be required of all musicians, including pianists. This can be accomplished through modelling good music making with students, not unlike the Suzuki Method (Suzuki, 1975) for young children. I found that students not only made music out of written symbols but were made keenly aware of all the elements that produced good and interesting music.

Decline in scores for SR10 and SR16. From my journal at the end of the semester for Phase 1:

I was careful not to disclose to the students which group was which until after all

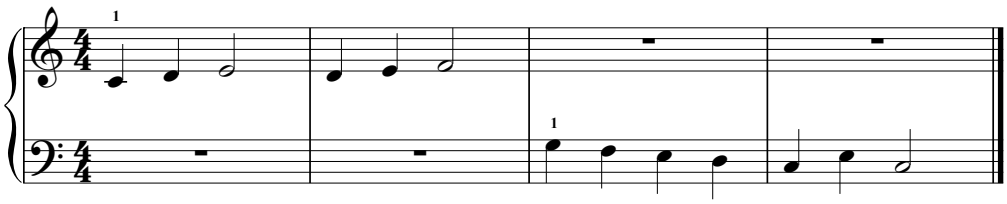
research was completed. My impression from the interviews and just my own feeling was that the ear training work did not help students to read any better than the students who did not receive ear training work. Matter of fact, I thought it interesting in the experimental groups that a couple of students reversed bass and treble clefs or were incorrectly reading the direction of the notes on the staff—i.e., the student played a descending pattern on the keyboard when the notes ascended on the staff. Some of them even relied more on memorizing the names of notes on the staff instead of using direction and interval to guide them to the next note. I have seen this in younger students who rely on memory for individual notes on the staff instead of comparing one note to another to see if it is higher or lower. I also noticed in this study that reading in different five-finger positions (e.g., C, F, G, d, a) hindered the ability to recognize a melodic pattern written in C position, the first position students learned. In the 10-week sight reading check, the reading in C position was much more solid; however, there were other variables also involved. Students were given more time to study the example and no dynamic or articulation were notated. As a class, we did not concentrate on reading in other positions until the 11th week.

With a closer look at the results of SR10 and SR16, an interesting finding emerged. This was the sight reading test that was given at the 10-week mark and at the 16-week mark (end of the semester). The sight reading examples were different and the amount of time given to preview the example was different. SR16 was more difficult than SR10 because it included more difficult intervals, added dynamics markings and

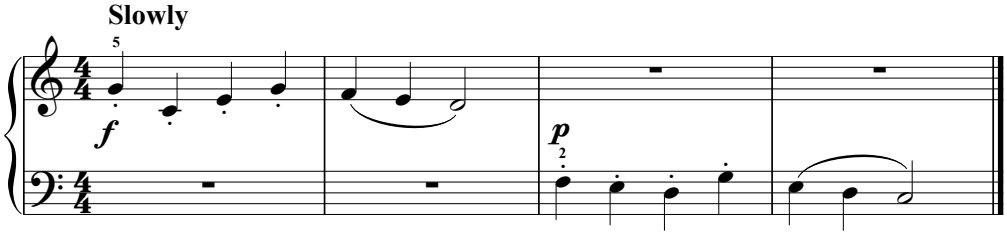
articulation. The example for SR10 was part of a class quiz in which students had the opportunity to study the example while waiting for me to come around and record them play it. Some students had up to 20 minutes to study the example in advance. The post-test SR16 was more of a "pure" sight reading test. Students were given 15 seconds to preview the example before playing.

Figure 5.2. Sight Reading

SR10



SR16



It was interesting that the reading group outscored both aural groups at the 10-week mark. Perhaps the time and emphasis placed on ear training in the first 10 weeks of the semester created a deficiency in reading for the aural group. However, for the remainder of the semester, students in the aural group were apparently able to catch up, improve, and seemingly surpass the reading skills of their pure reading group counterparts.

If the reading group outscored the aural group in SR10, why was there a significantly larger decline for the reading group from SR10 to SR16? I decided to listen

to the post-test recordings (SR16) and see if there was a consistent weakness I could identify. The following observations serve as a possible explanation for the lower scores. Out of seven students in the reading group:

1. Four demonstrated little or no feeling of rhythm or tempo
2. Five students misread one or more pitches
3. Three students misread pitch and melodic direction
4. Four students played without attention to articulation
5. Six students played without attention to dynamics.

In my journal dated, 11/30, my observation of the aural group was that two students frequently read bass clef notes in the treble clef and vice versa. This is a common mistake with beginning piano students. Another observation was that one student in particular read the fourth line in the bass clef as "G" instead of "F." This was probably because when notes on the staff were first introduced, the "F" on the F or bass clef was learned at the same time as the "G" on the G or treble clef. This is not an uncommon occurrence, and perhaps the two clefs should be taught at different times so that there is a clearer difference between which hand and which key the fourth line on the bass clef represent.

The results of sight reading between the reading and aural groups made me question how much and what kind of instructional reading material should be used. In the textbook that was used in this study, there were very few reading exercises, mostly pieces to play which became more and more difficult to sight read. Sight reading ability is usually one or two levels below playing ability and examples like these were lacking in

this particular textbook. The supplementary materials were created out of a need for more reading practice. The aural group used materials created by the me and the reading group used Bastien's Sight Reading, Level 1.

Data not included in Phase 1 results. This was one of the disappointments from Phase 1--to omit the findings from one class because of the low number of participants. Data was collected from an aural group from Mountain View College whose results were not included in Chapter 4. The group was very small and complete data was collected from only three students. (The class also had three students who were ineligible for the study because of their age under 18.) However, it is interesting to compare their results to the other two groups from Phase 1. Because an aural and reading group came from the same college, Mountain View, a more direct comparison could be made between the two groups as it pertained to the amount of class time and frequency of class meetings per week.

Both groups received the same amount of class time (2 hrs, 5 min per week) and meeting frequency (once per week). As you can see from below, the Mountain View aural group had a distinct advantage in all areas except for SR 10 (at 10 weeks). The aural group received consistently higher scores throughout the study, indicative of the much higher pretest at the beginning of the semester, but a lower score on the 10-week sight reading measure. This was an extremely small sampling and was the reason why the data was not included in the results for Phase 1. The following is a raw score comparison between the aural (previously excluded data) and reading groups from Mountain View.

Table 5.1. Raw Scores from Mountain View Aural Group* and Mountain View Reading Group – Phase 1

	ID	FT	NR1	SR10	NR2	SR16	PP1	PP2	PPA
AURAL GROUP*	226	5	5	5	5	5	5	5	5
	282	4.5	0	4	3.5	3.5	3.5	4	3.75
	290	5	4	5	5	5	5	5	5
Average		4.83	3.00	4.67	4.50	4.50	4.50	4.67	4.58
	ID	FT	NR1	SR10	NR2	SR16	PP1	PP2	PPA
READING GROUP	323	4.5	3.5	4	4	3	4.5	4.5	4.5
	391	0	5	5	5	5	5	5	5
	357	5	3.5	5	5	4	5	5	5
	396	0	0	5	3.5	4	2.5	3.5	3
	389	0	0	5	3.5	2.5	4.5	4.5	4.5
	313	5	4.5	5	5	4	4.5	5	4.75
	347	5	3.5	5	3	3	4	3	3.5
Average		2.79	2.86	4.86	4.14	3.64	4.29	4.36	4.32

*Not included in Phase 1 results

The two classes at Mountain View were small, which has been the norm in recent semesters since changing the course to a new one class per week format. The Mountain View aural group had three under-age students who could not participate in the study. These students were high school students who came after school for this mid-afternoon class. The class meeting time and proximity of Mountain View to the local high school contributed to the proportionately large number of students under age 18. Coincidentally, they tended to be some of the best students in the class. I also had one age-eligible student who did not turn in a consent form. Some students were absent on testing days and had incomplete data. As a result, a very low number of three students with complete

data participated in the Mountain View aural group. The quality of student in this class seemed average for Mountain View College.

The Mountain View reading group was a more stable group of seven participants. One student was under age and could not participate. The smaller class sizes at this college seemed to create a more personal learning environment because each student received more individual attention. Attendance and punctuality were generally not a problem. There is at Mountain View, however, a high attrition rate from the first day of the semester to about midway through the semester. Consequently, the reading group of 19 was reduced to 10 by the end of the semester. The Mountain View aural group began with 13 and also ended up with 10 who received grades. Many of the same issues regarding reading in Phase 1 inevitably came up in Phase 2.

Phase 2

SR10 and SR16. Like Phase 1, two different musical examples were used for SR10 and SR16 sight reading in Phase 2. The SR16 example was more difficult than the SR10 example. In the SR 16 example, dynamics and articulation were added along with a less predictable melodic shape. Like Phase 1, the way the test was administered probably accounted for the lower scores for SR16. SR10 was given at the 10-week mark in which a student could study the example for up to 20 minutes. The SR16 example was given at the end of the semester and students were given only 15 seconds to preview the more difficult example before playing. Because all groups in both phases had equal testing conditions for both tests, scores can be compared but the decline in scores should not be considered as a decline in skill.

Of particular note in Phase 2 was the low score of the Mountain View aural group on SR16 at 3.50. This is particularly interesting because the same group scored the highest in SR10 at 4.86. This large decline came as a surprise to me. It could be because we did not review sight reading examples in C major in the weeks prior to the test. Also, two of the students in the Mountain View aural group had learning disabilities, one of which needed special accommodations in class. The Mountain View reading group, however, performed the best on SR16. Their progress toward the end of the semester was remarkable. I recall the enthusiasm in which they had for learning the last piece for the final concert.

Bastien's Sight Reading Book, Level 1 is a series of mostly four-measure sight reading exercises ordered by level of difficulty and sorted by key. The reading group read through about fifty exercises, a little more than half of the exercises in the book, during the course of the semester. The examples were used for pure sight reading purposes (preview for 15 seconds, then play). The treatment group used a supplemental packet of exercises of four to eight measures, also about fifty in all. The supplemental packet was more of a multi-purpose set of exercises for sight singing and playing with less emphasis on pure sight reading like the control group. Comparing the two supplementary materials, Bastien's Sight Reading, Level 1 seemed to prepare students best for the SR16 example because of the similarity of musical examples to the SR16 testing example. This may have been a factor in the higher SR16 scores for the reading group.

Playing pieces by-ear and writing. Three pieces were taught to the aural groups by-ear in both phases of the study. Each student recorded the instructor's performance of

the piece on their cell phones for listening at home. As students were learning the piece, we talked about its formal structure—the parts that were repeated and the parts that were different—we called these sections the "A section" and the "B section." This helped students organize the piece in their minds and provided places to start as they were learning it. After the students finished learning the whole piece with both hands in about three weeks, the last step was to write out the piece in music notation in their manuscript notebooks. (We did not write out the third by-ear piece, *Vivace,* because that was already in their textbook.) We began by writing it on the board. Volunteers came to the board and wrote out a measure until the whole piece was on the board. We included dynamics, phrasing, and articulation along with the title and tempo indication. Then, they wrote it themselves in their notebooks. This seemed to be a valuable lesson for writing and reading. Then, we played the piece again, this time reading it from their own notation. I felt this reinforced the concepts of what Bruner (1966), Gordon (1980), and Elliot (1995) had in mind that reading from symbols should not be the first step but a last or parenthetical (Elliot, 1995) step.

The Mountain View reading group. At the end of the semester and before the evaluators scored the results of pretests and post-tests, I felt the reading group performed better in the post-test and in the last eight weeks of the semester. As it turned out, I was right. The reading group outscored the aural groups on all three measures, NR2, SR16, and Prepared Pieces. The reading group displayed more enthusiasm, and reading and playing technique seemed to be "clicking" along compared to the aural groups in those last few weeks. So, I looked back at my notes from each lesson to see why that might

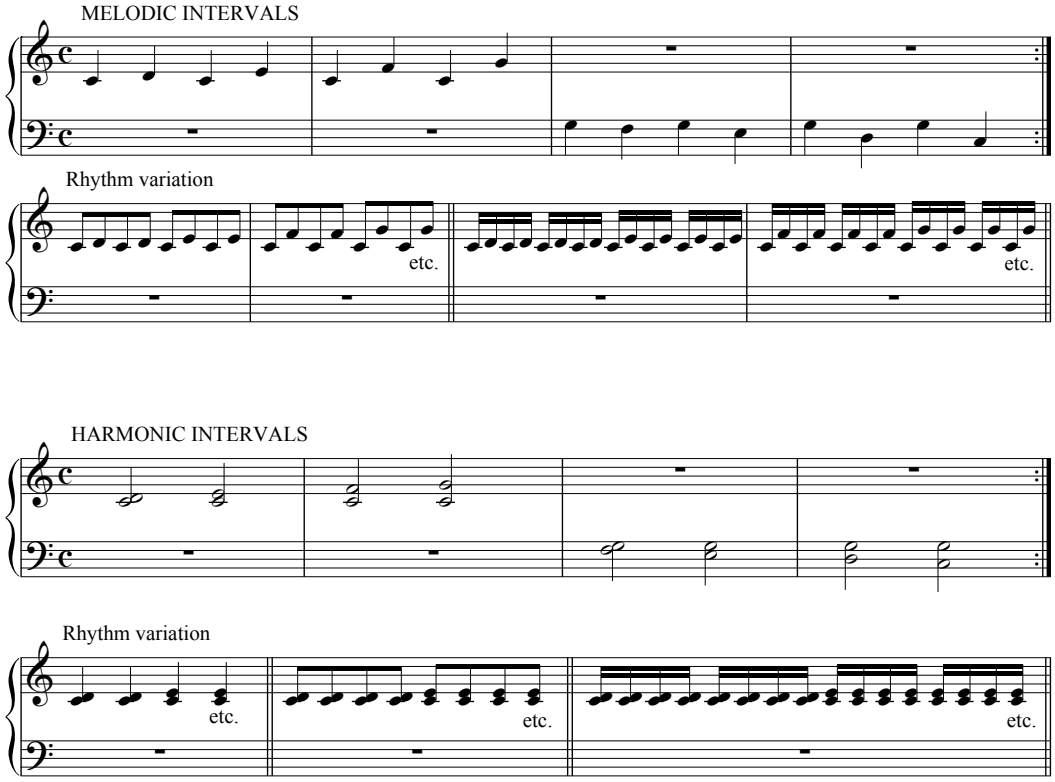
have happened. Referring to my journal in the third week of the semester, I recalled that the reading group had serious reading problems compared to the two aural groups. There was more confusion and several students were writing letter names in their textbooks.

This was disappointing and frustrating for me as the teacher but was the reality of my research. I wanted to figure out what was going on in these early weeks and fix it. So, in that third week, I began concentrating on reading, giving them supplementary reading exercises in class from *Sight Reading, Level 1*, by James Bastien. We previewed each example for 10-15 seconds before playing by looking at the time signature, silently tapping the rhythm, and quickly scanning all pitches. Then, we played each example all the way through tapping our foot to the pulse. It was a slow and methodical process but I felt that it would pay off later. In that same week, I continued by writing in my journal, "Bastien #1-6 reinforced middle C position which was perfect for today's lesson." I also noted which students had particular difficulty with reading.

As a teacher, I am the problem solver. Teaching is the constant process of assessing student problems and offering the best solutions. Early on in my teaching career, I would give students with reading problems a more "stock" solution (practice with flashcards, study this chart of the grand staff). But, as an experienced teacher, the solutions are often more complicated and unique to each class and individual. Is it an eye tracking problem, a coordination problem, a comprehension problem? For many of them, it was at least two of the above. We took more time studying each example either in the textbook and from Bastien's *Sight Reading, Book 1*. This helped because it was a small class compared to aural group at Bayside. I could get around to helping all of them.

By the fifth week, it was evident which students were struggling because, even though the slower pace was helping them, four of these students had stopped coming to class and eventually dropped the course. But, that did not stop me from working to get the rest of them to read better. *I did something that I did not do in the first phase of this research*. I gave the reading group a finger training exercise based on listening to the rhythm patterns learned by-ear. We did intervallic patterns in half notes, quarter notes, eighth notes, and even sixteenth notes. This is the same type of finger training exercises I did with the aural groups. We also transposed them to other keys and hand positions. The students enjoyed it because the pattern was simple but the sixteenth note rhythms were challenging at the same time.

Figure 5.3. By-Ear Interval Practice



I was excited. Now, at the time, I realized that by introducing this type of finger exercise, I was "spoiling" the reading group by exposing them to elements of the treatment. *Could this potentially change the results of my study?* I rationalized it at the time by thinking that this was "an experiment within the experiment" to see if this one element (finger training exercises learned by ear) could make a difference in improving reading and playing in the reading group. Could added finger technique exercises learned primarily by ear make a difference in reading and playing? I needed to try it because I honestly felt this could work.

In the sixth week, I wrote, "Excellent finger training in C and G positions. I think this helps with reading and playing!" Feeling this could work and then having it *actually work* is why I teach. For me, it was pure exhilaration. Looking back, it would have been equally interesting to *not* introduce the finger training exercises by-ear and see if the results would have been different. In a sense, I felt I would be letting my students down as a teacher. I was there to help and not withhold. So, at that moment, I decided to *help* because I somehow knew this would work. I continued the finger exercises through the eighth week of class.

Knowing that a certain piece, exercise, or teaching technique would help student learning comes with years of experience. Knowing that it would help students at a particular juncture in their learning also comes with experience. Withholding that particular piece, exercise, or teaching technique would seem against my natural inclination to help and problem solve. How could I keep teaching this class and withhold information that I know would help? I did not feel that way in my first semester of

research. In that first semester, both treatment and control groups were going well, and one class did not seem behind at the same point (three weeks) into the semester. So, as I was into the fifth week of this second phase of research, I had two choices--I could let the reading group fall behind even more or help them.

As it turned out, the finger exercises seemed to help them--although I cannot definitively demonstrate that. The results of the reading group in the post-test were significantly higher than both treatment groups. If the three post-test scores are averaged, the Mountain View reading group averaged 4.44 on the post-tests; the Bayside aural group, 4.00; and the Mountain View aural group, 3.98. The results of the Pretest, however, may have provided another explanation for the difference in post-test scores. The reading group had a distinct advantage when comparing the average of the two pretest scores. (I did not include SR10 as a pretest for this comparison since they were not given prior to instruction.) The reading group had an average pretest score of 3.20 compared to 2.79 for the Mountain View aural group, and 1.46 for the Bayside aural group. Like Phase 1, the Bayside aural group had the lowest scores in the pretest, and clearly had the most to gain on the post-tests.

Music majors. The Phase 2 Pretest scores between the Bayside and Mountain View Colleges varied widely. As suggested by the pretest scores, the overall level for the treatment group from Bayside College was much lower. This could have accounted for some of the lower scores on the post-test as well. To me, it seemed students from Mountain View had more playing and reading experience that led me to suspect that there were more music majors in the two classes from Mountain View. But, according to the

Beginning Piano Questionnaires, all three groups had a similar proportion of self-declared music majors. The Bayside aural group had five music majors, the Mountain View aural group had three music majors, and the Mountain View reading group had three music majors. However, something must be said about the quality of incoming music students at this college. Mountain View is known statewide for having a distinguished music department and a larger music program. Higher pretest scores may be an indication of the higher overall level of incoming music students at this college.

Mountain View seems to have an advantage over other colleges, including Bayside, in attracting students to its music program. It also advertises itself as such. On the homepage of the Mountain View College Music Department website, it reads:

> Welcome to one of the finest community college music programs in the state of California, if not the nation. Nearly 800 majors and over 4,000 students per semester study one or more of 80 classes in music appreciation, music history, music theory, applied music, commercial music, piano pedagogy, and sound recording, and excel in one or more of 25 performance groups. When measured against the enrollments of the 109 other community college Music programs in California, the [Mountain View] College Music Department ranks an amazing #1 in enrollments in the state.

A curious thing about self-reported music majors at the community college is that students do not have to pass an audition or proficiency exam to become a music major, hence, the wide range of pretest scores, particularly on reading. The five music majors from Bayside scored 5.00, 2.50, 1.25, 0.25, and 0.00 on the Note Reading pretest. For the

Mountain View aural group, the three self-reported music majors received scores of 4.75, 4.00, 2.00. For Mountain View reading group, the scores for self-reported music majors were 5.00, 4.50, 0.50. Scores of 2.0 or below for note reading seem extremely low for a declared (albeit self-declared) music major. Bayside's four lower music major scores of 1.25, 0.25, and 0.00 suggest that despite reporting as music majors, very little, if any, prior musical training occurred.

About community colleges. Community colleges in the United States provide undergraduate education to more than half of all enrolled students as of the fall of 2005. Community colleges also provide an important gateway to postsecondary study for many minority, low income, and first-generation students. In addition, many who attend community colleges are nontraditional students, such as those who attend school while working. Many students are mature learners who attend for personal enrichment while others may be high school students looking to supplement units in preparation for college. Community colleges are diverse institutions that serve a wide variety of needs (American Association of Community Colleges, 2017).

Most community colleges operate under such broad-based open access policies. They accept students who might not otherwise be accepted into a 4-year system and who may miss out on a postsecondary education if it were not for the community college by offering students the option of a much lower cost alternative. According to Goldrick-Rab (2010), students who initially enroll in 2-year colleges are more likely to be first-generation college students, come from low-income backgrounds, and work for pay during college. These characteristics put a tremendous amount of stress on community

college students and this can be seen in the large drop-out rates. Schudde and Goldrick-Rab (2015) suggest that empirical research needs to acknowledge the economic and social contexts of community college students' experiences. Analytical models that do not consider the external pressures and obligations students face are incomplete.

All these factors can affect the learning outcomes observed from class to class, school to school, and semester to semester. Each class is a unique combination of students from diverse family backgrounds, ages, and socio-economic levels, and educational goals. (For student demographics, see Appendix T.) In the context of the present research, a two-page Beginning Piano Questionnaire was handed out on the first day of class. The results of this questionnaire provided a very limited glimpse into musical background and educational goals. It, by no means, provided a complete picture of the external pressures students face.

Another consideration that can influenced test outcomes was the diverse age groups of the participants. From both phases, six students were in the 26-40 age group and four students were in the 41-60 age group. According to Adult Learning Theory Knowles, Holton, & Swanson, 1998), adults were more life-centered in their orientation to learning and were more internally motivated. As a self-directed learner (Merriam, 2001; Merriam, 2008), the adult learner viewed the instructor as facilitator and was not as dependent on the instructor for learning. In this study, the number of adults enrolled in the piano class for self-enrichment (and not credit toward a degree) could have had some bearing on test scores for this study. Consequently, this age group may not have considered the performance outcomes as important as merely fulfilling the desire for self-

enrichment.

In Mountain View's college newspaper, a blog written by Jayna Gavieres, staff reporter, was titled, "Challenging the community college stigma." Gavieres quotes student, Kayla Briet, an 18-year-old musician and aspiring filmmaker, "[Mountain View] community college is definitely stigmatized. It's so silly, but it's real," Briet said. "People believe that's where the delinquents go, where the 'no-gooders' go, where people who failed go, and once I heard that, I said I have to go to community college now and prove them wrong." Briet may not represent most students enrolled at community colleges, but such challenges are real to many students.

Data Omitted from Results

Research for Phase 1 and Phase 2 was conducted over two consecutive fall semesters. Data was also collected from classes during the spring semester between Phase 1 and Phase 2; however, this data could not be included in the Results because of a technical problem encountered during the last round of post-tests. This was a situation that I feared as an action researcher. To be teacher, test proctor, and recording engineer took its toll. I accidentally pressed the "input" button and inadvertently shut down the microphone of the Handy Recorder H4n. About eight of the last post-tests did not record properly. As one can imagine, I was frantic after I returned home and could not play the last post-tests. That single mistake ruined a whole semester's worth of research!

I decided to extend my research into the following fall semester. I was determined to get it right by double-checking all the settings and playing back recordings before students left. I made sure the recording levels were moving while the students played. As

a result, I was rewarded with complete data from all students that took the class from beginning to end in what I now called Phase 2.

Discussion of the Study

Instructor as Researcher

Because this was an action research study, an obvious challenge was the mitigation of researcher bias. Realistically, objectivity cannot be achieved as practitioners are intimately involved in building relationships with students and these relationships may limit the practitioner's ability to be open to new and different viewpoints (Efron & Ravid, 2014). I identified three areas of concern in which bias could have played a role when teaching the control and treatment groups: 1) the amount of preparation and quality of teaching time, 2) the quality of teaching materials, and 3) the amount of effort and care devoted to each group. Because one of the main purposes of action research is to inform my own practice, I wanted this study to be conducted with the highest integrity and respect for each student involved, eliminating any inclination toward a perceived outcome. I wanted to know if by-ear learning was a valid approach to teaching beginning class piano. I strived to provide the best quality teaching to both aural and reading groups while conducting this research.

To address the first concern, the reading group and aural group must have an equal amount of teaching and prep time. I developed careful lesson plans for both groups and made sure they were each going at a similar pace through the curriculum. Because the schools were from different community college districts and had different semester structures, the treatment group had more classroom hours than the control group. This

was unavoidable; however, I felt this was somewhat mitigated by the difference in the class size. The control group had 42% fewer students than the aural group.

To address the second concern, I wanted to ensure that the teaching materials for the control and treatment groups were of comparable quality. Because I created a supplementary reading packet for the aural group, I provided a supplementary reading book for the reading group, Bastien's *Sight Reading, Level 1*. Both supplementary reading materials were of similar difficulty and length (4 to 8 measure examples) and both groups had approximately the same amount of class time with these materials which was nearly every class meeting. The main difference was in the technique of teaching these materials. The aural group sang the examples before playing and the reading group recited the note names of the examples before playing. I felt that both approaches accomplished the task of identifying note names while maintaining a steady pulse. For Phase 2, there was one thing I did add to the control group's experience that was not done in Phase 1, and that was a finger exercise learned by-ear that was built on expanding intervals (see Appendix H).

To address the issue of equal effort and care for both groups, I deliberately wrote comments on how each group responded after each class, making sure to follow-up on any problems (absences, trouble with reading, difficulty in putting hands together, etc.). I tried to give equal amounts of encouragement to both groups. The groups were not told if they were the treatment or control group. After analyzing the results of the first phase of data, I did not want this knowledge to taint how I taught the next phase of participants and make sure that no bias had crept into my teaching. I wanted to make any results from

my study to be as trustworthy as possible.

No scoring or assessment of the results was made until after the semester was over. As the researcher and instructor, I had no idea if either group had any advantage or disadvantage. I did not score any of the students myself. I made a conscious effort during the semester not to compare any in-class quiz scores, journal notes, performances, or recordings. At the end of each class, I made journal notes regarding things that worked well, did not work well, and things that could be improved. I kept my thinking on each class as separate as possible which was made easier because each class met on a different day or was at different location.

Because I decided to collect another set of data from Phase 2 to obtain a larger sample size, I had to be careful that knowing the results of the first cycle would not influence how I collect data for the second cycle. Knowing that there was a large drop in reading scores for the both groups from the 10th week to the end of the semester, I was careful not to modify the way I taught reading. I followed the lesson plans drawn in the first phase and progressed at the same pace. I was also more careful the second time around to collect complete data from all participants throughout the semester in order to obtain a larger number of participants.

Validity

Threats to interval validity, or the possibility that results obtained were not due to the effect of the independent variable (Phelps, Sadoff, Warburton, & Ferrara, 2005), were inherent in the research design. Some possible extraneous variables that could have posed a threat to internal validity included differential selection and the effect of testing.

Random assignment was not a practical alternative to a convenience sampling as discussed previously. As for the effect of testing, the note reading example (identifying four notes on the grand staff) was the same on the pre- and post-test. It was unlikely that participants recalled the same four notes sixteen weeks later. Even so, because of the two-group design of the study, this threat was largely mitigated.

The Sight Reading (SR10 and SR16) posed a threat to internal validity in its design and implementation. Both tests were given under different conditions. In SR10, participants were given up to ten minutes to preview the example, but only 15 seconds to preview SR 16. The musical example in SR16 was also more difficult than SR 10. Therefore, both assessments could not accurately track development of the sight reading skill.

There were obvious threats to external validity in this study. Because of the small number of total participants, 48 students, the results cannot be generalized to the larger college population or the community college population. This study could and should be replicated with another instructor to see if an integrated aural approach would be beneficial to beginning piano students. In teaching music today, it seems that reading music notation is favored over learning by-ear. If the act of making music is perceived as the aural art that it truly is, aural transmission should be restored as an important way to learn. For some time now, there has been a steady call for aural learning in the classroom (Elliott, 1995; Gordon, 1980; Green, 2008; Haston, 2004; Kendall, 1988; Mainwaring, 1951; McPherson & Gabrielsson, 2002; Musco, 2006; Woody, 2012; Woody & Lehmann, 2010). “Ear driven activities can effectively facilitate development of

composing and arranging, improvisation, musical collaboration in groups, and individual artistic expression, not to mention more fluent notation reading" (Woody, 2012, p. 87). Why not heed that call now?

Significance of the Study

Effects on teaching. My main goal in conducting this action research was to improve my own teaching practice. I didn't realize that while immersed in the process of teaching, collecting data, and analyzing the results that I would learn so much. Now that I am on the other side and can reflect on what I have learned, I came up with a list of best teaching practices going forward:

1. Know your students. Having students complete the Beginning Piano Questionnaire at the beginning of the semester for this study helped me know who they were, their musical tastes, and their musical background. This was critical for my research. To be a more effective instructor, I need to be sensitive from where they have come. I plan to give out this questionnaire at the beginning of every semester. I know that other instructors give out questionnaires or ask students to provide their background information on blank index cards on the first day of class. For example, the Science Department at California State University at Northridge website, Sourcebook for Teaching Science, has a page devoted to Student First-Day of School Questionnaires with sample questions for instructors to learn who their students are (Herr, 2007).
2. Be "culturally responsible" as an instructor. College populations in California come from a diverse set of cultural backgrounds. Some students may not know

American folk or children's songs because they or their parents did not grow up here. I cannot assume all students know *Row, Row, Your Boat,* and use that as a familiar tune to learn by-ear, for example. I also cannot assume, unfortunately, that students have had any musical training at a previous institution before enrolling in the class. What they know about music may be only what they stream on Spotify. In a case study, Shaw (2015) explored how urban choral educators used contextual knowledge to inform pedagogical practice. Culturally responsive teaching (CRT) is a student-centered approach that "places students' strengths and needs, rather than musical products and processes, at the center of the curriculum" (p. 216). This would include selecting repertoire and designing instruction driven by knowledge of one's learners. An excellent resource tool for instructors is the book by Lind and McKoy (2016).

3. Adapt to how students learn as the semester begins. Not all students learn the same way. Not only are their backgrounds different, but so is the way they receive and respond to instruction. Through listening to interviews and reading student journals, I discovered that by-ear learning is not a learning preference for everyone and that some felt more comfortable reading notes on a page. But, I found that the vast majority of beginners who had no previous music training considered learning by-ear helpful, similar to findings by Musco (2006).
4. Use a balanced approach of aural and reading for beginning piano students. This supports the findings of McPherson (1993) who advocated the same balanced approach. From doing this research, I determined that both approaches are valid

but not mutually exclusive. Reading should not be the only way instructors teach beginning piano, nor should playing by-ear be the only way. Both are valid and both should be used in every class, at least in the first few weeks. Not only can learning by-ear develop reading and performing skills, but it can perhaps develop critical listening skills, something that was not a focus of this study. Listening for changes in dynamics, articulation, or harmony, for example, might be improved with continued aural skill development among beginners.

5. Know that "easy" and "enjoyable" are almost synonymous in the beginning. By keeping the learning by-ear examples easy, at least in the beginning stages, students responded by writing that the experience was easy as well as enjoyable. This is what I learned from their journals. However, teachers always have to balance level of ease/difficulty with the boredom/challenging factor. This is where the real art of teaching takes place. From the student's perspective, when attention is completely absorbed in the challenges at hand, *flow* is achieved (Nakamura & Csikszentmihalyi, 2005). "As people master challenges in an activity, they develop greater levels of skill, and the activity ceases to be as involving as before. In order to continue experiencing flow, they must identify and engage progressively more complex challenges" (p. 92). After the fifth week, the students who had difficulty with some of the more advanced by-ear playing tasks lost interest and wanted to do something else (like reading) instead. This is perhaps where the challenges exceeded the skills required to perform the task. The best window for by-ear learning seemed to be the first five weeks of the

semester, before they had put hands together playing different notes. Almost all students were successful with the by-ear playing assignments in the first five weeks and thought they were easy, helpful, and enjoyable. This finding supports a study by Haston (2004) who found that fourth-grade instrumentalists with no prior musical training benefitted the most from by-ear playing.

Results support findings from other research. Much research has been done on by-ear learning (Brown, 1990; Glenn, 1999; Green, 2008; Green, 2012; Haston, 2004; Kendall, 1988; Luce, 1965; Musco, 2006; Woody & Lehmann, 2010). All have documented the benefits of by-ear learning, many in conjunction with the traditional reading approach (Brown, 1990; Glenn, 1999; Haston, 2004, Musco, 2006). In fact, these studies also concluded that the emphasis on aural skills did not hinder development of reading skills and may have aided in developing these skills. In my research, I also found that to be the case. In both phases of the study, more significant gains were made by the Bayside aural group in note reading (NR1 to NR2) and less of a decline was observed in sight reading (SR10 to SR16). In Phase 2, the Bayside aural group also showed much larger gains in note reading, most likely because of the much lower pretest score. The additional emphasis on aural skills did not seem to hinder progress in reading, and many in the class found that it promoted a better understanding of what they were reading.

Suggestions for Future Research

Additional research on topics related to learning the piano by-ear is needed. The current study was from a very small sample size and a diverse ethnic population. This diversity (Hispanic, African-American, Asian American) was characteristic of the ethnic

make-up of areas with close proximity to a large urban center in California. It was also more typical in a community college setting than other higher education environments. The results of this study may or may not be due to the factors of population diversity.

Replication of this study or a similar study is important using an instructor that is not the researcher. This way, the researcher may more effectively examine the interaction between instructor and student, and teaching approach and its receptibility. It will also be important to sample different college populations to consider if results may be related to ethnic background, age, or gender.

Other suggestions for research include:

1. More research is needed in the field of teaching piano with an aural emphasis. Limited research has been done on aural training for keyboard students (Brown, 1990; Sweetnam, 2008). Most aural learning research involved band or orchestral instruments in an elementary or high school setting. Very little exists in the area of beginning piano, especially among adults. Beginning piano classes at the college level typically employ a reading-based approach. This may be because college and university instructors teach as they were taught and students devalue the practice of learning by-ear in favor of reading as observed by some students in the current study. Most instructors are formally trained and must possess college degrees to qualify as instructors of higher education. They may perceive themselves as unskilled in playing by-ear and may be reluctant to incorporate these activities (Musco, 2010). However, this does not mean that believing and trying an aural approach

cannot be cultivated and nurtured for great benefit to instructors and students alike. Teachers may see the benefits for themselves in developing their own by-ear playing skills and general confidence in playing their instrument (Varvarigou, 2014).

2. Studies measuring by-ear playing ability as a result of instruction are limited (Brown, 1990; Musco, 2006) and finding effective strategies for by-ear instruction should be explored. This study focused on the outcomes of reading music notation and performance of prepared pieces. It did not measure the skill of playing by-ear which was the treatment in this study.
3. A study should be conducted calculating the correlation between playing by-ear and sight reading in piano students. This would follow-up and build upon the research of Brown (1990), Glenn (1999), Haston (2004), and Musco (2006), which has documented a relationship between playing by-ear and sight reading,
4. Future research should involve piano students at intermediate levels and advanced levels to examine if the aural approach treatment is effective at different levels of instruction. This could also include improvisation in different styles of music. The ability to improvise was also shown to be highly correlated with the ability to play by-ear (McPherson, 1995).
5. A study should be done showing the effects of aural treatment over a longer period of time of two or four semesters. Data collected over a longer period of time could provide valuable information on the long term benefits of an aural

approach. Incorporating aural skills over a longer period of time was found to have a strong correlation with skills in other musical areas such as improvisation, playing from memory, and sight reading (McPherson, 1997).

Integration of an Aural Approach with a Reading-Based Approach

Integrating an aural approach with an existing reading-based approach is not as difficult as it may seem. Musco (2006) integrated learning songs by-ear for four weeks with 7th and 8th grade band students. In a study by Brown (1990), college students were immersed in one semester of aural instruction in which traditional approaches were enhanced by experimental instructional techniques. The current study attempted to show how a traditional piano curriculum can be enhanced by a few aural learning activities.

The important thing to know is that the instructor meets students exactly where they are as beginners. They come into the classroom with a unique variety of music that they know and can recognize by ear but cannot play or read from notation. The idea is to offer them some fun and easy playing experiences at first and gradually phase in reading.

To start, students need to associate the names of the keys to the finger that plays them. A reading-based approach might have them play from notation right away. But let's focus on just the name of the note and finger. The following are teaching strategies that seemed to work best in this study:

Have them set their fingers in a five-finger (or other) hand position. If the hand position is C major (C-D-E-F-G), call out (or sing) the note names (as you play them) in three quarter note values followed by a quarter rest. Instruct the class to listen first, then play when you cue them. This is playing in *call and response*

style. For example, sing C-D-C (rest/cue), and they will respond by playing C-D-C with the correct fingers. You will have to cue them (during the rest) to play while keeping a steady pulse. Keep giving them other three-note sequences (e.g., C-D-E, D-E-D, D-E-F, etc.) without losing the pulse. Once they have become familiar knowing the notes under their fingers, you can teach them a short tune or a finger exercise they can memorize using the same call and response procedure.

Technically, this is not yet learning by-ear. Learning or playing by-ear takes place when students are not given the names of the notes; instead, they just respond to hearing the notes that are played. The first pure by-ear experience might be learning finger exercises which are simple and repetitive, with phrases being taught one at a time. The Finger Exercise #1 (Fig. 5.1) is one example that consists of only two notes per phrase and the descending five-finger pattern at the end. Students should be able to memorize the whole exercise in the first session. Learners get a chance to look at their fingers as the keys go down. After a while, have them close their eyes or look away and they should be able to picture the keyboard in their mind while experiencing the tactile sensation with their fingers and hearing the sounds they are producing. The exercise should also be transposed to other keys. I used the first 5–10 minutes of almost every class for finger exercises.

Playing by-ear can also be accomplished by having students pick out a familiar tune by themselves on the piano. It could be finding the rest of the melody notes to *Row, Row, Row Your Boat* or some other familiar tune for homework. Have them learn the first phrase in class and ask them to figure the rest out on their own. Many of them will get it

and surprise themselves. This may instill confidence in playing by-ear and foster a feeling of enjoyment in the activity (Varvarigou, 2014). Another tune could be a more contemporary one, *Treasure,* by Bruno Mars. They can also bring in a recording of a tune of their choice. I believe that students just need to get acquainted with their instrument and feel comfortable knowing how it works through discovery after a brief introduction to the instrument.

If learners want to do more than pick out a familiar tune or finger exercises, try a short piece that is unfamiliar. One that moves mostly stepwise and is within a five-finger position is best. Have students make a recording to listen to at home. It is all up to the instructor on how much to guide them to the notes. The instructor could play a short phrase and identify the first note to play back, for example. Whenever possible, associate what they hear with what it may look like on the page. The approach does not need to include much additional musical material. Just having an "aural awareness" is a start. Was it a large interval or a small interval? How many counts did this note receive?

I have integrated an aural approach with two different group piano texts outside of this study. For additional music reading or sight reading practice, any supplementary material or material the instructor has created will work. It is how one approaches reading that makes this aural approach different. One way to do this is to first sing the melody using note names while staying in tempo. Then, sing and play fingers in the air on imaginary keyboards. This will help to reinforce symbol with correct finger and key. By using *audiation* (Gordon, 1980) to sing then imagine the pitch, students will be able to self-correct while sight reading later, as some students mentioned in this study.

Concluding Thoughts

My father was the inspiration for this study and his renditions of the golden oldies played by-ear on the old home piano still ring true to me today. He had only *two* piano lessons as a youth when his teacher told him that she taught him all he needed to know. She showed him the names of the notes and what they looked like on the music staff. Now it was his job to figure out the rest. And he did, mostly on his own by-ear.

Although music offerings at the college level have expanded to include Jazz, American, World, Rock and other forms of popular and folk music, the way we teach piano in higher education has remained basically static. Piano instructors have done a good job of teaching musical literacy. But not all music is written down. Have we created a dependency on the musical page?

Based on my experience as a musician and teacher, a review of the literature, and the results of this study, I believe that an aural approach merits consideration in piano course curriculum. Learning by-ear does not hinder learning in other areas such as reading (Haston, 2004; Musco, 2006) and according to my research, might aid in acquiring a deeper understanding of what we are reading. This study suggests that an integrated aural/reading approach to teaching piano to beginners may also be enjoyable and most students thought learning by-ear should be included in a beginning piano course, at least in the first few weeks. Further research on learning piano with an aural emphasis is needed before unequivocal recommendations can be made. Nevertheless, learning by-ear may provide a valuable tool for instructors in the piano classroom.

APPENDIX A
INTRODUCTION AND LETTER OF CONSENT

August 24, 2015

Dear Beginning Piano Student,

My name is Suzanne Wong and I am the instructor and researcher at XXXXX College. I am also a doctoral student at Boston University and am working on my dissertation. This letter is to ask your permission and consent to participate in my study.

For this semester, I will investigate the possible benefits of learning by-ear for beginning piano students. Because these learning activities are part of the regular beginning piano class, there will be no impact on credit and your evaluative grade in this class.

If you agree to participate in this study, data taken from the following class activities may be used in this study: answers to the questionnaire, your performance of a familiar tune by-ear and note reading (beginning of the semester), performance of two pieces and sight-reading (end of the semester), and entries in a student journal. In addition, volunteers will be asked to participate in a group and individual interviews of about 10 minutes each. All activities, with the exception of the interviews, will take place during regular class time. The interviews will take place at the end of the semester and after final grades have been determined.

Participation in this study is voluntary. You can withdraw at any time. Your participation or non-participation will not affect your grade or standing in the class. Only students age 18 and older will be allowed to participate.

Participants will be assigned a study identification number so that all participant information is known only to the administration at XXXXX College. I, the instructor, will not know who is in the study. The code list will be retained only until the data have been analyzed, or approximately six months. We will keep the records of this study confidential by storing them in a locked cabinet. We will make every effort to keep your records confidential.

The main risk of allowing us to use and store your information for research is a potential loss of privacy. I will protect your privacy by replacing your name with a code. The code key will be kept in a locked cabinet. Another potential risk is the loss of privacy that may occur after the group interview. As a precaution, I will ask the group not to tell anyone outside the group what any particular person said in the group; however, I cannot guarantee that everyone will keep the discussions private.

You may not benefit from taking part in this study. Others may benefit in the future from the information that is learned in this study.

If you have any questions about the study, please contact me at swong@XXXX or (XXX) XXX-XXXX. You may also contact my dissertation supervisor, Dr. Frank Heuser at fheuser@XXXX (XXX) XXX-XXXX or (administrator's name) XXXXX College. If you have questions

regarding your rights as a research subject, contact Boston University IRB directly at (617) 358-6115.

Your signature at the bottom of this letter indicates that you have read and understand the information provided above and that you are willing to participate in this study. You will receive a copy of this consent form.

As a college educator for more than ten years, I seek to employ the best teaching strategies I know. With this dissertation and your participation, I hope to determine the effects of the two teaching approaches and make a contribution to music education.

Thank you for your support. Please feel free to contact me if you have any comments or concerns about the study.

Sincerely,

Suzanne Wong
Instructor
XXXXX College
(XXX)XXX-XXXX
swong@XXXX

I agree to participate in the dissertation study as described. I understand the potential risks and benefits as outlined in this letter. I affirm that I am age 18 or older.

Name of participant _____
Signature of participant _____
Date _____

Audio Recording

We would like to audio record you during this study. If you are audio recorded, it will not be possible to identify you in the recording. We will store these recordings in a locked cabinet and only approved study staff will be able to access them. We will label these recordings with a code instead of your name. The key to the code connects your name to the recording. The college administrator or administrative designee will keep the key to the code in a locked cabinet. Recordings will be stored for approximately one year.

Do you agree to let us audio record you for this study?

_____YES _____NO _____INITIALS

APPENDIX B
BEGINNING PIANO QUESTIONNAIRE

Name_____
Date_____
College_____

1. Why are you taking this course?

   _____

2. What kind of learning activities do you expect in this class?

   _____

3. What do you expect to achieve in this piano course by the end of the semester? Please be specific.

   _____
   _____

4. What areas are you most interested in? Please rank in order of preference.
   a) playing songs or pieces ____
   b) improvising or composing ____
   c) playing scales and technical exercises ____
   d) reading music ____
   e) learning music theory ____
   f) playing by ear ____

5. What kind of music do you like to listen to? Please rank in order of preference.
   a) Jazz ____
   b) Classical ____
   c) Oldies ____
   d) Rock n' Roll ____
   e) Soul/R & B ____
   f) other _____ ____

6. What kind of music do you want to play on the piano? Please rank in order of preference.
   a) Jazz ____
   b) Classical ____
   c) Oldies ____
   d) Rock n'Roll ____
   e) Soul/R & B ____
   f) other _____ ____

7. Why are you taking this class at the college? (circle one)
    a) for credit toward an Associate degree
    b) for credit to transfer to a 4-year college/university
    c) for personal enrichment
    d) other_____

8. How would you classify your musical background? (circle one)
    a) little or no musical training
    b) some musical training
    c) several years of musical training

9. How would you classify your piano background? (circle one)
    a) little or no piano training
    b) some piano training
    c) several years of piano training

10. Are you a music major? (circle one)
    a) yes
    b) no

11. Which range represents your age? (circle one)
    a) Under 18
    b) 18-25
    c) 26-40
    d) 41-60
    e) over 60

12. What do you consider your ethnic background? (circle one)
    a) White, Non-Hispanic
    b) Hispanic
    c) Asian or Pacific Islander
    d) African American
    e) Native American
    f) Multi-ethnic
    g) Decline to state

13. Do you prefer learning to play piano by-ear? Can you play any songs by-ear on the piano?

    _____
    _____

14. Do you prefer learning to play piano by reading music notation? Can you play any songs by reading musical notation on the piano?

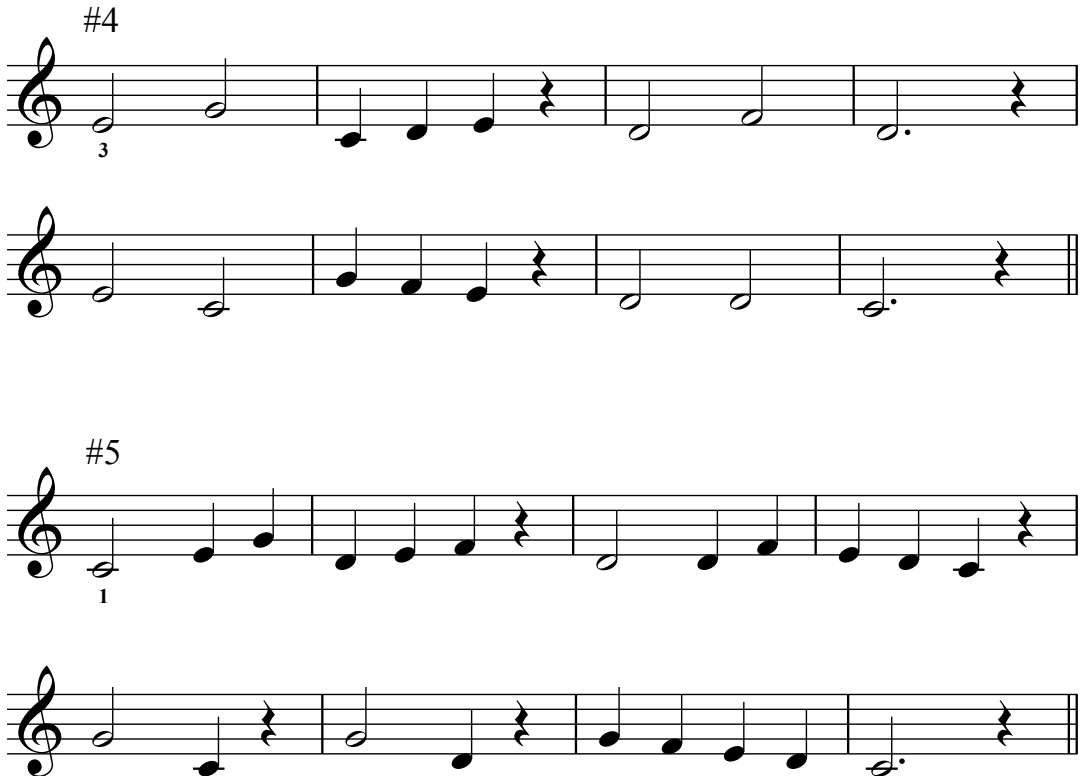
_____
_____

15. What do you admire more in a musician---one that can play songs by-ear or one that can play songs by reading musical notation? Why?

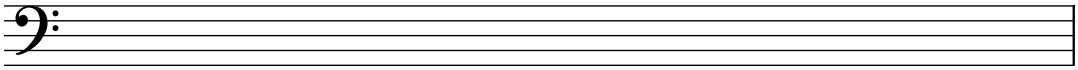
_____
_____

Thank you for taking time to complete this questionnaire. Your answers will help to improve the teaching of this course.

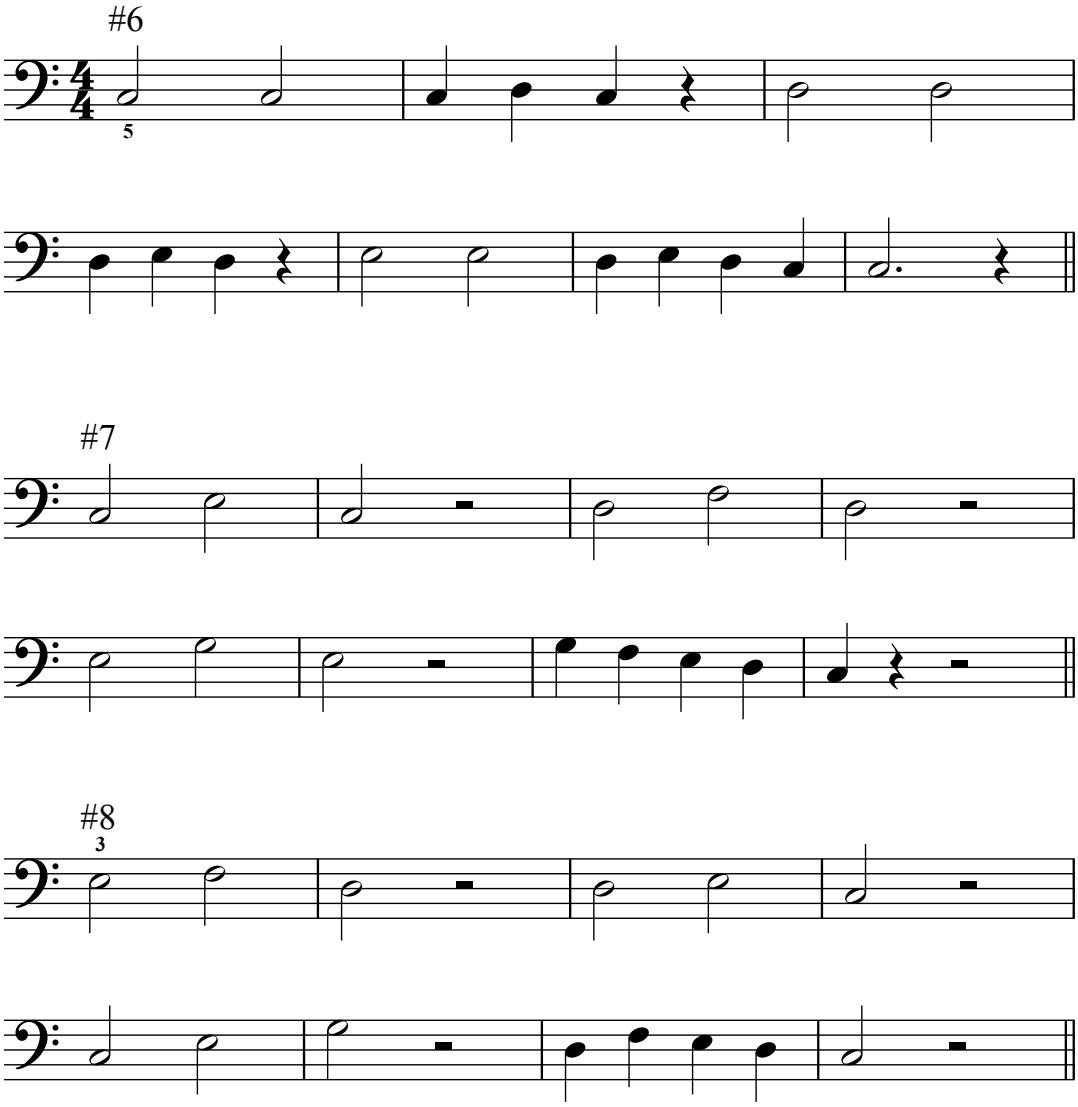
APPENDIX C
BEGINNING PIANO SUPPLEMENTARY PACKET



Bass Clef (LH in C position)



Draw C, D, E, F, G on the bass clef above



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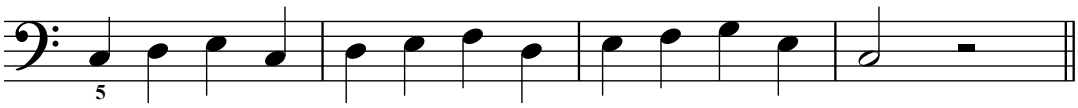
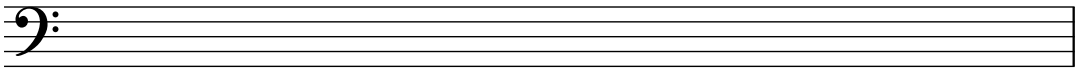
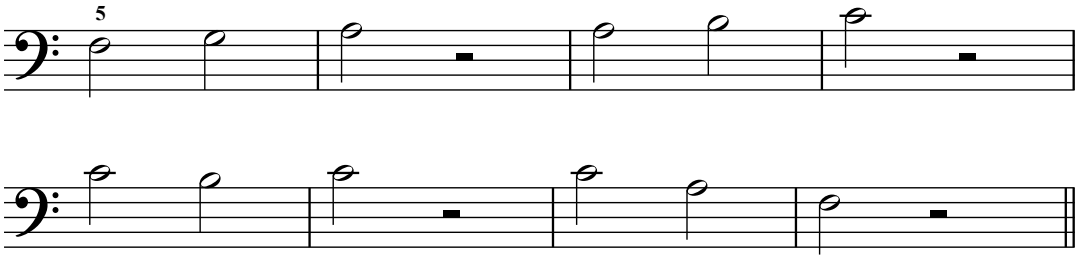


Bass Clef (LH 5th Finger on F)



Draw F, G, A, B, C in bass clef above

#10



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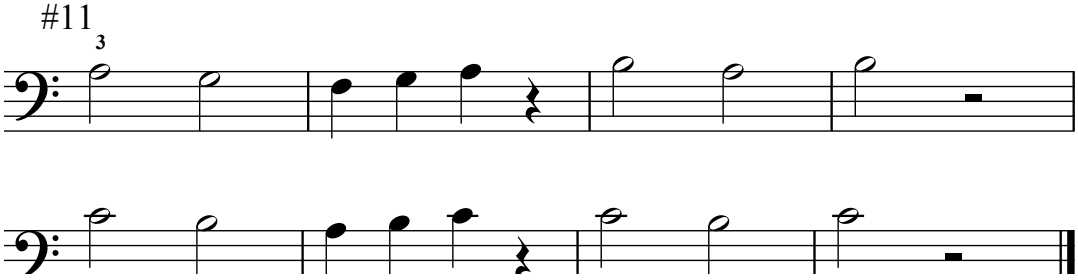
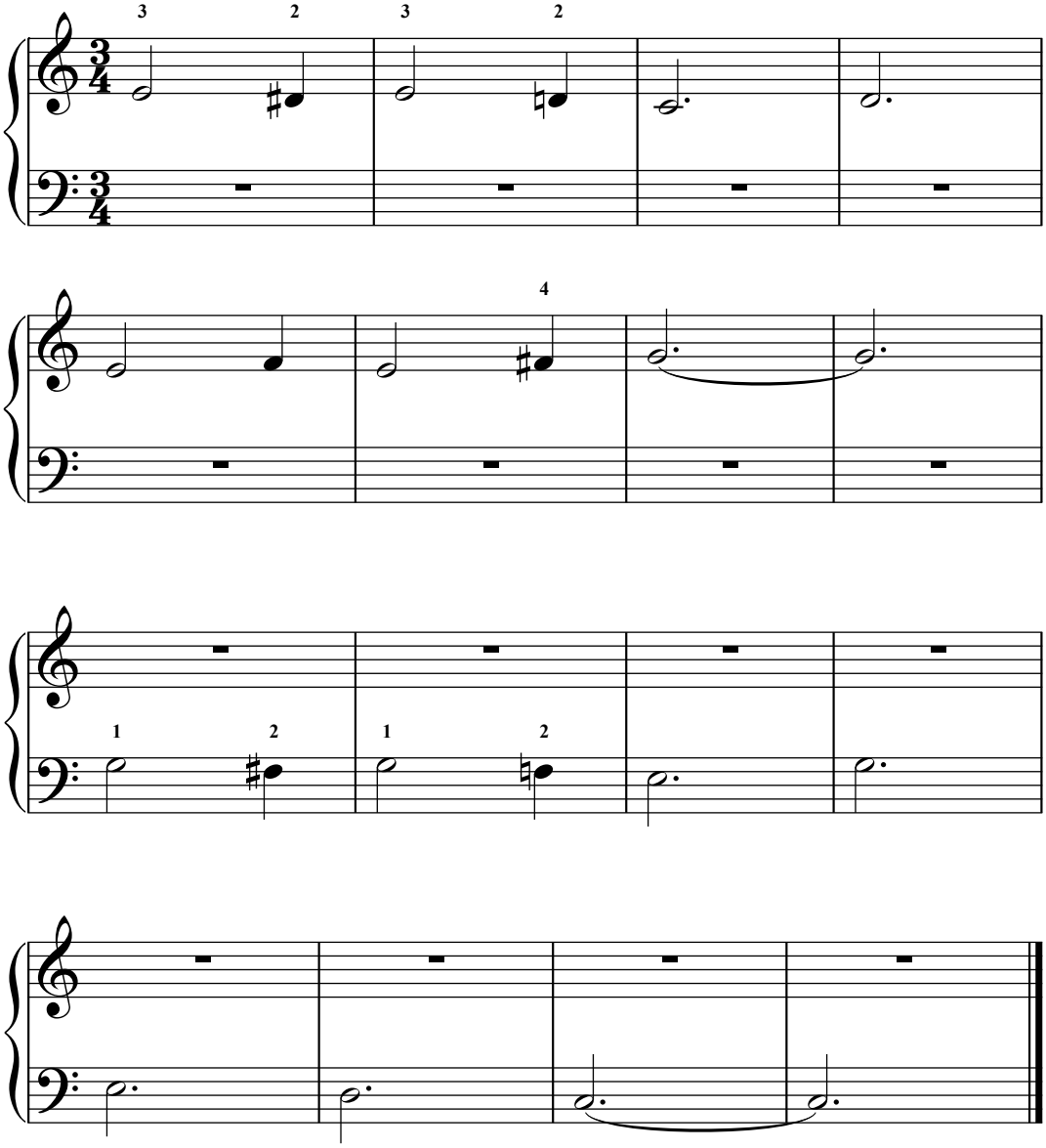


Sing & Play II

Accidentals ♯ ♭ ♮

#12



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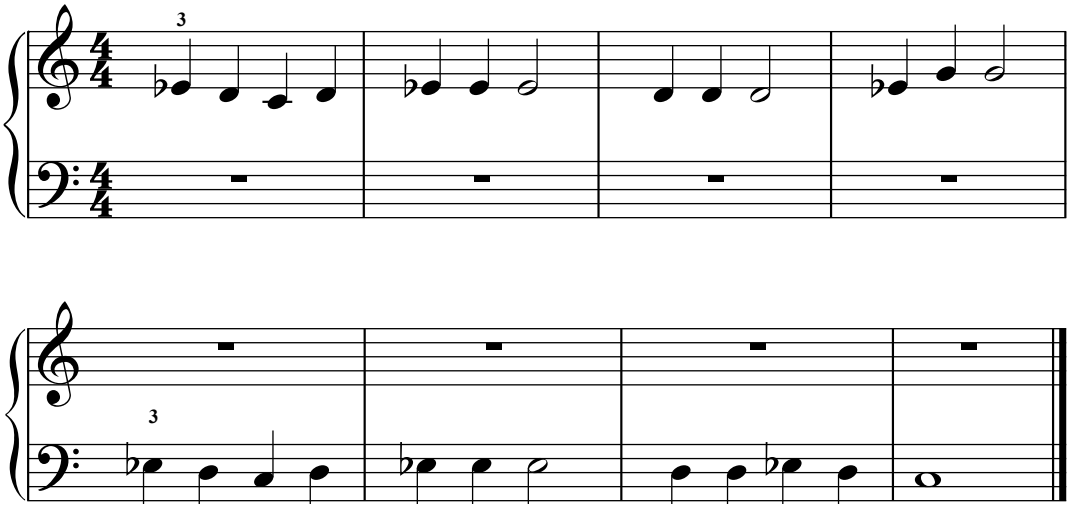
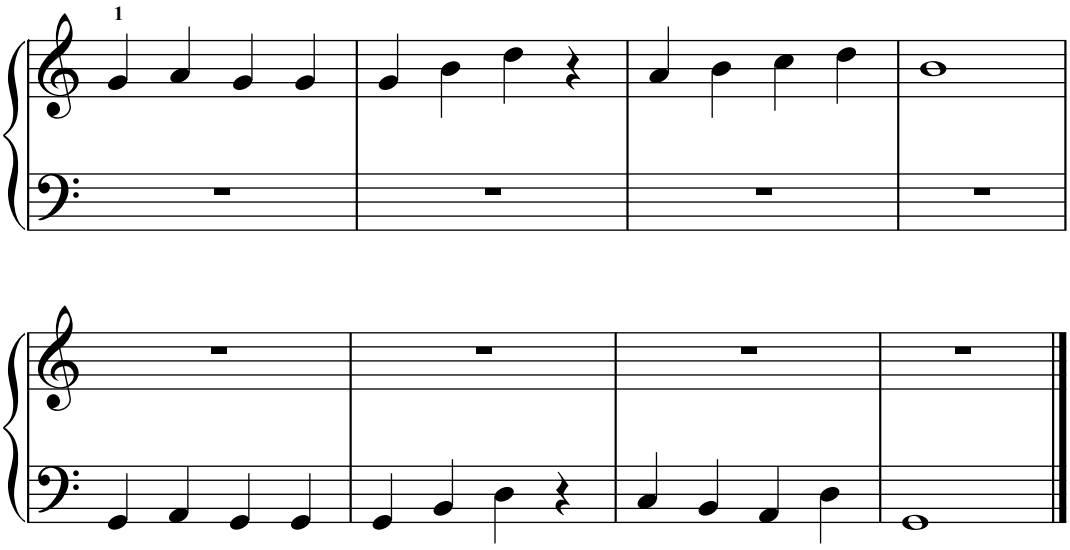


G Position

#14



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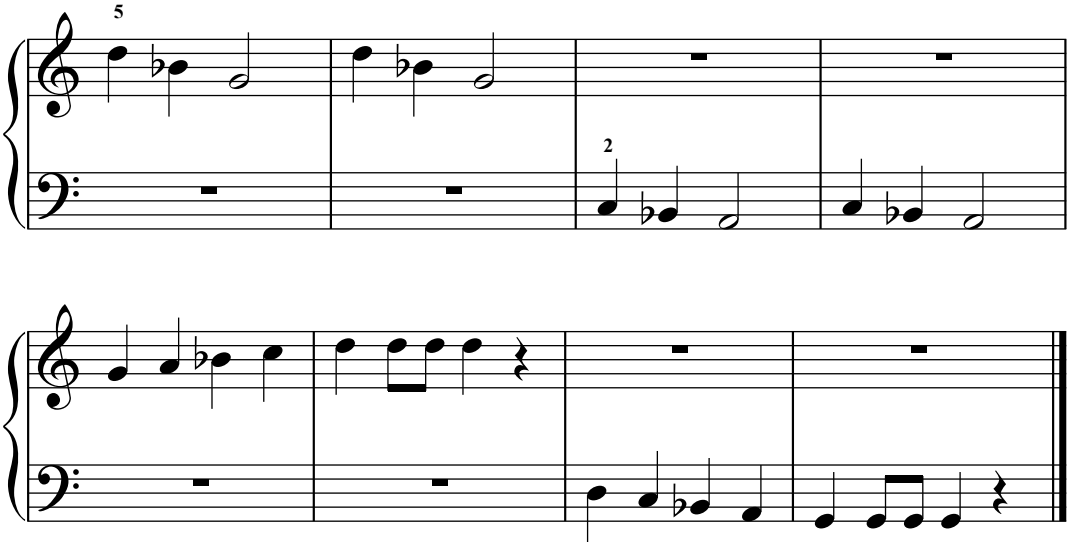
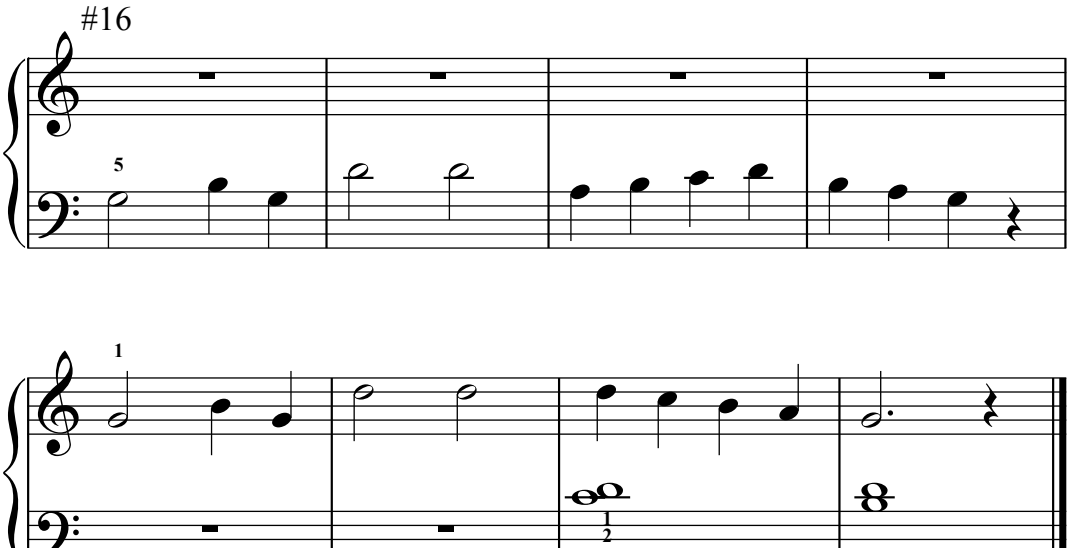
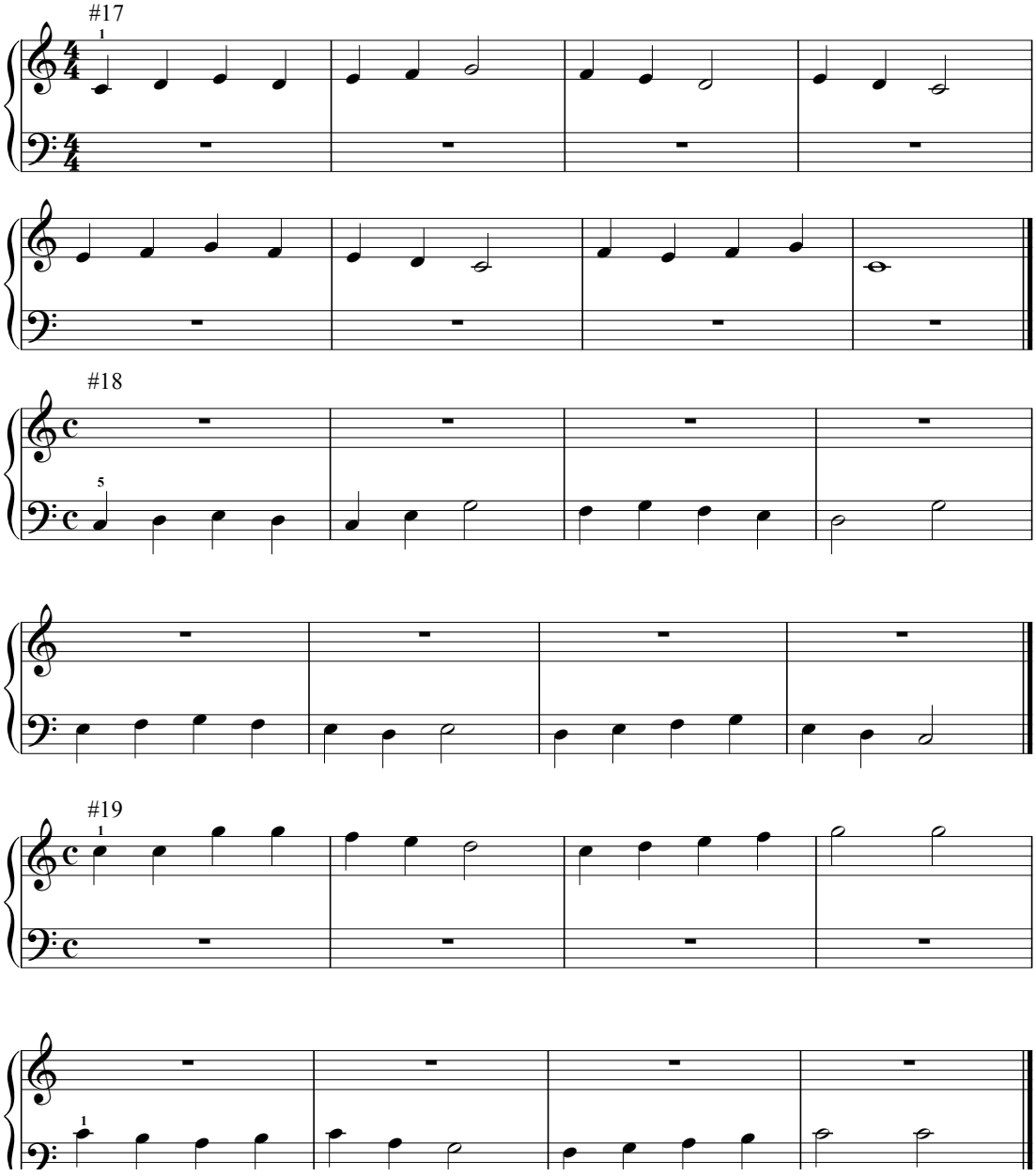
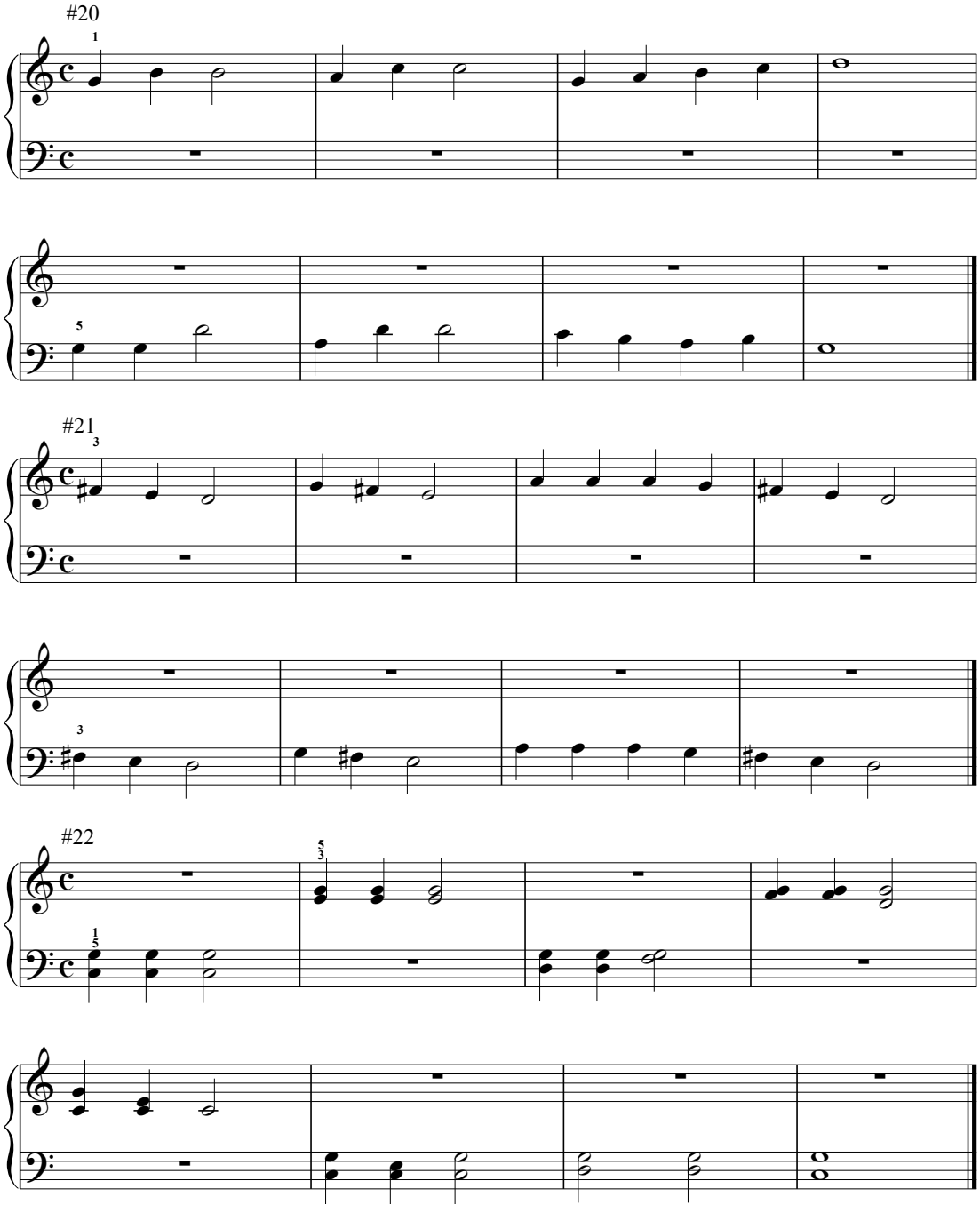



#16
5
1
1
2

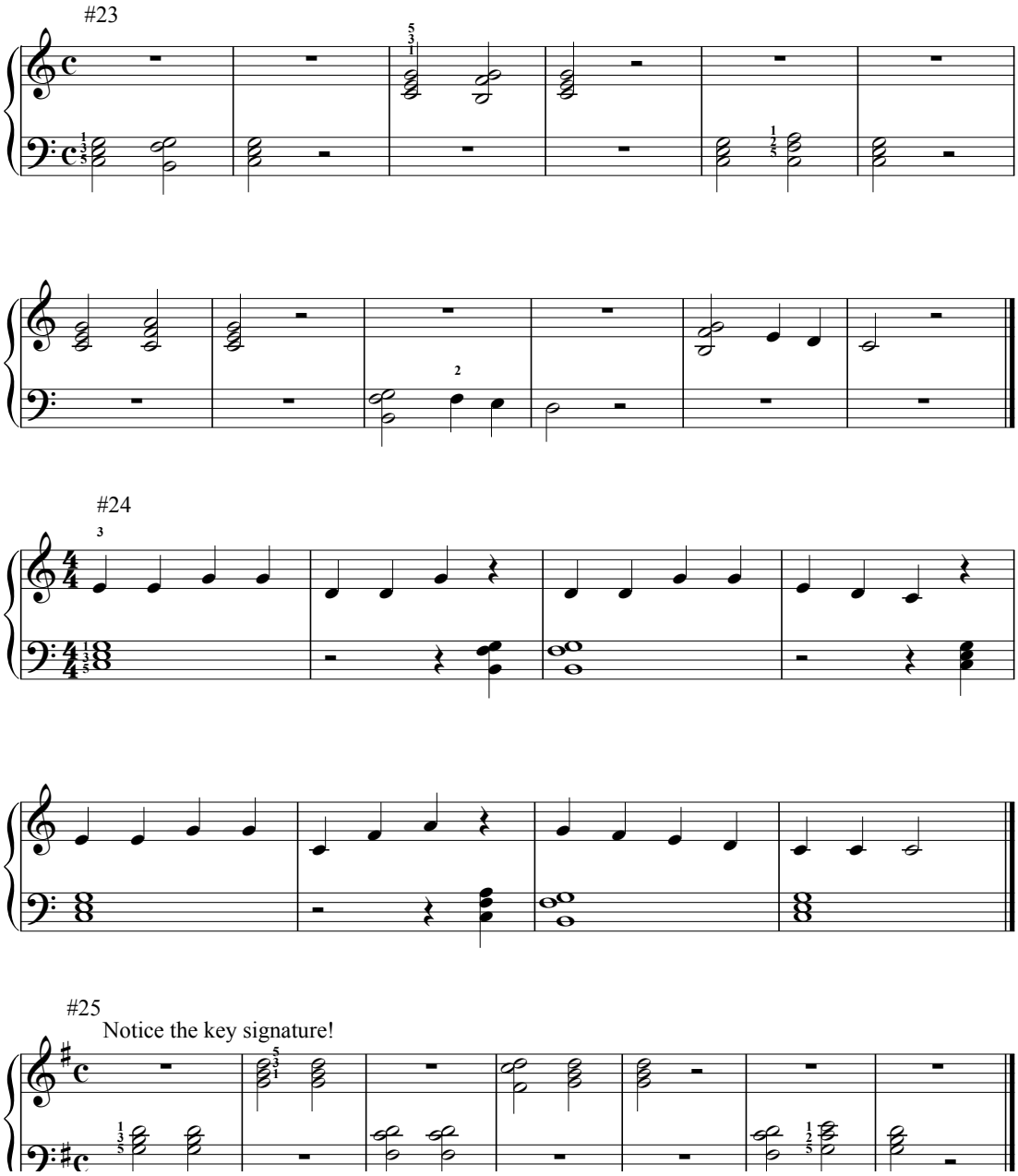
More C Position



Different Positions



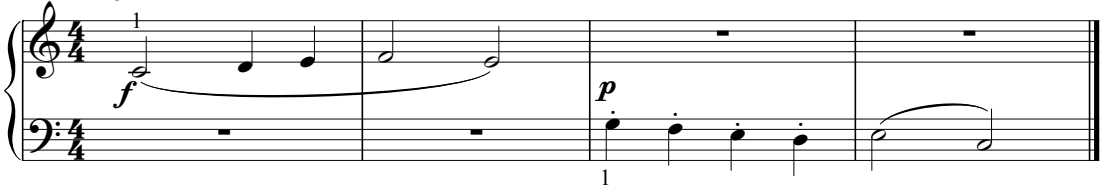
Chords!



Sight Reading for Fun!

Watch for key signatures and time signatures, dynamics, and articulation

#26



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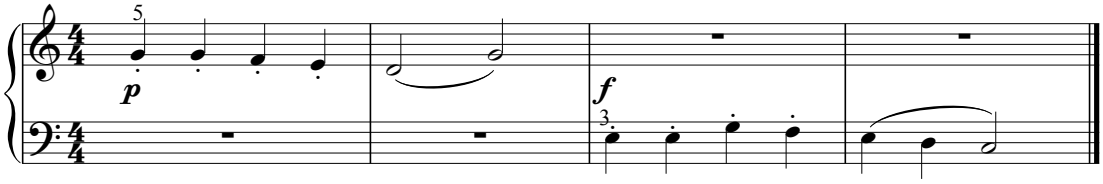

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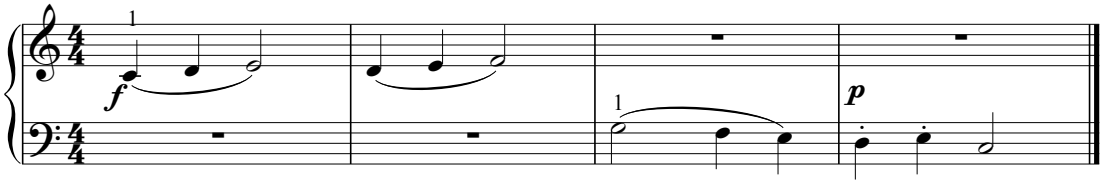

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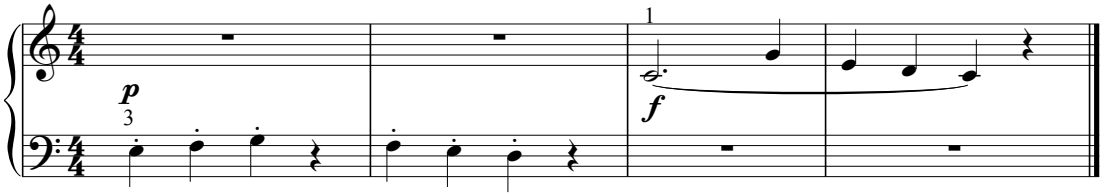

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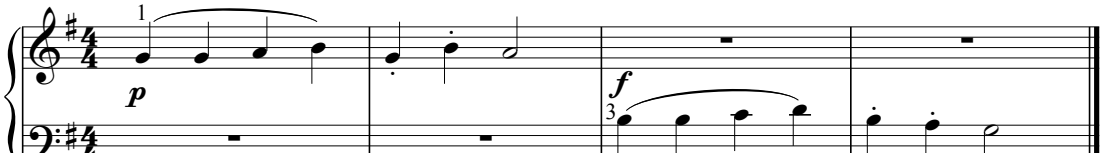

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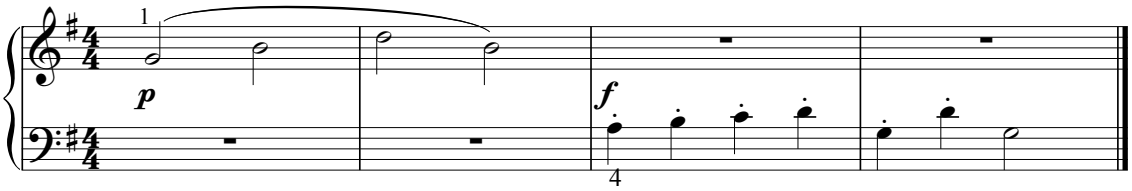

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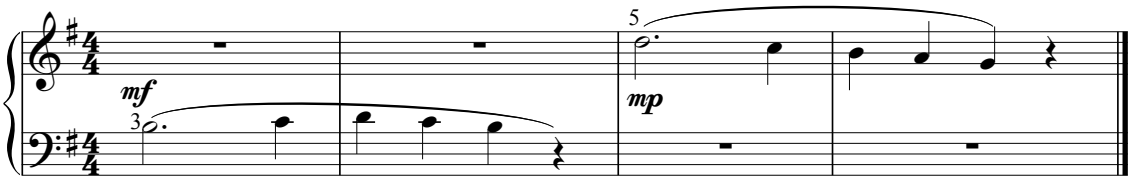

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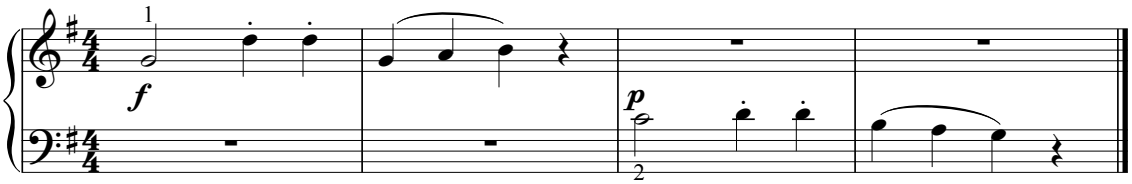

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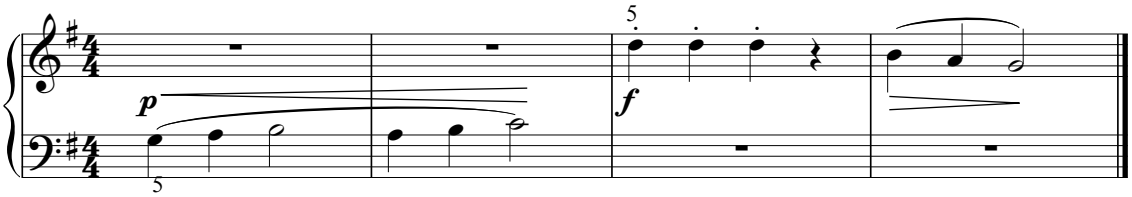

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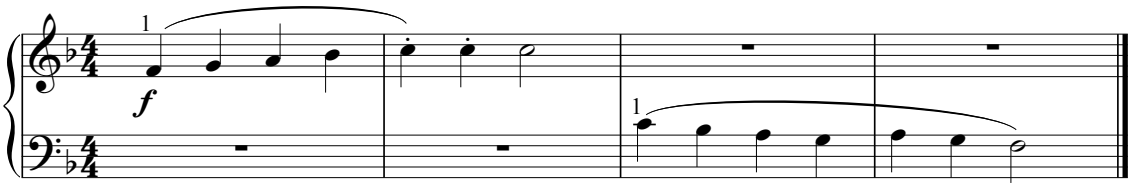

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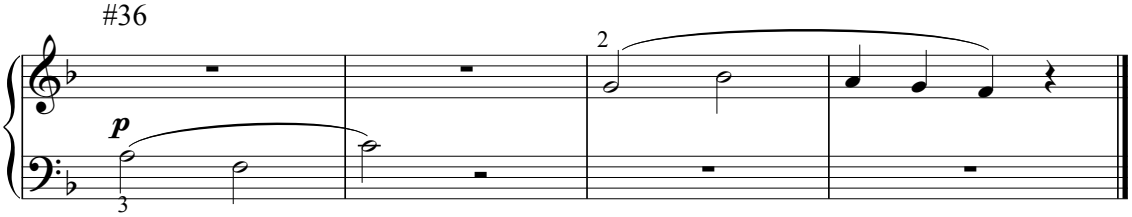

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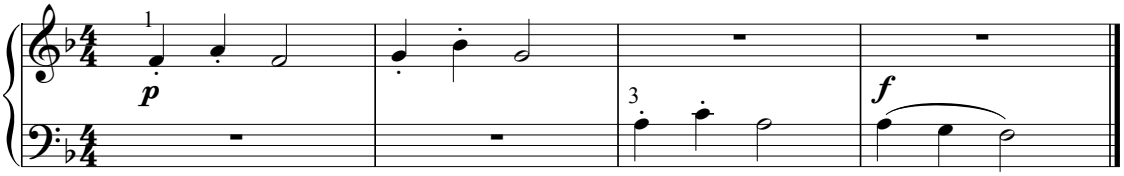

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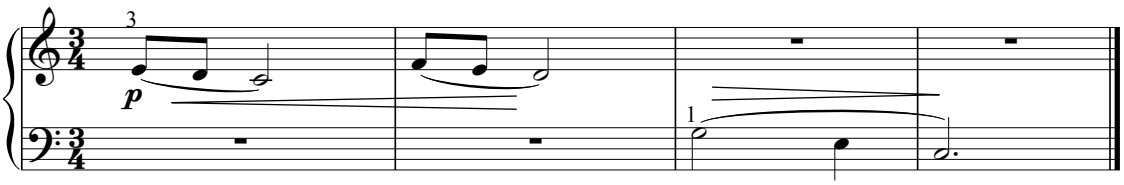

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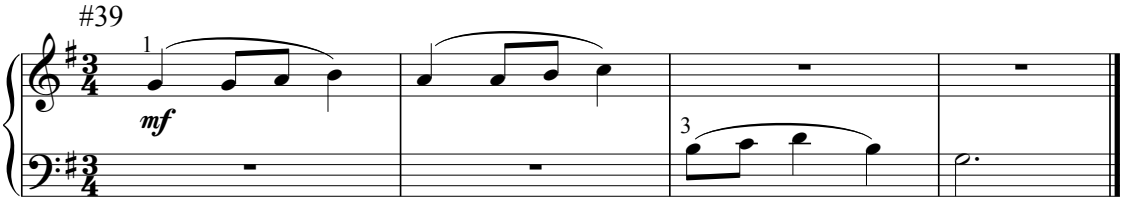

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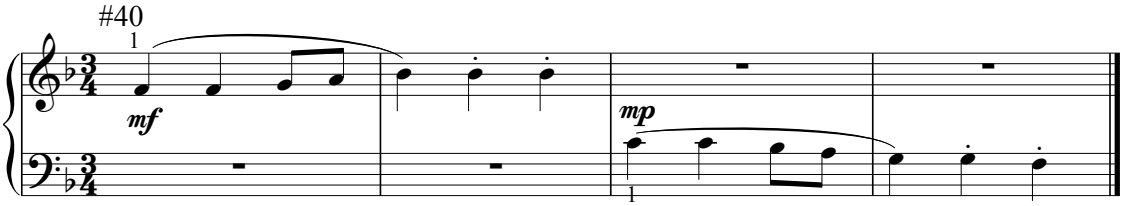

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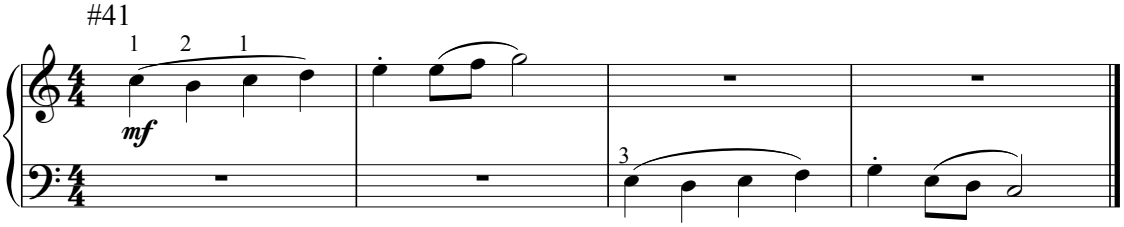

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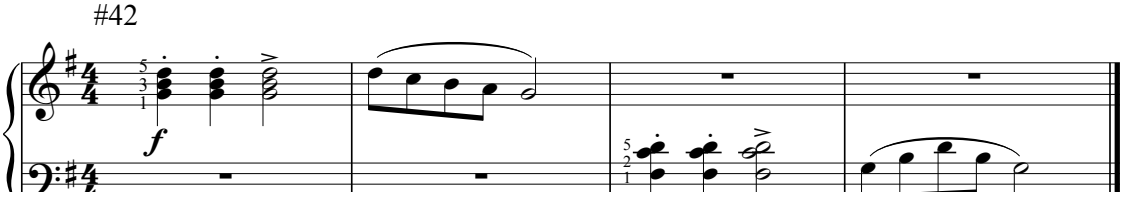


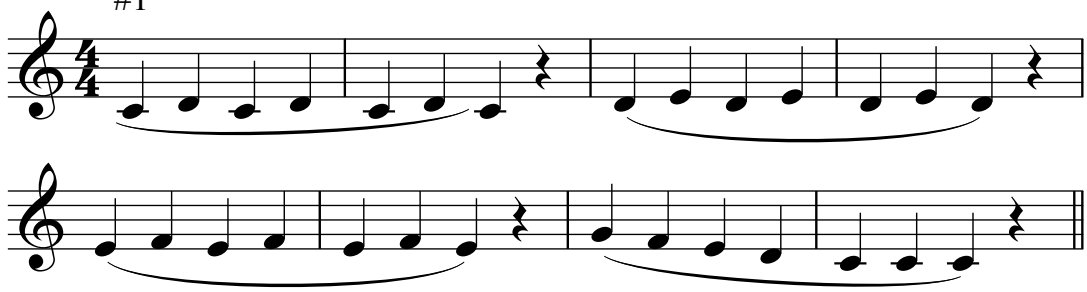
APPENDIX D

By-Ear Finger Exercises

transpose to any key
play hands separately and together
memorize

Suzanne Wong

#1



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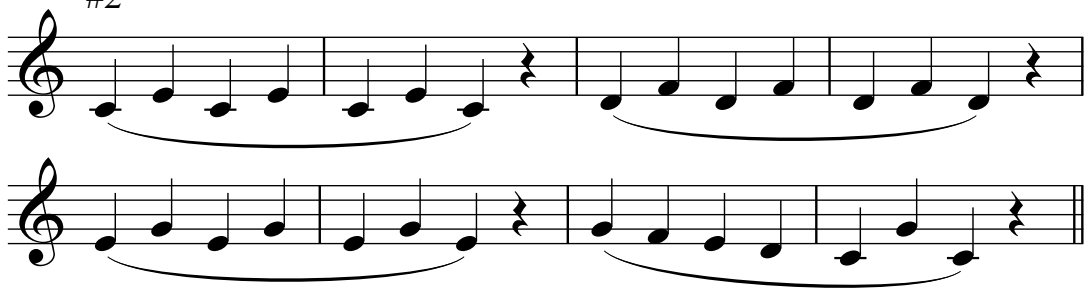

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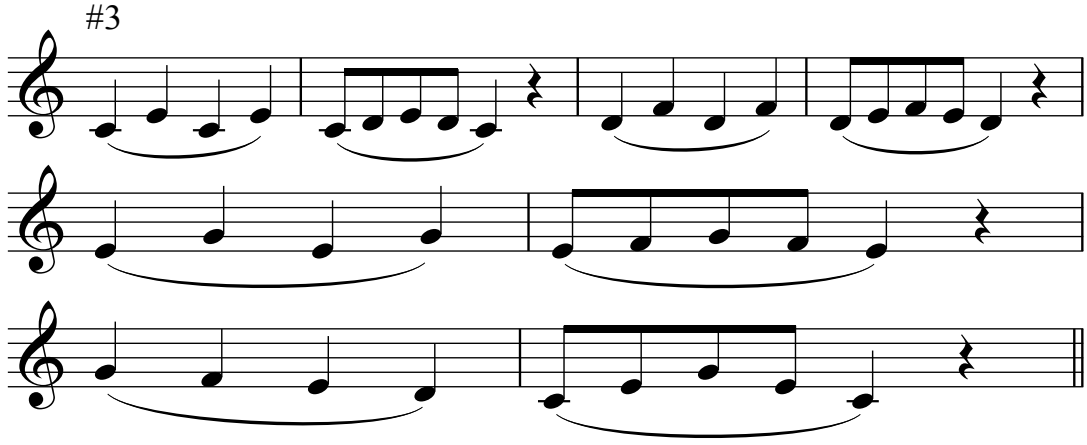

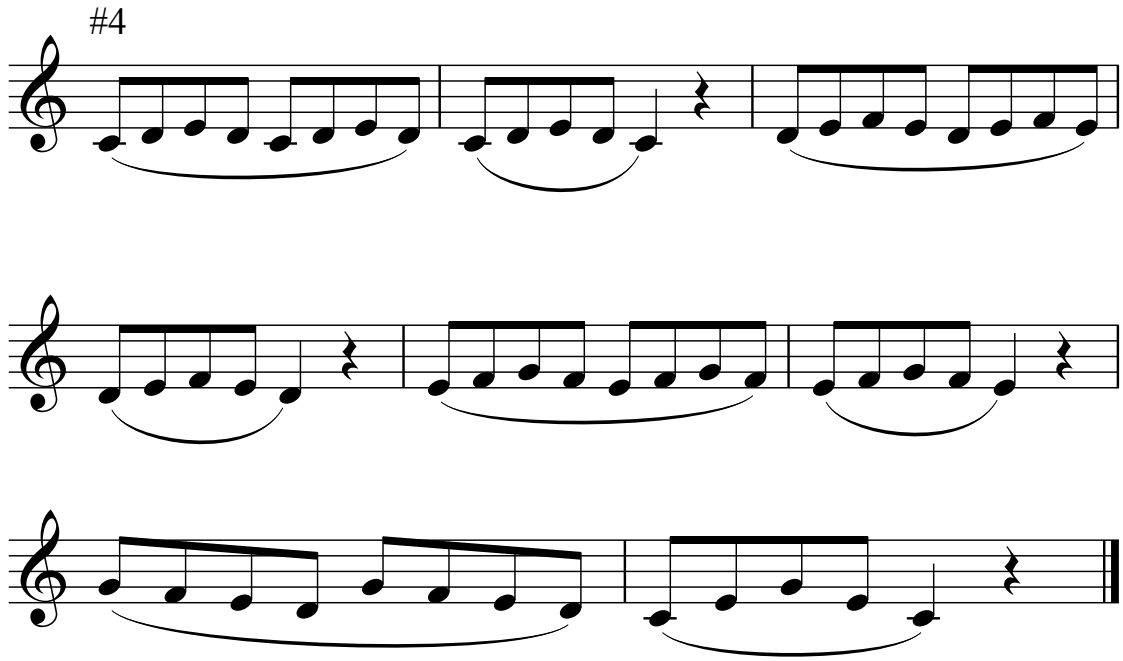
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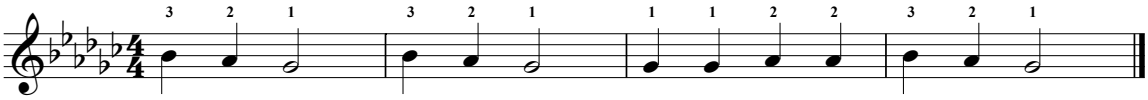
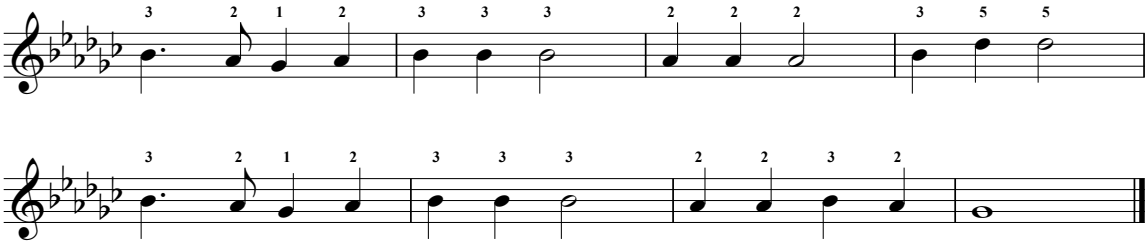
APPENDIX E

By-Ear Playing First Tunes

Hot Cross Buns



Merrily We Roll Along

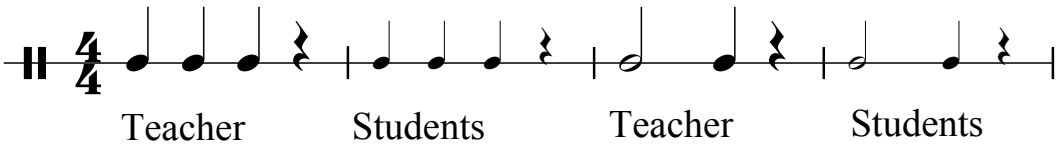


APPENDIX F

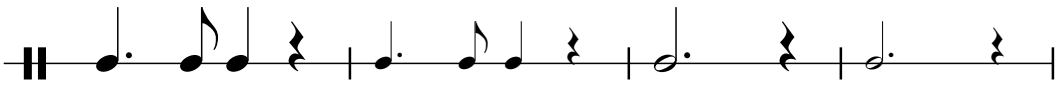
By-Ear Rhythm

Teacher may also add:
1) foot tapping in quarter notes
2) counting out load
3) RH & LH tapping on lap or desks instead of clapping

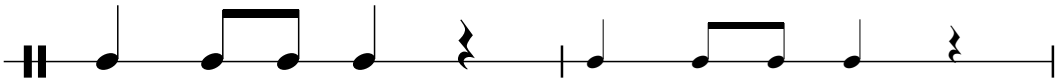
Sequence #1 (one measure)

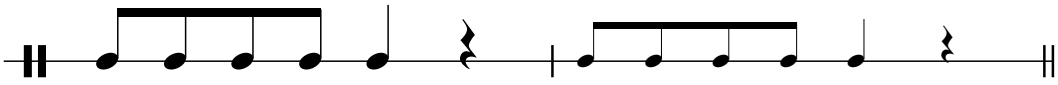


Teacher Students Teacher Students

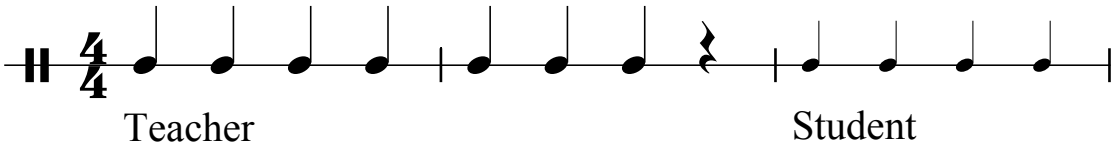


etc.

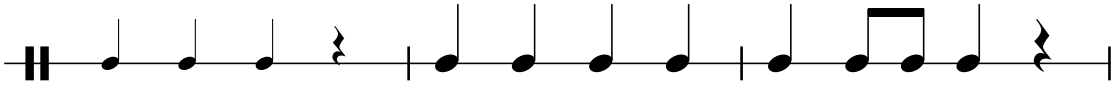


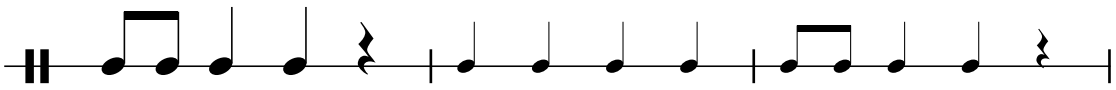


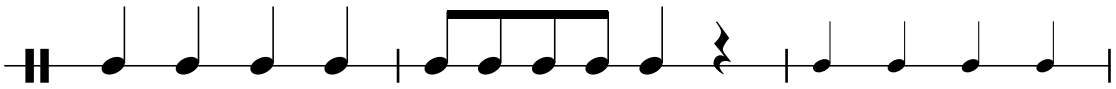
Sequence #2 (two-measures)

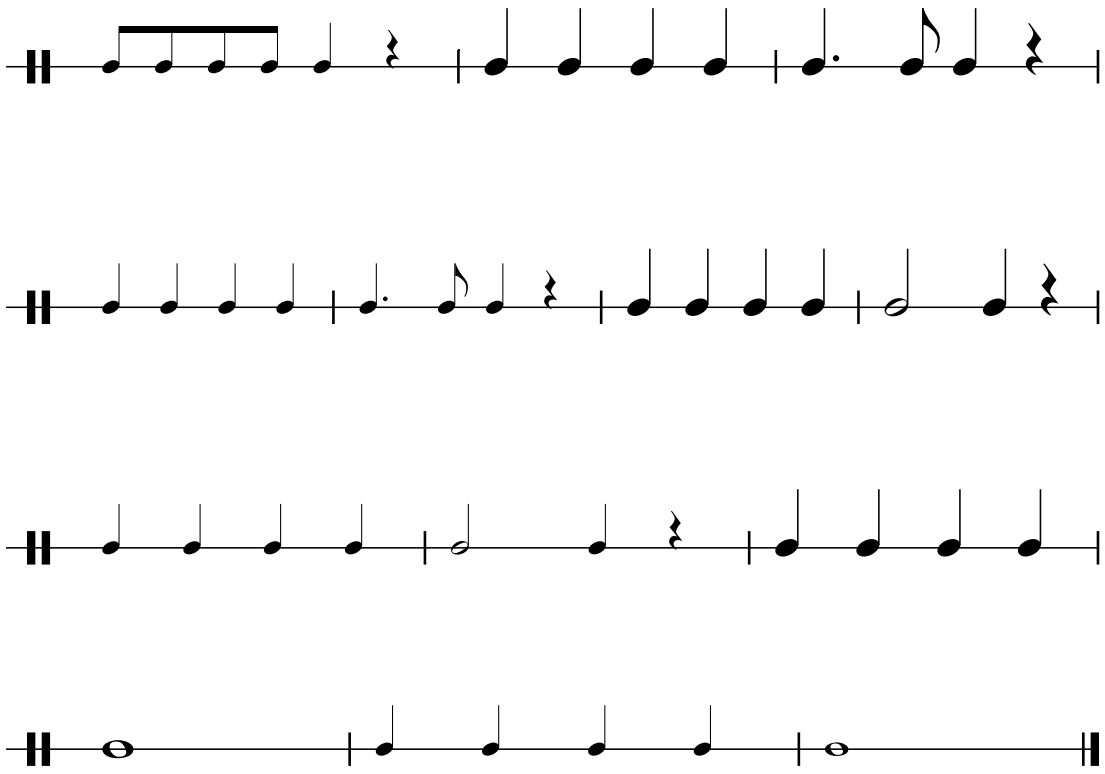


Teacher Student





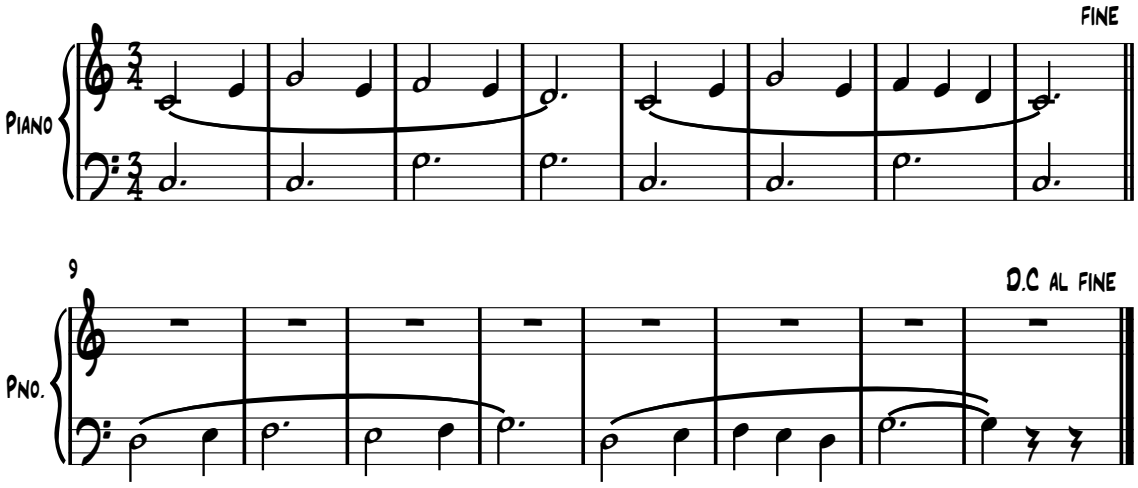




APPENDIX G
BY-EAR PLAYING PIECES

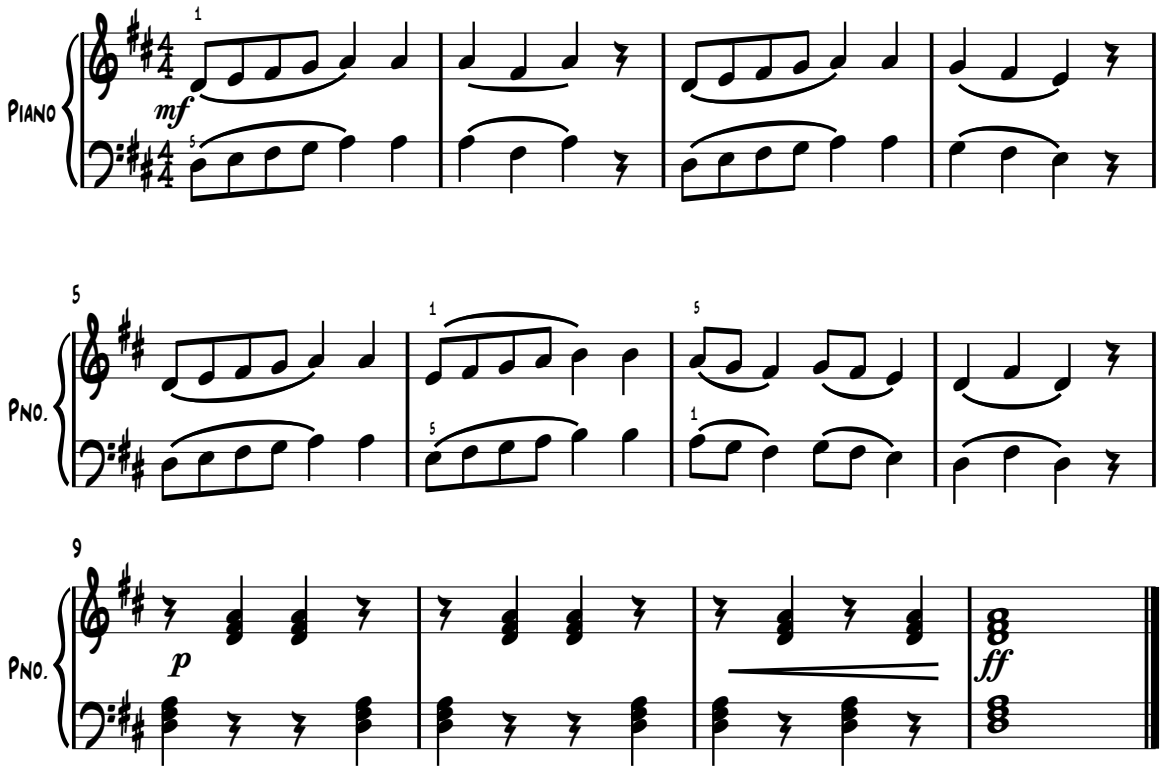
By-Ear :
The Swing

Suzanne Wong

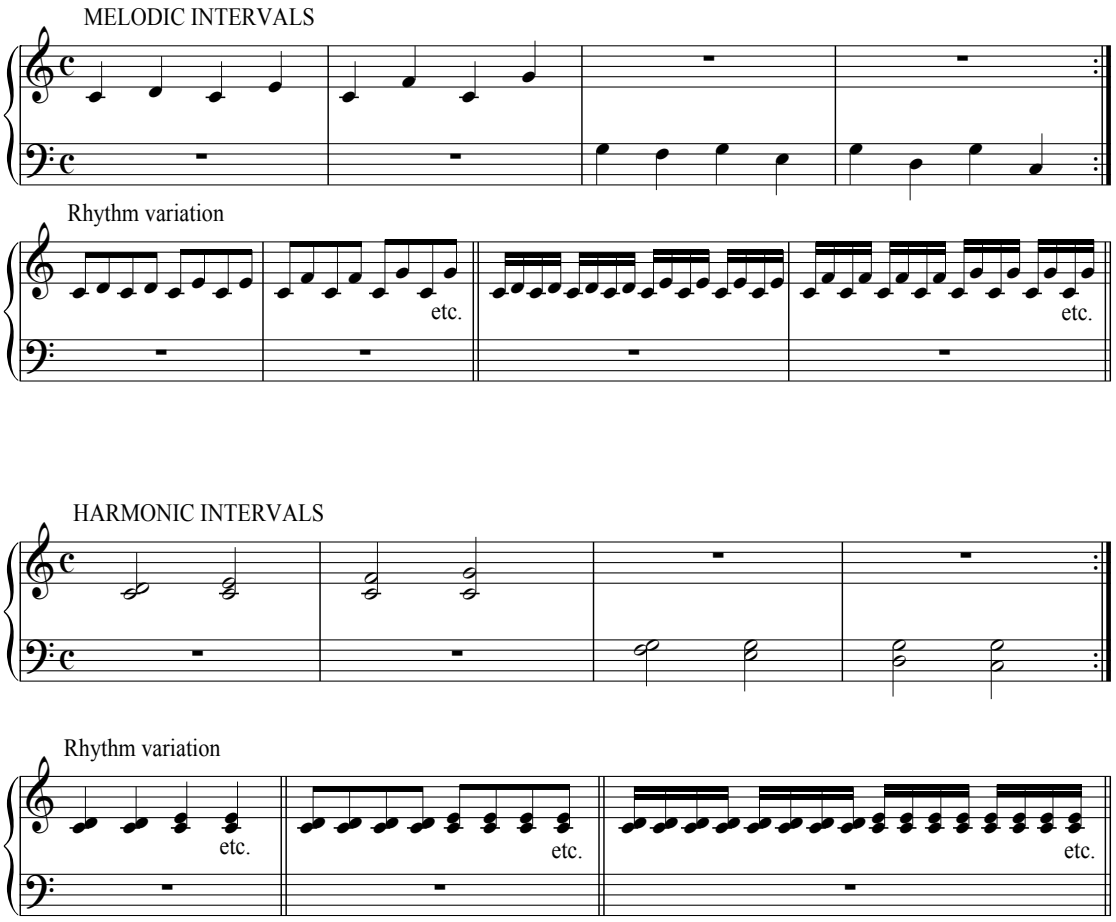


By-Ear:
The Circus
(or other titles students create)

Suzanne Wong



APPENDIX H
BY-EAR INTERVAL PRACTICE



APPENDIX I
STUDENT JOURNAL (TREATMENT GROUP)

Name_____

Date_____

PIANO JOURNAL 1

Please write at least two sentences to answer the following:

1. Is reading notes easy for you so far? Why or why not?

2. Do you like learning exercises by-ear? Why or why not?

Thank you! Your thoughts and ideas are appreciated! ☺

NAME _____
DATE_____

MY PIANO JOURNAL 2

Thank you for giving me your feedback!
Please write a few sentences on the following:

1) Do you prefer playing songs learned by-ear like *My Swing* or playing songs learned by reading the notes like *Money Can't Buy Ev-rything*? Why?

2) Write any other comments you have about the class.

NAME_____

DATE_____

MY PIANO JOURNAL 3

Thank you for giving me your feedback!
Please write a few sentences on the following:

1) How would you access your progress so far in the class? As expected?

2) Do you think learning pieces like “Leprechaun March” and Finger Exercise #4 has helped your playing?

3) Please write any other comments you might have.

NAME _____

DATE_____

MY PIANO JOURNAL 4

Thank you for giving me your feedback!
Please write a few sentences on the following:

1) This is our last journal entry. How would you access your progress in this course? Did you progress as quickly as you wanted to at this point?

- Playing ability

- Reading ability

- By-ear ability

2) Did you enjoy playing by-ear? Why or why not?

3) Do you think playing by-ear should be included in a Beginning Piano course? Why or why not?

4) Please write any other comments you have.

STUDENT JOURNAL (CONTROL GROUP)

Name _____

Date _____

MY PIANO JOURNAL 1

Please answer the following questions with at least two sentences. Thanks!

1. Is reading notes easy for you so far? Why?

2. Do you enjoy playing the piano so far? Why or why not?

3. Write any comments you have about our class so far.

NAME _____

DATE_____

MY PIANO JOURNAL 2

Thank you for giving me your feedback!
Please write a few sentences on the following:

1) This is our last journal entry. How would you access your progress in this course? Did you progress as quickly as you wanted to?

- Playing ability

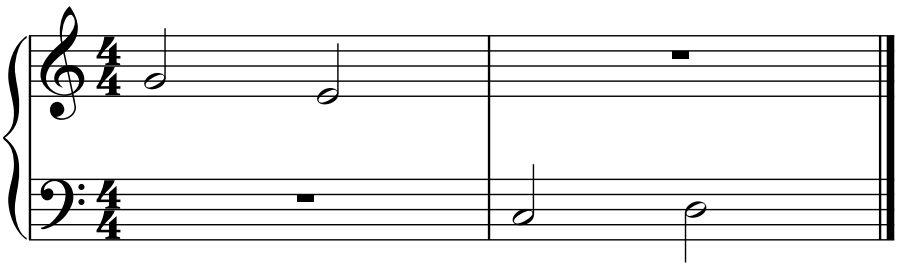
- Reading ability

- By-ear ability

4) Please write any other comments you have.

APPENDIX J
NOTE READING (PRE/POST-TEST)

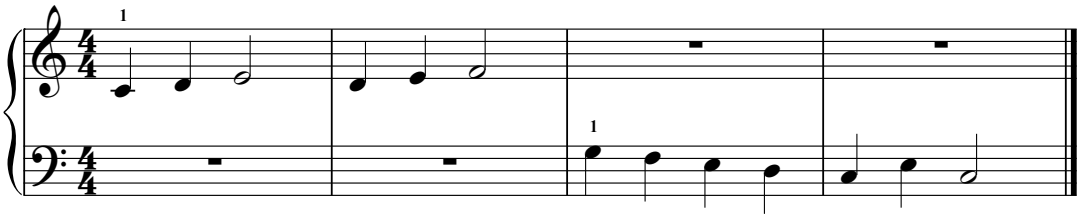
Note Reading (NR)



APPENDIX K
SIGHT READING AT 10 WEEKS (SR10)
SIGHT READING AT 16 WEEKS (SR16)

Sight Reading at 10 weeks (SR10)

#1



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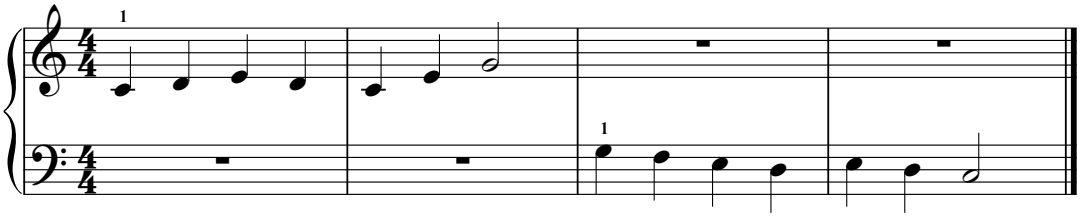
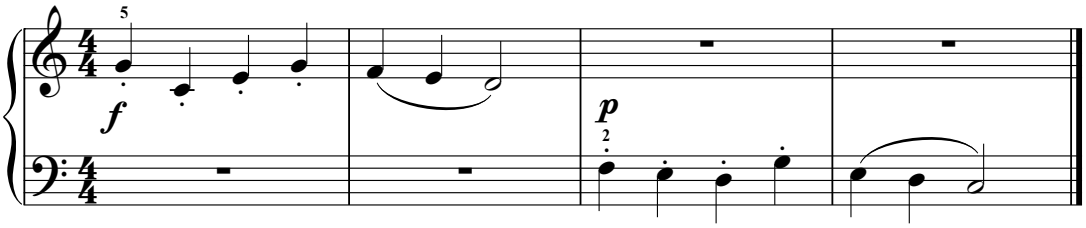


Sight Reading at 16 Weeks (SR16)

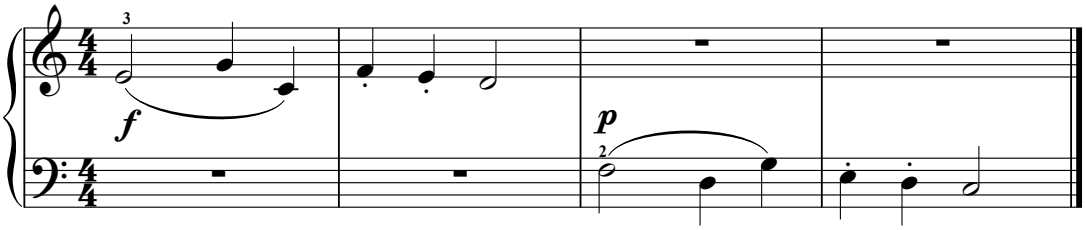
#1

Slowly



#2

Moderato



APPENDIX L
GROUP INTERVIEW QUESTIONS (TREATMENT GROUP)

1. What did you enjoy most about the class?

2. What did you enjoy least about the class?

3. How do you think learning by-ear helped you to learn the piano?

4. Do you think playing by-ear helped you to play better? If so, how?

5. Do you think playing by-ear helped you to read better? If so, how?

6. Was learning to play the piano in this class, especially the by-ear sessions, enjoyable for you? If so, why?

7. Do you think learning to play the piano by-ear should be included in a beginning piano course? If so, why?

8. What can I, the teacher, do to facilitate your learning in the areas of playing and reading music?

APPENDIX M
GROUP INTERVIEW QUESTIONS (CONTROL GROUP)

1. What did you enjoy most about the class?

2. What did you enjoy least about the class?

3. What do you think playing by-ear means?

4. Do you think learning to play by-ear would have been beneficial in this class? If so, how?

5. What value would you place on ear training activities?

6. Do you think by-ear activities should be included in a beginning piano class?

7. What portion of the class should be devoted to ear training activities?

APPENDIX N
INDIVIDUAL STUDENT INTERVIEWS (TREATMENT STUDENTS)

1. Tell me about your musical background. Have you played piano or keyboard before taking this class?

2. Do you have someone in your household or a family member that plays an instrument? How did they learn?

3. Did you enjoy learning to play piano by-ear in this class?

4. Do you prefer learning a piece by hearing it first or by reading it first?

5. When you listened to a melodic pattern or a piece that you had to play back by-ear, what strategies did you use to play it? Describe your thought process.

6. Do you think playing by-ear in this class helped your performance of pieces? If so, how?

7. Do you think playing by-ear in this class helped you to read music? If so, how?

8. Do you think learning to play by-ear should be included in a beginning piano course? If so, why?

APPENDIX O
LETTER TO EVALUATORS

December 25, 2016

Dear Evaluators,

Thank you for assisting me in my dissertation research again this Fall semester. Last Fall Semester, you evaluated participants in the first phase of the study. This semester is my FINAL phase of collecting data. Your role as an evaluator is essential to my dissertation research.

My dissertation, *Let's Play It By-Ear: How Adults Learn Piano in a Group with an Aural Emphasis,* can be summarized as follows:

> Learning to play the piano by-ear is usually associated with popular and jazz musicians. In the formal educational setting, learning piano by reading is usually emphasized. My hypothesis is that playing by-ear and other ear training skills can enhance playing and reading ability. The proposed study is an action research project investigating how playing by-ear and ear training can be used in a beginning piano class. The effects of by-ear playing and ear training will be compared to that of a control group. The study will also include perceptions of students after the by-ear playing and ear training treatment. A regular college textbook will be used along with the ear training materials. Approximately 12% of class time will be taken for the by-ear and ear training segments.
>
> The proposed study is a mixed methods design using both quantitative and qualitative data collection methods. Included in the design are a pre-test and post-test, questionnaire, journals, and interviews. My research questions are:
>
> 5) Are there measurable differences between community college students learning to play by-ear in a beginning piano class and similar students learning piano in a notation-based approach?
> 6) What effect, if any, does playing by-ear have on performance outcomes and sight-reading ability?
> 7) Do students enjoy learning to play piano by-ear? Do they think learning to play by-ear should be included in a beginning piano course? If so, why?
> 8) What observations did the researcher make regarding the effectiveness of strategies and techniques used to teach playing by-ear? How might these strategies be modified and/or improved?

The Pretest consists of Note Reading and Playing a Familiar Tune. Students are able to play anything familiar, it does not have to be Merrily We Roll Along or Row, Row, Row Your Boat. The 10-Week Reading Check is the same. The Post-test elements are also the same as the first phase: Note Reading (same as Pretest), Sight Reading, and Performance

of two pieces (in a recital format.) Student Numbers are announced at the beginning of each recording. This is to protect the participants in the study.

I have divided the listening into three Groups: A, B, C. Like last Fall, each student was recorded on a separate track for the Pretest, the 10-Week Sight Reading, and the Post-test 16-Week Sight Reading. The last track on the CD is the Post-test Performance of Prepared Pieces with all students on one track (in a concert format).

In your Evaluation Binder, you should find three sets (one for each Group A, B, C) of the following:

- CD recording
- Pretest Scoring sheet with CD Track #s
- 10-Week Reading Check with CD Track #s
- Post-test Scoring Sheet for Sight Reading with CD Track #s
- Post-test Scoring Sheet for Prepared Pieces on a single CD Track (Note: Please SKIP to the next student if you see SKIP. Titles of Pieces are notated on the scoring sheet for your convenience.)

In addition, for your reference, you should have one set of music scores for the following:

- Pretest By-Ear Playing of Familiar Tune Examples (2 songs)
- Pretest/Post-test Note Reading (3 examples)
- Sight Reading at 10 Weeks (2 examples)
- Post-test Sight Reading at 16 Weeks (2 examples)
- Post-test Prepared Pieces (5 pieces)

Scoring criteria is indicated on the Score Sheets and is the same last year.

I appreciate any comments or observations you have regarding individual students or the Groups.

Please call, text, or email me if you have questions.

Again, thank you very much for your time!

(XXX) XXX-XXXX mobile and text
swong@XXXX

APPENDIX P
PRETEST SCORE SHEET

PRETEST Group: Date:

Scoring System: 5=can play fluently with few or no mistakes, 4=can play most of it somewhat fluently, 3=can play about half with hesitation, 2= can play a little with many hesitations, 1=can play little or nothing with no sense of tempo, 0=did not try

Track #	Student #	By-Ear Familiar Tune	Note Reading	Comments
1		☐ Merrily ☐Row ☐Other		
2		☐ Merrily ☐Row ☐Other		
3		☐ Merrily ☐Row ☐Other		
4		☐ Merrily ☐Row ☐Other		
5		☐ Merrily ☐Row ☐Other		
6		☐ Merrily ☐Row ☐Other		
7		☐ Merrily ☐Row ☐Other		
8		☐ Merrily ☐Row ☐Other		
9		☐ Merrily ☐Row ☐Other		
10		☐ Merrily ☐Row ☐Other		
11		☐ Merrily ☐Row ☐Other		
12		☐ Merrily ☐Row ☐Other		
13		☐ Merrily ☐Row ☐Other		

APPENDIX Q
SIGHT READING SCORE SHEET

Group_____ Date_____

Scoring System of Sight Reading: 5=played in a steady tempo with accurate rhythm and notes with little or no mistakes, 4=played in steady tempo with mostly correct notes and rhythm, 3=played in a somewhat steady tempo with about half correct notes and rhythm, 2 =played with little sense of tempo and less than half correct notes and rhythm, 1 =played without sense of tempo with mostly incorrect notes and rhythm, 0 =did not try.

Track #	Student #	Sight Reading 10	Sight Reading 16	Comments
		☐#1 ☐#2	☐#1 ☐#2	
		☐#1 ☐#2	☐#1 ☐#2	
		☐#1 ☐#2	☐#1 ☐#2	
		☐#1 ☐#2	☐#1 ☐#2	
		☐#1 ☐#2	☐#1 ☐#2	
		☐#1 ☐#2	☐#1 ☐#2	
		☐#1 ☐#2	☐#1 ☐#2	
		☐#1 ☐#2	☐#1 ☐#2	
		☐#1 ☐#2	☐#1 ☐#2	
		☐#1 ☐#2	☐#1 ☐#2	
		☐#1 ☐#2	☐#1 ☐#2	
		☐#1 ☐#2	☐#1 ☐#2	

APPENDIX R
PREPARED PIECES SAMPLE SCORE SHEET

POST-TEST Group: B Date: 12/7/2016

Scoring System of Prepared Piece: 5=played fluently with few or no mistakes, 4=played most of it somewhat fluently, 3=can play about half correctly with hesitation, 2= played some correctly with many hesitations, 1= played little or nothing correctly with no sense of tempo, 0=did not try

Track #	Student #	Prepared Piece 1	Prepared Piece 2	Total Score	Comments
22	859	Master Mind	A New Day		
	823	Master Mind	Vivace		
	857	Vivace	Summer Memories		
	864	Master Mind	A New Day		
	839	Vivace	Summer Memories		
	850	Summer Memories	Vivace		
	822	Master Mind	A New Day		

APPENDIX S
STUDENT DEMOGRAPHICS

BAYSIDE COMMUNITY COLLEGE, PHASE 1 & 2

	FALL 2015		FALL 2016	
	Student Count	Student (%)	Student Count	Student (%)
TOTAL	24,000	100.00 %	24,092	100.00 %
African-American	3,515	14.65 %	3,378	14.02 %
American Indian/Alaskan Native	39	0.16 %	43	0.18 %
Asian	2,715	11.31 %	2,764	11.47 %
Filipino	825	3.44 %	859	3.57 %
Hispanic	12,363	51.51 %	12,586	52.24 %
Multi-Ethnicity	1,093	4.55 %	1,109	4.60 %
Pacific Islander	134	0.56 %	110	0.46 %
Unknown	122	0.51 %	113	0.47 %
White Non-Hispanic	3,194	13.31 %	3,130	12.99 %

MOUNTAIN VIEW COMMUNITY COLLEGE, PHASE 1 & 2

	FALL 2015		FALL 2016	
	Student Count	Student Count (%)	Student Count	Student Count (%)
TOTAL	24,512	100.00 %	24,280	100.00 %
African-American	703	2.87 %	650	2.68 %
American Indian/Alaskan Native	65	0.27 %	64	0.26 %
Asian	2,925	11.93 %	2,938	12.10 %
Filipino	698	2.85 %	680	2.80 %
Hispanic	13,230	53.97 %	13,362	55.03 %
Multi-Ethnicity	767	3.13 %	761	3.13 %
Pacific Islander	88	0.36 %	75	0.31 %
Unknown	694	2.83 %	774	3.19 %
White Non-Hispanic	5,342	21.79 %	4,976	20.49 %

CALIFORNIA COMMUNITY COLLEGES
DEMOGRAPHICS 2017

In the state of California where this research was conducted, the California Community Colleges is the largest system of higher education in the nation, with 2.1 million students attending 113 colleges. Over 67 percent of California community college students are people of diverse ethnic backgrounds and roughly 53 percent are female. Student Demographics by ethnicity for 2015-16 break down as follows: African-American 6.41%, Native American 0.44%, Asian 11.56%, Filipino 2.8%, Hispanic 42.48%, Pacific Islander 0.43%, White 27.42%, Multi-Ethnicity 3.73%, Unknown 4.72%. Student Demographics by age for 2015-16: age 19 and under 25.87%, age 20-24 31.67%, age 25-29 13.92%, age 30-34 7.82%, age 30-34 7.82%, age 35 and over 20.7% (California Community Colleges Chancellor's Office, 2017).

APPENDIX T
RAW SCORES OF THE PILOT STUDY

		PRETEST		POST-TEST			
	Part ID	FT	NR	SR	PP1	PP2	PPA
Aural Group (Mountain View)	11	4	2.5	4	5	5	5
	12	3.5	3	3.5	4.5	5	4.75
	13	5	4.5	3.5	4.5	5	4.75
	14	0	0	4	4.5	4.5	4.5
	15	5	5	4	4	4.5	4.25
	16	0	3.5	3.5	4	4.5	4.25
	Average	**2.92**	**3.08**	**3.75**	**4.42**	**4.75**	**4.58**
Reading Group (Bayside)	21	0	2.5	4	5	5	5
	22	0	1.5	4.5	3.5	4.5	4
	23	0	3.5	4.5	5	5	5
	24	5	4	5	5	5	5
	25	0	0	3.5	4	4	4
	26	0	1	3.5	4	3.5	3.75
	27	5	1.5	4	5	4	4.5
	28	5	0	4.5	4	5	4.5
	29	5	0	3.5	5	4	4.5
	30	5	5	5	5	5	5
	31	4.5	0	3.5	4	3	3.5
	32	0	0	3.5	3.5	3.5	3.5
	33	0	0	3	3	2	2.5
	34	4.5	5	4.5	5	5	5
	Average	**2.59**	**2.17**	3.94	**4.38**	**4.37**	**4.37**

FT=Familiar Tune NR=Note Reading SR=Sight Reading PP1=Prepared Piece 1 PP2=Prepared Piece 2 PPA=Prepared Piece Average

REFERENCES

Bastien, J. S., & Bastien, L. & Bastien, L. (1999). *Piano for adults*. San Diego: Kjos West.

Baker, D. & Green, L. (2013). Ear playing and aural development in the instrumental lesson: Results from a "case-control" experiment. *Research Studies in Music Education, 35,* 141-159.

Boyington, B. (2014, January). 4 types of people who benefit from community college. *U.S. News: Education*. Retrieved from https://www.usnews.com/education/best-colleges/articles/2014/01/29/4-types-of-people-who-benefit-from-community-college

Brown, T. W. (1990). *An investigation of the effectiveness of a piano course in playing by ear and aural skills development for college students* (Doctoral dissertation). Available from ProQuest Dissertations & Theses. (Publication No. 91144185)

Bruner, J. S. (1966). *Toward a theory of instruction*. Cambridge, MA: Harvard University Press.

California Community Colleges Chancellor's Office Datamart. (2017) Retrieved September 22, 2017, from http://datamart.cccco.edu

Choksy, L. (1999). *The Kodaly method II: Folksong to masterwork*. Upper Saddle River, NJ: Prentice Hall, Inc.

Cochran-Smith, M. & Lytle, S. L. (2009). Teacher research as stance. In S. Noffke & B. Somekh (Eds.), *Educational action research* (pp. 39-49). Los Angeles: Sage.

Coffman, D. D. (2002). Adult education. In R. Colwell & C. Richardson (Eds.), *The new handbook of research on music teaching and learning: A project of the Music Educators National Conference* (pp. 199-209). New York, NY: Oxford University Press.

Comprehensive Musicianship. (n.d.). Retrieved February 16, 2014, from http://www.leerobertsmusic.com/dynamic-learning-robert-pac/dr-robert-pace-national-con/robert-pace-national-confer-2.html

Costello, P. J. M. (2003). *Action research*. London: Continuum.

Dalby, B. (2017). About music learning theory. *The Gordon Institute for Music Learning*. Retrieved August 7, 2017 from https://giml.org/mlt/audiation/

De Jong, T. (2010). Cognitive load theory, educational research, and instructional design: Some food for thought. *International Science, 38*(2), 105-134.

Efron, S. E., & Ravid, R. (2014). *Action research in education: A practical guide*. New York, NY, USA: The Guilford Press. Retrieved from http://www.ebrary.com

Eisner, E. W. (1998). *The enlightened eye*. Upper Saddle River, NJ: Prentice-Hall, Inc.

Elliott, D. J. (1995). *Music matters: A new philosophy of music education*. New York: Oxford University Press.

Eubanks, Kara. (2015). *Essays in the Theory and Practice of the Suzuki Method*. Retrieved Aug. 31, 2017. City University of New York. Ann Arbor, MI: ProQuest. (Publication No. 3729014).

Faber, N. & Faber, F. (2009). *Adult piano adventures: A comprehensive piano course*. Ann Arbor, MI: Dovetree Productions, Inc.

Fisher, C. (2010). *Teaching piano in groups*. New York: Oxford University Press, Inc.

Glenn, K. A. (1999). Rote vs. note: The relationship of working memory capacity to performance and continuation in beginning string classes. *Dissertation Abstracts International: 60*(10), 1010.

Glesne, C. (2011). *Becoming qualitative researchers: An introduction* (4th ed.). Boston: Pearson Education, Inc.

Gordon, E. E. (1980). *Learning sequences in music: Skill, content, and patterns*. Chicago: G.I.A. Publications, Inc.

Green, L. (2008). Music, Informal Learning and the School: A New Classroom Pedagogy. Abingdon, Oxon, GBR: Ashgate Publishing Ltd. Retrieved from http://www.ebrary.com

Green, L. (2012). Musical "learning styles" and "learning strategies" in the instrumental lesson: Some emergent findings from a pilot study. *Psychology of Music, 40*(1), 42-65.

Grunow, R. F. (2005). Music learning theory: A catalyst for change in beginning instrumental music instruction. In M. Runfola & C. C. Taggart (Eds.), *The development and practical application of music learning theory* (pp. 179-200). Chicago: GIA Publications, Inc.

Hammond, J. & Gibbons, P. (2005). What is scaffolding? In A. Burns & H. Joyce (Eds.), *Teachers' voices 8: Explicitly supporting reading and writing in the classroom* (pp. 8-16). Sydney, Australia: Macquarie University.

Haston, W. A. (2004). *Comparison of a visual and an aural approach to beginning wind instrument instruction* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (Publication No. 3132535)

Haston, W. (2007). Teacher modelling as an effective teaching strategy. *Music Educators Journal, 93*(4), 26-30. https://doi-org.ezproxy.bu.edu/10.1177/002743210709300414

Hartley, A. A. (2013). Age and method variance in measures of speed and working memory. *Psychology and Aging*, *28*(2), 522-528. doi:10.1037/a0032176

Heale, R. & Forbes, D. (2013). Understanding triangulation in research. *Evidence-Based Nursing, 16*(4), 98.

Herr, N. (2007). Student first-day of school questionnaires. Retrieved December 15, 2016 from https://www.csun.edu/science/ref/management/student-questionnaire/student-questionnaires.html

Highben, Z., & Palmer, C. (2004). Effects of Auditory and Motor Mental Practice in Memorized Piano Performance. *Bulletin of the Council for Research in Music Education,* (159), 58-65. Retrieved from http://www.jstor.org.ezproxy.bu.edu/stable/40319208

Hilley, M. & Olson, L. F. (2002). *Piano for the developing musician*. Belmont, CA: Schirmer/Thomson Learning.

Kendall, M. J. (1988). Two instructional approaches to the development of aural and instrumental performance skills. *Journal of Research in Music Education, 36*(4), 205-219.

Knowles, M. S., Holton, E. F. III, & Swanson, R. A. (1998). *The adult learner*. (5th ed.). Woburn, MA: Butterworth-Heinemann.

Korenman, L. M. & Peynircioglu, Z. F. (2007). Individual differences in learning and remembering music: Auditory versus visual presentation. *Journal of Research in Music Education, 55*(1), 48-64.

Lancaster, E. L. & Renfrow, K. D. (1999). *Piano 101*. Van Nuys, CA: Alfred Publishing Co., Inc.

Lancaster, E. L. & Renfrow, K. D. (2008). *Group piano for adults, Bk. 1*. Van Nuys, CA: Alfred Publishing Co., Inc.

Levitin, D. J. & Zatorre, R. J. (2003). On the nature of early music training and absolute pitch: A reply to Brown, Sachs, Cammuso, and Folstein. *Music Perception, 20*(1), 105-110.

Lind, V. R. & McKoy, C. (2016). *Culturally responsive teaching in music education: From understanding to application*. Retrieved from https://ebookcentral.proquest.com

Livingstone, D. W. (2007). Re-exploring the icebergs of adult learning: Comparative finds of the 1998 and 2004 Canadian surveys of formal and informal learning practices. *The Canadian Journal for the Study of Adult Education, 20*(2), 1-24.

Luce, J. R. (1965). Sight-reading and ear-playing abilities as related to instrumental music students. *Journal of Research in Music Education, 13*(2), 101-109.

Magill, R. A. & Hall, K. G. (1990). A review of the contextual interference effect in motor skill acquisition. *Human Movement Science 9,* 241-289.

Mainwaring, J. (1951). *Teaching music in schools*. London: Paxton.

Mainwaring, J. (1951). Psychological factors in the teaching of music. *British Journal of Educational Psychology, 21,* 105-121, 199-213.

Marshall, C. & Rossman, G. (2006). *Designing qualitative research*. Thousand Oaks, CA: Sage Publications.

McPherson, G. E. (1993). *Factors and abilities influencing the development of visual, aural and creative performance skills in music and their educational implications* (Publication No. 9317278). Available from ProQuest Dissertations & Theses Global.

McPherson, G. E. (1995). Five aspects of musical performance and their correlates. *Bulletin of the Council for Research in Music Education, 127,* 115-121.

McPherson, G. E., Bailey, M. & Sinclair, K. E. (1997). Path analysis of a theoretical model to describe the relationship among five types of musical performance. *Journal of Research in Music Education, 45*(1), 103-129.

McPherson, G. E. & Gabrielsson, A. (2002). From sound to sign. In R. Parncutt & G. E. McPherson (Eds.), *The science and psychology of music performance: Creative strategies for teaching and learning*. Oxford Scholarship Online (Oct 2011 ed.). doi: 10.1093/acprof:oso/9780195138108.001.0001

Merriam, S. B. (2008). Adult learning theory for the twenty-first century. *New Directions for Adult and Continuing Education, 2008,* 93-98. doi: 10.1002/ace.309

Merriam, S. B., & Bierema, L. L. (2013). *Adult learning: Linking theory and practice*. Retrieved from http://ebookcentral.proquest.com

Merrienboer, J. & Sweller, J. (2005). Cognitive load theory and complex learning: Recent developments and future directions. *Educational Psychology Review*, 17*(2)* DOI: 10.1007/s10648-005-3951-0

Mezirow, J. (1997). Transformative learning: Theory to practice. *New Directions for Adult and Continuing Education, 1997*(4), 5-12.

Mezirow, J. (2003). Transformative learning as discourse. *Journal of Transformative Education, 1* (1), 58-63.

Modeling. (2009). In *Merriam-Webster collegiate dictionary* (11th ed.). Springfield, MA: Merriam-Webster, Inc.

Musco, A. M. (2006). *The effects of learning songs by ear in the multiple keys on pitch accuracy and attitudes of band students (aural transposition)*. Available from ProQuest Dissertations and Theses database. (Publication No. 3251862)

Musco, A. M. (2010). Playing by ear: Is expert opinion supported by research? *Bulletin of the Council for Research in Music Education, 184*, 49-64.

Owens, P. & Sweller, J. (2008). Cognitive load theory and music instruction. *Educational Psychology*. *28*(1), 29-45.

Nakamura, J. & Csikszentmihalyi, M. (2005). The Concept of Flow. In C.R. Snyder & S. J. Lopez (Eds.), *Handbook of Positive Psychology* (pp. 89-105). New York: Oxford University Press.

Pace, R. (1979). *Music for piano, Book 1*. East Greenbush, NY: Lee Roberts Music Publications, Inc.

Pace, R. (1983). *Teachers guide*. Retrieved February 16, 2014 from http://www.leerobertsmusic.com/test-drive-beginning-lesson-2/teachers-guide-section-1-pd.pdf

The Pace Approach. (n.d.). Retrieved February 16, 2014 from http://leerobertsmusic.com/dynamic-learning-robert-pac/the-pace-approach-is-known-/

Palmer, W. A., Manus, M. & Lethco, A. V. (1996). *Adult all-in-one course*. Van Nuys, CA: Alfred Publishing Co., Inc.

Petzold, R. G. (1960). The perception of music symbols in music reading by normal children and by children gifted musically. *Journal of Experimental Education 28*(4), 271-319.

Phelps, R. P., Sadoff, R. H., Warburton, E. C., & Ferrara, L. (2005). *A Guide to Research in Music Education*. Lanham, Maryland: The Scarecrow Press, Inc.

Salthouse, T. A. & Babcock, R. L. (1991). Decomposing adult age differences in working memory. *Developmental Psychology*, *27*(5), 763-776. doi:10.1037/0012-1649.27.5.763

Savin-Baden, M. & Major, C. H. (2013). *Qualitative research: The essential guide to theory and practice*. London: Routledge.

Seinfeld, S., Figueroa, H., Ortiz-Gil, J., & Sanchez-Vives, M. (2013). Effects of music learning and piano practice on cognitive function, mood and quality of life in older adults. *Frontiers in Psychology, 4*(810), 1-13. doi: 10.3389/fpsyg.2013.00810

Shaw, J. T. (2015). "Knowing their world": Urban choral music educators' knowledge of context. *Journal of Research in Music Education, 63*(2), 198-223.

Sheridan, M. M. (2015). *Singing is elementary: Teachers' use of singing in three kodály-based elementary general music classrooms* (Publication No. 3710391). Available from ProQuest Dissertations & Theses Global. (1702912137).

Stake, R. (1995). *The art of case study research*. Thousand Oaks, CA: Sage Publications.

Stambaugh, L. (2011). When repetition isn't the best practice strategy: Effects of blocked and random practice schedules. *Journal of Research in Music Education, 58*(4), 368-383.

Stambaugh, L. (2013). Differential effects of cognitive load on university wind students' practice. *Psychology of Music, 41*(6), 749-763.

Sweetnam, P. (2008). *The effects of applying an aural participation procedure while note reading and learning unfamiliar musical excerpts*. Available through ProQuest Dissertations and Theses Database. (Publication No. 3311125)

Sweller, J., Ayres, P. & Kalyuga, S. (2011). *Cognitive Load Theory*. New York: Springer.

Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. *Cognitive Science 12,* 257-285.

Sweller, J. (2011). Cognitive load theory. In B. Ross (Series Ed.), *Psychology of Learning and Motivation: Vol. 55,* 37-76. doi: 10.1016/B978-0-12-387691-1.X0001-4

Sweller, J. (2016). Working memory, long-term memory, and instructional design. *Journal of Applied Research in Memory and Cognition 5*(4), 360-367.

Suzuki, S. (1975). *Nurtured by love: A new approach to education*. (W. Suzuki, Trans.). New York: Exposition Press.

Suzuki Association of the Americas (2014). *About the Suzuki method: Every child can learn*. Retrieved February 15, 2014, from https://suzukiassociation.org/teachers/twinkler

Taylor, E. (2008). Transformative learning theory. *New Directions for Adult and Continuing Education, 119,* 5-15. doi: 10.1002/ace.309.

Woody, R. H. (2012). Playing by ear: Foundation or Frill? *Music Educators Journal, 99*(2), 82-88.

Woody, R. H. & Lehmann, A. C. (2010). Student musicians' ear-playing ability as a function of vernacular music experiences. *Journal of Research in Music Education, 58*(2), 101-115.

Van Gerven, P. W. M., Paas, F. G. W C., Van Merrienboer, J. J. G. & Schmidt, H. G. (2002). Cognitive load theory and aging: Effects of worked examples on training efficiency. *Learning and Instruction, 12*, 87-105.

Varvarigou, M. (2014). 'Play it by ear' – teachers' responses to ear-playing tasks during one-to-one instrumental lessons. *Music Education Research, 16*(4), 471-484.

Varvarigou, M. & Green & Green, L. (2014). Musical 'learning styles' and 'learning strategies' in the instrumental lesson: The Ear Playing Project (EPP). *Psychology of Music* published online June 4, 2014. doi: 10.1177/0305735614535460.

Yamaha Music Foundation. (2008). *Yamaha Music Education System Teacher Handbook*. Courtesy Yamaha Corporation of America.

CURRICULUM VITAE
SUZANNE WONG

Education

B.M.	University of Southern California, Piano Performance (1979)
Artist Diploma	Akademie Mozarteum, Salzburg, Austria, Piano (1980)
M.M.	University of Southern California, Piano Performance (1980)
D.M.A.	Boston University, Music Education (2019)

Major Teachers:

- James Bonn, Nancy Bricard, Carlo Zecchi (Piano)
- Alice Schoenfeld (Violin)
- Dr. Robert Linn (Theory/Composition)
- Marienne Uszler (Pedagogy)

Professional Experience

Adjunct Faculty, Fullerton College (2002—Present)

- Instructor of Music Appreciation, Class Piano, Applied Piano, Harmony, History of Rock
- Online Instructor in Music Appreciation (Canvas, Blackboard)
- Active Soloist and Collaborative Artist—a regular performer in FC Concert Series, Faculty Recitals, Musical Theater Workshop Group
- Distance Education--one of the pioneers in Distance Education and Virtual Instruction Academy since 2004

Adjunct Faculty, El Camino College (2005—Present)

- Instructor of Music Fundamentals, Class Piano, Music Appreciation, Theory
- Certified Online Instructor (Canvas, Etudes-NG)
- SLO's—wrote Student Learning Outcomes for Class Piano Program and Music Fundamentals

Adjunct Faculty, Irvine Valley College (2011—Present)

- Instructor of Class Piano, Applied Piano, Composition, Basics of Music Theory, Music Appreciation
- Online Instructor in Music Appreciation, Basics of Music Theory (Canvas, Blackboard)
- Annual Piano Faculty Recitals

Other Professional Experience

Private Teacher in Piano, Theory, Composition, Chamber Music, Home Studio, Fullerton (1988-Present)

Coach and Adjudicator, Junior Chamber Music, Huntington Beach (2007-2010)

- Chamber Music Coach (Piano, Strings, Winds)
- Audition Adjudication and Placement—audition students of high school level for placement in chamber groups with coaches

National Director, Advanced Curricula and Junior Original Concerts, Yamaha Corporation of America, Buena Park (1983-1999), responsibilities included:

- Long Term Division Planning—implemented Advanced Curriculum for all Yamaha Music Schools at the regional and national levels which also involved professional quality recordings, major concerts, and annual competitions
- Curriculum Development—designed and implemented curriculum for advanced level students in harmony, improvisation, composition, performance
- Teacher Training—designed and implemented training seminars in curriculum and special workshops in piano and composition for system teachers nationwide
- Student Recruitment and Auditions—evaluated teachers and students in Southern California and nationwide for entry into Advanced Programs
- Music Director of National and Regional JOC Concerts—produced and directed teachers, technical staff and students in these high-profile concerts

Lecturer, The Colburn School of Performing Arts, Los Angeles (1979-1987)

- Instructor of Piano
- Instructor of Violin
- Instructor of String Program at the 32nd Street Elementary Magnet School, Los Angeles

Positions of Leadership

Nominating Committee Chair for State Board of Directors, Music Teachers' Association of California (2018)

Branch Chair, Southern California Junior Bach Festival, Music Teachers' Association of California (2008–2017)

State Board of Directors, Music Teachers' Association of California (2011-2013)

State Convention Program Chair, Music Teachers' Association of California (2013)

Branch Board of Directors, Music Teachers' Association of California (2005-2010)

Project Co-Leader, Assessment of Learning Collaboration Project for Music Theory for El Camino College (2008)

Department Representative, Creating and Sharing Evidence of Effective Teaching Practices for El Camino College (2008)

Chair, State Solo and Concerto Competition, Music Teachers' Association of California (2002-2007)

Branch President, Music Teacher's Association of California (2002-2004)