EFFECT OF FIXED-DO AND MOVABLE-DO SOLFEGE INSTRUCTION ON THE DEVELOPMENT OF SIGHT-SINGING SKILLS IN 7- AND 8-YEAR-OLD CHILDREN

By

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To my parents: Regina Kozhyna and Vladimir Kozhyn

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By

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The purpose of this study was to investigate the effects of movable-do and fixed-do solfege instruction on the development of sight-singing skills of 7- and 8-year-old children. The main research question was: What effect does pedagogical approach have on children's sight singing achievement? Participants (*N*=181) for this study were students from twelve second grade classes from six schools in north central Florida. Four classes from two schools were randomly assigned to Experimental Group One that participated in movable-do solfege instruction. Four classes from two other schools were randomly assigned to Experimental Group Two that participated in fixed-do solfege instruction. Four classes from the remaining schools were assigned to be the Control Group which did not receive any solfege instruction, but participated in other singing and music reading activities. Participants in the experimental groups received solfege instruction for 10 sessions of general music classes, each 20 minutes in length. During the treatment period two different approaches to the solfege instruction were used: (1) movable–do instructional approach, which was based on Conversational Solfege method developed by John Feierabend and influenced by Kodály pedagogy and Gordon's Music Learning Theory; and

(2) fixed-do approach to the instruction based on Russian solfege textbooks by Frolova and Metalidi and Petcovskaya, which are traditionally influenced by French solfège methodology.

The children were individually tested prior to instruction and then again after the completion of 10 sessions. The children sight-sang randomly selected tonal patterns made of syllables *do, re, mi* and *sol, mi* and *la*. Sight-singing performance was evaluated for pitch and contour accuracy. To control for the effect of developmental tonal aptitude on sight-singing achievement, the *Intermediate Measures of Music Audiation* was administered prior to instruction. To control for singing voice development, the *Singing Voice Development Measure* was administered before and after experimental treatment to find out how the level of singing voice development affects sight-singing performance.

Results revealed a significant improvement in sight-singing achievement for both experimental groups. Children who participated in movable-do solfege instruction demonstrated highest scores on the post-tests and greatest gain in sight-singing achievement. MANCOVA test for total score on sight-singing post-tests revealed a significant effect for the pedagogical approach ($F = 4.24$, $df = 2, 176$, $p < 0.05$), school ($F = 13.98$, $df = 3, 176$, $p < 0.001$). Singing Voice Development Measure pre-test ($F = 6.86$, $df = 6, 176$, $p < 0.001$) and scores on sight-singing pre-test ($F = 21.63$, $df = 1, 176$, $p < 0.001$). Multiple regression procedures revealed that the number of solfege sessions ($p < 0.001$), the level of Singing Voice Development ($p < 0.001$) and scores on sight-singing pre-test ($p < 0.001$) were significant predictors of scores on sight-singing post-test. Tukey Pairwise Comparisons among pedagogical approaches yielded significant mean differences ($p < 0.01$) between movable-do and fixed-do pedagogy.

CHAPTER 1
INTRODUCTION

Need for the Study

Is it possible to imagine language arts classrooms in an American public school where students are taught to speak and listen but not how to write or read? On the other hand, it is not so difficult to find music classrooms where students are taught to sing songs by rote and listen to musical works but are not taught the basic skills of reading and notating music. The ability to read and notate music is considered to be an essential ingredient of musical understanding and vital to independent musical performance. However, research indicates (Miller, 1980; Scott, 1996) that not only ordinary people but even many singers are unable to read the music they perform:

> How many Americans are prepared for the musical experience? How many Americans can read music? How many Americans are even minimally capable of following the course of a Brahms symphony, to say nothing of a Mozart sonata, or even the finer points of a Gershwin tune? I would guess a fraction of one percent. Music desperately needs a prepared public, joyfully educated ears. Right now, music is an orphan; and it will always be that orphan until we get a grip on a methodology of music education for the young. (Bernstein, as cited in Bluestine, 2000, p. xv)

The ability to read music enables students to participate in a wide range of musical experiences. If students are able to read music on their own, they are more likely to actively and independently enjoy music. Damrosch (1894) emphasized the value of that skill and states that "it is only by learning to sing at sight that entrance can be gained to the vast treasure house of music, just as the treasures of literature can only be gained by those who are able to read" (p. 36).

The National Standards for the Arts (Consortium of National Arts Education Associations, 1994) is a document which outlines standards for arts education in American schools. The nine content standards for music affirm what every publicly educated child in United States should be able to achieve as a result of music instruction in Grades K through 12. The first standard states

that students should be “singing, alone and with others, a varied repertoire of music” (p. 1), and the fifth standard states that students should have skills in “reading and notating music” (p. 2).

In spite of the existence of these National Standards for the Arts, the reality in meeting these goals and standards may be less than adequate. Hoffer (2001) states that most teenagers cannot read even simple music. He describes three National Assessments of Music Performance which document that fewer than 20% of 17-year-olds are capable of sight reading a simple musical phrase. Research findings and national assessment data indicate that the goal of teaching students to sing does not appear to be fully met. The National Assessment of Educational Progress (1997) found that only 58% of the eighth-grade students in 268 schools across the United States were able to sing the song “America” with rhythm that was assessed as adequate or better, and only 35% of the students were able to sing with pitch and intonation that was assessed as adequate or better. Levinowitz, Barnes, Guerrini, Clement, D’April, and Morey (1998) assessed children’s singing voice development in grades Grades1 through 6. The results of the study indicated a decrease in students' skill in using their singing voices over the past few decades. They found that 75–90% of the population of children fall within the "presinger," "speaking-range singer," and "uncertain singer" categories of the Singing Development Voice Measure (Rutkowski, 1991). Byo’s (1999) study of classroom teachers’ and music specialists’ perceived ability to implement the National Standards for Music Education indicates that a shortage of instructional time and the lack of training were the reasons given by teachers for not implementing some of the standards.

The placement of music reading in the music education program is essential. Mursell (1956) reasoned:

> To learn to read music is to learn to understand music. The whole value of symbols is to help us to understand music better. Without an understanding of the symbols, musical

> understanding is bound to lag, just as without symbols called numbers, arithmetical understanding is bound to lag. But if musical understanding lags, musical growth lags. So the teaching of music reading is a "must" in a program planned to promote musical growth (p.137).

Music reading is a very complex task. Petzold (1960) defines that skill as the "process of reading and interpreting various kinds of music symbols and converting these symbols into sound." Musically literate students are able to perform more complex tasks than merely mechanically reproducing notated pitches on an instrument or just naming notes and intervals they see in notation. Gordon (2007) emphasizes that to read music notation in the truest sense of the meaning one must audiate. Audiation is the process of mentally hearing and comprehending music, even when no physical sound is present. He also states that "just like language literacy includes the ability to listen, speak, read, and write language with comprehension, music literacy includes the ability to listen, speak, read, and write music notation with comprehension" (p. 42). McPherson and Gabrielsson (2002) state that "when reading musical notation, "thinking in sound" involves an ability to inwardly hear and comprehend notation separately from the act of performance" (p. 103).

This concept highlights the important distinction between seeing notation and responding mechanically to produce the notated sound in contrast to seeing the musical notation and being able to hear the notation inwardly before reproducing it on instrument (McPherson and Gabrielsson, 2002). Feierabend (1997) supports this assertion and states that the ability to identify "letter names" (i.e., F, A, C, E, D#, etc.) when looking at notes on a staff and to press the corresponding keys on an instrument should not be confused with true music literacy. True music literacy involves the development of the ability to hear what is seen and see what is heard. Kodály (1954) wrote, "We should not allow anyone even to go near an instrument until he or she

can read and sing correctly. This is our only hope that one day our musicians will be able to sing on their instruments" (p. 2).

Music educators define sight-singing as the ability to convert music notation into sound upon initial presentation. Sight-singing practice includes very complex skills that require the singer to combine music pitches with rhythms, dynamics, and articulation symbols. Research indicates (Costanza and Russell, 1992; Miller, 1980; Scott, 1996) that sight-singing instruction remains one of the weakest components in the teaching of choral music. Philips (1996) is concerned that children learn to sing mainly by rote imitation. "When note reading is taught, it is often from a theoretical rather than a functional approach. Many vocal music students arrive in the high school chorus without the basic skills needed to sight-read accurately" (p. 32).

Research surveys have found that although most teachers have a positive attitude towards the teaching of music reading, few spend the time to teach the skills (Johnson, 1987; Daniels 1988; May 1993). The results of Scott's (1996) doctoral dissertation support this assertion. The study consisted of a holistic, criterion-referenced sight-singing test for high school sopranos based on the voluntary national standards for choral music education. Subjects included 120 high school sopranos from four Illinois high schools. Results indicated that none of the singers could sight-sing at the achievement levels established by the Music Education National Conference.

Such findings raised the question of the reason and responsibility for such sight-singing deficiencies. One body of research (Henry & Demorest, 1994; Johnson, 1987; Parker, 1979; Szabo, 1992) suggests that many elementary and secondary music teachers fail to develop classroom strategies for teaching and assessing students' individual sight-singing skills. Furby (2008) suggests that many teachers of singing were probably not taught in a way that emphasized

the importance of sight-singing, and so the cycle repeats; teachers continue to teach as they were taught and neglect sight-singing practice. Another body of research (McClung, 1996; Smith, 1998; Verrastro & Leglar, 1992) assumes that some teacher preparation programs fail to provide music education majors with the necessary and appropriate methods and sequences to teach sight-singing effectively. Many music programs make an effort to teach students how to sing and how to read music notation, but there appears to be a difference in what educators want students to achieve and what they are actually achieving. Perhaps one reason for this is teachers' limited knowledge of effective and sequential instructional methodology that successfully teaches music reading skills and can be easily implemented in the general music classroom.

One way to achieve the goal of teaching skills in music reading and writing and sight-singing, as well as developing audiation, is through the sequential and regular use of solfege instruction. Gordon (2004) suggests that the most rational and effective way to learn to read and write tonal patterns and rhythm patterns is through the use of neutral syllables followed by the introduction of the tonal and rhythm syllables known as solfege. In 1934 Melville Smith wrote, "solfege really is an essential of musicianship. . . we might perhaps logically carry this idea still further and say that without solfege the musicianship of any individual runs the danger of being defective, or at least incomplete" (p. 16).

The term solfege, or solfeggio, originally referred to the singing of scales, intervals, and melodic exercises to solmization syllables. The term solmization is derived from the work of the Benedictine monk Guido D'Arezzo (c. 990-1050) who used the initial syllables of the first six lines of a hymn to St John attributed to Paulus Diaconus of the eighth century. Each phrase of this hymn begins successively one note higher than the preceding one with the sounds of the hexachord using the syllables *Ut, Re, Mi, Fa, Sol,* and *La,* and the original sounds being the

hexachord C, D, E, F, G, A. By the mid-17th century, the seventh tone *Si*, completed the octave. Do replaced *Ut* in most European countries when the Guidonian syllables assumed a fixed position and *Ut* became C. Hughes and Gerson-Kiwi (2001) defines solmization as

> the use of syllables in association with pitches as a mnemonic device for indicating melodic intervals. . . Many systems of this sort exist in the principal musical cultures of the world; they serve as aids in the oral transmission of music, and may be used either for direct teaching or as a means of memorizing what has been heard. A solmization system is not a notation: it is a method of aural rather than visual recognition (p. 1).

In France during the 19th century solfege developed into an elaborately systematic regimen in basic musicianship. The French solfege tradition has served as a point of departure for numerous methods of teaching basic musical skills developed in other countries, among them the approaches to music education of Zoltan Kodály and Emile Jaques-Dalcroze. Solmization is recommended by many music educators, such as Zoltan Kodály (movable do) and Emile Jaques-Dalcroze (fixed-do) for the ease in singing of syllables, its aid in memorization, and its indication of tonal functions. Mursell and Glenn (1931) also state their support for using solfege through the "Tonic Sol-fa" system to develop the concept of tonality:

> By far the commonest device for emphasizing tendential effects and building a system of tonal expectation is the application of the sol-fa syllables. In England the system is known as the "Tonic Sol-fa," a teaching device which involves, among other things, a notation of its own. In America, school music teachers use the sol-fa syllables, largely without the rest of the system, because they are easily applied and so far represent the simplest device for practical application. . . .The value of the "sol-fa" system lies in its power of defining and bringing before the learner the tonality element in music (pp. 164-167).

Divergent approaches to solfege have continued to be a matter for debate in the 20th century, especially between the approaches of fixed-do and movable-do. Campbell (1991) explains the major difference between the fixed-do and the movable-do systems: "movable-do refers to the relative system by such the tonic of any key is "do." By contrast, Fixed-do is

absolute in its designation of pitches, so that C is always “do” regardless of whether it serves as the tonic” (pp. 50-51).

Research findings on the effectiveness of different sight-singing approaches yielded mixed results. In the 1950s, Siler (1956) asserted that a movable-tonic system was the worst system for teaching sight-singing and that the best suited system was one that employed a fixed-do system. Bentley (1959) challenged Siler's assertion and concluded that the movable-tonic system was more effective for teaching sight-singing skills. Collins (1979) surveyed 346 college and university music departments that held full membership in the National Association of Schools of Music. Results from the 233 surveys returned indicated that preferred sight-singing systems included movable-do, using either syllables or numbers as a means for solmization, and the neutral syllables. A study by Henry & Demorest (1994) investigated the level of individual sight-singing achievement in two choirs recognized for outstanding group sight-singing. One choir used the fixed-do system of sight-singing and the other used the moveable-do system. Results showed no significant difference in sight-singing achievement between these two systems. Demorest (2004) analyzed the responses to a web-based survey by 221 middle and high school choral directors. His results showed that 64% favored the moveable-do system, 21% favored numbers, and the remaining 15% fixed-do, neutral syllables, or other systems. In 1993, Steve Larson came to the following conclusion:

> It is impossible to say--in the abstract--that any one solfège system is superior to another. Specific solfège systems should be chosen for specific students, for specific educational objectives, and for specific repertoires. And every solfège system has the honor of being the best system for at least one given purpose (p. 115).

Collins (1993) indicates that the diversity of approaches used to teach music reading in American schools is both a blessing and a curse:

> Educators have the right, to a degree, to choose the approach they desire to use in teaching their classes. That is the blessing. On the other hand, singers who are exposed to several

> different teachers and approaches may become very confused and finish their tenure in secondary school unable to read. That is the curse (p. 236).

Notwithstanding, Collins declares that students must be taught to read music. He states that there are two cardinal rules for developing sight-singing skill. First, it must be taught using sequentially-ordered objectives, moving from the known to the unknown. Secondly, proficiency in sight-singing will only come through repeated series of exposures to instruction over time (usually two years).

In elementary schools, children are generally introduced to solfege and the instructor's choice of teaching approach, and the curriculum usually determines a particular solfege system. Several research studies support the use of solfege instruction with elementary grade students. Yarbrough, Green, Benson, and Bowers (1991) reported that, when performing a vocal echo task, solfege was the most effective response mode among using *la* and using *la* with hand signs in improving pitch-matching accuracy with problem singers in Grades K, 1, 2, 3, 7, and 8. Reinfinger (2007) found solfege to be helpful on a sight-singing task. In his study, groups whose instruction included the use of solfege had the highest means on the post-test for familiar patterns of both groups that used *loo* when singing the patterns, and the solfege group had the greatest effect size of pre-test to post-test gain ($d = 2.60$). Reinfinger concluded that the use of solfege helped the second-graders sing contours correctly on the patterns that were practiced. However, solfege is not usually the primary focus of lessons and the lack of sequential and regular instruction is obvious. Peddell (2005) examined activities in elementary general music classrooms in Pennsylvania. Results indicate that solfege was being used only occasionally (in approximately 25-50% of the lessons). However, Peddell reports that elementary music teachers consider solfege as a rather important activity ($M = 2.85$ out of 4 on a 4 point scale, where 4 were considered by subjects as very important activity).

Giles (1991) emphasizes the importance of the development of sight-singing skills in elementary musical training: "If students have not yet been exposed to Kodály or Orff instruction, middle school or junior high is now too late to begin" (p. 26). Gordon's research has led him to conclude that music aptitude does not continue to develop significantly after approximately age nine; the aptitude level acquired by age nine remains basically the same throughout life. Therefore, the quality of instruction through grade three, both inside and outside the music classroom, is of particular importance. In a longitudinal study of students in grades one through six, Petzold (1960) found that by the third grade many children had reached a plateau in auditory perception. He also determined that first-grade students can develop aural understanding and can successfully participate in music reading activities. Research findings indicate that the early years are critical for musical learning and it is the responsibility of public schools to provide the "ground" and the "climate" to flourish the child's musical development. Kodály (1974) emphasized that "if the child is not filled at least once by the life-giving stream of music during the most susceptible period – between his sixth and sixteenth years – it will hardly be of any use to him later on. Often a single experience will open the young soul to music for a whole lifetime. The experience cannot be left to chance; it is the duty of the school to provide it" (p. 120). "Below the age of fifteen, everybody is more talented than above it; only exceptional geniuses continue to develop" (p. 122).

Although numerous pedagogical approaches are available for general music educators, teachers who at least partially familiar with the conventional applications of traditional methods such as Dalcroze, Kodály and Gordon, make solfege an integral component of their curriculum. Peddell (2005) reported that teachers with advanced levels of specialized pedagogical training (Orff, Kodály, Dalcroze,and/or Gordon) use solfege more frequently then teachers without any

specialized pedagogical training. Although these methods have multifaceted applications, sight-singing is a vital element of their educational procedures. When using the Dalcroze method, for example, teachers will have students sight-sing with a non-chromatic fixed solfege system. On the other hand, the Kodály and Gordon approaches apply movable solfege, using *la* for the tonic of the relative minor. Even though the Orff-Schulwerk method is not generally associated with solfege like the Dalcroze and Kodály methods, solfege instruction is still a part of the instruction.

John Feierabend developed an eclectic method of teaching music literacy called *Conversational Solfege* (2001). Conversational Solfege is a sequential music program that develops music literacy skills through a 12-stage process that culminates in one's ability to write original musical thoughts (compose). In Conversational Solfege, Feierabend combined elements of the Kodály method and Gordon's learning theory. Feierabend (2001) explained, "As American music educators strive to develop an appropriate adaptation of the Hungarian Model, they will do well to investigate the work of Edwin Gordon for the insight it has to offer" (p. 286). Both Gordon and Kodály advocate the use of movable-do solfege, sequenced instruction, and singing before playing instruments. With the Conversational Solfege approach, music literacy starts with traditional music and an "ear-before-eye" philosophy. The ultimate goal is to develop independent musicians who can hear, understand, read, write, compose, and improvise.

It is important to realize that in many countries (France, Switzerland, Italy, Spain, the former Soviet Union republics, countries of Latin America, and many others) the fixed-do approach is the most common approach of teaching music literacy and it has been successfully implemented in public schools and music institutions. Ozeas (1991) states that the fixed-do system is gaining increased use in American conservatories of music such as Julliard, Curtis Institute, Oberlin Conservatory, and Carnegie Mellon University. According to Smith (1987),

the practice of solfege is vital to the educational process but, unfortunately, its use is declining in music education training:

> The effectiveness of solfeggio as a reading device is historically indubitable; it has existed as long as western music itself. Prominent music educators, from the Greeks to Guido, from John Curwen to Lowell Mason, have recognized that solmization facilitates the reading of music. And, solmization today, in Kodály and some ear-training courses, remains a potent force in music education. But in the last half of this century, the use of solfeggio in its historic matrix, the choral ensemble, has not been maintained with vigor (p. 16).

Purpose of the Study

This study investigated the effect of movable-do and fixed-do solfege instruction on the development of sight- singing skills of 7- and 8-year-old children. During the experimental portion of the study two different approaches to the solfege instruction were used: (1) the movable–do approach, based on the Conversational Solfege method developed by John Feierabend and influenced by Kodály pedagogy and Gordon's Music Learning Theory; and (2) the fixed-do approach, based on Russian solfege textbooks that are traditionally influenced by French solfege methodology. The purpose of the study was not to compare the two methods but rather to find the effect of different pedagogical approaches on the development of sight-singing achievement of 7-and 8-year-old children in rather typical American school settings.

Research Questions

The main research question was:

What effect do two pedagogical approaches have on children's sight-singing achievement?

The following sub-questions were:

1. What is the effect of sequential and regular movable-do solfege instruction on children's sight-singing achievement?
2. What is the effect of sequential and regular fixed-do solfege instruction on children's sight-singing achievement?

3. What is the relationship between the level of singing voice development as measured by the Singing Voice Development Measure (Rutkowski, 1990, 1996) and sight-singing performance?

4. What is the relationship between sight-singing achievement and (1) tonal aptitude; and (2) number of solfege sessions?

Definition of Terms

AUDIATION. The process of mentally hearing and comprehending music, even when no physical sound is present.

FIXED-DO SOLFEGE. The sight-singing approach of designating the degrees of the scale by syllables *do, re, mi, fa, sol, la, si (ti)*, in which *do* is always "fixed" at C (or 261.6 hertz).

INTERMEDIATE MEASURES OF MUSIC AUDIATION (IMMA). A developmental music aptitude test appropriate for students in grades one through six, consists of two subtests: tonal and rhythm.

MOVABLE-DO SOLFEGE. The sight-singing approach in which do refers to the tonal center of a given piece in a major key. The syllables *do, re, mi, fa, sol, la, ti* and their chromatic counterparts are use to indicate function, rather than pitch.

MUSIC READING. The ability to interpret the symbols of musical notation into proper sounds.

SIGHT-SINGING is the process of reading music notation and then reproducing the sounds it represents by singing without reference to a mechanical pitch source (Reinfinger, 2007).

SINGING VOICE DEVELOPMENT MEASURE (SVDM). A nine-point rating scale, developed by Rutkovsky (1990, 1996) that provides music educators with a consistent and definite rubric for measuring singing voice development based on the range of the singing voices.

SOLFEGE. A pedagogical solmization technique for the teaching of sight-singing in which each note is sung to a special syllable, called a solfege syllable. The seven syllables normally used for this practice in English-speaking countries are: *do, re, mi, fa, sol, la,* and *ti.* Solfege in the European sense is the study of music theory, music form, and analysis. It used in a much broader sense, to encompass almost all of musicianship and score-reading.

SOLMIZATION.A system that uses syllables to represent the tones of musical scale.

TONIC SOL-FA. A system of musical notation based on movable-do solfege developed by John Curwen. Every tone is given a name according to its relationship with other tones in the key: The usual staff notation is replaced with anglicized solfege syllables (*do, reh, me, fa, so, la, te*) or their abbreviations (*d, r, m, f, s, l, t*).

Significance of the Study

This study aimed to identify effective pedagogical strategies and promote the development of important music literacy skills such as music reading, writing, sight-singing and audiation during the child's elementary school years. Solfege instruction has existed since the beginning of eleventh century and the effectiveness of solfege as a sight reading device is historically unquestionable. Several researchers investigated and compared the impact of different solfege and other approaches to sight-singing instruction, but most of the studies were limited to middle, high school choral ensembles or undergraduate students. Only a few studies (Reinfinger, 2007; Yarbrough, Green, Benson, and Bowers, 1991; Martin, 1987) have examined the effect of singing with solfege syllables on young children's sight-singing ability. There are no studies investigating the effect of sequential solfege instruction on elementary children's sight-singing achievement. This study sought to add to the current body of knowledge concerning music learning in young children, particularly as it pertains to the contribution of sequential instruction of movable-do and fixed-do solfege to the development of sight-singing skills. Because the methodology of this study includes two approaches to solfege, movable and fixed, the application of the findings will be useful to educational practices not only in United States but in many other countries. The findings from this study may contribute to the wider spread of Feierabend's *Conversational Solfege* method in the United States and abroad, and to the development and popularization of the fixed-do solfege method applicable for American public education.

Limitations

- The duration of the study was limited to only one semester. The duration of experimental treatment was limited to 10 sessions. Due to the time limitation, the development of sight-singing within a five note range was investigated.

- This study was limited to public-school students in second grade and included schools in north central Florida only.
- Intact classes were used without the randomization of participants among classes; the treatment condition used by each school was assigned randomly.
- Generalizations about the effects of solfege instruction can only be limited to the specific teaching methodology used in the study.

Delimitations

This study was not concerned with:

- the development of rhythmic skills and knowledge of basic music theory;
- students' previous musical and educational experiences;
- backgrounds and teaching styles of participating teachers.

CHAPTER 2
LITERATURE REVIEW

Philosophical Rationales

When considering the implementation of instructional approaches, researchers and educators must have a clear philosophical rationale that provides a sense of direction, perspective and consistency in practical implications. Elliot (1995) comments: “Like a good map, a good philosophy can show us the best routes to our destination based on careful considerations of the territory we want to travel. It may also point us to routes and destinations we never considered” (p. 9).

David J. Elliot: Praxial Music Education

David Elliot developed a new, praxial philosophy of music education. His philosophy underlines that "music making lies at the heart of what MUSIC is and that music making is a matter of musical knowledge-in-action, or musicianship. Music education ought to be centrally concerned with teaching and learning musicianship" (p. 72). Elliot explains that the word “praxis” is a noun derived from the verb *prasso*, which means “to do” or “to act purposefully” (p. 16). The focus of music education philosophy, and thus music education instruction, should be "musicing”, which takes several different forms: singing or performing on an instrument, improvising, composing, arranging, or conducting. In other words "musicing" in all its forms has to be active, involved, and ongoing rather than passive, objective, or simply observational. In Elliot’s praxial philosophy, the content of the music curriculum is musicianship. “Musicianship is demonstrated in action, not in words” (p. 54). Elliot states that “while musicianship is procedural in essence, four other kinds of musical knowledge contribute to this essence in surrounding and supportive ways” (p. 54). Four other kinds of musical knowing

include formal musical knowledge, informal musical knowledge, impressionistic musical knowledge and supervisory musical knowledge. The praxial philosophy of music education "holds that formal knowledge have to be filtered into teaching-learning situation parenthetically and contextually" (p. 61). The issue of teaching music notation deserves separate comment in Elliot's philosophy:

> "music literacy", or the ability to decode and encode a system of musical notation, is not equivalent of musicianship. It is only one part of the formal procedural dimensions of musicianship. Moreover, literacy should also 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).

Regarding the implications for current study, both approaches to solfege instruction employed here are based on ideas of the praxial philosophy of musicianship. Elliot writes that:

> musicianship develops only through active music making in curricular situations that teachers deliberately design to approximate the salient conditions of genuine musical practices. The name I give to this kind of teaching-learning environment is *curriculum-as-practicum* .... (p. 72).

The goal of solfege instruction is to develop music literacy, not in the context of the mechanical reading of letter names while looking at notes on a staff or pressing the corresponding keys on an instrument, but rather the ability to hear what is seen on a staff paper and see what is heard. As Elliot points out, literacy should be taught as "a coding problem to be gradually reduced within the larger process of musical problem solving through active music making" (p. 61). All of the instructional activities in both types of solfege instruction in that study involve active music learning and music making: singing, moving, decoding, reading, writing, and composing. All instructional activities were organized in sequential order with gradual increase in complexity and difficulty level.

Johann Henrich Pestalozzi's Pedagogical Principles

One of the basic premises upon which movable-do solfege instruction is based is that students should learn with their ears before learning with their eyes. This idea was developed by Johann Henrich Pestalozzi (1746–1827) who formulated education theories that influenced the philosophy of elementary education. Pestalozzian pedagogical principles were brought to America by William C. Woodbrige (1794–1834). According to Mark and Gary (2007), the Pestalozzian principles, as applied to American music education, are as follows:

1. To teach sounds before signs—make the child sing before he learns written notes or their names;
2. Get the child to observe by hearing and imitating sounds, their resemblance and differences, their agreeable and disagreeable effects, rather than explaining these things to him. With this principle, the child is called upon to the difficult task of attending to all at once;
3. Teach but one thing at a time—rhythm, melody and expression are taught and practiced separately before the child is called upon to the difficult task of attending to all at once;
4. To make children practice each step of each of these divisions, until they are master of it, before passing to the next;
5. To give the principles and theory after practice, and as an induction from it;
6. To analyze and practice the elements of articulate sound in order to apply them to music;
7. To have the names of the notes correspond to those used in instrumental music (p. 27).

Pestalozzian principles influence theories and methodologies of many prominent music educators, such as Dalcroze, Kodály, Gordon, and many others.

Theoretical Rationales

A theoretical understanding of children's development and learning processes is crucial in designing and implementing any method or instructional strategy. Campbell and Scott-Kassner (2006) note that "theories of learning, teaching, and instruction are embedded in nearly every musical experience" (p. 16). Solfege is an instructional procedure intended to develop children's

musical literacy and audiation that will help them to become independent musicians who can hear, understand, read, write, compose, and improvise. Theories about how children learn, when certain learning is developmentally appropriate, what is the sequence of the learning process, and how to present concepts effectively are fundamental for guiding every musical experience.

Developmental Theories

Developmental theories provide a foundation for the development of instructional materials and for making curriculum decisions. Piaget's Stage Theory of Cognitive Development serves as a starting place for researchers and teachers. Piaget outlines a four-stage theoretical structure for understanding child development. He observed that children progress through four stages of intellectual development: (1) sensorimotor (ages zero to two), (2) preoperational (ages two to seven), concrete operations (ages seven to eleven) and (4) formal operations (ages eleven through adulthood). Identifying the level at which students are operating helps teachers to tailor an appropriate sequence of instruction and teaching style to meet the students' needs.

This study focuses on 7-and 8-year-old students, according to Piaget, this age group falls into the concrete operational stage. The ability to conserve is acquired at this stage and intelligence is demonstrated through logical and systematic manipulation of symbols related to concrete objects. As children progress into the stage of concrete operations they become capable of realizing the invariance of one musical element when another is altered; they begin to recognize pattern when it has been sang in different tempo or meter, etc. Campbell and Scott-Kassner (2006) outline that, according to Piaget's principles, age eight is the turning point in a child's cognitive development. This is one reason why children of this particular age are included in this study, it is assumed that children of this age are able to conserve musical

elements and that they have had plenty of preliminary musical experiences up to that time so it is developmentally appropriate to introduce staff notation and note reading.

Bruner (1960) developed the theory of Modes of Representation. His position on cognitive development focused on three different modes of cognitive processing which are related to early, middle, and late stages of development: enactive, learning through a set of actions; iconic, learning through images and graphs; and symbolic, learning by going beyond what is immediately perceptible in the environment and based upon an abstract, discretionary and flexible thought. Campbell and Scott-Kassner suggest that learning to read notation can be divided into three stages corresponding to Bruner's model. "Instruction may begin with arm and body movement to represent melodic contours (enactive), followed by line graphs that trace these contours (iconic), and ending with the reading and writing of notation itself on the staff (symbolic)" (p. 20).

One of Vygotsky's (1962) major contributions is an idea termed the "zone of proximal development" or ZPD. The ZPD is the range between a child's level of independent performance and the level of performance a child can attain with expert guidance. Vygotsky believed that learners were only able to grasp a concept of a certain complexity above their current level of understanding. Vygotsky's initial concept of scaffolding was similar to that of a construction site. You need to stand on something to reach the desired height. Scaffolding is a process through which a teacher gives aid to the student in her/his ZPD as necessary. Vygotsky proposed that teachers give students the tools necessary to construct a metaphorical scaffold for themselves within their own ZPD, and therefore reach the height needed to grasp the concept at hand.

When teachers design instructional procedures, including solfege, it is important to consider Vygotsky's, Bruner's, and Piaget's theories. Instruction and activities should be developmentally and cognitively age appropriate according to Piaget's stages of development and Bruner's mode of cognitive growth, and reachable but challenging enough within each student's ZPD.

Instructional Theories

Ausubel (1963) explained that there are two particular and distinct types of learning: reception and discovery learning. Within each of these types of learning, Ausubel (1963) distinguished between rote learning and meaningful learning. Material learned by rote is learned and retained by laws of associationism, while meaningful learning is "relatable and anchorable to relevant and more inclusive concepts in cognitive structure" (p. 42). "During reception learning, content is presented as a whole in its final form and the learner must internalize the material. In discovery learning, what is learned is not directly presented; rather, the learner independently discovers it so that it might be internalized" (p.16). Two important factors are involved in one's readiness to learn any given concept: the particular level of cognitive functioning and the development of adequate sophistication and background knowledge. Ausubel argues that teachers must consider the role of readiness in relation to the sequencing of instruction and curriculum must be organized along sequential lines, i.e., pupils acquire readiness for each new unit of subject matter as a result of mastering the preceding sequentially related unit.

Gagnè (1977) underlined the eight-category hierarchical theory of learning. Students progress from simple learning experiences at the beginning of the hierarchy to more complex ones at the end; it is possible, however, to work backward from any one objective of learning in order to determine what prerequisite skills are necessary. While progress through the sequence may move forward or backward, it is not recommended that instruction "skip over" intermediate

steps in the sequence; otherwise, it can be a contributing factor to the student's confusion. Gagnè explains that in order for instruction to be effective, the teacher should follow a pre-planned sequence to avoid the omission of pre-requisite capabilities along any route of learning.

Edwin Gordon's Music Learning Theory

Edwin Gordon's Music Learning Theory was partially influenced by Gagnè's hierarchical theory of learning. Like Gagnè's theory, Gordon's theory is hierarchical in nature and progresses through eight levels of learning, beginning with aural communication and understanding and leading to generalization and creativity. Music Learning Theory helps educators to understand how children learn music. Based on an extensive body of research and practical field testing Music Learning Theory is a comprehensive method for teaching audiation, a term developed by Gordon which means the ability to think music in the mind with understanding. Music Learning Theory outlines eight Skill Learning Sequences. The levels and sublevels of this sequence are outlined in the table 2-1.

Table 2-1. Levels and sublevels of skill learning sequence

Discrimination	Inference
Aural/Oral	Generalization (Aural/Oral – Verbal – Symbolic)
Verbal Association Partial Synthesis	Creativity / Improvisation (Aural/Oral – Symbolic)
Symbolic Association (Reading – Writing)	Theoretical Understanding (Aural/Oral – Verbal – Symbolic)
Composite Synthesis (Reading – Writing)	

Gordon (2007) emphasizes that the first and most elementary level of discriminative learning is aural/oral which serves as the readiness for every other step in the sequence. The main purpose of teaching at that level is to develop listening and performing vocabularies in

music. Gordon likens the listening and performing vocabularies in music to the listening and speaking vocabularies in language. "At the aural/oral level of learning students immediately learn a variety of tonal patterns in various tonalities" (p. 103).

At the verbal association level of music learning, children are taught associate tonal solfege with tonal patterns and rhythm solfege with rhythm patterns. The movable-do tonal system with a "*la*"-based minor is suggested because " whether or not pitches represent the same function and tonality, the same syllable names, as they relate to a resting tone, are given to pitches with the same relative sounds" (p. 108). Like labeling or naming objects in spoken language, children learn to label familiar objects that they have learned during the aural/oral level of learning. Children also learn the following terms to identify tonal and rhythm patterns during verbal association learning: major, minor, duple, triple, tonic, dominant, macrobeat, and microbeat.

The partial synthesis level functions in two ways. As students assimilate aural/oral and verbal association levels, they become more aware of the intrinsic logic of tonal syllables within and among tonal and rhythm patterns. Second, at the partial synthesis level, children begin to audiate tonal and rhythm patterns in the series. Teaching at the partial synthesis level of learning involves learning to discriminate among a series of tonal patterns and rhythm patterns, not just individual patterns. Some exercises may include setting up series of patterns in contrasting tonalities or meters for children to compare. Children listen to two series of rhythm patterns and decide whether the first or second was in duple or triple meter. Musical labels, e.g. macrobeat, microbeat, duple, triple, major, minor, tonic, and dominant learned at the verbal association level would be very helpful in the audiation of contrasting tonalities or meters. In this regard, learning at a partial synthesis level requires that children make inferences for themselves based on familiar tonal and rhythm content.

At the symbolic association level of learning, children are taught to read and write the tonal and rhythm content in both familiar and unfamiliar order. Gordon states that "learning to read and write music notation helps students better understand what they can already audiate." Students learn to read and write music by associating notational symbols with the syllables and sounds of patterns they represent, audiating patterns; tonality and meter that they are reading or writing. Gordon refers to this process as notational audiation.

Composite synthesis is the highest level of discrimination learning. At this level, students learn to simultaneously audiate the tonality or meter as the child reads or writes tonal or rhythmic notation. At this stage of musical learning, musically intelligent reading and writing is possible. Children are not just able to audiate familiar tonal or rhythm patterns, they are also able to audiate the underlying tonality or meter of those patterns.

The most elementary level of inference learning is generalization which has three sublevels: aural/oral, verbal, and symbolic. At the generalization-aural/oral level of learning, children identify two sets of familiar or unfamiliar sets of musical patterns as being either the same or different. At the generalization-verbal level of learning, children infer tonal syllables or rhythm syllables from patterns heard performed on a neutral syllable. At this level of learning, children are capable of identifying the tonality or meter of a series of patterns heard performed using neutral syllables. "At the generalization-symbolic level of learning, children are expected to read, without the help of the teacher, a mix of familiar and unfamiliar tonal patterns or familiar and unfamiliar rhythm patterns, and to identify the tonality or meter they audiate as they read" (p. 138).

The next level of inference or generalization learning is creativity/improvisation. Gordon made a distinction between musical responses that are creative responses and those that are

improvised responses. According to Gordon, creativity is a matter of premeditation, while improvised responses are a matter of immediate reaction based upon restrictions of harmonic chord progression and meter. "Like the generalization level of inference learning, there are aural/oral, verbal and symbolic sublevels within the creativity/improvisation level of learning" (pp. 128-132).

Theoretical understanding, the first step in Gordon's skill learning sequence, also has three sublevels: aural/oral, verbal, and symbolic. Here, verbal explanations of music notation are taught after one has successfully developed listening, performing, reading, and writing vocabularies in music. Skills learned during theoretical understanding may include the identification of intervals, scales, letter names, musical form, and chord structure.

Musical understanding or musical meaning is a critical component of music learning theory. An important aspect of musical understanding is the audiation of musical syntax, or the order and arrangement of pitches and durations that give rise to tonality and meter in music. Gordon stresses the importance of this aspect when he states that "syntax cannot be taken from music: Syntax must be given to music through audiation" (p. 147). Gordon believes that the ability to audiate tonal and rhythm syntax through audiation is a prerequisite for musical understanding, musical appreciation, and aesthetic responses to music.

The instructional methods of fixed-do and movable-do solfege are based on sequenced learning. Movable-do solfege instruction uses an adapted version of the Conversation Solfege method developed by John Feierabend. This method is based upon Music Leaning Theory and follows all the steps of Gordon's learning sequences.

Historical Overview of the Development and Use of Solfege

Bridges (1982) provides a historical perspective on the development of the fixed and movable solfege systems. In her article, she belittles the ongoing dispute between supporters of

the two major systems and contends that proper application of the solfege syllables can only be attained through better understanding and knowledge of the setting-up and the circumstances surrounding the development of the two system practices.

Bridges argues that establishing aural-visual concepts of both absolute and relative pitch relationships are important in teaching music reading. However, the real issue is in that "the same sol-fa syllables which certain countries have adopted as names for sounds of absolute pitch are used elsewhere (notably in countries which identify absolute pitch sounds by alphabetical letter names) to denote sounds of relative pitch" (p. 11). She goes on further to cite a quote from Erzsebet Szonyi who stated:

> Both fixed and relative systems have been employed *side by side* and have been of considerable use to music teachers right up to the present day. However, it should be understood that one and the same system cannot be used to indicate two separate ideas; i.e. sol-fa syllables for both definite and relative pitch at the same time. . . . Where sol-fa syllables are used to indicate pitch (i.e. in France and Italy), they cannot be employed for relative notation. It is then necessary to resort to another notation system (p. 11).

Bridges asserts that solfege syllables were introduced as early as the eleventh century by a Guido d'Arezzo, who developed a system (referred to as *gamut*) "of mnemonics which enabled singers to pitch correctly the notes of any given hexachord written in staff notation without having to depend on the tuned monochord for any note other than the starting note" (p. 12). That is, solfege syllables were originally used as a movable system to enhance relative pitch. Later on, between 1600 and 1854, music theorists advocated a simplified version of the *gamut* which came to be called the "Lancashire" of "English" sol-fa. This version "discarded *ut* and *re* and used *fa, sol* and *la* twice, followed by *mi* to indicate what we would now call the seventh scale degree of a major scale" (p. 12).

France and Italy have extended the original six syllables to seven and applied the syllables as an absolute-pitch system:

> By the beginning of the seventeenth century, a seventh syllable, *si* had been added to the original six, and the Italians had substituted *do* for *ut* because it was more singable. In both France and Italy letter names for staff notation had been abandoned and sol-fa syllables were used for the definite pitch sound of the scale of C (p. 13).

In other words, the function of the sol-fa syllables had changed in these countries as they "no longer represented relative pitch concepts" (p. 13). On the other hand, the Germanic countries have developed a more advanced absolute-pitch system:

> The sol-fa syllables were discarded but the letter names were retained for absolute pitch in the Guidonian tradition. By adding to each letter 'is' for a sharp and 'es' for a flat the Germans improved on the English use of letter names because they had a syllable for every note of the chromatic scale (p. 13).

The debate between the two solfege systems arose in England during the late nineteenth century with the adaptation of the French absolute-pitch system by Dr. James Kay (Education Secretary) and his protégé John Hullah and the introduction of John Curwen's "tonic sol-fa" system. Bridges noted that both Kay and Hullah had been ignorant of the "implications of transplanting the French sol-fa pitch nomenclature into England, substituting it for letter names, and imposing it into a long-established practice of using sol-fa." On the other hand, Curwin's development of Sarah Glover's system of teaching with a complete sol-fa scale, allowed people to sight-sing easily and in any key and any modulations. It was during this time that the "terminology fixed/movable do came into existence" (p. 14), and the debate between these two systems started to develop and the debate continues until the present day.

Teaching Music Literacy in the United States

In the United States at the beginning of the eighteenth century, an interest in teaching sight-singing occurred because of the need to improve the congregational singing of hymns. In 1721 the Reverend John Tufts (1689-1750) wrote *Introduction to the Singing of Psalm-Tunes* which included an explanation of the rudiments of music and an altered form of musical notation intended to facilitate music reading. This book adapted the *fasola* (English sol-fa) notation, in

which traditional notation was substituted with the first letters of the four solmization syllables. It was this book, and many others like it, that led to the development of the singing school, thus introducing Americans to instruction in music literacy.

Most singing schools took place in churches, where music teachers or singing masters taught interested worshippers how to sing by note. Collins (1993) indicated that the students were taught to sing in parts and to read music using sung *fasola* solmization singing. The emphasis was on music reading, vocal production, and style of performance. The importance of these singing schools and the popularity of music societies led to the inclusion of music in public school education. Lowell Mason, a director of one of the most famous singing schools in Boston, had a profound influence on the development of a music school curriculum. He advocated that children should first become comfortable with singing and sounds of music before learning music reading. In contrast to the *fasola* patterns that were popular at the time, he also advocated the use of movable-do solfege. He devised a course of study for each of the three categories of music-reading instruction: rhythm, melody, and dynamics.

Meanwhile, with the introduction of music education to the general public, a debate was arising regarding the importance of sight-singing instruction and musical literacy. Description of the approaches to music reading which existed during the years 1885–1905 was provided by Edward Bailey Birge (1928). The first approach caused students to learn as many songs as possible with the teacher's aide. This approach, which is based on the Pestalozzian tradition of sound before sign, was called the rote-note, or the rote song method. The other method emphasized that the students should initially learn how to read music before they attempt to sing songs from various music texts. Phillips (1984) writes:

> Thus the debate began between methods that advocated immediate training in note reading and those that advocated a rote-to-note approach. In conflict were solmization systems in

> use. This period was marked by nonconformity in music instruction, a practice that has continued to the present day (p. 13).

It is important to note that after the Civil War, general music was taught in most cases by elementary classroom teachers in fifteen-minute daily periods. With the little time allocated to music instruction, it became crucial for teachers to become efficient in their teaching. According to Birge, no other person embodied the spirit of efficiency more than Sterrie A. Weaver (1853-1904):

> He aimed to be able to hand a child a piece of music and have him sing it without help. Such skill demanded a tonal and rhythmic vocabulary every detail of which the pupil must be ready to use. Eye and ear must be perfectly coordinated. Each tone of the vocabulary was taught by imitation and related to all the other tones. The singing was done by the entire class or by individuals as called for (pp. 125-126).

According to Thompson (1942), Weaver grew up in New Haven, Connecticut, where he attended singing schools. He began his career by teaching and organizing several singing schools throughout that region. Weaver had a goal to teach all children how to read music individually, without the aid of another person. At that time, this goal was considered to be drastic since, even though music reading was taught everywhere, only a small fraction of the children could actually read music with accuracy. Weaver believed that classroom singing by itself was not sufficient and that singing instruction should also include individual singing through the development of tonal and rhythmic vocabularies. His techniques involved teaching separately the tonal and rhythmic aspects of music. Tonal instruction began with the first five notes of the major scale and *do* was constantly shifted in order to teach tonal independence. In the eighth grade, tonal instruction included short diatonic and arpeggiated tonal phrases or patterns. In the earliest grades, tonal instructions began on *do*, but later any starting pitch was used. Weaver found that this process stimulated independent "tone thinking." Rhythm was taught through imitation using seven different time motions, one for each grade. Weaver has

been a pioneer in adapting tests and measures in music reading and in attempting to measure music performance through sight reading. His method of classroom singing, together with his special emphasis on individual singing, is based upon his own research and the study of children's natural capabilities. All of Weaver's techniques were ultimately collected and published in 1890 as the *Individual Sight-singing Method.*

Around the beginning of the 20th century, the focus of music education began to shift away from an emphasis on teaching music reading skills towards teaching children to enjoy music through singing (Mark and Gary, 2007).

With the launch of Sputnik in the late 1950s, the Soviet Union proved superior in the area of space technology which gave us a "wake-up call" that resulted in a complete revision of the American public education system. Some of these changes included restructuring the school music curricula. The Yale Seminar on Music Education, the Manhattanville Music Curriculum Project and the Tangelwood Symposium were all conceived out of the need to address the issues facing music instruction in the 1960s. But, unfortunately, the expectation that music reading would be integrated into all aspects of the music learning process was not fully realized. Zoltan Kodály (1882-1967) was instrumental in bringing back the value of the tonic sol-fa method. Kodály's ideas were first exposed in the United States in 1966 when he and his colleague Szorny participated in the International Society for Music Education conference in Interlochen, Michigan, and presented lectures at the Stanford Symposium. The Kodály Musical Training Institute was established in September 1969 in Wellesley, Massachusetts, as the result of Denise Bacon's 1967-68 year of study in Hungary. Since that time and until present, many teacher training institutions are adapting the Kodály concept of music education to American culture. One of the objectives of Kodály's musical training is "to make music known to children, to help

them become musically literate in the fullest sense of the word—able to read, write, and create with the vocabulary of music" (Abramson, Choksy, Gillespie, Woods, 1986, p. 72). The tools employed in Kodály's practice are (1) tonic sol-fa, (2) hand signs, and (3) rhythm duration syllables. Since the late 1960s and until present day, Kodály's certified music teachers successfully use tonic sol-fa (or movable-do solfege) in their music classrooms.

With the introduction of the National Standards for Arts Education in 1994 and the focus on music literacy in Standard 5, there was a drive to teach music reading skills in general music classes. According to Von Kampen (2003), "the profession has done well at giving students a great experience in the performance medium, but too often it has been at the expense of a foundational approach to aural and written music instruction." Adler (1997) further stated "We often fail to train our students' ears while we teach their fingers and minds" (p. 9).

Research

This part of the literature review examines the research related to the purpose and research questions of the study.

Development of Music Reading Skills

Petzold (1960) suggests that music reading depends on three perceptual levels: (1) auditory perception of musical sounds; (2) the visual perception of musical symbols; and (3) the integrative, internalized process through which the individual organizes previous auditory and visual perceptions of given stimuli in order to react to these same stimuli as they appear in new learning situations. Petzold (1960) studied problems in children's perception of symbols in music reading, using a sample of forth-, fifth-, and sixth-grade children in Madison, Wisconsin, public schools. Phase I of his study employed a ten item individual test of music reading devised by the author. Students were given visual presentations of tonal configurations consisting of three, four, five and six notes and then the starting pitch had been given, the students were asked

to sing the pattern. When the first task was completed, a second visual presentation of the same pattern, now accompanied by an aural presentation of the pattern, was provided to the student; the subject was asked to sing what was heard and seen. Petzold came to the following conclusions: (1) children in elementary school have considerable difficulty in reading tonal configurations found in the songs they sing; (2) children are not always able to make their voices go the right way; (3) children may be aware of the general shape of a configuration but not perceive internal changes; (4) when presented with an unfamiliar configuration, children may change it to a familiar one or just guess; and (5) children may respond to aural items more easily than visual ones.

Phase II of the study used especially composed song containing ten items to individually test the pupils' ability to read music. An extensive analysis of song materials from music text appropriate for each grade was made and test items were prepared according to the findings. This second phase of Petzold's study was concerned with which of the two methods resulted in more rapid learning of a song. One procedure involved learning five configurations contained in a song before attempting to learn the song. A second procedure involved learning a song and then the five configurations contained in the song. Petzold found that average fourth-grade students profited from tonal configuration practice, gifted students derived little from the practice, and average sixth-grade students did not profit from the practice at all. Also, gifted fourth-grade students were not influenced by the presence or absence of the practice on tonal configurations prior to learning the song. All other groups benefited significantly from practicing the tonal configurations before learning the song. Tonal configurations were identified best by average fourth- and sixth-grade students if they had previously seen the

configurations in a song. The gifted students had higher scores than the average students in all situations.

Based upon the two phases of the study, Petzold (1960) came to several conclusions: (1) no significant differences were found between boys and girls in terms of the ability to read music; (2) older children were able to learn to read the song at a faster rate; (3) no significant differences were found between grade levels in ability to learn to read tonal configurations; (4) the relative level of achievement in reading tonal configurations with no external assistance was relatively low for all grades; (5) musically superior children learned all the material more rapidly; 6) little music reading growth took place between the fourth-grade and the sixth-grade; and (7) the major source of music reading difficulty may be traced to inadequate aural understanding of the musical sound.

Petzold's conclusions show that prior practice on tonal configurations enabled students to learn the song more effectively. He suggests that greater emphasis be placed on assisting children to recognize the shape and design of tonal configurations when learning to read music notation. He recommends that the relationship between auditory and visual perception needs to be more clearly established. Many reading errors made in this study were caused by the subject's inability to 'hear internally' what the stimulus should sound like, and, consequently, were unable to control the voice. Petzold (1963) suggests that the music program of the school must include a variety of activities designed to stimulate and challenge the child if children are to develop an aural understanding of musical sounds. This synopsis parallels with that of Pestalozzian's philosophy of sound-to-symbol and with Gordon's theory of the auditation or development of inner hearing and as the precursor to visual symbols.

The purpose of Bluestine's (2007) study was to acquire understanding of the hierarchical stages of learning to comprehensively read tonal notation. This study compared four approaches of teaching music reading. The subjects in each group learned how to read familiar tonic, dominant, and cadential patterns, in major and minor tonalities, in isolation and in various series. The study highlighted the following differences among the four approaches: Students read (1) whole patterns; (2) individual pitches within patterns; (3) whole patterns, followed by individual pitches within patterns; and (4) individual pitches within patterns, followed by whole patterns. Students in third-, fourth-, and fifth-grades (*N*=100) from Philadelphia, Pennsylvania, participated in the study. From October 2005 until March 2006, four groups received 32 instructional sessions of tonal music reading, two 20-minutes sessions per week. The researcher taught each of the four groups. At the end of the treatment, a test of sight-reading and a test of sight-singing were administered. The sight-singing test consisted of four etudes rated independently by three judges using a five-point continuous rating scale designed by the researcher. No significant differences were found among the groups mean for either test. The researcher concluded that no one method of teaching tonal music reading used in the study is superior to any other. Also the author noted that among students who are beginning tonal reading instruction, sight-reading and sight-singing are virtually unrelated skills.

Bobbitt (1970) developed a programmed method of music reading pedagogy for use in the elementary school. His ideas were based on B.F. Skinner's operant conditioning theory:

> Nothing must be presented to the subjects that cannot be used immediately and within the context of the lesson, e.g., rhythm studies should include only those periodicities that are employed in melody exercises; interval studies should include only those intervals that are found in material covered to the date. Further, the pace of instruction must be carefully controlled to obviate the chance of distraction or boredom. And, most important [*sic*], the appearance of each new item must be immediately reinforced by its application in such a manner that the pupil realizes he is making use of the information himself (pp.144-145).

Bobbitt's system was established upon the premise that music reading should begin with the learning of intervals not limited to a certain tonality or pitch class scale. He challenges the notion of solfege, stating that students are unable to break away from solmization and are unable to apply it to contemporary (atonal) music. The fifth- and six-grade students met once weekly for about 30 minutes and were involved in activities such as unison and two-part responses to aural and visual rhythmic and pitch stimuli and visual identification and recall of notation. Bobbitt used a carousel slide projector to present a sequence of slides containing rhythmic and melodic information. He concluded that the programmed approach to learning can aid in the understanding of structural hearing due to effective treatment of the large amount of drill work required.

Bobbit recommended the use of singing, as opposed to using an instrument, as a means of teaching music reading. "It is possible, and not at all unusual, to play an instrument quite well without understanding structural nature of the music or even being aware of the laws governing the melodic progression of a given part" (p. 154). He contended that the use of voice in the development of music reading ensures the students' active involvement with the process of learning to read music. The instruction should follow a disciplined routine and should begin no later than third or fourth grade. At the conclusion of the 20 to 25 30-minute lessons, fifth-grade students in his experiment were able to identify and sing octaves, perfect fourths and major and minor thirds. Prior to these lessons, the children were unable to consistently recognize these intervals. Bobbit believed that a continuation of such a program would lead to music literacy.

In a study using first-grade students, Klemish (1970) compared two methods for teaching music reading. The subjects were 102 first-grade children from Oshkosh, Wisconsin, public schools. The pre-test and post-test developed by the researcher consisted of oral and written

responses. Tonal patterns taught were taken from song material, and numbers were used rather than solfege. The first teaching method made use of a simple visual representation of the total patterns with hand movement, body movement, and pseudo notation (not using the staff or conventional notation). This was in preparation for the use of conventional notation. The second teaching method employed the use of the music staff with filled-in note heads.

Klemish concluded that first graders can learn to read music since 69.6% of them were able to acquire over half of the total possible points on the post-test while only 39.2% scored over one half of the maximum points on the pre-test. The effect of the methods was not significant however examination of the difference between the groups showed that some skills developed better under one method than another. Under method one, students developed better skills in identification of melodic direction, aural matching, aural-visual matching and singing patterns. Under method two, which includes using conventional notation right away, students scored higher in recognition of patterns, writing notes dictating from the piano, and visual matching. Klemish suggests that since there was no significant difference between the two methods that it is not necessary to use pseudo notation prior to the use of conventional notation. However, researcher recommends that many techniques used in method one, such as hand and body movements, may supplement to clarify the concept of melodic direction.

Walker (1981) investigated the different methods employed to teach music reading to 8- and 9-year-old children. He used two different types of invented notations prior to introducing traditional staff. During three half-hour sessions, one group (n = 21) read a worksheet on which patterns of pitches were indicated with dots placed high or low across a horizontal plane. Half of the session was dedicated to reading rhythm, the other half to pitch. Results indicated that this group of children learned quickly and demonstrated by singing with the neutral syllable *la* that

the placement of the dots indicated higher and lower pitches, although specific pitches were not indicated. A second group (*n* =24) read a worksheet on which patterns of pitches were indicated with letters representing solfege syllables (tonic solfa) and acted in response by singing with solfege. The letters were written without indication of high or low by their visual placement. Because the children had no prior experience with solfege, they could not interpret if the next sound was supposed to be higher or lower. A teacher sang each pattern, which eliminated the necessity for the children to read the notation. During stage two of the experiment, traditional staff notation was introduced and practiced in three half-hour sessions, with each group using the same material. The students were shown a pattern of notes on a staff written on the chalkboard which the teacher pointed to while singing with *la* or solfege, depending on the group.

Two types of tests were administered: (a) listening to prerecorded patterns produced by a tone generator using sine waves and then identifying the correct notation from four possible choices; and (b) listening to patterns played on a metallophone and then writing down the correct staff notation of the sounds that were heard. Results from the identification of correct notation test indicated that the group using dots placed high and low on the page before using standard notation performed significantly better than the group using solfege letters as an introduction to standard notation. There was no significant difference between the two groups on the second test which included the note-writing task.

Kyme (1960) compared the effectiveness of different approaches on the skill of reading music. Experimental groups were taught to read music through the use of shape notes. Three control groups used other methods such as sol-fa syllables, numbers, and instrumental training. Results revealed that the experimental groups were statistically significantly superior to the control group. Kyme concluded that "in the light of this evidence, music educators may wish to

reappraise the shape note system of teaching sight-singing, a system in use for over 150 years in the Southeastern United States" (p. 8).

Hutton (1953) investigated the effect of audio-visual aids on teaching sight-singing. The goal was to compare two methods of teaching sight-reading with fourth-grade students. The control group was taught without the use of any special visual materials. In rare cases, only the staff was used to show the relative distance between notes. The experimental group was taught sight reading with the aid of flash cards, musical games, and slides. The flash cards contained from two to six notes representing intervals used in songs taught during the year. Slides contained melodic patterns and simple folk tunes such as "Old McDonald." The slides contained only the music, no words or titles were present. Both class and individual singing were used and the exercises done during flash card drills was related to the learning of new songs. While both groups improved in the sight-singing, on average, the students taught by method two showed a greater increase ($M = 8.21$) in their sight-singing ability then students taught by method one ($M = 7.71$). Hutton concluded that the use of audio-visual materials accelerated the learning process of sight-singing for fourth-grade students.

Effect and Contribution of Solfege Syllables

Reifinger's (2007) examined the effect of instruction with song-related tonal patterns on second-graders' pitch reading accuracy. Second-grade students ($N = 193$) in three urban elementary schools in Pennsylvania received sight-singing instruction for 15 sessions of general music classes, each 25-minutes in length. At the beginning and end of each session, the children read notation and sang four-note tonal patterns. Also during each session a new song with an activity was learned by rote and sung. In the 16th session, all 15 patterns were reviewed. Instructional treatment included singing the patterns with solfege or *loo*, and singing a related or unrelated song. Four treatment conditions were randomly assigned to the classrooms: (1)

solfege/related song; (2) solfege/unrelated song; (3) *loo*/related song; (4) *loo*/unrelated song. The children were individually tested at three points in time on their ability to read and sing the patterns: a pre-test prior to instruction; a post-test after the 16th sessions of instruction, and a retention test that followed an additional eight weeks of no sight-singing instruction. To assess sight-singing achievement, students were tested on their ability to sight-sing both familiar patterns that they practiced in class and unfamiliar patterns, that they did not practiced in class. Sight-singing performance was evaluated for pitch and contour accuracy.

The instruction resulted in a significant improvement in sight-singing achievement for all groups. Reifinger concluded that the performance in sight-singing remained statistically stable for the students because of non-significant differences from post-test to retention test for all treatment groups. Significant improvement in singing unfamiliar patterns indicated that skills were transferred. Results of research indicated that treatment effectiveness differed according to pattern type. For familiar patterns, contour accuracy scores were significantly higher in the solfege condition; however, for unfamiliar patterns, contour accuracy scores were significantly higher in the *loo* condition. Learning related songs during instruction period had no significant effect on students' ability to sight-sing the patterns.

Yarbrough, Green, Benson and Bowers (1991) examined the impact of solfege syllables and hand signs on pitch matching accuracy. In this study solfege syllables and hand signals were employed as the means to explore the effect of these different response modes on children's pitch-matching accuracy. A total of 163 children in K–third and seventh–eigthth grades were selected as the subjects of this study, based on their inability to match pitch as assessed by a pre-test. All children received eight weeks of instruction in hand signals and solfege syllables prior to the post-tests. The subjects at each grade level were randomly assigned to one of the three

different response modes: using hand signals, singing with the solfege syllables, or singing with the neutral syllables *la*. The investigators found that the subjects' correct responses among the three groups were not significantly different. However, a simple rank-order of correct responses by grade level under each response mode revealed that: (1) the kindergarten students were the only ones helped by the neutral syllable *la*; (2) the first-graders were the ones who benefited most from the hand signals, and (3) the second-, third-, seventh- and eighth- grade subjects accomplished the most with the solfege syllables. The researchers concluded that in spite of no statistically significant differences found in the study, solfege syllables seemed to help children to sing more accurately than hand signals or the single syllable *la*. They also suggested that "a pitch-matching approach beginning with a neutral syllable in kindergarten, adding hand signals and solfege in the second and third grades, and fading hand signs thereafter might be effective" (p. 32).

Martin (1987) investigated the contribution of tonal (solfege) syllables, hand signs, and letter representations of tonal syllables, as well as high and low levels of tonal aptitude and school readiness, to the development of verbal and symbolic tonal syllable skills of first-grade students ($N = 65$). During the first part of the study, all groups echoed tonal patterns during the first nine minutes of every class meeting. Each group received three 30-minute music classes per week. The experimental treatment lasted for 18 sessions during each part of the study. Group I echoed the patterns with tonal syllables; and Group II echoed the patterns with tonal syllables accompanied by hand signs; and Group III echoed the patterns with tonal syllables accompanied by hand signs while viewing letter representations of the patterns on a card. The patterns were randomly chosen from a 378-item list of three- and four-note tonal patterns developed by the researcher using the syllables *do, re, mi, sol* and *la*. A singing range of middle C to A was used.

During the second part of the study, all groups continued to echo tonal patterns during the first nine minutes of class but also saw the patterns written in note heads on a staff. Group I did not use hand signs, while Group II and Group III did use hand signs. Additionally, every other class meeting, Group III viewed letter representations on the staff instead of note heads. Researcher-constructed tests were given at the conclusion of each part of the study. Tests I and III required the student to listen to a tonal pattern sung with a neutral syllable and sing it back with the correct pitches and solfege syllables. Test II required the student to look at a tonal pattern written in note heads on a card, listen to the starting pitch, and sing the correct pitches with solfege syllables. The data from the Metropolitan Readiness Tests, the Primary Measures of Music Audiation (PMMA), and three researcher-constructed tests were subjected to a three-way analysis of variance. The results showed that only tonal aptitude, as measured by PMMA, had a significant effect on test scores. No method was found to be significantly better.

Cousins and Persellin (1999) studied the effects of using hand signs on the ability of first-grade children to accurately recall and sing a song. Forty-seven first-graders in a suburban elementary school in San Antonio, Texas, served as the subjects of this investigation. During 25-minute music classes which met two or three times a week for a 10-week treatment period, the children participated in singing and music reading activities. The first class ($n = 24$) was taught to sing and read music notation using the Curwen hand signs in conjunction with solfege syllables. The second class ($n = 23$) was taught to sing and read music notation using solfege syllables without Curwen hand signs. Both classes participated in opening activities, score-reading exercises, and singing games.

To assess singing accuracy on pre-tests and post-tests, the children individually sang an eight-measure song which was first modeled by the piano and then by a female voice. Two

music teachers rated their singing accuracy using the Children's Vocal Accuracy Scale developed by the researchers and based on the Singing Voice Development Measure (Rutkowski, 1990, 1996).

No significant difference was found between the two groups on post-test singing accuracy, indicating that there was no advantage in using hand signs. The mean pre-test score for students in the Curwen hand signs group was 7.8 and their mean score for the post-test was 9.0. Students in the solfege-only group also showed a gain in vocal accuracy. The mean pre-test score of students in the pre-test for the solfege-only group was 6.7 compared to 7.6 for the post-test. Cousins and Persellin stated that the size of the tested sample, the 10-week treatment period, and the 50–75 minutes of music instruction per week may not have been sufficient to produce detectable effects.

Autry's (1976) study compared the sight-singing improvement of two groups, one using movable-do solfege alone and one using solfege with hand signs. Control and experimental groups consisted of two college classes (two music fundamentals classes and two elementary music methods classes) and fifth-grade classes. The college classes were Control groups used solfege only, and experimental groups used solfege with hand signs. To minimize the effect of teacher differences, all classes were taught by the same teacher. The experiment, however, could only reflect group achievement, and although improvement in sight-singing occurred, results showed that the use of hand sighs alone could not account for the improvement from pre-test to post-test.

Cassidy (1993) investigated the effects of different types of syllable systems used during practice on sight-singing performance with college elementary education majors ($N = 91$). Each group practiced sight-singing using one of the following five methods: (1) solfege and Curwen

hand signs; (2) solfege alone; (3) letter names of the lines and spaces; (4) the neutral syllable *la*; and (5) words of songs which were used instead of practice exercises.

Results indicated that improvement in sight-singing appeared in all experimental groups, with post-test scores of subjects using solfege coupled with Curwen hand signs and subjects using solfege alone scoring significantly better($p < .05$) than subjects using staff letter names and those using the neutral syllable *la.* However, Cassidy counted a response as correct if the correct solfege syllable or letter name was used regardless of the pitch accuracy. "For these observations, if a note was a written *sol* and the subject used the term *sol,* used the term "G," or demonstrated the appropriate Curwen hand sign, it was counted as correct regardless of whether the pitch produced was actually *sol*. Therefore, accuracy of use of strategies was determined without regard to pitch but rather by terms or movements used in relationship to the printed page" (p. 298). That gave the solfege and letter-name groups an advantage over the other groups. If any of the students in the neutral-syllable group lacked the vocal ability to respond with the correct pitch, no other indicators could be used to determine sight-singing performance. Because of this, the validity of these scores to measure performance in singing is questionable.

Bolden's (1967) experimental study examined the extent of influence of the piano keyboard, syllables/letter, and recorder on the growth of insight-singing and rhythm reading. The study involved 348 elementary education majors at Michigan State University. All participants in the study were enrolled in a Music Foundations course, one of the two required music courses for education major students. The course consisted of nine sections, three groups of three classes each. Each class within a group received instruction in one of the training methods. Although the syllables/letter method proved to be the most effective of the three, the degree of difference between the methods was not significant. Research finding also indicated

that the amount of musical training did not have an effect on the sight-singing growth of the group. The results of this study indicate that sight-singing and rhythm reading can be accomplished by using the piano keyboard, syllables/letters, or the recorder.

Effect of Tonal Pattern Training

Many researchers (Belmondo, 1986; Gamble, 1989; Grutzmacher, 1987; MacKnight, 1973; Dell, 2003, Bernhard, 2003) have promoted the concept that students tend to learn tonal patterns as a means of learning how to read tonal notation. Many scholars believe that experienced sight-readers do not just see notes as isolated stimuli but are capable of mentally arranging the notes they see into patterns.

Research by MacKnight (1973) into the effects of tonal pattern training on the aural achievement of fourth-grade instrumental students is often cited (Bergonzi, 1991; Bluestine, 2007) as one of the important studies regarding Gordon's Music Learning Theory. MacKnight sought to discover an interaction between music aptitude and pattern training and its influence on musical achievement. He selected a sample of ninety fourth-grade students enrolled in the instrumental program from three elementary schools. These students were then stratified on the basis of their musical aptitude, as measured by MAP, and their academic aptitude as measured by the Lorge-Thorndike intelligence test. During the 32-week instructional period, both the experimental and control groups were taught using the same pitches, rhythm, meters, key signatures, tempos, and dynamics.

The experimental group learned new pitches aurally before notation was introduced. Melodies used contained the tonal patterns learned by rote. The control group used the single-instrument traditional method *Breeze Easy*. Students in the control group were taught each new note as it was presented with notation in the method book. MacKnight found that the students in the experimental group scored significantly higher ($F = 18.76$, $p < .05$) than those in the control

group on the Watkins-Farnum Performance scale. According to MacKnight, tonal pattern instruction supports the development of music reading skills to a greater extent than note identification instruction.

Gamble (1989) studied the effects of three different approaches to teaching tonal music reading to beginning clarinet students. In his study three groups were used: one group learned to read stepwise methods; another group learned to read arpeggiated patterns; and the third group learned to read individual pitches apart from patterns group. All three groups received 15 weeks of reading readiness exercises and then an additional 15 weeks of treatment. Upon conclusion of the investigation, the subjects were tested on their abilities to audiate and perform familiar and unfamiliar melodies from notation. The group that had received arpeggiated pattern instruction performed significantly ($p = .002$) higher than the group had received no pattern instruction; however, there was no major difference reported between the group that had been taught to read stepwise patterns and the group had been taught to read arpeggiated patterns.

Richardson (1971) compared the effectiveness of teaching tonal pattern and song material in a specific sequence on the ability of students in second-grade to read tonal notation. In this investigation two experimental groups of subjects learned tonic major patterns (and rote songs with melodies that outlined a tonic major chord) before they learned stepwise patterns, and two control groups learned the same pattern but in random order. All songs and patterns were taught in the key of D major, no other key or tonality was used. Each group met for three 25-minute weekly sessions for 18 weeks.

Following the administration of the treatment, Richardson tested the subjects on their ability to (1) recall and notate (with no visual prompt) patterns they had learned; (2) sing familiar patterns seen in notation; (3) visually recognize patterns presented in a notable melody; and (4)

distinguish the melodic direction of notated patterns. Richardson reported a significant difference between the groups ($p < .05$) in favor of the experimental group but only on the ability to differentiate melodic direction. The performance of the groups did not differ much on the other tasks.

Jarjisian (1981) studied the effects of pentatonic and diatonic instruction content, socioeconomic status, and music aptitude on the rote-singing achievement of first-grade subjects. She discovered that subjects who received both diatonic and pentatonic pattern instruction scored significantly higher than those who received one or the other. Additionally, subjects with high aptitude sang significantly more accurately than those with low aptitude. Jarjisian found both diatonic and pentatonic patterns to be useful, because diatonic patterns assisted in developing the student's sense of tonal center, whereas the pentatonic patterns encouraged a sense of melodic contour. The researcher concluded that using both pentatonic and diatonic patterns provides students with the rich atmosphere for musical growth.

Grutzmacher (1985) considered the development of a sense of tonality, investigating the relationship between tonal pattern instruction and the development of tonal concept and performance achievement in beginning instrumentalists. Forty-eight subjects in either fifth- or sixth-grade were randomly assigned to experimental and control groups. The experimental treatment included the teaching of ten tonal patterns, first aurally and then visually. Each tonal pattern was learned aurally using solfege syllables, and accompanied by tonic, subdominant, and dominant harmonies. Activities included playing scales and arpeggios using harmonization and vocalization. New fingerings were introduced through their use in familiar tonal patterns, proceeding from an aural introduction to notation. The control group was instructed using a notation-based method. Activities included playing scales and arpeggios from notation without

harmonization or vocalization, as in the experimental group. New material consisted of concurrent presentation of new notes through fingering and reading notation. The Iowa Test of Music Literacy (ITML, Gordon, 1970: Tonal test levels 1 and 2) was used to measure each student's ability to discriminate between short melodies in major or minor tonalities and recognize musical notation from performed melodies. ITML together with the Music Aptitude Profile (MAP) Tonal Imagery subtest (Gordon, 1965) served as pre-tests. These three tests were used as covariates to control for the possible effects of varying musical aptitude among the students in the two groups. These tests were re-administered as post-tests, along with a researcher-developed Melodic Sight-reading Achievement test to serve as dependent's variables.

The results of the study indicate a significant difference ($p < .0001$) between the melodic sight-reading scores of the experimental and control groups, with the experimental group scoring significantly higher. There was also a significant difference($p < .0001$) between the experimental and control groups on the ITML test 1 post-test, with the experimental group better able to aurally identify major and minor tonalities. Results indicate that tonal pattern instruction taught through harmonization and vocalization improved the melodic sight-reading skills of beginning band students, and improved their understanding of major and minor tonalities.

Dell (2003) studied the effects of singing and tonal pattern instruction on the accuracy of intonation performance skills of beginning string students. His research addressed two questions: (1) would there be a difference in the intonation performance post-test scores of the groups instructed using the Aural-Based, Aural-Based with Tonal Pattern Enhancement, and Notation-Based methods; (2) how might the intonation performance scores differ as a function of treatment, pitch discrimination and prior experience while controlling for music aptitude. One hundred sixty eight fifth- and sixth- grade beginning string students in their first and second year

of study served as subjects for the study. These students were members of nine intact classes in seven schools of two suburban school districts of Columbia, South Carolina. Three methodologies were used: Aural-Based Method, Aural-Based with Tonal Pattern Enhancement Method and a Notation-Based Method. Intonation Performance Scores incorporating both pitch matching and intonation performance served as the dependent variable. An ANCOVA was used to determine the effect of methodology on intonation performance skills, using the IMMA tonal subtest as a covariate. The results indicated that the students taught using Aural-Based and Aural-Based with Tonal Pattern Enhancement instruction performed with greater intonation accuracy than those taught using Notation-Based instruction.

Bernhard (2003) study investigated the effects of tonal training, using standard method book melodies, on the melodic ear playing and sight reading achievement of beginning wind instrumentalists. Forty-two sixth-grade band students were assigned randomly to one of two experimental groups (n = 21) or one of two control groups (n = 21). All groups received instruction from the researcher, during regularly scheduled 45-minute band classes, twice a week for a period of 10 weeks. Instructional materials consisted of 22 traditional beginning method book melodies.

The experimental groups received tonal training (the use of vocalization and solfege syllables to emphasize sensitivity to pitch relationships), while the control groups received traditional training. For each melody, the experimental groups: (a) listened to the researcher sing the melody using the syllable *loo*; (b) sang the melody using the syllable *loo*; (c) listened to the researcher sing the melody using solfege syllables; (d) sang the melody using solfege syllables; (e) performed the melody instrumentally by ear; and (f) performed the melody instrumentally by sight. The control groups: (a) visually identified pitch letter names of the melody; (b) visually

identified associated fingerings or slide positions; and (c) performed the melody instrumentally by sight.

Post treatment analysis of subjects' ear-playing and sight-reading achievement revealed that tonal training significantly affected ear-playing achievement ($p < .001$), but did not significantly affect sight-reading achievement ($p > .05$). These results suggest that tonal training, using standard method book melodies, can positively contribute to beginning wind instrumentalists' melodic ear-playing achievement without preventing the development of melodic sight-reading achievement.

Vande Wege (2005) conducted a study to determine whether pattern instruction, specifically those designed by Gordon in his *Learning Sequence Activities,* affects the development of singing voice in children. Did first-grade students who received tonal pattern instruction experienced greater gains in singing voice development than students who did not receive tonal pattern instruction? Subjects ($N = 63$) came from four intact first-grade classes from a semi-rural school district in Michigan. Two classes served as the experimental group and two classes served as the control group. For 18 weeks, all students received instruction from a music specialist for two 42-minute sessions. The tonal aptitude of all students was determined prior to treatment, using Gordon's *Primary Measures of Music Audiation* (PMMA). All students were individually pre- and post-tested with Rutkowski's *Singing Voice Development Measure* (SVDM). The experimental group received 11 weeks of pattern instruction for the first five or ten minutes of each music class. A t-test was performed on gain scores to determine if pattern instruction had an effect on the singing voice development of first-grade students. No significant difference was found according to treatment.

Fixed-Do or Movable-Do?

Buchanan's (1946) research was one of the pioneer studies to compare movable-do and fixed-do solfege methods of teaching sight-singing. Buchanan seemed most concerned with the use of rote teaching and by the fact that so many people can read and write language, but can not read or write music. In the preface to his study, Buchanan stated the following: "What passes for sight singing may be more accurately described as sight guessing, aided by piano or voice, which provides a model to be imitated" (p. iii). The five age groups available in the choir system at Westminster Church of Detroit took part in experiment of comparing the fixed-do and movable-do solfege (tonic solfege). The age groups were adult, high school girls, girls 11 to 13, boys 8 to 12 and girls 8 to 10. Each of these groups was divided into two subgroups, one half being taught fixed solfege and the other half tonic solfege. The fixed solfege and tonic solfege sections of each of the five age groups were matched as much as possible by pairs, age, experience, gender and talent. A sight-singing test consisting of 62 notes in 8 test items was given to 82 subjects. The 41 fixed solfege participants were matched with the 41 tonic solfege participants for age, intelligence, previous training and musical talent.

Comparison of the percentages of subjects who made higher scores on a sight-singing test during the post-test than on the pretest reveals that both groups improved and the average improvement was greater in the case of movable-do solfege instruction. The improvement of the tonic solfege participants was better than that of the fixed solfege subjects at every age level except the youngest, where the average score of the fixed solfege subjects was raised by the high score of a single unusually talented subject. Improvement in sight-singing was found to be greatest in the ages 10 to 17. Sight-singing skill was found to have a close relationship to school achievements and intelligence ratings, a lesser relationship to piano training and very little relationship to choir experience. Both fixed and tonic solfege subjects acquired theoretical

knowledge of key signatures. Flash cards, for drill in key signatures, were used with all subjects. The major conclusion of this study is that more improvement in sight-singing may be expected to result from lessons in movable do solfege than from fixed-do solfege.

In the 1950s, two scholars research and debated about the "best" system for teaching sight-singing. Siler (1956) purported that the systems in current use (German, French and English) were all defective and not suited well for the "international" language of music. He further asserted that movable-do is the worst system for teaching sight-singing or music reading. His system, *safelo,* was one that approximates a fixed-do system. The vowel 'a' is used for all the white keys (key of C major). If a pitch is raised, the vowel 'e' would be substituted, and if the pitch is lowered, the vowel 'i' is used. The ascending chromatic scale would be sung thus: *da, de, ra, re, ma, me, fa, fe, sa, se, la, le, ta, te, da.* The descending chromatic scale would be sung *da, do, ta ,to, la, lo, sa, so, fa, fo, ma, mo, ra, ro, da.*

Bentley (1959) challenged Siler's assertion. Bentley regarded tonic solfa as a most useful means of aural training and teaching music reading, enabling even the person who has never played an instrument to interpret accurately the staff notation of the musical score.

In summarizing the various systems used for teaching sight-singing, Phillips (1984) primarily contrasts advocates of the fixed-do and movable-do systems. He lists many distinguished proponents of the fixed-do system, for example, Robert Shaw, Robert Page and Thomas Hillbish. Phillips concluded, "Advocates of the fixed-do system note that seventeen different names are all a singer needs to learn for the entire scale, contrasting with a possibility of seventeen names of each pitch in movable *do*" (p. 16). Phillips also summarized the work of Edwin Gordon with regards to teaching aural skills and music reading. Phillips notes that in contrast to Shaw, Page, and Hillbish, Gordon strongly advocates the use of movable-do.

Over thirty years after the Siler/Bentley debate, Smith, Houlahan, and Tacka (1992) engaged in a similar written argument over solmization systems. Smith (1991) noted that the reasons many theory teachers choose certain methods to teach sight-singing have relatively little to do with a system's pedagogical value. Scholar suggests that teachers choose what they were taught, choose to teach what is taught in Europe, or choose to teach what they assume "all great performers" use. Smith listed pros and cons of the fixed-do systems and the movable-do systems, and concludes that the movable-do systems, specifically the "do-tonic," are the most appropriate for teaching aural skills, including sight-singing, to college students. He outlines five specific criteria for choosing a solmization system: analytical orientation, aural orientation, consistency, singability, and stylistic flexibility. According to Smith, the movable "do-tonic" system fulfills each of these criteria. This system is appropriate for sight-singing atonal music as it is for singing tonal music. Also the understanding the structural functions of pitches (analytical orientation) and facilitating the use of the ear first and the eye second are another important criteria fulfilled by the "do-tonic" system.

Houlahan and Tacka (1992) responded to Smith's opinion by providing comments and support for their own argument that movable "la-minor" is the better system for teaching sight-singing. These scholars cited the Bartok and Kodály philosophies, current research, and their own teaching experience as support for their position (p. 148). Smith (1992) wrote an author's reply to Houlahan and Tacka, pointing out some similarities of the "do-tonic" and "la-minor" systems.

The results of Pembrook and Riggins' (1990) research indicate that there is no general consensus concerning which method of sight-singing is the most advantageous. Data were obtained from 306 institutions from forty-five different states. In their study of freshman and

sophomore sight-singing teachers, they found that a majority of teachers used a movable system: 34 of 116 respondents use movable-do with la- minor, and 31 of 116 respondents use movable-do with do- minor (p. 236). The most frequently used systems of all 518 respondents were the scale-degree systems. Second in ranking was movable-do (do- minor), followed by neutral syllable such as *la*. These data indicate that there is a preference for movable systems among college teachers of sight-singing. However, while a majority of teachers marked the scale-degree system, or the movable-do system, all nine systems of sight-singing, including fixed-do were chosen at least once.

Taggart and Taggart (1994) surveyed colleges and universities in the United States to determine practices of sight-singing pedagogy in higher education institutions. According to the results of the research, movable-do (la-based minor) was the most commonly used system, followed by movable-do (do-based minor), followed by numbers. Advocates of the movable-do /la-based minor system reported four major strength of the system: (1) the assistance in functional hearing; (2) the advantages of *mi* to *fa* and *ti* to *do* always being half steps; (3) clarity between the modes; and (4) confidence in the system's effectualness. However, they noted that this system has a disadvantage when it comes to the singing of chromatic music. The instructors who use movable -do/do-based minor stated that this system is useful for understanding scale-degree function and reinforcement of tonal harmony; however, the system is also difficult for singing atonal and chromatic music. Proponents of the number system claimed that this system is very simple to use, helps one to understand functional harmony, and facilitates the learning of intervals. However, teachers noted that numbers are not the most vocal-friendly choice. Advocates of the fixed-do system stated that this system helps to develop perfect pitch and it is

universal and adaptable to all genres of music. Neglect of relative pitch development and lack of modulation facilitation were discussed as weaknesses of the system.

Larson (1993) examined the reasons for choosing a particular system for teaching sight-singing. Larson addressed the fact that many proponents of a particular system choose their system based upon how many syllables they presume the student will have to learn. He provided extensive examples to illustrate how many rules are necessary for using both movable and fixed systems. Students must actually learn many functions for the same syllable, since the same syllable will not have the same harmonic function in all music. Larson concluded that different systems for sight-singing may be necessary for "specific students, for specific educational objectives, and for specific repertoires" (p. 115). Although, he does purport that one system may be the "best" system for a specific purpose, he maintains that the do-based minor is the better choice for teaching sight-singing in the context of scale-degree function.

May (1993) investigated the methods, the typical amount of class time, and the printed texts used to teach melody reading by high school choral directors in Texas. May found out that the movable-do system was used by the majority (82.3%) of survey participants. The Relative Minor method was used by 68.75% of the respondents to teach melody reading in minor keys. Results indicate that nearly 80% of the 192 directors involved in the study reported that they taught sight-singing four to five days each week. The mean score of rehearsal time used for such instruction was 11.76 minutes with 80% of the directors spending more than ten minutes a day. Music educators generally (92% of the time) used their performance literature for sight-singing materials.

Henry and Demorest (1994) measured the individual sight-singing abilities of students in Texas high school choirs with a record of outstanding group sight-singing success in the Texas

state contest. They found no difference between students with moveable-do and fixed-do training, but a significant difference in performance related to years of piano instruction. Demorest and May (1995) continued on with Henry and Demorest's study and found out that singers using movable-do solfege achieved significantly higher scores than those using fixed-do syllables; however they cautioned that these results may have been confounded by the skills of the teachers using various methods.

McClung (2001) conducted a survey of 2,115 members of senior high all state choruses from six southeastern states. The survey consisted of one question: "In which sight-singing system have you received the most instruction?" This study produced the following results: (a) the melody pitch numbers was the sight-singing system in which the largest number of respondents received most sight-singing instruction (58%); (b) the movable-do system was the second most frequently chosen method (19%); (c) the neutral syllables method was used by 13 % of respondents; (d) other methods 6%; and (e) fixed-do 4%. However, McClung indicated that this finding conflicts with the results of Smith's (1998) survey of high school music instructors in Florida which concluded that moveable-do was the most frequently used system (44%) in that state. It also conflicted with the results of May's (1993) survey of high school choral music instructors in Texas that indicated that the widely used sight-singing system was moveable-do (82%).

Smith (1998) examined teacher's experience, preparation, opinion of ability, teaching procedures, and attitudes in relation to sight-singing instruction in high schools in Florida. Nearly half of the teachers regarded their college preparation for teaching sight-singing as fair or poor. Indeed, over 50% felt their training was not satisfactory, and 80% would have preferred more instruction in sight-singing pedagogy. While a majority of directors claimed that their

college sight-singing class was the most beneficial class for them in teaching sight-singing, almost 60% stated that they did not use the system of sight-singing they were taught. A large majority (97%) of the respondents to the survey also indicated that they thought choirs who sight-sing on a regular basis learn music faster. The results indicate that the average teacher spent between five and fifteen minutes, three days a week for teaching sight-singing, and the systems most commonly used were moveable-do (la-minor), intervals by singing a familiar tune and scale degree numbers. Few respondents used fixed-do or modified scale degree numbers. Seventy percent of the teachers used drills unconnected to the choral literature.

Brown (2001) examined the effects of fixed and movable sight-singing training on undergraduates' ability to sight-sing non-rhythmic, twenty-note passages in four music contexts: diatonic, modularity, chromatic, and atonal. The purpose of the study was to determine the most effective sight signing system for university music students by examining how students who either trained under a fixed or a movable sight signing system differ on pitch and label accuracy when sight-singing twelve melodic passages from various compositional styles. Students (primarily music majors) completing a second-year ear-training course were selected from four-year universities accredited by National Association of Schools of Music. Results indicate that students of the movable system scored significantly higher on pitch accuracy for the chromatic music category and the simple complexity level while students of the fixed system scored significantly higher on label scores for the atonal music category and the difficult complexity level.

The main effect between the two systems and the three-way interaction effect among systems, music categories, and complexity levels were not statistically significant on the dependent measures. For the secondary analysis, variables of influence were regressed on sight-

singing ability. The results show that students who play keyboard as their primary instrument, who train in a separate non-integrated aural-skills class, who have perfect pitch, or who have more years of private-lessons instruction have a significantly higher level of sight-singing ability.

The research done by Killian and Henry (2005) indicates that there is no significant relationship between sight-singing system and overall success. Overall accuracy scores on sight-singing test were significantly higher with more preparation time. Analysis of the tests also indicates that high scored singers tonicized (vocally establish the key), used hand signs, sang out loud during practice, physically kept the beat and finished practicing the melody within 30 seconds. Such characteristics as private voice or piano lessons, playing an instrument, membership in instrumental ensemble, sight-singing individually outside of class, and individual sight-singing tests had significant effect on the attainment of high scores on sight-singing test.

Summary

Review of the studies on the development of music reading reveals that music reading depends on the auditory perception of musical sounds. Children respond to aural items more easily than visual ones. Reading errors caused by the children's inability to audiate and also result in the inability to control the voice. Additionally, the development of music reading ability is influenced by the visual perception of musical symbols. Children can be aware of the general shape of a configuration but at the same time not perceive internal changes. It is important to put a greater emphasis on assisting children to recognize the shape and design of tonal configurations when learning to read music notation. Furthermore, it is dependent on internalized process through which the individual organizes previous auditory and visual perceptions of given stimuli. Prior practice on tonal configurations enabled students to learn a song more effectively.

Results of the studies support the idea of early music reading experiences. Music reading instruction should follow a disciplined routine and should begin no later than third- or fourth-grade. Klemish's (1971) study concluded that first graders are ready to learn to read music and, as per Hutton (1953), the use of audio-visual materials accelerated the learning process of sight-singing.

Studies investigating the effect of instruction with use of solfege syllables on development of sight-singing skills revealed the following results:

- Martin's (1987, 1991) research outlined that for the first-grade students, tonal aptitude rather than any of the three instructional methods (aural, with hand signs and combined aural with hand signs and with visual representation of notation) determines how good they score on tests of verbal and symbolic generalization of tonal skills.
- Cousins and Persellin (1999), Martin (1987) and Autry's (1976) studies revealed that there was no advantage to using hand signs in sight-singing instruction.
- Reifinger's (2007) research indicated that instruction with tonal patterns in a general music setting was effective in improving the sight-singing ability of second-grade students. The use of solfege during instruction was more effective than the use of a neutral syllable such as *loo* in helping students learn to sight-sing. However, a significantly greater gain with the use of solfege was evident only for the patterns that were practiced in class.

Tonal pattern instruction is a key component of solfege instruction. A review of the research (Belmondo, 1986; Bernhard, 2003; Dell, 2003; Gamble, 1989; Grutzmacher, 1987; MacKnight, 1973) on the effect of tonal patterns revealed that it has a positive effect on the development of the following skills: (1) music reading skills; (2) melodic sight-reading skills and

understanding of major and minor tonalities; (3) intonation accuracy for string students; and (4) melodic ear playing achievement.

Bluestine's (2007) found no evidence that any of the four methods of teaching sight-reading used in the study, which included (1) whole patterns, (2) individual pitches within patterns, (3) whole patterns, followed by individual pitches within patterns, and (4) individual pitches within patterns, followed by whole patterns, was superior to any other at generalization-symbolic level. Based on the results of the study, no method of teaching symbolic association and composite synthesis deserves to be unequivocally recommended over any other.

Debates over which systems of sight-singing is the most appropriate have continued throughout this century, facing the fact that there is no proof that one system is superior over another in all circumstances. Research on comparing different sight-singing approaches has been done mostly with choral ensembles and undergraduate students. Teachers usually choose the sight-singing approach that they were taught, some choose to teach what is taught in Europe, or choose to teach what they assume "all great performers" use. This literature review indicates that there is a preference for movable systems among college teachers of sight-singing. Alan C. McClung's (1998) survey of 2,115 members of senior high all state choruses from six southerneastern states produced the following results: (a) the melody pitch numbers was the sight-singing system in which the largest number of respondents received most sight-singing instruction (58%); (b) the movable-do was the second most frequently chosen method (19%); (c) neutral syllables method was used by 13% of respondents; (d) other methods 6%; and (e) fix-do 4%. Smith's (1998) survey of high school music instructors in Florida concluded that moveable-do was the most frequently used system (44%) in that state. Henry and Demorest (1994) measured the individual sight-singing abilities of students in Texas high school choirs and found

no difference between students with moveable-do and fixed-do training. Demorest and May (1995) expanded on Henry and Demorest's study and found out that singers using moveable-do solfege achieved significantly higher scores than those using fixed-do syllables. The recent research done by Killian and Henry in 2005 concludes that there is no significant relationship between a sight-singing system and overall success. Overall accuracy scores on sight-singing tests were significantly higher with more preparation time.

The review of the literature led the investigator to the conclusion that the movable-do approach is the most popular in the United States but evidence suggest that it is not absolutely superior in the development of sight-singing abilities. Teachers should choose the approach appropriate for the region (country) they are teaching and for specific educational objectives.

CHAPTER 3
METHODOLOGY

Approval to conduct this study was initially obtained from the Institutional Review Board (IRB) of the University of Florida. Upon receiving the IRB's approval, the request was then sent to *The Department of Research, Assessment and Student Information* in one of the school districts in Central Florida. Once that was accomplished, final approval to conduct the study was solicited from the principals of the schools. Eight music teachers in the district were interested in participating in this study. In order to represent diversity but at the same time equality between the different experimental and control groups, six schools were chosen to take part in the study. Permission was then secured from the principals and the classroom teachers. Because the program in this study became part of the regular music curriculum for the second grade classes, all of the children in those classes participated in all facets of the program. However, data was only collected from those students who returned consent forms signed by their parents/guardians.

Subjects

The selection of the participating schools was influenced by several factors. Based on information obtained from the Florida Department of Education Bureau of Education Information and Accountability Services, the selected schools in the control and experimental groups were similar in school grade (in Florida schools are assigned a grade based primarily upon student achievement data from the Florida Comprehensive Assessment Test), number of students on free/reduced-price lunch, number of students with Limited English Proficiency and number of students with disabilities. Another important consideration was teachers' familiarity with solfege; this method has not been used with their students prior to the experiment. Also teacher's agreement and enthusiasm towards the experiment played an important role in the selection process. Out of the six selected schools, two schools were randomly assigned to

movable-do experimental groups, two other schools were randomly assigned to fixed-do experimental groups and two schools were randomly chosen to be the control group

The investigation took place during the spring semester of the 2008 school year and involved 181 participants aged seven and eight from six public elementary schools (K-5) in North Central Florida. Sample size affects the statistical power of the test so the researcher used G- power software (2001) to run a Statistical Power Test to compute the required sample size for three groups with error probability $\alpha = .5$ and power level $(1-\beta) = 80$. The results indicate that in order to meet conventional power, a sample of 159 subjects was needed and this sample exceeded the power minimum.

Research was conducted with 12 intact second-grade classes. Four classes from two schools were randomly assigned to movable-do Experimental Group One that participated in movable-do solfege instruction. Four classes from other two schools were randomly assigned to fixed-do Experimental Group Two that participated in fixed-do solfege instruction. Four classes from the remaining two schools were assigned to be the Control Group, which did not have any solfege instruction, but participated in other singing and music reading activities.

Demographics

Table 3-1 provides demographic information related to the students in the State of Florida and in the participating district and schools during the 2006-07 school year. The individual schools in which the study was conducted had grades K-5 enrollments ranging from 228 to 784. The number of students who were economically disadvantaged was lowest in School A at 30.7% followed by School D at 41.5% and highest in School B at 80.3%. The other three participating schools had a higher percentage of economically disadvantaged students than those reported for the state and district. The number of students who were English Language Learners (ELL) was relatively low across all schools and with School F having the highest percentage at 4.2% and

three of the participating schools having a percentage of 0.4% or less. The six schools did not vary considerably in the number of students who were disabled and were in close proximity to the state and district averages.

A breakdown of the ethnicity of the students in the schools can be seen in Table 3-2. The overall student population of the state indicated a majority of white (46.8%) students and a minority of black (23.1%) students. At the district level, the number of black students was higher at 36.7% with a lower Hispanic population of 5.6%. The ethnic breakdown in Schools A-D mirrored that of the state with even higher majority of white students; School F approximated more closely the district average while School E reversed that distribution with a much higher black population at 62.4%.

To further assess the nature of each school, assessment data concerning the students' general academic achievement were obtained. Table 3-3 shows the percentage of students who scored 3 or above on the 2006-07 state assessments in writing, math, and reading. The performance of the students at the participating schools can be compared to the performance of the students in the state and the participating district. In general, students in School A performed considerably above the state/district averages. In School C, students scored higher than the state/district averages in reading but tended to perform similarly in the other two assessments. In the other participating schools, students performed comparably to the state/district averages to some degree.

Teachers

The general music teachers had to meet the following criteria in order to participate: (1) a minimum of three years experience in teaching second-grade general music; (2) no previous experience in teaching solfege to the current second-grade classes; (3) and a current teaching assignment in which they taught at least two different second-grade music classrooms within the

same building. Six elementary music teachers with diverse teaching experience agreed to participate and use solfege instruction within their second-grade music classes during the spring 2008 school year. The first teacher has a bachelor's and a master's degree in music education. She has taught music for 12 years, and possesses an Orff-Schulwerk Level 1 certificate. The second teacher has a bachelor's degree in music education, has taught music for six years and holds an Orff-Schulwerk Level 1 certificate. The third teacher has a bachelor's and a master's degrees in music education and has been teaching music for three years. The forth teacher has a bachelor's degree in music education, has taught music for 23 years and holds an Orff-Schulwerk Level 1 certificate. The fifth teacher had a bachelor's degree in music education and a master's degree in music performance and had been teaching music for eight years. The sixth teacher has bachelor's degree in music education, Orff-Schulwerk Level 1 certificate, and has taught music for 32 years. All six teachers stated that they did not used solfege instruction with their second-grade classes before but had used literacy activities and singing games in the past. All had well-equipped music rooms with piano, CD player, set of Orff instruments, whiteboard with music staff, etc., for their classes.

Reliability Procedures

The researcher scored all of the singing tests for each participant. Two expert music educators served as judges. Each listened to the recordings of the children singing on the sight-singing pre-tests and post-tests and recordings of the children singing the song "Row, Row, Row Your Boat." One judge was a PhD candidate in music education and the other held a PhD in music education. Both of the judges had previous experience teaching elementary music. Each judge scored 50% of the tests.

Independent Variables

Instructional Treatment

The independent variable in this study was the pedagogical approach used to teach sight-singing skills. Three different pedagogical approaches were used in the music classes. In Experimental Group One, students were engaged in movable-do solfege activities based on John Feierabend's (2001) *Conversational Solfege* approach. In Experimental Group Two, students learned sight-singing using the fixed-do approach. In the control group, students participated in music activities that included singing and sight-singing without the benefit of any solfege instruction. The students' regular music teacher provided the instructional treatment in each of the classes during the regularly scheduled music period. In this district, music classes were held once a week for 45-minutes. A 20 to 25-minute portion of 10 of the sessions in the experimental groups were devoted to solfege activities. The remaining time in the music lesson was used for other activities selected by each individual music teacher.

Consistency among the music teachers in implementing the instructional procedures in the experimental groups was accomplished through pre-service and in-service training and through in-progress monitoring of the classes by the researcher. Pre-service and in-service training involved discussions and practices on how to lead and assess solfege instruction. Lesson plans for the solfege portion of the lesson was provided by the researcher to each teacher. Examples of the lesson plan are provided in Appendix C and D.

Movable-Do Solfege Instruction

Four classes were randomly assigned to the movable-do experimental condition. Movable-do instruction was based on the *Conversational Solfege* method developed by Dr. John M. Feierabend, chair of music education at the University of Hartford's Hartt School. Feierabend (2001) states: "The simple premise on which this method is based is the same one which is

advocated for the teaching of foreign languages. One should learn with his/her ears before learning with his/her eyes" (p. 9). The sequence of this method involves a 12 step process to teach music literacy.

This teaching method brings students from the readiness step to the step of creating music through inner hearing and then transferring their musical thoughts into notation. Feierabend emphasizes that, through Conversational Solfege, children will learn to aurally understand music, and after that they have done so, they can associate this aural understanding to the notation. Conversational Solfege Level 1 presents patterns, rhymes, and traditional folk songs based on simple rhythm and tone sets. Only the tonal portion of the Conversational Solfege Level 1 was taught in the classes. All of the 12 steps were taught in experimental classes; however, not all of the suggested exercises were implemented during the experimental treatment due to time limitations and, in certain cases, to the difficulty level.

As recommended in the teaching manual, tonal patterns were used in every lesson to initially develop new skills. Inner hearing activities were also included in almost every lesson. The first set of tonal patterns was based on the pitches *do, re* and *mi*. *Sol* and *la* were introduced in the second part of the experimental treatment. As Feierabend states:

> The simple set of tones that occur in traditional folksongs was found to be do, re and mi. There were very few authentic folksongs found based on only sol and mi. Although several authentic songs based on la, sol, and mi were discovered, do, re and mi were chosen as the first tones because the presence of the resting tone seemed more indicative of our tonally based musical culture (pp. 9-10).

The following is a brief explanation of 12 steps of Conversational Solfege:

Readiness: (1) Rote. At this stage all songs are taught by rote. They all contain tonal patterns that will be studied later by the students. Tonal patterns can also be echoed on a neutral syllable.

Conversational Solfege: (2) Rote . During this stage the tonal syllables are introduced. The teacher will sing the melody patterns with the tonal syllables; the students repeat it with syllables. Through repetition the students will bond the tonal syllables with the aural labels. (3) Decode (familiar). This serves as an evaluation to determine whether the students have bonded the tonal patterns with the correct syllables. The teacher sings a pattern on a neutral syllable and the students must repeat the pattern with the correct tonal syllables. The patterns used are the same patterns taught in the rote stage. Aural recall and decoding skills are used during this stage, but not inference thinking. (4) Decode (unfamiliar). This is the next evaluation stage. Students need to generalize their use of the syllables with unfamiliar patterns and songs. The same procedure is followed as above with the teacher singing the pattern on a neutral syllable followed by the students repeating the pattern with the correct syllables. Students are required to use aural decoding skills and inferential thinking. (5) Create. At this stage, students are encouraged to develop original musical thoughts. Original tonal patterns are created by the students using tonal syllables.

Reading: (6) Rote. During this stage students are introduced to notation symbols. The teacher sings the notated pattern and the students repeat the pattern while looking at the notation. (7) Decode (familiar). During this stage, another evaluation is made to see if the students have bonded the notation for the tonal pattern with the correct syllables. Once again the patterns used are the same ones that have been previously presented. Visual recall and decoding skills are required, but not inferential thinking. (8) Decode (unfamiliar). This is another evaluation stage to see if students have bonded notation for tonal patterns with correct syllables and are capable of generalizing their knowledge of the tonal syllables to unfamiliar patterns. An unfamiliar pattern is notated and the students are asked to think first, and then sing it using the correct syllables.

This requires visual decoding skills and inferential thinking. A common term for this is sight-reading.

Writing: (9) Rote. At this stage, students learn to write notation. They copy familiar written melodies and songs while being instructed in proper manuscript techniques. (10) Familiar. During this stage students use decoding and writing skills. A familiar melody is sung, on neutral syllables, or played on an instrument and students are expected to guess the syllables (decode) and write the notation. Aural and visual decoding is required. (11) Unfamiliar. This stage requires the use of aural and visual decoding skills, as well as inference thinking, and is commonly referred to as dictation. At this time, the teacher sings on neutral syllables or plays an unfamiliar pattern or phrase from a song on an instrument. The students must think the tonal syllables and then write down the pattern. (12) Create. This is the final stage where the students must conversationally create a melody through inner hearing, decode that melody, and finally transfer it to musical notation. This skill is usually referred to as composition. Figure 3-1 demonstrates the steps and sequence of Conversational Solfege.

In this study, movable-do pedagogy was based on an adaptation of John Feierabend's Conversational Solfege Level 1 due to the limited available time. Prior to the tonal solfege instruction, Feierabend's methodology included the singing of variety of folk songs and rhythm patterns instruction. Conversational Solfege Level 1 is a one-year program, so this study was certainly a condensed and limited version of that approach. Instruction started with tonal patterns utilizing the pitches *do*, *re* and *mi*. All of the 12 steps of Conversational Solfege have been sequentially utilized in the instruction. Pitches *sol* and *la* were introduced only during the second half of experimental treatment.

An Example of the movable-do lesson plan based on Conversational Solfege can be found in Appendix C.

Fixed-Do Solfege Instruction

The fixed-do approach used in this study was based on the contemporary Russian Solfege method historically influenced by French fixed-do solfege methodology. Exercises and pedagogical approaches were adapted from two textbooks: *Solfeggio Podgotovitelny Class* by Frolova (2006) and *Solfeggio dlya 1 classa detskoy muzykalnoy shkoly* by Metallidi & Pertcovskaya (2003). This method is more visual than Conversational Solfege and includes introduction to basic music theory. Introduction to notation began with the first lesson. Exercises for the reinforcement of pitch memory were part of every lesson. Every music lesson started with the game "This is the sound of middle *do."* This game reinforced the memory of Middle C (middle *do*) and challenged the children to recognize pitches that were higher or lower of Middle C. Lessons also included the singing of the C major scale, first as a pentachord with five notes (*do, re, mi, fa, sol*, *sol, fa, mi, re, do*) and then as a whole scale. From the first lesson, notes *do* (C) on the treble clef on the ledger line and *re* (D) were introduced and children were encouraged to sing exercises comprised of combinations of *do* and *re*. As the lessons progressed, children were singing exercises with three, then four, five and six notes respectively. Children were also taught some of the concepts of basic music theory such as steps, leaps, and melodic direction. During each lesson, children were singing notation from the blackboard and flashcards. Many lessons included teaching music writing on wipe-off slates with a single five line staff. Every lesson included the following sequence:

1. Game: "This is the sound of middle *do."*
2. Introduction of a new note visually first then aurally.
3. Sight-singing exercises (sight-singing notation from the board and flashcards).
4. Games with music reading.
5. Music writing exercises.

An example of the Fixed-do lesson is presented in Appendix D.

Control Groups

In the control group, students participated in music activities, including singing and music reading activities, without any solfege instruction. The researcher did not provide lesson plans or special instructions. As a condition for the school selection, the teachers must not have taught solfege prior to the commencement of the experiment. The teachers who taught control group classes were encouraged to teach classes as they would have taught it before, without teaching sight-singing with the use of the solfege syllables.

Dependent Variable

Sight-Singing Achievement

The main dependent variable in this experiment was sight-singing achievement. The students demonstrated sight-singing ability by reading and singing six randomly selected three-note tonal patterns (see Appendix E). Pre-test 1 and post-test 1 included three tonal patterns of random combination of the pitches *do, re* and *mi*. Pre-test 2 and post-test 2 included three tonal patterns of random combination of the syllables *sol, la* and *mi.* The patterns were practiced during the experimental treatment with the experimental groups and before the test administration with all groups including the control group. The notation of each pattern showed three pitches notated using blackened note-heads on five-line staff in the key of C major. No bar lines or key signatures were used. Patterns were printed as flash cards with staff lines one inch apart, using large, bold, black print on a piece of paper measuring 11 x 8.5 inches. A complete list of the tonal patterns can be found in Appendix E.

Testing Procedures

At the beginning of the experiment and prior to starting the instructional treatment, Gordon's tonal subtest of the Intermediate Measure of Music Audiation Test (IMMA) was administered to assess the participants' developmental tonal aptitude. Raw scores were used for statistical analysis rather than using converted scores based on norms. The IMMA is a standardized measure of musical aptitude designed for use with children in grades one through four. While the test includes tonal and rhythm subtests, only the tonal subtest was used for this study. This subtest took about 20 minutes to administer. It consisted of a recording of 40 three-note pattern pairs for which the listener must decide if the second pattern in the pair is the same or different from the first. All tones are isochronous and the tempo is consistent, requiring the listener to discriminate exclusively by pitch.

Following the administration of the IMMA test, the Singing Voice Development Measure (SVDM) was then administered to the children. SVDM, developed by Rutkowski (1990, 1996), is a nine-point rating scale for classifying developing singers based on the range of their singing voices. A higher level on the scale indicates an increasing level of control over the singing voice, (Brophy, 2000). Figure 3-2 demonstrates an explanation of the SVDM rating scale.

In order to measure each child's singing voice development, the criterion song "Row, Row, Row, Your Boat" (a song in D-major) was taught and then performed by each child individually in a testing room. The performance of each child was recorded. According to the research findings of Levinowitz, Barnes, Guerrini, Clement, Pasquale D'April and Morey (1998), SDVM was recommended for use at all elementary levels (Grades K-5) as a tool to evaluate the singing content standard, particularly when children sing a short, familiar, major song. The researcher and two judges rated the performances of "Row, Row, Row Your Boat" using the SVDM. The inter-judge reliability for SVDM between judges was .87.

A pre-test and post-test in sight-singing was administered by the researcher by having each student individually sight-sing tonal patterns from the list in Appendix E. The pre-test took place prior to the commencement of the instructional treatment and the post-test after the 10-week instructional period. To facilitate the process of individual testing, the children were initially introduced to the researcher by their music teacher prior to the pre-tests. Classroom visits by the researcher prior to the experiment helped the children become familiar with the investigator and the procedures of testing. All sight-singing tests were audio-recorded using an Olympus Digital Recorder and then the audio files were transferred to a computer and downloaded onto CDs for later scoring by the judges. Individual testing was conducted in a quiet, well-lighted room. In most of the schools, the teachers' offices were used for this purpose, but in school B another classroom was used for testing.

During testing, the researcher and the child were seated facing each other on opposite sides of a desk or small table. The researcher sang the starting pitch for each pattern. A glockenspiel was used to help the researcher maintain the accuracy of the starting pitch. The pre-tests occurred during January and February of 2008, before implementation of experimental treatment. All of the children used *loo* to sing the patterns during the pre-test. Prior to the pre-test, the researcher explained the test procedures to the whole class and children practiced singing the patterns after the researcher. The researcher showed a flash card of a three-note pattern which was taken from the stack of the patterns used in the test. The children listened to the researcher singing the notes while pointing to each corresponding note on the flash card. Then the children sang the same pattern while the researcher was pointing to each note. The first pre-test, which included the pitches *do, re* and *mi,* and second pre-test, which included the pitches *sol, la* and *mi,* were administered on two different days.

At the beginning of the individual testing, the child was told that he or she would first practice some patterns in the same way as he or she practiced it with the whole class. Immediately following that "practice," the researcher said, "Now you try it," sang the starting note, and pointed to each note again while the child sang it. This was repeated for one more practice pattern. Following that, the researcher told the child to "choose any pattern from the stack and try to sing on your own." The child randomly selected a pattern; the researcher then showed a flash card of the pattern and sang the starting pitch of the pattern. The researcher then pointed to each of the three notes as the child sang them. All of the three patterns were presented this way in random order. No specific feedback on performance was given during the test, but each child was praised for his or her attempt. The standardized testing script can be found in Appendix F. As each flash card was shown, the researcher wrote down the pattern number on the scoring sheet for further scoring of the tests. Each child's singing was assigned a number on the digital recorder. That number was also written down on the scoring sheet.

The sight-singing post-tests took place during May and June of 2008. The testing procedures were the same as for the pre-tests except that the children in the experimental groups were given the option of singing the patterns with solfege, or *loo*. The children in the control group were asked to sing on *loo*. As in the pre-test, post-test one included the pitches of *do, re* and *mi* and post-test two included the pitches of *sol, la* and *mi.* Post-test one and post-test two were administered on two different days. Likewise, the patterns were practiced before the test with the whole class and then individually.

Judging and Scoring

As there were two sight-singing pre-tests, two sight-singing post-tests, and an SVDM pre-test and post-test for each of the 181 participants, a total of 1086 tests were scored. The sight-singing tests were compiled in random order of the schools and classes and then burned to CDs.

Each class had a separate CD with a special code on it (for example A1). Each class also had a separate scoring sheet with the number of the child on the left side and the notes of the pattern that the child sang as it was recorded on CD. The example of the scoring sheet can be found in Appendix G. The CD and the scoring sheet were organized in a separate paper folder and then given to the judges. The SVDM tests were also compiled in random order of the schools and classes and then burned onto separate CDs. The scoring sheets, with explanation of the rating scale of the SVDM were also given to the judges. The folders with the CDs and scoring sheets for each class were given to two judges who scored 50% of the recordings for each test. The researcher scored all of the tests.

To help facilitate objectivity in the scoring, two judges had no knowledge of which class or which experimental group the material were from, nor did the judges know from which of the two testing conditions (pre-test or post-test) the recording came. The judges were informed that some children used solfege and some used *loo* when singing and that it would vary by recording. Also the judges were advised to ignore the name of the solfege syllable each child was singing and determine the correctness based on pitch only. This was particularly important in the cases when the pitch and the solfege syllable did not match. For example, if the child used the wrong solfege syllable, but sang the correct pitch, it was counted as correct and if the child used the correct solfege syllable, but sang an incorrect pitch, it was counted as incorrect.

Each sight-singing test included data on note accuracy and contour accuracy in order to evaluate different dimensions of sight-singing performance. Note accuracy was determined by counting the number of pitches that were sung correctly. The recordings included the example of the starting pitch sang by the researcher so the judges could hear the starting pitch. For each test a maximum possible score of 9 could be obtained, with a maximum combined score of 18 on test

one and test two for the pitch accuracy dimension. The contour accuracy was identified by counting how many note-to-note contours were sung correctly. Performance was evaluated on whether the student's singing followed the contour of the pattern, i.e., whether the next note went higher, lower, or stayed the same, without regard for pitch accuracy. This way, within a three-note pattern, there were two contours to be assessed yielding a maximum possible score of 6 for each test with a combined total of 12 on test one and test two.

The composite score for each of test1 and test 2 carry a maximum of 15 points with a maximum total score for both tests of 30 points. The researcher explained the scoring process to the judges individually. After the scoring sheets were collected, the researcher calculated the mean score for each child and entered it to a separate spreadsheet onto MINITAB software for further statistical procedures.

Summary of the Procedures

The length of time needed to conduct this study as designed was to have been a minimum of 24 weeks, with the treatment time lasting for at least 12 weeks. However, the experiment was completed in only 10 weeks due to a prolonged IRB and informed consent process, holidays, state-mandated testing, etc. Table 3-4 demonstrates the time line for the study.

Prior to the instructional treatment, the students took the IMMA tonal subtest during their regular music class. The students were then individually administered the SVDM. Prior to the first instructional session one class period was needed in order to explain and familiarize the children with testing procedures for pre-test 1. The students were then individually pre-tested on their ability to sight-sing the tonal patterns made of *do, re* and *mi* for the pre-test 1. Another class period was needed to explain and familiarize the children with testing procedures for pre-test 2 and the children were then individually tested on their ability to sing tonal patterns made of *sol, la* and *mi* for pre-test 2. Ten weeks of solfege instruction, each 20-25 minutes long, were

then implemented in each experimental school. In the control group classes, music instruction remained the same as usual with no solfege instruction. At the beginning of the 18th week, children were post-tested for SVDM. Prior to post-test 1, the researcher reviewed the testing procedures and tonal patterns with every class during their scheduled music lesson. The post-test 1 was then administered to each child individually. The same procedure was followed for post-test 2 i.e., review with the whole class followed by individual testing.

Table 3-1. 2006-07 Demographic data about the state, the school district, and the participating schools

	Economically Disadvantaged, %	*English Language Learners (ELL), %*	*Disabled, %*
State	45.4	11.8	14.7
District	44.3	2.3	19.4
School A	30.7	0.3	16.1
School B	80.3	0.4	18.4
School C	50.4	1.5	19.4
School D	41.5	2.5	17.0
School E	65.0	0.4	19.2
School F	64.5	4.2	17.9

Table 3-2. 2006-07 Ethnic distribution of students in Florida, the school district and the participating schools

	Asian, %	*Black, %*	*Hispanic,%*	*White, %*	*American Indian, %*	*Multi-racial, %*
State	2.3	23.1	24.2	46.8	0.3	3.3
District	3.8	36.7	5.6	49.3	0.2	4.3
School A	7.1	24.5	5.5	54.8	0.6	7.4
School B	0.4	19.3	1.8	74.1	0.9	3.5
School C	0.8	15.5	6.7	70.3	0.3	6.2
School D	3.4	26.9	7.4	55.9	0	6.5
School E	6.3	62.4	2.0	24.9	0.2	4.1
School F	7.6	40.0	5.9	38.1	0.8	7.6

Table 3-3. Percentage of students, by state, district and participating school, who scored 3 and above on the 2006-07 state assessments

	Writing, %	*Math, %*	*Reading, %*
State	93	63	57
District	93	61	59
School A	99	85	85
School B	94	51	57
School C	96	67	80
School D	91	72	73
School E	90	64	65
School F	98	61	63

Note: The scores for the writing assessment range from 1 (lowest) to 6 (highest), whereas those for math and reading assessments range from 1 to 5.

Table 3-4. Time line

Weeks									
1	2	3-4	5-6	7-9	10	11-17	18	19-20	21-22
IMMA tonal subtest	SVDM pre-test	Sight-singing pre-test 1	Sight-singing pre-test 2	Treat-ment period	Spring break	Treat-ment period	SVDM post-test	Sight-singing post-test 1	Sight-singing post-test 2

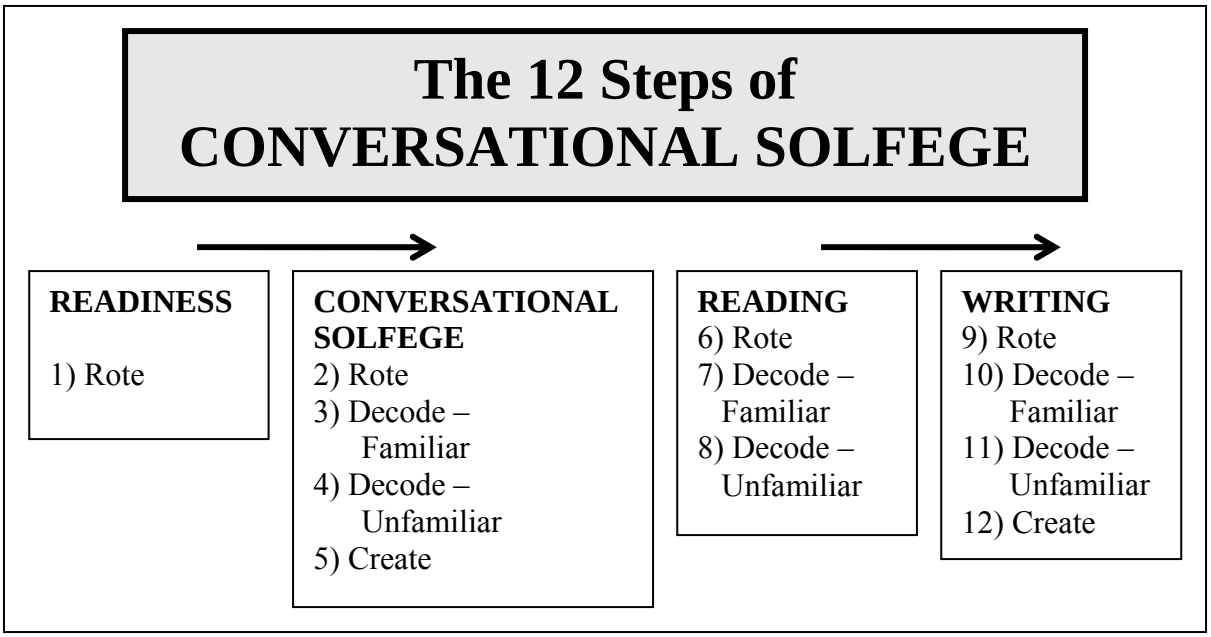

Figure 3-1. The 12 steps of Conversational Solfege.

1	**Pre-Singer** does not sing but chants the song text
1.5	**Inconsistent Speaking Range Singer** sometimes chants, sometimes sustains tones and exhibits some sensitivity to pitch but remains in the speaking voice range (usually A^2 to a)
2	**Speaking Range Singer** sustains tones and exhibits some sensitivity to pitch but remains in the speaking voice range (usually C^3 to c)
2.5	**Inconsistent Limited Range Singer** wavers between speaking and singing voice and uses a limited range when in singing voice (usually F^3 to f)
3	**Limited Range Singer** exhibits consistent use of limited singing range (usually D^3 to d)
3.5	**Inconsistent Initial Range Singer** sometimes only exhibits use of limited singing range, but other times exhibits use of initial singing range (usually A^3 to a)
4	**Initial Range Singer** exhibits consistent use of initial singing range (usually B^3-flat to b-flat)
4.5	**Inconsistent Singer** sometimes only exhibits use of initial singing range, but other times exhibits use of extended singing range (sings beyond the register lift: B^3-flat and above)
5	**Singer** exhibits use of consistent extended singing range (sings beyond the register lift: B^3-flat and above)

Figure 3-2. Singing Voice Developmental Measure (Rutkowski, 1996).

CHAPTER 4
RESULTS

This chapter presents the procedures used to analyze the data collected and the results of these analyses. Data from the Intermediate Measures of Music Audiation (IMMA) tonal sub-test, the Singing Voice Development Measure (SVDM), and sight-singing tests were collected from 181 participants in accordance with the procedures outlined in Chapter 3.

The analyses were guided by the research questions outlined in Chapter 1: What effect does pedagogical approach have on children's sight-singing achievement? The following sub-questions guided this analysis:

1. What is the effect of sequential and regular movable-do solfege instruction on children's sight singing achievement?
2. What is the effect of sequential and regular fixed-do solfege instruction on children's sight singing achievement?
3. What is the relationship between the level of singing voice development as measured by the Singing Voice Development Measure (Rutkowski, 1990, 1996) to sight-singing performance?
4. What is the relationship between sight-singing achievement and tonal aptitude and number of solfege sessions?

Variables and Analyses of Data

The dependent variables of this study were the scores on two sight-singing tests. The independent variables were (a) pedagogical approach; and (b) the level of singing voice development. Covariates for the study were (a) tonal aptitude; and (b) the number of solfege sessions.

The statistical approaches used in this study include descriptive statistics, the Kolmogorov-Smirnov test of normality, analyses of covariance, regression analyses and the post-hoc Tukey test. The Kolmogorov-Smirnov test was used to compare the empirical cumulative distribution function of sample data with the distribution expected if the data were normal. If the observed

difference were sufficiently large, the test would reject the null hypothesis of population normality.

The Pearson *r* correlation coefficient was used to calculate inter-judge reliabilities: the coefficient between the researcher and judge one was significant ($r = .91$, $p < .001$) and coefficient between researcher and judge two was also significant ($r = .93$, $p < .001$).

Descriptive Statistics

Scores on tonal subtests of IMMA were obtained from all participants. Raw scores were used for statistical analysis rather than using converted scores based on norms. Descriptive statistics for the IMMA scores are shown in Table 4-1. The mean scores for the various groups assigned to different pedagogy technique were: $M = 31$ for movable-do groups; $M = 32.74$ for fixed–do groups and $M = 32.21$ for control groups. The distribution of the IMMA scores had normal skewness and kurtosis and data from the Kolmogorov-Smirnov tests indicated that there was no significant deviation from normality. The results of the Kolmogorov-Smirnov test are shown in the Table 4-2. Because the *p*-value of the test results are greater than .05 ($p > .05$), it can be concluded that the distribution of scores of the sample is normal. Table 4-3 shows the SVDM pre-test data.

Rutkowski's rating scale includes nine levels; however, judges rated the children at seven of the nine levels. No child was rated at the lowest levels of the scale: Pre-singer and Inconsistent Speaking Range Singer. Out of the total 181 participants, 26% of children were categorized as Singer, 12.2% as Inconsistent Singer, 19.9% as Initial Range Singer, 9.4% as Inconsistent Initial Range Singer, 20.4% as Limited Range Singer, 5% as Inconsistent Limited Range Singer and, 7.2% as Speaking Range Singer. *School A* and *School B* respectively had the largest and the smallest number of children, who scored as Singers on the SVDM scale.

Results of the SVDM post-test indicate that children performed the song "Row, Row, Row Your Boat" with an improved level of singing voice development. This shows that children's singing voice developed slightly across the period of the study. Out of the total 181 participants, the judges categorized 33.1% of children as Singer, 17.7 as Inconsistent Singer, 14.4 as Initial Range Singer, 13.2 as Inconsistent Initial Range Singer, 14.9 as Limited Range Singer, 2.8 as Inconsistent Limited Range Singer, and 3.9 as Speaking Range Singer. These results corroborate other research findings that suggested small-group and individual strategies employed in weekly class meetings significantly contribute to children's acquisition of use of singing voice (Rutkowski, 1996; Rutkowski & Miller, 2003). Table 4-4 presents the post-test SVDM results.

Descriptive statistics for the distribution of pre-test scores are shown in Table 4-5. The results of the Kolmogorov-Smirnov test of normality are shown in Table 4-6. The results indicate that: (a) the movable-do groups' total pre-test scores were normally distributed ($Z = .06$, $p > .15$); (b) the fixed-do groups' total pre-test scores had markedly positive skewness and kurtosis ($< \pm 1$), and differed significantly from normal distribution ($Z = .12$, $p < .01$); and (c) control groups total pre-test scores had negative skewness and kurtosis($< \pm 1$), and differed significantly from normal distribution ($Z = .14$, $p < .01$). The mean for pre-test 1 (patterns with *do*, re and *mi*) is greater for all groups then the mean for pre-test 2 (patterns with *sol, la* and *mi*). The highest mean for the total pre-test score was in control groups ($M = 7.14$, $SD = 6.07$), followed by movable-do groups ($M = 5.97$, $SD = 3.97$). The lowest mean score was in fixed–do groups ($M = 5.24$, $SD = 3.83$).

At the end of the three-month treatment period, sight-singing post-tests were administered. The procedures for the post-tests were exactly the same as those for the pre-test and as described in Chapter 3. Descriptive statistics for the distribution of the post-test scores are shown in Table

4-7. The results of the Kolmogorov-Smirnov test of normality is demonstrated in Table 4-8. It indicates that all of the post-test scores for both the movable-do and fixed–do groups were normally distributed, whereas post-test for the control groups had markedly positive skewness and kurtosis ($< \pm 1$), and differed significantly from normal distribution ($Z = .14$, $p < .01$). It should be noted that one of the classes in School E was a special class for gifted and talented children and sight-singing scores in that class were significantly higher then those in other classes.

Descriptive statistics for the distribution of scores for total score on pre-test and post-test and the difference in score's means are shown in Table 4-9. Results show that the movable-do groups scores increased by 9.79 points from the pre-test to the post-test, from the pre-test M = 5.97 to the post-test M = 19.33. The fixed-do groups' scores increased by 8.48 points, from the pre-test M = 5.24 to the post-test M = 13.72. The control groups' scores increased by 1.53 points, from a pre-test M = 7.14 to the post-test M = 8.67. The control groups also made a small gain in their sight-singing achievement (pre-test M = 7.14, post-test M = 8.67, difference 1.53).

Each sight-singing test was rated by the researcher and the judges on two dimensions of sight-singing performance: Pitch Accuracy and Contour Accuracy. Table 4-10 presents the descriptive statistics and Table 4-11 presents the data from the Kolmogorov-Smirnov test scores for Pitch Accuracy and Contour Accuracy for the various schools categorized by pedagogical treatment on the pre-test. Table 4-12 presents the descriptive statistic and Table 4-13 presents the data from the Kolmogorov-Smirnov test scores for Pitch Accuracy and Contour Accuracy for the various schools categorized by pedagogical treatment on the post-test.

The maximum score for Pitch Accuracy is 18 and that for Contour Accuracy is 12. Results of descriptive statistics indicate that movable-do groups ended up with highest gain in Pitch

Accuracy scores (pre-test M = 4.28, post- test M = 9.49) and Contour Accuracy scores (pre-test M = 1.69, post-test M = 6.27). Fixed-do groups also had a relatively good gain in the Pitch Accuracy (pre-test M = 3.82, post- test M = 7.99) and Contour Accuracy (pre-test M = 1.42, post-test M = 5.81). The control groups demonstrated a small gain in their scores for Pitch Accuracy (pre-test M = 4.85, post-test M = 5.53) and Contour Accuracy (pre-test score M = 2.28, post-test score M = 3.14).

Pearson correlation among the Note Accuracy scores and those for Contour Accuracy on the pre-test is $r = 0.74$ ($p < .001$) and on post-test $r = 0.82$ ($p < .001$). The high correlation between those scores implies a positive association between the results on Note Accuracy and Contour Accuracy. It indicates that large values of Pitch Accuracy scores tend to be associated with large values of Contour Accuracy scores and small values of Pitch Accuracy score are associated with small values of Contour Accuracy scores.

To identify the relationship between the level of singing voice development and sight-singing performances, the means on Sight-singing pre-test and post-test were calculated for each level of singing voice development. These data are in Tables 4-14 and 4-15. The sight-singing score's mean on pre-test and on post-test is higher for higher categories of singing voice development.

Analyses of Covariance, Regression Analyses, and Tukey Tests

The primary statistical procedures used were multiple analysis of covariance (MANCOVA) and regression analysis. MANCOVA allows one to control for the effects of supplementary continuous independent variables—covariates, such as SVDM post-test, IMMA tonal subtest, pre-test scores and number of solfege sessions. The nested MANCOVA was used. The variable *school* was nested within the variable *pedagogical approach*. The nested procedure provided two critical statistical calculations: (1) differences among the movable-do, fixed-do and

control groups; and (2) the effect of school (or the teacher, since there was one music teacher per school) within the pedagogical approach.

Table 4-16 demonstrates the results of the MANCOVA procedures. Significance was set at $\alpha < .05$ for all analyses. MANCOVA results for pedagogical approach revealed that Wilks' λ was significant ($F = 4.24$, $df = 2, 176$, $p < .05$). MANCOVA results for the schools among pedagogical approach revealed that Wilks' λ was also significant ($F = 13.98$, $df = 3, 176$, $p < .001$). Covariate analyses revealed a significant Wilks' λ for SVDM Pre-test ($F = 6.86$, $df = 6, 176$, $p < 0.001$), for Sight-singing Pre-test ($F = 21.63$, $df = 1, 176$, $p < 0.001$) while IMMA scores were non-significant ($F = 0.21$, $df = 1, 176$, $p = .64$).

Results indicate that there was significant ($p < .001$) variability among the schools within the pedagogical approach and difference between pedagogical approaches was also significant ($p < .05$). It is likely that the teacher effect, difference in student preparation as well as other factors within the schools, had an impact on sight-singing achievement. In other words, the variability may be due to differences between the schools, as well as to variability among the pedagogical approaches.

A posteriori comparisons of means were conducted using Tukey's Honestly Significant Difference (HSD) test and demonstrated in Table 4-17. The significance level for all analyses was $\alpha < .05$. Tukey Pairwise Comparisons procedures among Pedagogical Approaches yielded significant mean differences ($p < 0.01$) between movable-do and fixed-do pedagogy.

Regression procedures were then applied to the results of the post-test total sight singing tests with the number of solfege sessions, IMMA raw score, and the SVDM pre-test as the predictor variables. This analysis revealed that all of the variables, except IMMA tonal subtest

scores, were significant predictors of score on sight-singing post-test. The results of the multiple regression analysis are presented in Table 4-18.

An interaction plot is a simple line graph for examining interactions between variables. The resulting profiles are parallel when there is no interaction and nonparallel when interaction is present. Figure 4-1 demonstrates an interaction plot for total sight-singing post test with SVDM post-test and pedagogy as independent variables. It shows the levels of SVDM post-test on the X axis and the mean for total score on sight-singing post-test on the Y axis. As it demonstrated in the Figure 4-2, there is a little interaction between the three types of pedagogy.

Table 4-1. Descriptive statistics for the IMMA tonal subtest scores (*N* = 181)

Pedagogy	*N*	*M**	*SD*	*Minimum*	*Maximum*
Movable-do					
School A	26	31.42	3.06	24	38
School B	25	30.56	5.41	10(25)	38
Total	51	31	4.35	10(25)	38
Fixed-do					
School C	40	32.18	2.86	12(23)	38
School D	35	33.29	2.83	27	39
Total	75	32.74	2.85	12(23)	39
Control					
School E	26	32.00	5.73	17	39
School F	29	32.41	3.95	22	39
Total	55	32.21	4.84	17	39

* Maximum points possible = 40 for the IMMA

Table 4-2. Kolmogorov-Smirnov normality test results for the IMMA tonal subtest (*N* = 181)

Pedagogy	*Skewness*	*Kurtosis*	*K-S (Z)*	*K-S p-Value*
Movable-do				
School A	-0.26	0.61	0.09	0.15
School B	-2.24	8.32	0.17	0.07
Total	-2.18	9.99	0.12	0.08
Fixed-do				
School C	-0.11	-0.24	0.04	0.15
School D	-0.66	0.44	0.09	0.15
Total	-1.10	1.34	0.11	0.05
Control				
School E	-1.16	0.98	0.15	0.15
School F	-0.72	0.73	0.07	0.15
Total	-1.10	1.34	0.11	0.12

Table 4-3. Number and percentage of children at various levels of Singing Voice Development Measure pre-test (SVDM pre-test)

Pedagogy	*Number of Children*	*S* N/%	*IS* N/%	*IRS* N/%	*IIRS* N/%	*LRS* N/%	*ILRS* N/%	*SRS* N/%
Movable-do								
School A	26	17/65.4	2/7.7	4/15.4	1/3.8	1/3.8	0	1/3.8
School B	25	2/8.0	1/4.0	6/24.0	3/12.0	6/24.0	4/16.0	3/12.0
Total	51	19/37.3	3/5.9	10/19.6	4/7.8	7/13.7	4/7.8	4/7.8
Fixed-do								
School C	40	9/22.5	8/20.0	10/25.0	4/10.0	6/15.0	1/2.5	2/5.0
School D	35	7/20.0	7/20.0	9/25.7	3/8.6	5/14.3	2/5.7	2/5.7
Total	75	16/21.3	15/20.0	19/25.3	7/9.3	11/14.7	3/4.0	4/5.3
Control								
School E	26	7/26.9	2/7.7	5/19.2	1/3.8	9/34.6	0	2/7.7
School F	29	5/17.2	2/6.9	2/6.9	5/17.2	10/34.5	2/6.9	3/10.3
Total	55	12/21.8	4/7.3	7/12.7	6/10.9	19/34.5	2/3.6	5/9.1
Combined Total	181	47/26.0	22/12.2	36/19.9	17/9.4	37/20.4	9/5.0	13/7.2

Note: S - Singer, IS - Inconsistent Singer, IRS - Initial Range Singer, IIRS - Inconsistent Initial Range Singer, LRS - Limited Range Singer, ILRS - Inconsistent Limited Range Singer, SRS - Speaking Range Singer

Table 4-4. Number and percentage of children at various levels of Singing Voice Development Measure post-test (SVDM post-test)

Pedagogy	*Number of Children*	*S* N/%	*IS* N/%	*IRS* N/%	*IIRS* N/%	*LRS* N/%	*ILRS* N/%	*SRS* N/%
Movable-do								
School A	26	17/65.4	5/19.2	1/3.8	2/7.7	0	0	1/3.8
School B	25	4/16.0	4/16.0	7/28.0	2/8.0	5/20.0	2/8.0	1/4.0
Total	51	21/41.2	9/17.6	8/15.7	4/7.8	5/9.8	2/3.9	2/3.9
Fixed-do								
School C	40	13/32.5	11/27.5	6/15.0	3/7.5	7/17.5	0	0
School D	35	12/34.3	6/17.1	6/17.1	3/8.6	6/17.1	0	2/5.7
Total	75	25/33.3	17/22.7	12/16.0	6/8.0	13/17.3	0	2/2.7
Control								
School E	26	9/34.6	2/7.7	4/15.4	4/15.4	6/23.1	0	1/3.8
School F	29	5/17.2	4/13.8	2/6.9	10/34.5	3/10.3	3/10.3	2/6.9
Total	55	14/25.5	6/10.9	6/10.9	14/25.5	9/16.4	3/5.5	3/5.5
Combined Total	181	60/33.1	32/17.7	26/14.4	24/13.2	27/14.9	5/2.8	7/3.9

Note: S - Singer, IS - Inconsistent Singer, IRS - Initial Range Singer, IIRS - Inconsistent Initial Range Singer, LRS - Limited Range Singer, ILRS - Inconsistent Limited Range Singer, SRS - Speaking Range Singer

Table 4-5. Descriptive statistics for the distribution of pre-test scores by school and pedagogy

Pedagogy	*n*	*M*	*SD*	*Minimum*	*Maximum*
*Pre-test 1**					
Movable-do					
School A	26	4.02	3.16	0	12
School B	25	2.94	1.94	0	8
Total	51	3.49	2.66	0	12
Fixed-do					
School C	40	2.65	2.01	0	8
School D	35	3.33	3.21	0	13
Total	75	3.05	2.63	0	13
Control					
School E	26	4.56	3.88	0	15
School F	29	3.10	2.00	0	8
Total	55	3.79	3.27	0	15
*Pre-test 2**					
Movable-do					
School A	26	2.92	2.00	0	8
School B	25	2.02	2.21	0	9
Total	51	2.48	2.13	0	9
Fixed-do					
School C	40	2.02	1.86	0	7
School D	35	2.43	3.02	0	14
Total	75	2.19	2.47	0	14
Control					
School E	26	4.50	4.29	0	14
School F	29	2.31	2.00	0	8
Total	55	3.34	3.42	0	14
*Pre-test 1&2***					
Movable-do					
School A	26	6.94	4.46	0	14
School B	25	4.96	3.15	0	14
Total	51	5.97	3.97	0	14
Fixed-do					
School C	40	4.67	2.35	0	9

Table 4-5. Continued

Pedagogy	*n*	*M*	*SD*	*Minimum*	*Maximum*
School D	35	5.76	4.96	0	25
Total	75	5.24	3.83	0	25
Control					
School E	26	9.06	7.70	0	29
School F	29	5.41	5.00	0	13
Total	55	7.14	6.07	0	29

** - Max. = 15, ** - Max. = 30*

Table 4-6. Kolmogorov-Smirnov normality test results for the pre-test scores by school and pedagogy

Pedagogy	*Skewness*	*Kurtosis*	*K-S (Z)*	*K-S p-Value*
Pre-test 1				
Movable-do				
School A	0.51	0.30	0.10	0.15
School B	0.99	1.10	0.13	0.15
Total	0.86	1.05	0.06	0.15
Fixed-do				
School C	0.95	0.33	0.10	0.15
School D	1.28	1.51	0.11	0.15
Total	1.41	2.43	0.11	0.04
Control				
School E	1.13	1.09	0.12	0.15
School F	0.56	-0.92	0.12	0.15
Total	1.24	1.88	0.12	0.04
Pre-test 2				
Movable-do				
School A	0.60	0.27	0.06	0.15
School B	1.54	2.76	0.14	0.15
Total	0.96	0.84	0.08	0.15
Fixed-do				
School C	0.84	0.07	0.08	0.15
School D	2.09	5.41	0.16	0.03
Total	2.07	6.48	0.12	0.02

Table 4-6. Continued

Pedagogy	*Skewness*	*Kurtosis*	*K-S (Z)*	*K-S p-Value*
Control				
School E	0.82	-0.47	0.16	0.08
School F	0.99	1.27	0.07	0.15
Total	1.42	1.60	0.15	0.01
Pre-test 1&2				
Movable-do				
School A	0.82	1.69	0.08	0.15
School B	0.95	1.46	0.12	0.15
Total	1.02	1.99	0.06	0.15
Fixed-do				
School C	-0.12	-0.54	0.07	0.15
School D	1.84	5.42	0.15	0.04
Total	2.07	8.74	0.12	0.01
Control				
School E	1.06	0.58	0.17	0.05
School F	0.42	-0.54	0.09	0.15
Total	1.59	3.02	0.14	0.01

Table 4-7. Descriptive statistics for the distribution of post-test scores by school and pedagogy

Pedagogy	*n*	*M*	*SD*	*Minimum*	*Maximum*
*Post-test 1**					
Movable-do					
School A	26	10.31	3.10	3	14
School B	25	7.82	3.51	0	13
Total	51	9.09	3.51	0	14
Fixed-do					
School C	40	9.27	3.08	3	14.5
School D	35	6.34	3.86	0	15
Total	75	7.94	3.79	0	15
Control					
School E	26	5.98	4.28	0	15
School F	29	4.28	3.00	1	11
Total	55	5.80	3.57	0	15

Table 4-7. Continued

Pedagogy	*n*	*M*	*SD*	*Minimum*	*Maximum*
*Post-test 2**					
Movable-do					
School A	26	9.02	3.18	0	13
School B	25	4.24	3.85	0	13
Total	51	6.68	4.24	0	13
Fixed-do					
School C	40	6.97	3.36	1	13
School D	35	4.31	3.83	0	14
Total	75	5.83	3.79	0	14
Control					
School E	26	4.86	3.80	0	15
School F	29	2.45	2.00	0	8
Total	55	3.59	3.16	0	15
*Post-test 1&2***					
Movable-do					
School A	26	19.33	4.92	3	28
School B	25	12.06	6.70	0	26
Total	51	15.76	6.86	0	28
Fixed-do					
School C	40	16.31	5.12	5	24
School D	35	10.66	6.80	0	29
Total	75	13.79	6.60	0	29
Control					
School E	26	10.85	7.28	0	28.5
School F	29	6.72	7.00	2	13
Total	55	8.67	5.91	0	28.5

** - Max. = 15, ** - Max. = 30*

Table 4-8. Kolmogorov-Smirnov normality test results for the post-test scores by school and pedagogy

Pedagogy	*Skewness*	*Kurtosis*	*K-S (Z)*	*K-S p-Value*
Post-test 1				
Movable-do				
School A	-1.08	0.97	0.145	0.15
School B	-0.58	-0.17	0.072	0.15
Total	-0.74	0.01	0.098	0.15
Fixed-do				
School C	-0.35	-0.83	0.140	0.05
School D	0.33	-0.61	0.085	0.15
Total	-0.20	-0.91	0.086	0.15
Control				
School E	0.71	-0.20	0.101	0.15
School F	0.95	0.35	0.128	0.15
Total	1.06	0.81	0.119	0.05
Post-test 2				
Movable-do				
School A	-0.68	1.01	0.065	0.15
School B	0.85	0.18	0.145	0.15
Total	-0.08	-1.03	0.066	0.15
Fixed-do				
School C	0.04	-0.98	0.060	0.15
School D	0.84	0.15	0.084	0.15
Total	0.23	-0.82	0.054	0.15
Control				
School E	1.31	1.41	0.152	0.12
School F	1.10	1.68	0.108	0.15
Total	1.77	3.72	0.139	0.01
Post-test 1&2				
Movable-do				
School A	-1.30	3.92	0.164	0.07
School B	0.13	-0.31	0.056	0.15
Total	-0.53	-0.34	0.108	0.14
Fixed-do				

Table 4-8. Continued

Pedagogy	*Skewness*	*Kurtosis*	*K-S (Z)*	*K-S p-Value*
School C	-0.68	-0.17	0.118	0.15
School D	0.61	0.23	0.096	0.15
Total	-0.22	-0.66	0.097	0.09
Control				
School E	1.19	0.90	0.216	0.01
School F	0.39	-0.98	0.097	0.15
Total	1.66	3.27	0.157	0.01

Table 4-9**.** Descriptive statistics for total sight-singing pre-test and post-test (*N* = 181**)**

Pedagogy		*Pre-test*		*Post-test*		*Difference Score*
	n	*M**	*SD*	*M**	*SD*	*Mean**s*
Movable-do						
School A	26	6.94	4.46	19.33	4.92	12.39
School B	25	4.96	3.15	12.06	6.70	7.10
Total	51	5.97	3.97	15.76	6.86	9.79
Fixed-do						
School C	40	4.68	2.35	16.31	5.12	11.63
School D	35	5.76	4.95	10.66	6.80	4.90
Total	75	5.24	3.83	13.72	6.60	8.48
Control						
School E	26	9.06	7.70	10.85	7.28	1.79
School F	29	5.41	3.40	6.72	3.42	1.31
Total	55	7.14	6.06	8.67	5.90	1.53

*points possible = 30
**Difference Score Means–difference between post-test score means and pre-test score means

Table 4-10. Descriptive statistics for the distribution of pre-test pitch and contour accuracy scores by school and treatment

Pedagogy	*N*	*M*	*SD*	*Minimum*	*Maximum*
Pre-test Pitch Accuracy					
Movable-do					
School A	26	5.02	2.84	0	12
School B	25	3.52	2.24	0	9.5
Total	51	4.28	2.65	0	12
Fixed-do					
School C	40	3.51	1.95	0	7
School D	35	4.07	3.09	0	15
Total	75	3.82	2.56	0	15
Control					
School E	26	6.00	4.81	0	17
School F	29	3.83	4.00	0	13
Total	55	4.86	3.86	0	17
Pre-test Contour Accuracy					
Movable-do					
School A	26	1.92	1.85	0	8
School B	25	1.44	1.32	0	4.5
Total	51	1.69	1.61	0	8
Fixed-do					
School C	40	1.16	1.03	0	4
School D	35	1.69	2.17	0	10
Total	75	1.42	1.68	0	10
Control					
School E	26	3.06	3.21	0	12
School F	29	1.59	2.00	0	5
Total	55	2.28	2.49	0	12

Table 4-11. Kolmogorov-Smirnov normality test results for the distribution of pre-test pitch and contour accuracy scores by school and treatment

Pedagogy	*Skewness*	*Kurtosis*	*K-S (Z)*	*K-S p-Value*
Pre-test Pitch Accuracy				
Movable-do				
School A	0.22	0.21	0.04	0.15
School B	0.71	0.75	0.08	0.15
Total	0.51	0.23	0.05	0.15
Fixed-do				
School C	-0.19	-0.50	0.06	0.15
School D	1.33	3.25	0.10	0.15
Total	1.14	3.85	0.09	0.11
Control				
School E	0.65	-0.12	0.10	0.15
School F	0.07	-0.79	0.05	0.15
Total	1.06	1.44	0.10	0.15
Pre-test Contour Accuracy				
Movable-do				
School A	1.47	3.41	0.09	0.15
School B	0.38	-0.71	0.07	0.15
Total	1.31	3.30	0.06	0.15
Fixed-do				
School C	0.67	0.04	0.06	0.15
School D	2.03	5.21	0.17	0.01
Total	2.36	8.56	0.15	0.01
Control				
School E	1.34	1.21	0.21	0.01
School F	0.74	0.36	0.05	0.15
Total	1.93	4.29	0.16	0.01

Table 4-12. Descriptive statistics for the distribution of post-test pitch and contour accuracy scores by school and treatment

Pedagogy	*N*	*M*	*SD*	*Minimum*	*Maximum*
Post-test Pitch Accuracy					
Movable-do					
School A	26	11.54	3.10	0	16
School B	25	7.36	3.82	0	15
Total	51	9.49	4.03	0	16
Fixed-do					
School C	40	9.33	3.17	3	14
School D	35	6.31	4.34	0	17
Total	75	7.99	4.06	0	17
Control					
School E	26	7.11	4.34	0	17
School F	29	4.10	4.00	1	7
Total	55	5.53	3.66	0	17
Post-test Contour Accuracy					
Movable-do					
School A	26	7.79	2.22	3	13
School B	25	4.70	3.18	0	11
Total	51	6.27	3.12	0	13
Fixed-do					
School C	40	6.97	2.39	0.5	10.5
School D	35	4.34	2.84	0	12
Total	75	5.81	2.91	0	12
Control					
School E	26	3.73	3.28	0	12
School F	29	2.62	2.00	0	7
Total	55	3.15	2.58	0	12

Table 4-13. Kolmogorov-Smirnov normality test results for the distribution of post-test pitch and contour accuracy scores by school and treatment

Pedagogy	*Skewness*	*Kurtosis*	*K-S (Z)*	*K-S p-Value*
Post-test Pitch Accuracy				
Movable-do				
School A	-2.16	6.94	0.16	0.10
School B	0.14	-0.17	0.09	0.15
Total	-0.67	-0.24	0.11	0.15
Fixed-do				
School C	-0.68	-0.34	0.09	0.15
School D	0.42	-0.21	0.08	0.15
Total	-0.29	-0.64	0.08	0.15
Control				
School E	0.80	0.30	0.16	0.1
School F	-0.00	-1.23	0.08	0.15
Total	1.27	2.07	0.13	0.03
Post-test Contour Accuracy				
Movable-do				
School A	0.42	0.50	0.08	0.15
School B	0.39	-0.42	0.08	0.15
Total	-0.15	-0.32	0.09	0.15
Fixed-do				
School C	-0.66	-0.02	0.09	0.15
School D	0.65	0.38	0.07	0.15
Total	-0.16	-0.74	0.06	0.15
Control				
School E	1.12	0.82	0.14	0.15
School F	0.93	0.78	0.08	0.15
Total	1.53	2.79	0.13	0.04

Table 4-14. MANCOVA for total post-test with SVDM post- test, IMMA tonal subtest, pre-test scores and number of solfege sessions as covariates (*N* = 181)

Source	*DF*	*Seq SS*	*MS*	*F*	*p*
Pedagogy	2	162.59	74.35	4.24	0.016*
School (pedagogy)	3	1125.73	245.14	13.98	0.0005**
SVDM pre-test	6	721.94	120.32	6.86	0.0005**
IMMA raw	1	255.75	3.67	0.21	0.648
Number of sessions	1	2030.79	35.82	2.04	0.155
Total pre-test	1	1054.10	379.20	21.63	0.0005*
Error	162	2839.79	17.53		
Total	176	8190.69			

Note. * $p < .05$; ** $p < .001$; S = 4.18683; R-Sq = 65.33%

Table 4-15. Distribution of scores on sight-singing total pre-test by the level of SVDM pre-test (*N* = 181)

Level	*N*	*M**	*SD*
Singer	47	9.31	6.19
Inconsistent Singer	22	5.88	2.89
Initial Range Singer	36	5.72	4.45
Inconsistent Initial Range Singer	17	5.64	2.59
Limited Range Singer	37	4.28	2.66
Inconsistent Limited Range Singer	9	2.50	1.69
Speaking Range Singer	13	2.69	2.24

* points possible = 30

Table 4-16. Distribution of scores on sight-singing total post-test by the level of SVDM post-test (*N* = 181)

Level	*N*	*M**	*SD*
Singer	61	17.50	5.89
Inconsistent Singer	31	15.33	5.75
Initial Range Singer	26	11.30	4.88
Inconsistent Initial Range Singer	24	8.14	5.34
Limited Range Singer	27	8.37	5.26
Inconsistent Limited Range Singer	5	5.10	2.96
Speaking Range Singer	7	2.28	2.29

*points possible = 30

Table 4-17. Significance level matrix for Tukey a Pairwise Comparisons among pedagogical approaches for total post-test score ($N = 181$)

Pedagogy		*Fixed-do*	*Movable-do*
	M	13.79	15.76
Control Group	8.67	0.90	0.99
Fixed-do	13.79		0.01*

Note. * $p < .05$

Table 4-18. Regression analysis for total sight-singing score versus number of solfege sessions, IMMA tonal subtest score, SVDM pre-test score and total pre-test score

Predictor	*Coef*	*SE Coef*	*T*	*p*
Number of sessions	0.60	0.084	7.12	0.0005**
IMMA raw score	-0.07	0.091	-0.81	0.417
SVDM pre-test	2.7936	0.4415	6.33	0.0001**
Total pre-test	0.54723	0.09029	6.06	0.0005**

**$p < .001$; S = 4.7932; R – Sq = 54.3 %

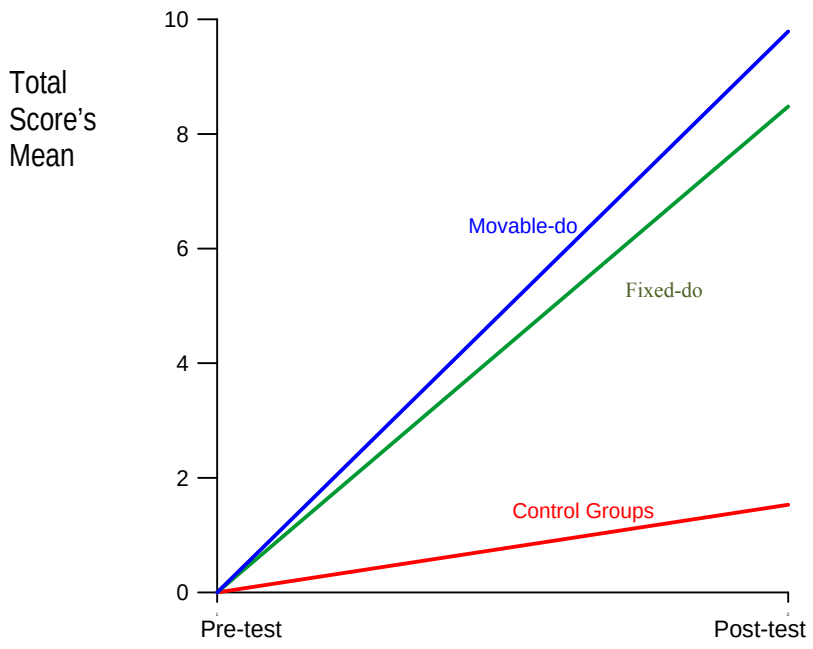

Figure 4-1. Difference between pre-test and post-test total score's means.

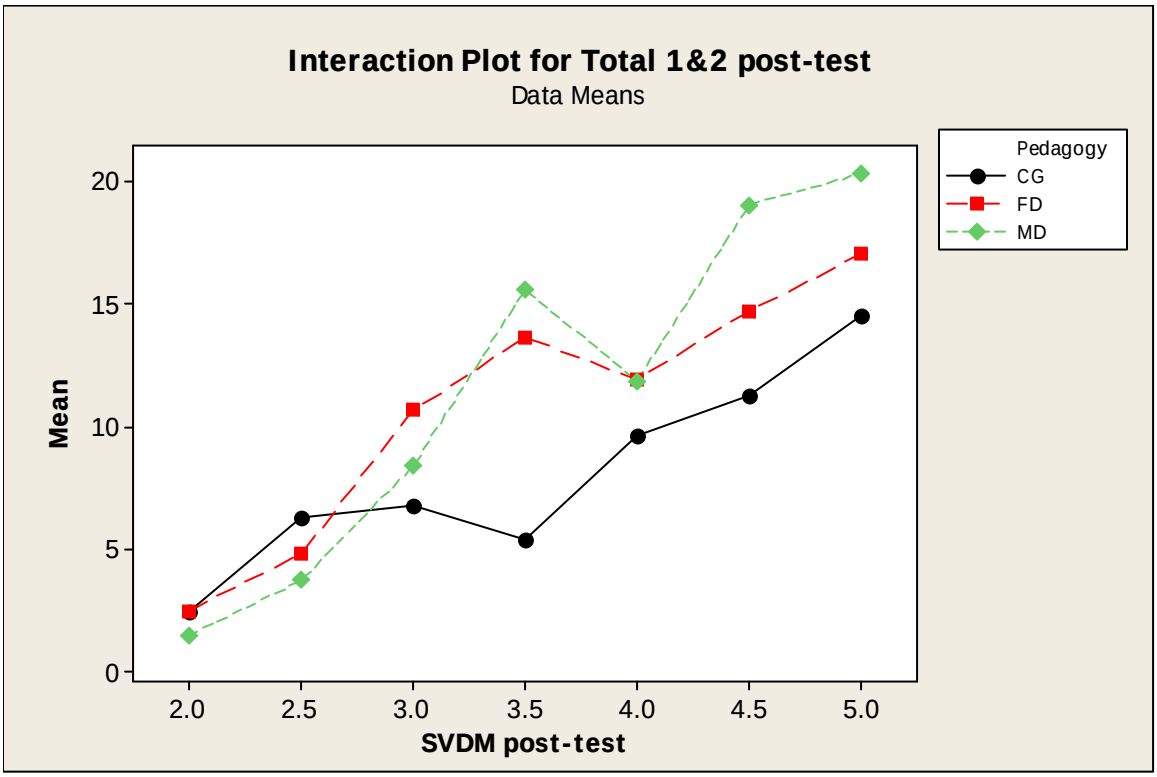

Figure 4-2. Interaction plot for total sight-singing post-test with SVDM post-test. The Y-axis presents mean for total sight-singing post-test. The X-axis presents levels of SVDM post-test.

CHAPTER 5
DISCUSSION

Summary

The purpose of this study was to examine the effect of different pedagogical approaches to solfege instruction on sight-singing achievement in 7- and 8-year-old children. Participants included six experienced music teachers and 181 second grade students in twelve music classes in a public school system in North Central Florida. Each school was randomly assigned a treatment condition with each teacher in that school applying that specific treatment. Four classes from two schools were randomly assigned to movable-do groups; these students participated in movable-do solfege instruction. Four classes from two other schools were randomly assigned to fixed-do groups; these students participated in fixed-do solfege instruction. Four classes from the remaining two schools were assigned to be the control group. These students did not receive any solfege instruction; rather, they participated in other singing and music reading activities.

The solfege instruction was carried out in ten twenty-minute sessions during regular music classes in the spring 2008 school semester. Prior to the instructional treatments, all children were given a battery of assessments. The Intermediate Measures of Music Audiation (IMMA) test was administered to measure tonal aptitude; the Singing Voice Development Measure (SVDM) was given to provide a measure of singing voice development. Two researcher-designed sight-singing tests provided a measure of sight-singing skill.

Instructional procedures to solfege instruction were standardized and scripted; lesson plans for every lesson in each experimental condition were provided by the researcher to the teachers. The music teachers who carried out the experimental instructional treatments participated in pre-service and in-service training. Following the instructional treatment period, the two sight-

singing tests and the SVDM were re-administered to assess the treatment effects. The recordings of all sight-singing tests and the SVDM test were randomly prepared for scoring. Three judges, blind to all conditions, independently listened to the performances and scored the tests according to a pre-set scoring procedure. Each sight-singing test was rated by the judges in two dimensions of sight-singing performance: pitch accuracy and contour accuracy. Results indicated that the movable-do solfege groups had the best improvement. MANCOVA procedures revealed significant ($\lambda = .00$, $p < .001$,) variability among the schools within the pedagogical approach, and significant ($\lambda = .00$, $p < .05$,) differences among pedagogical approaches. Regression procedures revealed that SVDM pre-test scores, number of solfege sessions, and results on pre-test scores, were significant predictors of scores on the sight-singing post-tests ($p < .001$). However, tonal aptitude, as measured by IMMA tonal subtests was not a predictor of sight-singing achievement ($p = .41$).

Conclusions

The present findings lead to the following conclusions:

- Solfege instruction in a general music setting was effective in improving the sight-singing ability of 7- and 8-year-old students. Pitch accuracy and contour accuracy improved significantly in all experimental classes.
- The use of movable-do solfege during instruction was more effective than that of fixed-do solfege instruction in helping the students learn to sight-sing.
- Variability between the schools within the pedagogical approach suggests that the teacher effect and other uncontrolled factors within each individual school were very influential in children's sigh-singing development.
- Sight-singing achievement correlated with singing voice development as measured by SVDM.
- Children's singing voice development improved after experimental treatment.
- Tonal aptitude, as measured by the IMMA tonal subtest, was not a predictor of sight-singing achievement.

Research Questions

The first research question which guided this study was: What is the effect of sequential and regular movable-do solfege instruction on children's sight-singing achievement? The results of the study reveal that movable-do instruction based on Conversational Solfege method was highly beneficial for the students. Ten sessions of solfege instruction significantly improved sight-singing achievement in singing tonal patterns of *do, re, mi,* and *sol, la, mi* of 7- and 8-year-old children. Their scores increased by 9.79 points from the pre-test (M = 5.97) to the post-test (M = 15.76). Teachers indicated that children really enjoyed the solfege activities recommended in the Conversational Solfege method and were eager to learn more.

The second question was: What is the effect of sequential and regular fixed-do solfege instruction on children's sight-singing achievement? Fixed-do solfege instruction was also helpful in improving the students' sight-singing abilities. The results indicate that the sight-singing scores increased by 8.48 points from the pre-test M = 7.14 to the post-test M = 13.72. According to the teachers' feedback, children enjoyed playing the game "This is the sound of middle do," writing music notation, notating short music dictations, and creating new patterns.

The third research question was: What is the relationship between the level of singing voice development as measured by the Singing Voice Development Measure (Rutkowski, 1990, 1996) to sight-singing performance? Sight-singing achievement was significantly correlated with singing voice development as measured by SVDM ($p < .001$). Results indicate that children with higher levels of singing voice development demonstrated better results on sight-singing tests. For example, the mean score for children identified as Singers was M = 17.5 on the post-test versus M = 2.28 for children identified as Speaking Range Singers. It is important to note that children's singing voice development improved after experimental treatment in both movable-do and fixed-do groups. During the experimental treatments, children were involved in

approximately 20 minutes of singing activities. These results corroborate other research findings (Rutkowski, 1996; Rutkowski & Miller, 2003) that suggest that small-group singing activities contribute to children's acquisition of the use of singing voice.

The final research question was: What is the relationship between sight-singing achievement, tonal aptitude, and the number of solfege sessions? Tonal aptitude, as measured by the IMMA tonal subtest, was not a predictor of sight-singing achievement. However, the results indicate that the number of solfege sessions influenced the scores on sight-singing tests. Children who attended all solfege sessions typically demonstrated better sight-singing achievement than the children who had missed some lessons.

Discussion

Even though the groups which used the movable-do solfege approach had the highest gain in sight-singing achievement, the researcher believes that no system can explicitly be regarded as the most effective approach in teaching sight-singing to 7- and 8-year-old children. The study's findings reveal that effective sight-singing pedagogy may have more to do with the school context and teachers' and children's previous musical experience than with the sight-singing system itself. In other words, the process and the teacher appear to be more influential than the tool (sight-singing pedagogical approach). Even though teachers had the same lesson plans, and the same class size, and their classes met at approximately the same time (around10-12 a.m.), the variability among the schools was highly significant ($\lambda = .00$, $p < .001$,). This outcome supports Justus' (1974) statement:

> It matters little which "method" one chooses, the real importance lies in the instructor's confidence in his plan, his diligence in applying it, and his trust in his students' ultimate ability to achieve success. Know what you want to do . . . organize for it. . . work hard at it. . . and things will happen which will amaze both you and your singers" (p. 10).

It appears that the teaching method is important, but school context, students' musical background, and the teacher's knowledge, skills, enthusiasm, and organizational skills are as crucial.

A number of unexpected difficulties influenced the duration of this experimental treatment. The waiting period for obtaining the permission of the IRB, the school district, and the school principals, and the consent of the parents/guardians, was approximately two months. Administration of the testing procedures took a longer time than expected. Most of the teachers expressed interest to continue the study in the following fall 2008 semester; however, unexpected budget cuts forced the school district to eliminate half of the instructional time/load allocated for music. Most of the teachers who participated in the study were either forced to change schools, or, in some cases, career paths. As a result of the budget cuts, this research study had to be discontinued at the end of spring 2008.

After the completion of the instructional treatment and data collection for the study, the researcher met with each of the teachers who carried out the solfege instruction in order to solicit comments about the instructional treatments and recommendations for future research. All teachers stated that the children in their classes were excited to learn solfege. The teachers thought the pitches of *do, re,* and *mi* and *sol, la,* and *mi* were appropriate for instruction of second graders. Teachers also thought that 20minutes of solfege instruction was appropriate and manageable for children at this grade level. The teachers who carried out the movable-do solfege instruction indicated that the children really enjoyed playing decoding games, creating new patterns and writing tonal patterns.

The favorite activities of children in fixed-do groups were writing music notation, playing the game "This is the sound of middle *do*," and creating patterns. After evaluating the results,

the researcher observed that while many children in fixed-do experimental groups were able to name the syllables correctly, they were unable to sing the correct pitches. While the main goal of solfege instruction is to develop audiation, i.e., the ability to internally hear the notation patterns, it is important to note that even though some children were unable to sing pitches and counters correctly, they were able to recognize the notes. This is a skill that could possibly benefit them in future instrumental study.

The researcher believes that introducing the pedagogy of teaching solfege in music teacher training programs is necessary. As indicated in several research studies (McClung, 1996; Smith, 1998; Verrastro & Leglar, 1992), some teacher preparation programs fail to provide music education majors with the necessary and appropriate methods and sequences to teach sight-singing effectively. In teacher preparation programs, we need to emphasize the importance of teaching music literacy skills and to teach sight-singing methodology which can be easily implemented in the general music classroom. The researcher has been incorporating solfege pedagogy in her undergraduate courses, which has resulted in the students' consistent implementation of solfege instruction in their lesson plans, field study experiences, and student teaching.

Implications for Music Education

Music education professionals continually strive to improve their teaching methods and elevate the music and academic achievement of their students. Previous research studies have documented the need to improve sight-singing skills among children in all grades. Researchers have examined various aspects of teaching and learning sight-singing in order to improve the effectiveness and efficiency of instructional practices. Accordingly, the researcher specifically investigated the effect of pedagogical approach on the development of sight-singing achievement of second grade children. The results revealed that the overall improvement in sight-singing was

considerable for all groups, with significantly greater improvement for students in the experimental groups, indicating that the solfege instruction improved second grade students' sight-singing performance in a general music setting.

Even though this study was limited to only ten solfege sessions, the pitch accuracy and the contour accuracy in singing tonal patterns of the pitches of *do, re, mi* and *sol, la, mi* improved significantly in all experimental schools as well children's singing voice development. Based on the results of the study and reflections of participating teachers, the Conversational Solfege method proved to be a very effective method for teaching sight-singing at the elementary school level. The researcher recommends for teachers explore, learn, and implement Conversational Solfege during their regular music classes. The researcher further believes that the systematic, regular, and consistent usage of solfege instruction will greatly help to build music programs that enables students to become independent musical thinkers who can hear, understand, read, write, compose, and improvise.

Zoltan Kodály (1974) wrote: "Often a single experience will open the young soul to music for a whole lifetime. This experience cannot be left to chance. It is the duty of the school to provide it″ (p.120). Music classes in elementary schools should engage children in music activities that nurture the love and understanding of music. When children grow up, most of them will become consumers of music at some level; hopefully, some of them will continue to be active music-makers. The ability to read music will help students to acquire musical independence in many different ways. The ability to sight-sing will enable students to produce music with the most natural instrument, their voice, and will help them to become musically literate in the true sense of the word.

Feierabend (1997) indicated that true music literacy is when someone is able to hear what is seen and see what is heard. If teachers provide students with sequential and regular sight-singing experiences throughout their elementary years, most students will develop these music literacy competencies to a reasonable degree and possibly continue their participation in music. The national standards for music education promote the goal of teaching students how to sing and read music notation. School music classes the only place where most children will have the opportunity to develop these skills. Music teachers need to keep in mind that by teaching sight-singing and music reading skills in their classrooms, they plant the seeds for their students' lifelong involvement with music.

Recommendations

For Teachers

To extend the findings of the present study, the researcher believes that the following recommendations should be considered.

Prior to learning music reading and sight-singing, children need to develop a variety of basic music skills, including: (a) the ability to match pitch; (b) aural perception (ability to hear same or different sounds or patterns); (c) singing voice developed at the level of Limited Range Singer or higher (according to the Singing Voice Development Measure) ;and (d) sufficient repertoire of folk songs and singing games.

An organized, sequential and developmentally appropriate curriculum is needed. A systematic structure, regular and consistent usage, and developmentally appropriate materials are crucial in the development of sight-singing skills. Development of music reading and sight singing skills is a multi-level and lengthy process. Starting with second grade students, teachers should dedicate at least 10-15 minutes of each music lesson to solfege instruction. This would help students to become rather proficient sight readers by the time they enter middle school.

A sound before symbol approach, or, in another words, learning to understand music by ear before learning to read and write music, should be emphasized in teaching sight-singing and music reading. Students need to have a variety of musical experiences and intuitively comprehend musical sounds first, and then link this knowledge to an understanding of musical symbols. As many educators recommend, students should have multiple aural experiences with music before notation is introduced. The fixed-do approach requires visual reinforcement and theoretical training from the beginning; however, it also requires a variety of experiences with music before the introduction of symbols.

Visual and kinesthetic reinforcement is necessary in every music lesson. Every lesson should include a variety of music activities, including singing, moving, listening, reading, writing, and composing, thus providing a multi-sensory approach to music instruction.

Inclusion of acapella singing (singing without accompaniment) is highly recommended. The teacher, not the piano or CD, should be the vocal model for the children.

For Researchers

Most elementary classroom teachers seem to make pedagogical decisions about which sight-singing method to use with little empirical evidence; they are often guided by their previous training and/or personal preference. This study offers a starting platform and provides useful, practical information regarding fixed- vs. movable-do. The fact that the experimental treatment was only for 10 sessions limits the strength of the findings to some extent. A longitudinal study investigating the best sight-singing pedagogy for elementary age children is necessary. The results of this study indicate a high variability between the schools within the pedagogical approach which show that teacher characteristic did affect the results of the study. To control for the "teacher effect" it is suggested using the same teacher for experimental groups One and Two, to teach both movable-do and fixed-do solfege.

The sight-singing instruction and the tests in the current study included only five pitches: *do, re, mi, fa, sol,* and *la.* Studies which include more pitches in different keys in sight-singing patterns and exercises are needed.

The results also revealed that movable-do solfege instruction based on the Conversational Solfege method resulted in better sight-singing achievement. However, it is not significant enough to recommend the exclusive use of that method. More research is needed to clarify the best sight-singing pedagogy for elementary school children. A year-long study about the effect of Conversational Solfege method on sight-singing ability is recommended for future investigations. It would be beneficial to test the progress of children's sight-singing development as they advance through each of the 12 steps of that approach.

The Conversational Solfege sequence begins with *do, re, mi* patterns; however, Kodály's sequence starts with *sol-mi* patterns. Thus, future research might attempt to discover which sequence is more effective in terms of children's musical development.

The development of other skills as a result of solfege instruction can also be the focus of future investigations. For example, what are the effects of solfege instruction on the development of the students' verbal association and verbal generalization skills? It practical to study how different types of music activities benefit the development of sight-singing skills. For example, how does writing music notation or/and dictation reinforce students' aquisition of sight-singing skill?

During the fixed-do solfege instruction in the present study, children learned basic music theory. The question is: How much exposure to theoretical foundations is necessary for successful development of sight-singing skills, and to what extent? Also, how effective are

fixed-do solfege games such as “This is the sound of middle do” in developing pitch reinforcement and pitch memory?

The assessment of sight-singing instruction of elementary children can be another subject for investigation. The researcher admits that more patterns should be presented to the children so as to ensure more accurate results. The use of combinations of familiar patterns (the ones that were practiced in class) and unfamiliar patterns (those that they never practiced) could be beneficial to validate the results of the study. During the sight-singing tests in this study, the children may have recognized some of the patterns that were practiced in class and possibly recalled the sounds of those patterns by using long-term memory. In these instances, the children may not have been sight-singing in the strictest sense of the term. Investigation of the optimal length and number of tonal patterns for sight-singing assessment can be another theme for investigation.

The Conversational Solfege method is based on the movable-do approach of teaching sight-singing in elementary school level. To date, there is no American adaptation of the fixed-do solfege method for elementary school; therefore, there is an opportunity for educators and researchers to develop a fixed-do sequential method for teaching sight-singing at the elementary level.

Future researchers need to continue to examine different instructional approaches and practices for teaching music literacy skills in elementary general music classroom. The vital goal of this research is to have more students benefit from sight-singing pedagogy, and to help them to reach higher levels of musical understanding and enjoyment.

APPENDIX A
INSTITUTIONAL REVIEW BOARD APPROVAL

UF | Institutional Review Board
UNIVERSITY of FLORIDA

PO Box 112250
Gainesville, FL 32611-2250
352-392-0433 (Phone)
352-392-9234 (Fax)
irb2@ufl.edu

DATE: January 15, 2008

TO: Alena Holmes
PO Box 117900
Campus

FROM: Ira S. Fischler, PhD; Chair
University of Florida
Institutional Review Board

SUBJECT: **Approval of Protocol #2007-U-1128**

TITLE: Investigation of the Effect of Fixed-do and Movable-do Solfege Instructions on Tonal Skills Development of 7 and 8 year old children

SPONSOR: None

I am pleased to advise you that the University of Florida Institutional Review Board has recommended approval of this protocol. Based on its review, the UFIRB determined that this research presents no more than minimal risk to participants. Given your protocol, it is essential that you obtain signed documentation of informed consent from the parent or legal guardian of each participant. When it is feasible, you should obtain signatures from both parents. Enclosed is the dated, IRB-approved informed consent to be used when recruiting participants for the research.

> It is essential that the parents/guardians of your minor participants sign a copy of your approved informed consent that bears the IRB approval stamp and expiration date.

If you wish to make any changes to this protocol, ***including the need to increase the number of participants authorized***, you must disclose your plans before you implement them so that the Board can assess their impact on your protocol. In addition, you must report to the Board any unexpected complications that affect your participants.

If you have not completed this protocol by **January 7, 2009**, please telephone our office (392-0433), and we will discuss the renewal process with you. It is important that you keep your Department Chair informed about the status of this research protocol.

ISF:dl

APPENDIX B
PARENTAL CONSENT

Department of Music
PO Box 117900
University of Florida
Gainesville, FL 32611-7900

Parental Consent

Dear Parent/Guardian,

I am a PhD student in the Department of Music at the University of Florida, conducting doctoral dissertation research under the supervision of Dr. Timothy Brophy on the development of sight–singing skills of elementary school children. The purpose of this study is to determine the effect of different approaches to sight–singing instruction on acquiring music skills to accurately sing and read music. The results of the study may help teachers to find the best instructional practices which will benefit children's musical development. With your permission, I would like to ask your child to participate in this research.

The study includes administration of short music aptitude test and singing test which will last approximately 20 minutes each. The procedure will be presented by your child's music teacher during regular music class period. With your permission, your child will be audio taped during the test period. The audio tape will be accessible only to the investigator for research purposes. At the end of the study, the tape will be erased. Although the children will be asked to write their names on the music aptitude test, their identity will be kept confidential to the extent provided by law. I will replace their names with code numbers. Results will only be reported in the form of group data. Participation or non- participation in this study will not affect the children's grades or placement in any program.

You and your child have the right to withdraw consent for your child's participation at any time without consequence. There are no known risks or immediate benefits to the participants. No compensation is offered for participation. Group results of this study will be available in July upon request. If you have any questions about this research protocol, please contact me at 352-505-6622 or my faculty supervisor, Dr. Timothy Brophy, at 352-392-0223 x222. Questions or concerns about your child's rights as research participant may be directed to the IRB02 office, University of Florida, Box 112250, Gainesville, FL 32611, (352) 392-0433.

Alena Holmes

I have read the procedure described above. I voluntarily give my consent for my child, _____, to participate in Alena Holmes's study of development of sight-singing skills. I have received a copy of this description.

_____ _____
Parent / Guardian Date

Approved by
University of Florida
Institutional Review Board 02
Protocol # 2007-U-1128
For Use Through 1/07/2009

APPENDIX C
SAMPLE OF MOVABLE-DO SOLFEGE LESSON

(Adapted from *Conversational Solfege* by John Feierebend)

Lesson 2 *Rote Solfege Activities* (Duration -20 minutes)

Objective
Introduce the tonal patterns by rote with solfege syllables. Develop the bond of tonal patterns with aural labels.

1. Echo This Pattern
   - Teacher sings tonal patterns with neutral syllable *loo*. Tonal patterns include different combinations of *do, re* and *mi.*
   - Students repeat each tonal pattern with the same neutral syllable.

2. Echo Me
   - Teacher sings tonal patterns with solfege syllables (all 24 combinations of *do, re* and *mi*).
   - Students repeat each tonal pattern with solfege syllables.

3. The Missing Link
   - Teacher sings a pattern of *do, re* and *mi* with solfege syllable for the class to inner hear and memorize.
   - Teacher sings the pattern again, leaving out one tone.
   - Students are asked to sing the tone that was left out.
   - Do the same exercise with other patterns. If the children sing the wrong tone, repeat the pattern again.

4. "Decoding Game".
   a. Teacher sings four tonal patterns with solfege, students echo it.
   b. Fifth tonal pattern teacher sings on neutral syllable "loo", students are expected to decode it and sing with correct solfege syllables.
   c. If the students have trouble decoding it, teacher helps them. Repeat this game with all 24 patterns.

5. Human Piano
   - Divide the class into groups.
   - Assign each group a pitch – *do* or *re* or *mi*
   - Ask each group to sing the assigned tone when they are pointed to.
   - "Play" familiar patterns and "Closet Key" song on human piano.

APPENDIX D
SAMPLE OF FIXED-DO SOLFEGE LESSON

Lesson 2 (Duration —20 minutes)

Objective
Reinforce the recognition and pitch matching ability of note *do*. Introduce notes writing techniques: notes on line and in spaces. Introduce tonal pattern of *do*, *re and mi* aurally and visually.
Procedures:

1. Teacher emphasizes that note *do* is a musical note so it has particular sound. Teacher sings the song "This is a sound of middle *do.*" Children join singing "This is the sound of middle *do.*"

2. Game "Is this a sound of note *do*?" Teacher sings different notes and asks children to recognize if this is a sound of *do.* If not, children say "no" and show with their hand if it is lower then *do* or higher then *do.*

3. Teacher shows how to draw a note *do* on a ledger line on the board. Teacher sings "This is the sound of middle *do*" while pointing at the note on the board. Children join in singing that song.

4. Teacher introduces a friendly neighbor –note *re,* which lives under the music staff and a step above *do.*

5. Teacher emphasizes that because *re* lives one step above the *do*, so the sound of *re* will be one step higher then *do*. Teacher sings the sound of re and asks children to try to match it.

6. Teacher draw the patterns of *do, re, do; do, do, re; do, re, re; re, do, do; re, do, re; re, re, do.*

7. Teacher sings these tonal patterns while pointing at each note on the board. Children echo teacher as teacher continue to point at each note on the board.

8. Human Piano
    a. Divide the class into groups.
    b. Assign each group a pitch – *do* or *re*
    c. Ask each group to sing the assigned tone when they are pointed to

9. Teacher gives students plastic boards and asks to write note *do* on the ledger line.

10. Teacher explains how to write note *re*. Students write the note *re* on their plastic boards.

11. Teacher sings tonal pattern of *do, re, do; do, do, re; do, re, re; re, do, do; re, do, re; re, re, do* and asks students to write it on their boards.

APPENDIX E
TONAL PATTERNS FOR SIGHT-SINGING TESTS

Test 1

do, do, re	*re, re, do*	*mi, mi, do*
do, re, do	*re, do re*	*mi, do, mi*
do, re, re	*re, re, mi*	*mi, mi, re*
do, do, mi	*re, mi, re*	*mi, re, mi*
do, mi, do	*re, do, do*	*mi, do, do*
do, mi, mi	*re, mi, mi*	*mi, re, re*
do, re, mi	*re, do, mi*	*mi, do, re*
do, mi, re	*re, re, do*	*mi, mi, do*

Test 2

mi, mi, sol	*sol, sol, mi*	*la, la, mi*
mi, sol, mi	*sol, mi, sol*	*la, mi, sol*
mi, sol, sol	*sol, sol, la*	*la, la, sol*
mi, mi, la	*sol, la, sol*	*la, sol, la*
mi, la, mi	*sol, mi, mi*	*la, mi, mi*
mi, la, la	*sol, la, la*	*la, sol, sol*
mi, sol, la	*sol, mi, la*	*la, mi, sol*
mi, la, sol	*sol, la, mi*	*la, sol, mi*

APPENDIX F
TESTING SCRIPT

Pre-test Testing Script

"I WANT TO SEE HOW WELL SECOND GRADE STUDENTS IN……SCHOOL CAN LEARN HOW TO READ MUSIC NOTES AND SING THEM CORRECTLY. TODAY I BROUGH YOU SPECIAL FLASHCARDS WITH MUSIC NOTES."
(Show the stack of the patterns)
LOOK AT THIS PATTERN ON FLASHCARD!
[Show the first pattern from the stack]
"I AM GOING TO SING THIS PATTERN FOR YOU AND SHOW YOU THE NOTES I AM SINGING ON THE MUSIC STAFF."
[Sing the pattern with syllable *loo* and point on each note]
"AFTER I SING THE PATTERN I WOULD LIKE YOU TO SING IT BACK TO ME WITH THE SAME PITCHES AS YOU LOOK AT THE MUSIC STAFF."
[Show the same pattern to the child. As the student sing point to each note.]
"NOW LETS PRACTICE SINGING OTHER PATTERN. FIRST TRY TO PRACTICE MATCHING YOUR VOICE TO THE SOUND OF THE FIRST NOTE."
[Researcher sing the first note, child echo it]
"NOW LISTEN HOW I SING THE PATTERN, THEN YOU TRY TO SING IT."
[Show another pattern; sing it and point to each note in the pattern.
"YOU TRY IT."
Point to each note again as the student sings.
"NOW YOU ARE READY TO TRY SOME ON YOUR OWN."
[Proceed with three more patterns in random order, except practice patterns.]

APPENDIX G
SCORING SHEET FOR SIGHT-SINGING TEST

Child #	Pattern #	Notes on the Pattern	Pitch Accuracy (Max. 3)	Counter (Max. 2)	Total Score (Max. 5)
1	Pattern 1 Pattern 2 Pattern 3	mdd mrd rrd			
2	Pattern 1 Pattern 2 Pattern 3	rmd rmm dmm			
3	Pattern 1 Pattern 2 Pattern 3	mrr mrm drm			
4	Pattern 1 Pattern 2 Pattern 3	rmr rdm rdr			
5	Pattern 1 Pattern 2 Pattern 3	rrm drm drd			
6	Pattern 1 Pattern 2 Pattern 3	mrr drr drm			
7	Pattern 1 Pattern 2 Pattern 3	mdr mdd mmd			
8	Pattern 1 Pattern 2 Pattern 3	mmd drd dmr			
9	Pattern 1 Pattern 2 Pattern 3	mdr ddr ddm			
10	Pattern 1 Pattern 2 Pattern 3	mrr mrm drm			
11	Pattern 1 Pattern 2 Pattern 3	mrd rrd mmd			
12	Pattern 1 Pattern 2 Pattern 3	mmd mrd mdd			
13	Pattern 1 Pattern 2 Pattern 3	mdr mdd mmd			
14	Pattern 1 Pattern 2 Pattern 3	mmd drd dmr			

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BIOGRAPHICAL SKETCH

Alena Holmes is an Assistant Professor and Coordinator of Music Education at the University of Wisconsin–Whitewater, where she is teaching music education courses including Early Childhood, Elementary and Middle School Music Methods, Pedagogy and Practice for Teaching General Music K-12 and Music as a World Phenomenon and supervising Students Teacher and Field Study.

Originally from Belarus, Ms. Holmes earned a bachelor's degree in music education from Belarusian State Pedagogical University, a Master of Education degree from the University of Oklahoma and a Doctor of Philosophy degree from the University of Florida. Alena Holmes started her career in her native country where she taught elementary classroom music, solfege, and piano skills, worked as a musician and singer with popular bands and concert organizations, and had numerous appearances on popular Belarusian TV and radio shows. She then worked as a singer, musician, and teacher in China, Bahrain, and Italy.

During her studies at the University of Florida Ms. Holmes taught courses Music in the Elementary Classroom and Fundamentals in Arts and Humanities. At the same time, she taught in the Florida public schools and ran her own innovative piano/solfege studio. Her instruction at the University of Florida landed her 2006 David Wilmot Prize for Excellence in Music Education. In 1993, while she was a student teacher at the Belarusian State Pedagogical University in Minsk, Belarus, she was awarded the Best Music Teacher's Award.

Ms. Holmes is increasingly active in presenting research papers and conducting workshops at music education conferences. She has presented at the International Society for Music Education Conference in Malaysia and Italy, Hawaii International conference on Arts and Humanities, Regional and National conferences of College Music Society, 18th International Kodály Symposium, First and Second Symposiums on Assessment in Music Education,

American Orff-Schulwerk National Conference, National Conference of Organization of American Kodály Educators and American Educational Research Association. Her research interests include the impact of solfege instruction on musical development of children, music education in Russia and Belarus, music education for general teachers, and the effect of music on second language acquisition.