TEACHING CHILDREN TO SING: AN EIGHT-WEEK STUDY

By
Kathleen Riggs
Liberty University

A MASTERS THESIS PRESENTED IN PARTIAL FULFILLMENT OF
THE
REQUIREMENTS FOR THE DEGREE
OF MASTER OF ARTS IN MUSIC EDUCATION

Liberty University
December 2022
TEACHING CHILDREN TO SING: AN EIGHT-WEEK STUDY

By
Kathleen Riggs
Liberty University

A Masters Thesis Presented in Partial Fulfillment
Of Requirements for the Degree
Master of Arts in Music Education

Liberty University, Lynchburg, VA
December, 2022

APPROVED BY:
Samantha Miller, D.M.A., Associate Professor of Music
Monica Taylor, Ph.D., Adjunct Professor of Music
Abstract

Teaching children to sing is both a powerful and practical way to enhance their quality of life. With careful instruction and a playful approach, children can be taught foundational singing skills, and develop a love for singing at a very early age. In many schools today, children learn songs in music classes but are not taught how to sing. Over the course of eight weeks, twelve children ages five to ten were taught to sing using Susan Kenney’s natural singing method detailed in “Seven Steps for Developing Successful Singing and Listening Habits.” Children participated in two group lessons and six individual lessons. In addition to Kenney’s singing method, children were provided with games and activities to encourage participation and focus on improvements in pitch, rhythm and breathing. Children were individually recorded at the beginning and end of the study to determine the efficacy of this method and its effect on children’s pitch, rhythm and breathing. Their pitch matching accuracy was measured with the help of an online pitch detector, rhythmic accuracy was tested against a metronome, and the length of their exhale was measured in seconds. By the end of the study, children showed overall improvements in all three of these areas. However, children developed more in pitch and breathing than they did rhythmically. An end-of-study survey revealed children in this study and their parents enjoyed this singing method.

**Key words:** music education, teaching, children, sing, singing naturally, pitch, rhythm, breathing, popular music, listening
Dedication/Acknowledgment

I wish to express my deepest appreciation to my husband for his support in this massive endeavor. For the hours of childcare, for his encouragement, for his sage advice, for the sacrifices he offered to smooth the path for me to pursue this dream, I will always be indebted.

For my dad, who always believed in my talent and pushed me to reach for the stars, I will always be grateful. Your spark, mentorship, and continuous pursuit of knowledge taught me that proper understanding is the grand quest of a lifetime.

Finally, I am eternally beholden to my Savior for His support in this journey. He has made my burdens light and strengthened me to meet what often felt like insurmountable challenges. Great is Thy faithfulness, great are Thy mercies, and wondrous are Thy works, O Lord!
Contents

Chapter 1: Introduction ....................................................................................................................1

Background ......................................................................................................................................1

  Statement of the Problem........................................................................................................3

  Statement of the Purpose ....................................................................................................4

  Significance of the Study .....................................................................................................5

  Research Questions ..............................................................................................................6

  Research Plan .......................................................................................................................7

  Definition of Terms..............................................................................................................7

Chapter Two: Literature Review ...................................................................................................13

  Development of Pitch and Range in Children ......................................................................17

    The Causes and Effects of Pediatric Muscular Tension and Vocal Damage......................19

  The Physiological Process of Singing ..................................................................................21

    Vocal Register ..................................................................................................................23

  How Age and Gender Affect the Voice ..................................................................................24

    The Pediatric vs. Adult Larynx .......................................................................................24

    Male vs. Female Laryngeal and Vocal Development .......................................................26

  Summary ............................................................................................................................32
# List of Tables

2.1 Differences Between the Pediatric and Adult Larynx .................................................25

4.1 Improvement in Pitch from Week 1 to Week 8 .............................................................47

4.2 Rhythmic Accuracy Analysis from Week 1 to Week 8 ....................................................49

4.3 Change in Breath Duration from Week 1 to Week 8 .....................................................50

4.4 Boys and Girls Total Correct Pitches ...........................................................................51

4.5 Boys and Girls Rhythmic Accuracy ..............................................................................52

4.6 Boys and Girls Total Length of Exhale .......................................................................53

4.7 Older and Younger Children Pitch Accuracy .................................................................54

4.8 Older and Younger Children Rhythmic Accuracy .........................................................55

4.7 Older and Younger Children Total Length of Exhale ....................................................56
Chapter One: Introduction

Music instructor Zoe Greenhalgh stresses, “Music has an infinite capacity to affect the brain and body. It can act as a unifying force and a vehicle by which other skills can be developed, enjoyed, and understood. As such, music can be a powerful means of learning.”¹

Using our voice is essential to musical self-expression and identity. Greenhalgh adds, “Our voice ...has profound links with our physical, social, emotional and intellectual well-being.”²

Even young children can express feelings in song.³ Keeping this powerful truth in mind, it makes sense to give children the tools to master their ability to express these feelings. Vocal music is the most accessible of all instrumental music. Therefore, teaching children to sing is a powerful and practical way to enhance their quality of life.

Background

Recent studies show that the pediatric larynx (or voice box), like the adult larynx, is more cylindrical than funnel-shaped.⁴ Even so, the child's larynx is exceptionally delicate, and incorrect vocal training at young ages could lead to injury. A statement made in 2003 by the American Academy of Teachers of Singing (AATS) concludes, “the necessary elements for singing—respiration, phonation, resonation, and articulation—are in place at a very early age. It follows that the opportunity to teach children to sing more efficiently and expressively can also

---

¹ Zoe Greenhalgh, Music and Singing in the Early Years (New York: Routledge, 2018), 11.
² Ibid.
occur at a very early age.\textsuperscript{5} They continue, “No scientific, pedagogical, or physiological evidence indicates that child voice pedagogy is inherently harmful to children's bodies, minds, or spirits.”\textsuperscript{6} The Academy further observes benefits to teaching children to sing, which include a lower likelihood than untrained singers to hurt their voices.\textsuperscript{7} They determine that teaching young children to sing should include “age-appropriate vocal exercises and repertoire that support the natural inclination of children to express themselves in singing and song.”\textsuperscript{8}

One study finds that “Singing requires coordination that goes beyond speech.”\textsuperscript{9} While proper vocal training involves sometimes complicated technical instruction; teachers should develop technical exercises for children that match their knowledge, experience, and understanding. Further, song selections should “challenge but do not overly tax the young body and mind.”\textsuperscript{10} In short, children should be taught to sing naturally in a way that provides a foundation for further vocal instruction.

In Susan Kenney’s “Seven Steps for Developing Successful Singing and Listening Habits,”\textsuperscript{11} she explains that while music classes in many schools teach children songs, children

\textsuperscript{5} “NATS Visits AATS [Teaching Children to Sing],” \textit{Journal of Singing - the Official Journal of the National Association of Teachers of Singing} 59, no. 5 (05, 2003): 377.

\textsuperscript{6} Ibid.

\textsuperscript{7} Ibid.

\textsuperscript{8} Ibid.


\textsuperscript{10} “NATS Visits AATS,” 377.

\textsuperscript{11} Susan Kenney, “Teaching Young Children How to Sing: One School’s Experience,” \textit{General Music Today} 24, no. 2 (January 2011): 54.
are not taught how to sing.  According to Kenney, “The earlier a child receives vocal instruction, the better.”

Statement of the Problem

Joanne Rutkowski reveals, “Despite the fact that singing has remained the most widely-used activity in the general music classroom, approximately 18% of students in sixth grade and younger have been observed as non-singers.” Not surprising, then, are the results of a study by Professor Valerie Trollinger of Kutztown University in Pennsylvania, which reports that “Approximately half of the five- and six-year-old children in a singing study displayed unhealthy vocalization habits.” Children cannot develop good vocal habits if good habits are not taught in the classroom or private study.

Music education today still suffers from neglect of children’s vocal training. Unless steps are taken to begin training voices correctly at a young age, they could develop damage to their delicate instruments or, over time, begin to consider themselves “non-singers” and become discouraged from singing. We will then increasingly become a nation of music consumers, with children who do not understand how to use their voices.

---

12 Kenney, “Teaching Young Children How to Sing,” 52.

13 Ibid.


17 Ibid.
Trollinger suggests that musicians should lean towards scientific facts to instruct children’s singing. Welch and White’s research on the developing voice asserts that an accepted “definition of normal, healthy singing” is not established. Much disagreement presently exists, therefore, on how to approach vocal teaching in children.

Researcher Debra Hedden adds, “Although there has been a genuine effort to share information about children’s singing through journals and books, the extant literature is not complete and is, thus, inconclusive.” Hedden’s statement suggests a gap in research that should be addressed. Existing literature on teaching children to sing would benefit from studies testing the efficacy of safe singing practices on children over time.

Statement of Purpose

This study seeks to implement the method used by Susan Kenney in “Seven Steps for Developing Successful Singing and Listening Habits” on individual children for eight weeks to determine if children’s pitch, rhythm, and breathing skills improve during that time. Kenney’s method includes the following steps for teaching children to sing: 1. Energize and align the body, 2. Love the breath, 3. Play with the voice, 4. Sing one pitch, 5. Sing two pitches, 6. Sing a short phrase, and 7. Add words to the phrase. In this article, Kenney’s details the implementation of these steps on groups of children in kindergarten and first-grade classrooms, and then provides

---

18 Trollinger, “Performing Arts Medicine and Music Education,” 45.


21 Kenney, “Teaching Young Children How to Sing,” 54-55.
some positive results of the method. Yet, Kenney reveals that studies show children sing more accurately when singing alone than in groups. Because learning to sing well and use the diaphragm effectively is vital to beautiful, healthy singing; this research seeks to study the individual improvements five- to ten-year-old children make using Kenney’s method and other natural singing and music play methods.

Significance of the Study

According to Debra Hedden, most research on the child’s voice published in the last 25 years is inconclusive in its findings. Instead of traditional vocal training at young ages, children should vocalize in fun and playful ways that encourage proper and gentler uses of the voice to avoid damage to vocal cords. Hedden summarizes a study done in 2006 which tested children aged four to eight years and concluded: “pitch accuracy improved over two years when the children sang alone, but singing quality also improved both in groups and individual performance settings.” She continues, “Goetze and Horii’s (1989) investigation with K children, first graders, and third graders found that singing was more accurate when performed individually than in groups.”

This study seeks to support the AATS’ position that training children to sing in playful and natural ways is inherently beneficial. This research project aims to implement promising

---

22 Kenney, “Teaching Young Children How to Sing,” 55.


24 Ibid.

25 Ibid., 55.

26 Ibid.
strategies proposed in children’s vocal instruction and education, with permission from responsible parties (parents and primary caregivers). Enhancing these strategies will train new generations of engaged, capable singers and allow them to enjoy all the physical, social, and emotional benefits of singing.

Research Questions

The following research questions will be addressed during this study.

Research Question 1:

What will be the effect of implementing the singing methods in Susan Kenney's “Teaching Children to Sing: One School's Experience” on children ages 5 - 10 years old on an individual basis over eight weeks?

Research Question 2:

Will implementing this method in children’s individual singing lessons improve their pitch, rhythm, and breathing?

Research Question 3:

How will the factors of age and gender affect the attitudes of the participants and the results of this study?

Research Question 4:

Will incorporating popular music into these lessons increase the enthusiasm of the participants?
Research Plan

This mixed methods study will implement the following methods for data collection. Students will be asked to attend two group lessons (approximately 50 minutes each) and six individual lessons (about 30-45 minutes each). These lessons will implement Susan Kenney’s “Seven Steps for Developing Successful Singing and Listening Habits,”27, and age-appropriate music in age-appropriate vocal ranges. Lessons will incorporate vocal “play” and games into singing practice. The first and last individual lessons will be audio recorded using the Windows 11 voice recorder app and saved as .m4a files for the study. In the first and last lessons, children’s pitch will be assessed using pitch-matching software for accuracy through the Online Mic Test website.28 Rhythm and pitch will also be recorded in the first and last individual lessons. The rhythm will also be analyzed against a metronome app. Breathing improvement will be determined by assessing the length they will be able to sustain a “hiss” sound without taking a breath. At the end of the study, participants will be asked questions regarding their experience in the study.

Definition of Terms

Abduction - Abduction occurs when the vocal folds come apart to open the glottis for breathing.29

27 Kenney, “Teaching Young Children How to Sing,” 52-56.


Adduction - Adduction occurs when the vocal folds come together to close the glottis.  

Articulation - Articulation refers to the mechanics of producing speech and involves the movement and adjustment of speech organs (lips, tongue, velum, cheeks, jaw, larynx) to produce a specific sound.  

Arytenoid Cartilages – The arytenoid cartilages are a pair of small three-sided pyramids which form part of the larynx. They articulate with the cricoid cartilage in a shallow ball-and-socket joint, which allows a wide range of motion.  

Cricoid Cartilage – The cricoid cartilage lies beneath the arytenoid cartilages and completely encircles the airway.  

Cricothyroid Muscles - The vocal fold lengtheners. They pull the thyroid cartilage down and forward on its hinge, which increases the distance between the arytenoids and the thyroid notch (the Adam's Apple), thereby lengthening and tightening the vocal folds; this causes them to vibrate faster, thus raising pitch.  

Diaphragm - A muscle in the upper abdomen that regulates the airflow in and out of the lungs.  

Edema – An excessive buildup of fluid in a tissue space or body cavity, often causing swelling.  

Epiglottis – The thin elastic cartilaginous structure located at the root of the tongue that folds over the glottis to prevent food and liquid from entering the trachea while swallowing.  

References:

30 Ibid.  
33 Your Voice and How it Works: Anatomy,” University of Minnesota Department of Otolaryngology.  
**Exhalation** – The physiological process of expelling breath out of the body.

**External Arytenoid Muscles** – The larger muscles surrounding the larynx, or the larger strap muscles of the neck.\(^{35}\)

**Falsetto** – The term falsetto usually denotes the high male vocal production that sounds like an imitation of the female voice in which the pitches produced lie above the normal male speaking range.\(^{36}\)

**Fry Register** – The vocal fry register (also known as pulse register, laryngealisation, pulse phonation, creak, popcorning, glottal fry, glottal rattle, glottal scrape, or strohbass) is the lowest vocal register and is produced through a loose glottal closure which will permit air to bubble through slowly with a popping or rattling sound of a very low frequency. During this phonation, the arytenoid cartilages in the larynx are drawn together which causes the vocal folds to compress rather tightly and become relatively slack and compact.\(^{37}\)

**Glottis** – The opening between the vocal cords at the upper part of the larynx.\(^{38}\)

**Hyoid** – The horseshoe-like bone located between the chin and the thyroid cartilage which supports the tongue and aids in tongue movement and swallowing. It is not connected to bones nearby, but is instead anchored by the muscles surrounding it.

**Inhalation** – The physiological process of taking breath into the body.

---


**Interarytenoid Muscles** – The small muscles that control the vocal fold length, tension, and mass for small changes in pitch, loudness, and quality.  

**Intercostal Muscles** – The muscles located between the ribs. They aid in the process of inhalation and exhalation.

**Larynx (Voice Box)** – The vocal tract comprises the external arytenoid and interarytenoid muscles.

**Modulation** – A change from one musical key to another.

**Nasopharyngeal** – Regarding the upper part of the pharynx continuous with the nasal passages, where the back of your nose meets the top of your throat.

**Oropharyngeal** – Regarding the part of the pharynx that is below the soft palate and above the epiglottis and is continuous with the mouth.

**Oscillation** – In music: a vibration, or, one segment of a repetitive motion.

**Phonation** – The act of making sounds, including speaking or singing.

**Pitch** – The specific sound quality that makes it a recognizable tone. Pitch defines the location of a tone about others, thus giving it a sense of being high or low. The relative height or depth of a sound. Pitches are changed by adjusting the frequency of vibrations.

---


40 Ibid.


**Range** – In music, the extent of pitch covered by a melody or lying within the capacity of a voice of instrument.\(^\text{45}\)

**Resonance** - The intensification or amplification of frequencies.

**Register** – The range of a human voice or a musical instrument.\(^\text{46}\)

**Rhythm** – The patterning of musical sound, as by differences in the timing, duration, or stress of consecutive notes.\(^\text{47}\)

**Subglottal Pressure** – Air pressure in the lungs which energizes the human voice and lies below the glottis.

**Thyroarytenoid Muscles** - The muscles that form the body of the vocal folds themselves. They shorten the vocal folds by pulling the arytenoid (back) end of the vocal folds toward the thyroid (front) end. This shortens the vocal folds and bunches them up, which causes them to vibrate more slowly, thus lowering pitch. The thyroarytenoid muscles also have a force to strengthen glottic closure. That is, they help bring the vocal folds together and keep them together to resist the airstream from the lungs.\(^\text{48}\)

**Thyroid Cartilage** – The larynx's largest cartilage has two broad processes that join anteriorly to form Adam’s apple.\(^\text{49}\)

---


\(^{48}\) “Your Voice and How it Works: Anatomy,” University of Minnesota Department of Otolaryngology.

**Trachea** - The windpipe; a tube made of cartilage that allows air to travel to and from the lungs. Sits below the larynx.

**Vocal Folds** – The sharp-edged fold of mucous membrane overlying and incorporating the vocal ligament and the thyroarytenoid muscle and stretching along either wall of the larynx from the angle between the laminae of the thyroid cartilage to the verbal process of the arytenoid cartilage; airflow causes the vocal folds to vibrate in production of the voice.50

**Vocal Tract** – The airway used in the production of speech, especially the passage above the larynx, including the pharynx, mouth and nasal cavities.51

**Whistle Register** - The whistle register is the highest register of the human voice. It is so named because the timbre of the notes this register produces is like that of a whistle.


Chapter Two: Literature Review

In a 1965 publication, the Music Educator’s National Conference emphasized “the importance of establishing a ‘conceptual’ base for teaching.”\textsuperscript{52} With this emphasis, unfortunately, the skill of singing was given little notice.\textsuperscript{53} For all this focus on conceptual teaching in music education, Mosher and Phillips assert, “If a music teacher couldn't produce good classroom singing - who cared?”\textsuperscript{54}

Timothy Brophy explains, “Elementary music teachers incorporate singing into their classroom instruction on a regular basis, and singing has been described as ‘probably the most commonly accepted and widely used practice in today’s elementary music classrooms.’”\textsuperscript{55} Additionally, non-music teachers use singing as the primary means of introducing music in the classroom.\textsuperscript{56} With the frequency in which children are encouraged to sing, teaching them how to do so is of pressing importance.

The 1994 Music Educators National Conference delineated standards for teaching elementary students to sing. They stated, “students in grades K-4 shall ‘…sing, alone and with others, a varied repertoire of music...independently, on pitch and in rhythm, with appropriate timbre, diction, and posture and maintain a steady tempo.’”\textsuperscript{57} These standards should be available to those in and out of the public school system.

\textsuperscript{52} Mosher and Phillips, “Children's Choral Corner,” 34-35.
\textsuperscript{53} Ibid., 35.
\textsuperscript{54} Ibid.
\textsuperscript{56} Ibid.
\textsuperscript{57} Ibid., 58.
Kenney’s approach to teaching children to sing comprises the following logical steps to encourage healthy singing, which should be introduced: 1. Energize and align the body, 2. Love the breath, 3. Play with the voice, 4. Sing one pitch, 5. Sing two pitches, 6. Sing a short phrase, 7. Add words to the phrase.\textsuperscript{58} This approach encourages singing naturally, and by incorporating fun ways of accomplishing these steps and a pleasant and encouraging demeanor, children will enjoy the method.

The AATS’s 2003 statement suggests the following approach to children’s vocal instruction: “Elements such as posture, breath management, phonation, resonation, articulation, and interpretive skills need to be addressed in a patient, creative, and playful manner.”\textsuperscript{59} The statement concludes, “Using standard pedagogical tools such as lip and tongue trills, scales, triads, and arpeggios, the singing teacher must endeavor to create exercises that resemble games rather than repetitive drills.”\textsuperscript{60} Greenhalgh emphasizes the importance of making learning enjoyable for children,

Young children like to sing and vocalise when they play, and they learn best when they are enjoying themselves. ...This approach is highly positive and makes failure all but impossible; the children learn unconsciously through play and their ability is only openly assessed when the skill has already been mastered. What is vitally important is that the children enjoy what they are doing, that they are engaged and that they interact in playful activities with their peers in a positive and nurturing environment.\textsuperscript{61}

Greenhalgh further points out the need for repetition in these lessons as well as the essentiality adding movement and games to cement learning through “multi-modal means.” She emphasizes the importance of repetition, noting that children like to revisit familiar songs,

\begin{flushleft}
\textsuperscript{58} Kenney, “Teaching Young Children How to Sing,” 55.
\textsuperscript{59} “NATS Visits AATS,” 378.
\textsuperscript{60} Ibid.
\textsuperscript{61} Greenhalgh, Music and Singing in the Early Years, 17.
\end{flushleft}
rhymes, and stories. As the material becomes very familiar, Greenhalgh asserts that it is possible to develop what she calls the ‘game’ by adding layers of complexity to deepen learning and enhance enjoyment. This can be done by incorporating creative movements, introducing instrument playing, or adjusting the activity to meet fresh objectives. She concludes, "In this way, learning is scaffolded, multimodal, social, and fun."62

The “scaffolded” learning to which Greenhalgh refers comes from an educational approach outlined by Thomas A. Regelski. He stresses the “systematic development of musicianship skills” through readiness staging, or “the knowledge and skill students need to succeed with new learning.”63 The layers of complexity that must gradually be presented as children sing may include adding new warm-ups and more difficult breathing games, always making fun the primary motivator.

Greenhalgh additionally highlights the importance of childhood exposure to a wide range of “styles, genres, and modes of participation.”64 This adds to the standard but the essential repertoire of nursery rhymes and folk melodies. Repetitious songs are the easiest for children to both comprehend and master.65 Fun vocal warmups will be a necessary part of each lesson. Sandra Frey Stegman emphasizes that warm-ups focused on “preparing [students] to sing, listen, and learn establishes the direction of the rehearsal and furthers ongoing vocal and musical development.”66

62 Greenhalgh, Music and Singing in the Early Years, 18.


64 Greenhalgh, Music and Singing in the Early Years, 20.

65 Ibid., 21-22.

Popular music, transposed into ranges accessible to children, will help invest children in the lessons. Music Education Professor Lucy Green crafted a music study in which young students were asked to recreate their favorite popular songs in the music classroom. After the study, these students’ music teachers identified improvement in the students’ music listening, ensemble playing, and instrumental and rhythmic skills. Teachers also observed a noticeable improvement in students’ motivation and enjoyment.

Debra Hedden reveals, “Singing accuracy depends on the singer’s ability to produce the sounds, replicating pitch. At the basis of pitch, production is the physiological aspect of breathing.” She continues, “Many children habitually sing in chest voice.” Hedden concludes, “An essential element of good singing is consistently working on the physiological aspect of singing. In doing so, the teacher concertedly instructs the physical side of singing through ‘gross body coordination, posture, breathing motion, breath management, speech, phonation, and vocal resonance.’ It is important for the child to feel the production of singing to control their singing better, making a strong case for its inclusion.” Vocal specialists agree that “musical stimulation in children should be encouraged but never forced… Vocal drills…to train agility and flexibility should be fun and creative for young voices and thus encourage a willingness to engage in daily practice.”

---


68 Ibid.


70 Ibid., 56.

71 Ibid., 57.

Development of Pitch and Range in Children

First and foremost, reminds Hedden, “…the child voice—meaning from preschool to the point of puberty—is characterized by an incomplete vocal apparatus.” It must therefore be treated with care. Hedden encourages the proper teaching of the developing voice,

Given the vocal mechanism, we must understand what the capabilities are. That infants are able to vocalize in three registers is quite remarkable, but that information also suggests that young children already have a fairly wide range that requires careful development in terms of singing accuracy. In other words, a mechanism is in place, but we must teach children how to properly develop and use it.

Pitch develops in children at a very early age, according to Greenhalgh. She asserts, “From the very earliest days of life, babies have a highly developed sense of hearing with a finely tuned sense of pitch. By the twenty-sixth week of pregnancy hearing is fully developed and babies are listening, interpreting, and learning from the voices and sounds that surround them.” The structure of a baby’s larynx (voice box) is distinct from that of an adult, and it develops substantially over the next eight years of life. This partly means that babies and toddlers possess limited vocal range and an inability to sing loudly.

Hedden, explaining research done on infant vocal range, reveals that the register of infants typically lies within the fry register (30-250 Hz), “…The children were capable of both very high and very low frequencies that spanned the fry, modal (150-700 Hz), and falsetto (850-2500 Hz) registers, which are all common as children acquire language.” She continues,

---

74 Ibid.
75 Greenhalgh, Music and Singing in the Early Years, 5.
76 Ibid., 9.
“Although the range of sound appears to be functional for infants, the use of that range requires years to develop into a singing voice that exhibits tuneful singing.”

A study of preschool children by Flowers and Dunne-Sousa in 1990 reports that children’s range was typically larger than the range they demonstrated in singing songs, with modulation observed in almost half of the children’s singing. Further, a child’s range will typically expand throughout maturation. One study suggests the typical range for preschool children is middle C to C, an octave above. Hedden determines, “…the typical vocal range for children aged 8 to 11 years can be approximately two octaves and occurs between low G and high G#.” To avoid injury to the immature larynx, children should sing in their natural range. Additionally, the repertoire for young singers should be age-range appropriate and emotionally relatable to a child’s present life experiences and level of understanding.

Pitch matching develops as children grow and mature. Hedden confirms that the skill of pitch matching contributes to singing accuracy and “seems to be related to the child’s age and range.” Researcher Valerie Trollinger finds that a higher speaking voice correlates with greater pitch-matching accuracy. She additionally finds that bilingual preschool children who speak a

---

79 Ibid.
80 Ibid.
81 Ibid.
82 Ibid.
83 Greenhalgh, Music and Singing in the Early Years, 21.
tonal language (Cantonese) had more extraordinary pitch-matching ability than their “monolingual counterparts.”

It is natural for children to want to listen to and imitate the singing they hear on the radio. Children today are exposed earlier and earlier to adult media, including music. However, most of the famous singers on the radio sing in a range most pleasant to the human ear (low for women and high for men), and when they deviate from that range, they do so in a virtuosic way. When children cannot sing what they hear on the radio, they lose enthusiasm for singing and stop trying. Further, because most young children possess higher ranges, they will not naturally be able to sing like the singers they hear on the radio. They may experience laryngeal stress and damage their vocal cords if they try. Gebhart observes that good role models for adolescent singers are becoming rare in the 21st century.

The Causes and Effects of Pediatric Muscular Tension and Vocal Damage

In an article entitled “Laryngeal Tension in Adolescent Choral Singing,” Beverly Smith-Vaughn, Celia Hooper, and Donald A. Hodges affirm, “A singer's [ability] to open the glottis completely and renew the breath silently demands...an acquired high level of coordination.”

They further present the causes and effects of muscular tension on young voices:

Speaking or singing out of range can cause muscular tension that leads to abnormal voice. Vocal tension results from muscle tension in the area of the larynx. The interarytenoid muscles, those small muscles that control length, tension, and mass of the vocal folds for small changes in pitch, loudness, and quality, can react to stress, talking over music, or general body tension and produce a less than optimal sound. The external arytenoid muscles, the larger muscles surrounding the larynx, or the larger strap muscles of the neck, can also exhibit body tension affecting voice. These muscle fibers join with

---

the interarytenoid muscles comprising the “voice box,” and can affect larger changes in vocal pitch, loudness, and quality.\textsuperscript{88}

Though their study focuses on adolescent singers, their findings are generalizable to children’s voices. They continue, “Singing out of range, performing in a tessitura that is too high or too low for a continual vocal performance, can cause vocal fatigue and swelling that may lead to vocal fold nodules.”\textsuperscript{89} Poor vocal habits formed as children will likely affect singing into adolescence.

\textit{Pediatric Voice: A Long-Term Collaborative Approach to Care} explains that most vocal nodules cause pediatric hoarseness or dysphonia.\textsuperscript{90} It further states that these nodules most often occur due to heavy voice use or vocal misuse.\textsuperscript{91} Risk factors for voice trauma include vocal performance overuse, as well as vocal overactivity, such as shouting, screaming, and throat clearing.\textsuperscript{92}

The Physiological Process of Singing

Breath is the fuel we use for singing. The benefits we get from proper breathing technique may include better control over the breath and thus the quality of the voice's tone, more efficient use of the breath, the ability to sustain notes for longer and to sing longer phrases, increased lung capacity, a natural (unforced) increase in volume, and improved overall stamina.

\footnotesize{\textsuperscript{88} Smith-Vaughn et al., “Laryngeal Tension,” 404.}

\footnotesize{\textsuperscript{89} Ibid.}


\footnotesize{\textsuperscript{91} Ibid.}

\footnotesize{\textsuperscript{92} Ibid.}
or endurance. Proper breath control can also minimize tension in the chest, shoulders, neck and face, and create less pressure on the vocal folds. It can also help oxygenate the body.

When we inhale, the diaphragmatic muscles contract - they shorten and tighten - and the diaphragm moves downward in the body. As the diaphragm depresses, it creates a vacuum in the lungs and air rushes in to fill that vacuum. During exhalation, the diaphragm relaxes and rises, lung volume decreases, and air rushes out. When air meets resistance at the laryngeal level, sound is produced.

Breathing is regulated by the autonomic nervous system but can also be controlled with the conscious mind. We can actively control our breathing, choosing how much air we will inhale or exhale in a breath or deciding how rapidly we inhale or exhale. The breathing mechanism is the voice's “motor,” providing energy to the tone and the ability to sustain passages of music. Without the diaphragm and the surrounding muscles that support its work, air can neither enter nor leave the lungs. Without the expelling of air from the lungs, the vocal folds can't vibrate. Without the vibration of the vocal folds, sound isn't produced.

Singing requires a higher rate of breath energy than speaking does, as well as an extension of the breath cycle. There are two important aspects of breath management: 1) regulating the amount of air that is pushed past the vocal folds and the rate it is expelled out of the lungs, and 2) ensuring that the stream of air is steady. The diaphragm, in cooperation with the intercostals (back) and abdominal muscles, is generally considered to be the chief organ of breathing.

The movement of the diaphragm sets off a chain of reactions that occur in the lungs, larynx and mouth or nose. Diaphragmatic breathing is both natural and ideal when singing. The
air stream created through inhalation is referred to as subglottal pressure. Through inhalation and controlled exhalation, subglottal pressure can be utilized for strong and consistent singing.

The act of making sounds, including speaking or singing, is called phonation. Phonation utilizes the vocal folds and the other small muscles and cartilage in the larynx. During phonation, the vocal folds move like a wave as air blows through them, adducting (coming together) and abducting (coming apart). To sing the pitch A440 (the “A” above Middle “C”), the standard pitch used to tune string instruments, the vocal folds vibrate at 440 times per second.

The vocal folds are controlled by tiny muscles in the larynx called the thyroarytenoid muscles and the cricothyroid muscles. The size and thickness of these muscles help determine whether a voice is low or high. These muscles also cause the vocal folds to thicken or elongate, like stretching a rubber band or a string on a violin.

When the larynx muscles are relaxed, singing with vibrato happens naturally. Fast but consistent vibrato is a sign that someone’s voice is in its natural state and is using a steady stream of air (subglottal pressure). When singing with vibrato, the air oscillates through the mouth about seven times per second.93

In The Vocal Athlete, Wendy D. LeBorgne and Marci Rosenberg detail the factors influencing vocal fold vibration:

…Vocal fold vibration is reliant on: (1) neuromuscular control to adduct or approximate the vocal folds, (2) biomechanical attributes of displacement and recoil allowed for by the elastic properties of the vocal fold layers, and (3) driving force of air pressure, to facilitate aerodynamic activities of subglottal pressure…to help perpetuate vocal fold vibration. All of these must occur…to initiate and maintain vocal fold vibration. …If you have any type of vocal fold pathology (nodules, polyp, cyst, etc.), it is the disruption of

---

vocal fold vibration and alteration of vocal fold closure that in part creates the resulting hoarseness.\textsuperscript{94}

When the vocal folds vibrate, they generate sound frequencies depending on the length and tension of the vocal folds and the air pressure provided. Once that frequency is produced, the sound wave travels above (and below) the vocal folds into spaces called resonators. LeBorgne and Rosenberg identify seven vocal resonators: “…two subglottic (chest and trachea), the laryngeal vestibule, the pharynx (further broken into oropharynx, nasopharynx, and laryngopharynx), the oral cavity, the nasal cavity, and the sinus cavities.”\textsuperscript{95} Each of these spaces should normally be filled with air. Some of them (the chest, trachea, nasal cavity, and sinuses) provide sensory feedback to the singer, but are not manipulated in size or shape to modify the sound. “However,” explain LeBorgne and Rosenberg, “the laryngeal vestibule, pharynx, oral cavity, and to some degree the nasal cavity are vital components in shaping the timbre (brightness/darkness) and amplitude (loudness) of the sound.”\textsuperscript{96}

Vocal Register

Vocal registers are, very simply, ranges of tones in the human voice. Vocal registers have different timbres and qualities based on how the vocal folds vibrate and whether the voice is male or female. Vocal registers can be delineated into four categories: modal voice (or normal voice), vocal fry, falsetto, and the whistle register. These registers originate in the larynx and


\textsuperscript{95} Ibid., 93-94.

\textsuperscript{96} Ibid., 94.
occur as a result of different vibratory patterns. Each of these vibratory patterns produces distinctive sounds.

These registers are active in different pitch ranges (upper, middle, or lower). Falsetto and whistle registers comprise the upper registers, modal voice comprises the middle register, and vocal fry presents in the low register. Falsetto and whistle registers are produced in head voice. The lower registers resonate in the chest and nasal cavities. A skilled vocal artist possesses the ability to sing smoothly between registers with openness and strength (i.e., without breaks). As the frequency of the vocal fold vibrations changes from register to register, the length, tension and mass of the vocal folds are in a constantly altering state.

How Age and Gender Affect the Voice

The Pediatric vs. The Adult Larynx

Several recent studies have debunked the notion that children possess “funnel-shaped” larynxes. One study resolutely states, “The pediatric larynx is more cylindrical than funnel-shaped, and an age-based transition from a pediatric funnel-shaped to the cylindrical adult larynx was not observed.”97 Researchers Victoria Possamai and Benjamin Hartley reveal, “In a child, the larynx is relatively smaller, and sits in a higher position, with the cricoid at the level of the fourth cervical vertebra compared with the sixth in an adult…”98 Describing a typical child’s larynx to that of the adult larynx, they continue,

---


The epiglottis has a more tightly curled shape. The vocal folds are shorter, with a reduced membranous–to–cartilaginous fold ratio. The structure of the vocal fold is immature, lacking the 5 layers seen in the adult vocal fold. The mucosa of the subglottis is more reactive and therefore prone to edema, hence the predisposition to croup and laryngeal obstruction in children. The suggestion that the subglottis is the narrowest level of the pediatric airway has been challenged, with the finding that in children the narrowest part is also at the glottic level, with no evidence of the classically described funnel-shaped larynx.\textsuperscript{99}

Though the child larynx possesses a structure similar to the adult larynx, it is also less mature and much more reactive than the adult larynx. The pediatric epiglottis is also much more curved than the adult epiglottis. The adult epiglottis is broader, its axis parallel to the trachea. The child epiglottis is more horseshoe-shaped, with its axis angled away from the trachea. The following table effectively delineates the differences between the pediatric and adult larynx.

<table>
<thead>
<tr>
<th>Features</th>
<th>Pediatric</th>
<th>Adult</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position</td>
<td>Higher (cricoid T4)</td>
<td>Lower (cricoid T6)</td>
</tr>
<tr>
<td>Shape</td>
<td>Curled epiglottis</td>
<td>More open epiglottis</td>
</tr>
<tr>
<td>Vocal Fold Structure</td>
<td>Immature</td>
<td>Mature: 5 layers</td>
</tr>
<tr>
<td>Vocal cords</td>
<td>Membranous:</td>
<td>Membranous:</td>
</tr>
<tr>
<td></td>
<td>Cartilage ratio 1.0:1.5</td>
<td>Cartilage ratio 1.0:5.0</td>
</tr>
<tr>
<td>Mucosa</td>
<td>Reactive, prone to edema</td>
<td>Less reactive\textsuperscript{100}</td>
</tr>
</tbody>
</table>

\textsuperscript{99} Possamai and Hartly, “Voice Disorders in Children,” 880.

\textsuperscript{100} Ibid.
Male vs. Female Laryngeal and Vocal Development

The larynx matures at different times for males and females. Possamai and Hartly specify that the length of the vocal folds is the same for both girls and boys (6-8 mm) until they reach ten years old.101 Thereafter, substantial growth will occur in both genders. This growth is more extreme in boys, with their membranous vocal folds developing to 14.8 to 18.0 mm, contrasting with the 8.5 to 12.0 mm in girls.102 The cartilaginous portion of the vocal cord likewise elongates with age but less so than the vocal folds. “...The ratio of membranous-to-cartilaginous fold is 1.5:1.0 in the newborn,” Possamai and Hartly explain, “4.0:1.0 in the adult female, and 5.5:1.0 in the adult male.”103

One study even suggests, “It is usually possible to identify the sex of a pre-pubertal child from their voice, despite the absence of sex differences in fundamental frequency at these ages.”104 This same study finds the average vocal tract length of an eight-year-old boy to be 13.5 cm and the average vocal tract length of an 8-year-old girl to be 12.75 cm.105 At a young age, therefore, distinguishing characteristics are present between the male and female vocal tract.

Possamai and Hartly further speak to the “characteristic difference” between the child and the adult voice.106 In males and females, pitch “lowers gradually throughout infancy and

102 Ibid.
103 Ibid.
childhood… with a more marked change at puberty, most significant in boys.”

These changes in pitch are linked to the “anterior growth of the thyroid cartilage.” They are impelled by testosterone and result in the development of Adam’s apple.

An embryo’s larynx acquires most of its anatomic characteristics in the womb by the third month of life, according to vocal researchers Robert T. Sataloff and Karen M. Kost. They continue, “At birth, the thyroid cartilage and hyoid bone are attached. The laryngeal skeleton then separates, and the slow process of ossification (cartilages turning to bone) begins.” By age 2, they explain, the hyoid bone starts to ossify. Then, they detail, “The thyroid and cricoid cartilages ossify during the early 20s, and the arytenoid cartilages ossify in the late 30s. Except for the cuneiform and corniculate cartilages, the entire laryngeal skeleton is ossified by age 65.

They continue, “At birth, the larynx is located high in the neck, resting at about the level of the third cervical vertebra (C3). It descends to about the level of C5-C6 by age five and continues gradual descent, lying at about the level of C6-C7 between ages 15 and 20.” Lowering of the larynx continues throughout life in both genders.

As puberty begins, male vocal folds grow 4 to 11mm. In contrast, female vocal folds increase by 1.5 to 4 mm. Sataloff and Kost reveal that the superficial and intermediate layers in


108 Ibid.

109 Ibid.


111 Ibid.

112 Ibid.
the connective tissue of the vocal folds “develop progressively throughout childhood” and “are well defined with a mature vocal ligament by age 16.”\textsuperscript{113} Voice mutations can rapidly occur in males and females because of puberty. The body will typically initiate puberty between the ages of 8 and 15 in females and between 9 ½ and 14 in American males. Puberty is between 12 and 16 ½ in females and 13 ½ to 18 in males. “Voice mutation is most active between ages 12 ½ and 14 and is usually complete in both sexes by age 15,” they continue. “Mutational voice usually lasts about 1 ½ years but can last as long as three years.”\textsuperscript{114}

Smith-Vaughn and her team of researchers add that the most delicate stage for adolescent vocal development is during “the ‘growth spurt’ of puberty, generally occurring between the ages of 10-18 in females and 12-20 in males.”\textsuperscript{115} They continue, “Although the vocal folds essentially have reached adult length following a pubertal growth spurt, the connective tissues of the vocal folds may continue to increase in size and quantity into adulthood.”\textsuperscript{116}

Voice mutation and voice maturation occur in multiple ways. “In both sexes, the epiglottis flattens, grows, and elevates; laryngeal mucosa becomes stronger and thicker,” they explain.\textsuperscript{117} After puberty, the female voice will drop about 2.5 semitones to between 220 to 225 Hz. In contrast, the male voice drops by around one octave to between 120 to 130 Hz by 18.\textsuperscript{118}
The entire vocal tract is altered in many ways during puberty. Tonsil and adenoid tissues atrophy and partially recede, which, Sataloff and Kost reveal, may increase “oropharyngeal and nasopharyngeal resonance.” The length and circumference of the vocal tract will continue to grow throughout puberty and into maturity, with growth typically concluded at age 20 or 21.

In an article entitled “The Effects of Hormones on the Voice,” Sataloff joins with Dr. Sameep Kadakia and Dr. David Carlson to examine specific hormones and their effects on the voice throughout life. “The larynx is extremely responsive to sex hormones-androgens, progesterone, and estrogen,” they describe. “…The menstrual cycle and pubertal development both have an effect on the female larynx. In males, increased levels of testosterone and DHT during puberty are responsible for the increase in size of the laryngeal cartilages.” They explain that this increase accompanies increased bulk of the laryngeal muscles and ligaments. This change in the size and bulk of the larynx causes a drop in the male voice of about one octave.

They continue, “Females mature in response to increased amounts of progesterone and estrogen... During puberty, the female voice does not undergo as drastic a change as the male voice. Sex hormones allow for a decrease in basal pitch of one third of an octave.”

---

120 Ibid.
122 Ibid.
123 Ibid.
124 Ibid.
female’s menstrual cycle, her voice undergoes concurrent cyclic changes. Higher amounts of estrogen and lower levels of progesterone mark the beginning of the menstrual cycle, or follicular phase. This combination of hormones causes vocal fold edema and increased blood flow to the larynx. As they do elsewhere in the body, “Polysaccharides in the vocal folds break down and bind water more readily, furthering the fluid build up in the vocal folds. The vessels in the nasal passages also dilate, resulting in changes in patency and the singer's perception of her voice.”

The researchers continue, “Additionally, the hormonal environment can cause an increase in reflux symptoms by slowing gastric motility.” Progesterone levels increase more than estrogen levels in the second half of the menstrual cycle, or the luteal phase. Progesterone promotes the shedding of the laryngeal epithelium. “It also makes the glandular secretions more viscous,” the researchers disclose, “leading to a decrease in vibratory efficiency and possibly increased cell damage.” These hormonals changes affect changes in the voice during menstruation.

Women experiencing premenstrual syndrome (PMS) also experience vocal change. The most common of these is difficulty of singing higher notes. Premenstrual syndrome (PMS) can include symptoms such as irritability, breast tenderness, anxiety, and edema. These occur due to high estrogen levels. PMS can coincide with changes to the female voice, sometimes referred

126 Ibid.
127 Ibid., 572.
128 Ibid.
129 Ibid.
130 Ibid.
to as premenstrual voice syndrome.\textsuperscript{131} These may be caused by some of the changes of PMS “Due to the increased estrogen levels,” the researchers explain, “there is also more edema during the premenstrual period because fluid flows from the inside of the cells and capillaries to outside.”\textsuperscript{132} This edema may can cause voice changes such as dysphonia, “which may alter vocal efficiency and clarity in about one-third of singers.”\textsuperscript{133} Abdominal cramps women experience during their menstrual cycle “also can impair efficient phonation by interfering with support.”\textsuperscript{134}

Dental development completes for both males and females in young adulthood. This may result in changes to jaw alignment, resonance, and pronunciation. Braces may trigger similar changes. “Tongue position and mouth opening can be influenced by discomfort and limitations of the temporomandibular joint complex that develops due to dental malalignment or injury,” add Sataloff and Kost. The voice reaches its full potential at this growth stage due to the enlargement of the chest and the strengthening of the thoracic and abdominal muscles.\textsuperscript{135}

During adulthood, drastic anatomic and physiologic changes to the larynx occur, as well as changes to the overall vocal tract and respiratory system. “Cartilages undergo ossification and calcification, intrinsic muscles atrophy, and joints erode…”\textsuperscript{136} Sataloff and Kost continue, “Changes in the larynx from young adulthood to old age are generally more extensive in men


\textsuperscript{132} Ibid.

\textsuperscript{133} Ibid.

\textsuperscript{134} Ibid.

\textsuperscript{135} Sataloff and Kost, “The Effects of Age on the Voice, Part 1,” 64.

\textsuperscript{136} Ibid., 65.
than in women, with the possible exception of muscle atrophy about which there is little information on gender differences.”

“The most drastic changes in the female voice occur during menopause,” Kadakia, Carlson, and Sataloff explain, “when the levels of estrogen and progesterone fall.” They continue,

In the period immediately after the start of menopause, the level of FSH and LH is very high, continuing to cause ovarian androgen production. Usually, these ovarian steroids are converted to estrogen, especially in women with more peripheral fat stores. Women have excessive peripheral fat prior to menopause, allowing more conversion of androgens to estrogen, preserving the effects of estrogen on the body. Some women however, have less ability to do so and have relatively higher levels of androgen as a result. Androgens deepen the voice and cause irreversible changes.

The effects of aging also reveal themselves in the voice after menopause. “Laryngeal muscles decrease in size, cartilages harden and eventually may ossify, vocal folds become thicker, and collagenous fibers decrease in quantity leading to an overall stiffening of the vocal apparatus. The changes of aging may be difficult to distinguish from potentially treatable hormonal changes caused by menopause.”

Summary

As significant differences between the child and adult voices exist, children should be taught differently. Their learning should involve more play and repetition than adult learning

---

137 Sataloff and Kost, “The Effects of Age on the Voice, Part 1,” 65


139 Ibid.
methods. As the child's larynx is more delicate and less developed than the adult's voice, they must also be taught to use it with great care. A natural singing method is, therefore, ideal.

Research reveals that speaking and singing habits formed as a child can last a lifetime.\textsuperscript{140} Rianne Marcum Gebhart concludes, “because experiences in adolescence are much more vivid than experiences from other life stages, it is one of the best stages, if not the very best, in which to intervene in harmful behaviors.”\textsuperscript{141} Youth who receive “inadequate or no voice training can be at increased risk for vocal problems.”\textsuperscript{142} Adolescents typically resort to inappropriate vocal techniques when vocal demands are placed on them.\textsuperscript{143}

\textsuperscript{140} Smith-Vaughn, Hooper, and Hodges, “Laryngeal Tension,” 403.


\textsuperscript{142} Smith-Vaughn, Hooper, and Hodges, “Laryngeal Tension,” 404.

\textsuperscript{143} Ibid.
Chapter Three: Methodology

Introduction

The methodology of this research is based on Susan Kenney’s “Seven Steps for Developing Successful Singing and Listening Habits.”\(^\text{144}\) It also incorporates singing and music teaching ideas for children as included in Zoey Greenhalgh’s book *Music and Singing in the Early Years*. These resources will serve as the foundation for this research.

Design of Study

This research will analyze the effectiveness of one-on-one implementation over two months (eight weeks) of Susan Kenney’s “Seven Steps for Developing Successful Singing and Listening Habits.”\(^\text{145}\) It will also implement age-appropriate music in age-appropriate vocal ranges and incorporate play in singing practice. This research design will be applied to a study group of twelve children aged 5-10 years to determine if this group will show improvement in pitch matching, rhythm, and breathing. Group lessons will also build enthusiasm and capitalize on positive peer pressure.

This research study will provide the benefits of individualized vocal training while examining Kenney’s method’s efficacy. Music philosopher David Elliott states that assessment should be “embedded in the process of learning.”\(^\text{146}\) Vocal training, by its very nature, requires evaluation and correction. This approach will also use recording at the beginning and end of the

\(^{144}\text{Kenney, “Teaching Young Children How to Sing,” 54.}\)

\(^{145}\text{Ibid.}\)

study to analyze development. Teaching methods from Music Educator Zoe Greenhalgh (Music and Singing in the Early Years) will also be implemented.

Hedden reveals a method that compares visual, auditory, and kinesthetic methods in teaching a song to primary students.\textsuperscript{147} This study finds that the visual model (which consisted of a visual aid indicating high-low) helped the children “sing with significantly greater accuracy.”\textsuperscript{148} She continues, “This might have been because the singers could see representations of pitch levels while reproducing the vocal lines.”\textsuperscript{149} Additionally, “Five- and 6-year-old children who used movement gestures to kinesthetically feel the differences in three-note tonal patterns improved pitch-matching accuracy,… demonstrating that using additional means of presenting the concept of pitch produced positive results.”\textsuperscript{150} Hedden further finds, “In teaching children aged 8 to 11 years to match low, middle, and high notes of chords,… the major third was the easiest interval to match…”\textsuperscript{151}

Hedden concludes that children’s pitch-matching ability improves with age and can be developed with practice as children mature.\textsuperscript{152} She additionally prescribes that children should build pitch, “beginning with pitches matched near the child’s speaking voice, working on expanding pitch matching by teaching patterns, and then proceeding to the teaching of songs.

\textsuperscript{147} Hedden, “An Overview of Existing Research,” 54.
\textsuperscript{148} Ibid.
\textsuperscript{149} Ibid.
\textsuperscript{150} Ibid.
\textsuperscript{151} Ibid., 55.
\textsuperscript{152} Ibid.
Integrating visual, aural, and kinesthetic presentation of pitch may assist the singers in improving their pitch matching.\textsuperscript{153}

**Age Range**

Children should begin learning to use their voices at a young age to obtain maximum benefits.\textsuperscript{154} Therefore, this study will focus on training children’s voices in an age range of five- to ten years old. The literature agrees that children’s vocal accuracy improves with age.\textsuperscript{155} Older students will necessitate different vocal techniques due to puberty and the learning levels of older children. Lastly, children younger than five will have greater difficulty with stamina and following instructions. The age range of five- to ten years old is therefore ideal.

**Length of Study**

An eight-week study is necessary to give an allowable time frame for student growth. This time frame will also prevent student burnout and boredom. Each child will receive 30-45 minutes of vocal instruction per week for six 30–45-minute lessons. In addition, two-hour-long group lessons with all students will be scheduled at the beginning and towards the middle of the study to increase positive peer pressure and excitement for the program.

\textsuperscript{153} Hedden, “An Overview of Existing Research,” 54.


\textsuperscript{155} Nancy A. Cooper, “Children's Singing Accuracy as a Function of Grade Level, Gender, and Individual versus Unison Singing,” *Journal of Research in Music Education* 43, no. 3 (1995): 223.
Teaching Methods and Measurement of Improvements in Pitch Matching, Rhythm, and Breathing

Improvements in vocal pitch matching, rhythm, and breathing are objective and, therefore, not susceptible to researcher bias. Children will be encouraged to appropriately use the diaphragm (i.e. breathe with the belly) throughout the study. Range should not be pushed during a child’s younger years due to potential damage to the voice. Valerie Trollinger warns: “Having children try to sing songs written for adult voices needs to be scrutinized and, if possible, dropped entirely, as younger children simply do not have the physiology to sound like adults vocally.”\textsuperscript{156}

Songs such as “This Little Light of Mine” in the key of G Major (B4 to C5) and “Amazing Grace” in the key of C Major (G3 to G4) will be implemented in instruction, along with other nursery rhymes, folk songs, and popular music to encourage participation. According to Hedden, the typical vocal range for young children is middle C to the octave above middle C (high C). She also explains the standard vocal range for children aged 8 to 11 years can be two octaves from low G and high G#.\textsuperscript{157} Therefore, music in this study will be keyed to stay within the range of low G to high E (G3 to E5).

Other songs children will learn in this study are “The Second Story Window,” a camp song that incorporates nursery rhymes in a fun singing game (B4 to G4); “Do-Re-Mi” (Rogers & Hammerstein) in C major (C4 to C5); “Here Comes the Sun” (The Beatles) in the key of A major (A4 to C5); “The Drummer and the Cook” (Harry Belafonte) in the key of E major (B4 to E5);


\textsuperscript{157} Hedden, “An Overview of Existing Research,” 53.
“Country Roads” (John Denver) in the key of E major (B4 to C#5); “The Cup Song” (Anna Kendrick) in C major (G3 to C5); and “Wonderwall” (Noel Gallagher) in E minor (E4 to E5). These songs will be learned based on each child’s ability to progress from easiest to most difficult. In “The Cup Song,” the lyric “whiskey” will be changed to “root beer” to make the subject matter suitable for children. Songs that will be sung in group lessons are “This Little Light of Mine,” “Amazing Grace,” “Do-Re-Mi,” “The Second Story Window,” and “The Drummer and the Cook.” These song selections will help improve pitch, breathing, and rhythm understanding. “The Cup Song” is accompanied by a beat pattern tapped onto cups that will allow children to identify how this beat pattern correlates with the words as they are sung.

Children will be reminded of the rules of singing: “No shouting, no screaming, no growling.” They will also be taught to distinguish the differences between “talk-sing,” “ring sing,” and “low sing” voices, as described by Kenney. In her words,

The talk-sing voice sounds like elongated talking. The rhythm is usually correct, and the longer sounds may be held out as the voice speaks the words, but the melody is missing… The low-sing voice… approximates accurate pitch but is sung in what we think of as a chest range sound indicating that the child does not yet consistently use the voice’s higher range. The ring-sing voice… has a light ringing quality and usually, though not always, has an accurate melody.\(^{158}\)

“The Drummer and the Cook” will demonstrate the combined use of “talk-sing,” “low sing,” and “ring-sing” voices.

The teacher will keep assessments light and fun. An approach towards kind, enthusiastic, and encouraging children will help ensure the children understand that “failure is impossible.”\(^{159}\) In addition, children love hearing their voices recorded.\(^{160}\) The first and last individual lessons

---

158 Kenney, “Teaching Young Children How to Sing,” 54.
160 Ibid., 95.
will be audio recorded using the Windows 11 voice recorder app and saved as .m4a files for the study and the records of the children’s parents.

In both group and individual lessons, children will warm up the voice by performing sirens and imitating the sound of fireworks (using hand and arm movements to indicate high and low vocal movement and to help them “open up” the voice). They will also sing simple songs using animal sounds (meow, moo, etc.). As the children become more acclimated to lessons, they will be taught how to lower the jaw and open the mouth to allow more sound to escape while singing and incorporate more traditional vocal warmups, such as “ya-ya-ya” (5-3-1) and “ha-ha-ha” (5-3-1). Children will be instructed to try to feel how the throat feels when it is open by imitating the sound of surprise (a quick gasp) or a yawn.

Tools and Data Collection

The Jerry Falwell Library will be used to gather resources to support this research. In addition to The Jerry Falwell Library, vocal scores/anthologies and vocal pedagogy texts personally owned by the researcher and other voice teachers will be used to teach the children. The following methods for gathering data on children’s pitch matching, rhythmic accuracy and breath control will be implemented. Children will be taught individually for six classes, and in a group for two classes. To ensure their privacy, children’s information will be kept confidential and they will be identified by number in this study. At the end of the study, children will be invited to answer three yes/no and one open-ended question in order to ascertain their opinion of the study.
Pitch

Sadly, “vocal pitch accuracy is still a problem for up to one fifth of elementary school students.” Greenhalgh suggests some of the following methods for improving pitch, which will be incorporated into this study: 1. Use songs that start with a child singing a solo line for the rest of the group to copy; 2. If children are struggling after much practice, sing the phrase again without comment but at a slightly slower tempo; 3. Position a struggling singer next to a stronger one; 4. Use songs that the children already know well. This familiarity means that the child “…can sing it without thinking.” Pitch singing may also improve if teacher and student use hands and bodies to make pitches visible.

Children in this study will be trained using the C-major scale and given eight pitches to match in sequence, ascending and descending: Do-Mi-So-Do, Do-So-Mi-Do. Using encouragement, games, and repetition, students will be taught to sing the target pitches correctly. Also, as evidence suggests that children sing more naturally on a neutral syllable, they will sometimes be asked to sing on “la.” Solfege hand signs will incorporate visual and kinesthetic learning methods. A steel tongue drum pitched to the C major scale will also be implemented in pitch instruction, allowing the children to visually find the pitches on the drum. For the beginning- and end-of-study assessments of children’s pitch, pitch matching will be done using an online pitch detector from the website “Online Mic Test” to test accuracy. At the beginning

---

163 Ibid., 26.
164 Cooper, “Children's Singing Accuracy.” 224.
and end of the study, the researcher will assess how many pitches each child sings correctly out of eight possible pitches: Do-Mi-So-Do, Do-So-Mi-Do.

**Rhythm**

By the end of the eight weeks, the goals will be for the children to create a steady and consistent beat, reproduce the rhythm of simple songs, and combine a steady beat and rhythm.\(^{166}\) Greenhalgh suggests “speaking and tapping in time” as another vehicle to feel the beat and make lessons fun.\(^{167}\) Rhythm skills can also be reinforced by incorporating bells, xylophones, and rhythm instruments.\(^{168}\)

Children will learn these skills through singing songs to a beat (hand clapping or foot tapping), playing rhythm games (“Seven” and “Cups”), and through repeated imitation of the instructor’s given beat patterns (no greater than two measures long). Older, more experienced students will be given more difficult beat patterns to imitate. Group and private lessons will provide a basic understanding of 3/4 and 4/4 time signatures. They will also be taught the difference between quarter, eighth, and sixteenth notes. In private instruction times, children who come in late or early when singing a phrase of a song will count out the entrances and sustained phrases with the researcher. At the beginning and end of the eight weeks, children will be assessed on their ability to stay on the beat of a song using a metronome app for reference.

Children will sing the first verse of “This Little Light of Mine” along with a metronome, beating at 118 (Allegretto) per quarter note. Children will learn this song during the first group

---

\(^{166}\) Greenhalgh, *Music and Singing in the Early Years*, 33.

\(^{167}\) Ibid., 35.

\(^{168}\) Ibid., 49.
lesson and sing it at every subsequent lesson. This song has 39 points that will be used to assess whether children are singing in time with the metronome. End-of-study assessment numbers will consist of the percentage of times the children sing the correct words on the correct beat (out of 39 possible):

```
I       I       I       I       I       I       I       I
This little light of mine, I’m gonna to let it shine.
I       I       I       I       I       I       I       I
This little light of mine, I’m gonna let it shine.
I       I       I       I       I       I       I       I
This little light of mine, I’m gonna let it shine.
I      I I         I     I I         I     I I
Let it shine, let it shine, let it shine.
```

**Breathing**

In addition to Kenney’s emphasis on “loving the breath,” breath control skills will be reinforced through voice instruction, identification of the diaphragm, and practice using the diaphragm through simple exercises such as panting like a dog, “hahaha,” etc. Children will be taught proper posture and will periodically be reminded to adjust posture to allow for the fullness of breath, as Kenney advises.  

Hedden says, “The teaching of breath control demonstrated improvement in changing children’s breathing from chest to diaphragmatic, positively affecting singing range and pitch matching.”

Children’s breath control will be measured by their ability to sustain breath. This is vital to their ability to sing more controlled and intentionally. Proper breath control will also increase their capacity to enunciate more clearly. Children will be instructed to breathe deeply and then

---

169 Kenney, “Teaching Young Children How to Sing,” 54.

“hiss” to release the air. Hissing does not involve using the vocal cords or larynx and will not cause damage. Students will be asked to mimic “blowing up a balloon” and then releasing it quickly. The same exercise will then be repeated, wherein children are encouraged to release the air of their imaginary balloon slowly and evenly by hissing it out with the researcher. They will be instructed to “hiss” their breath out to encourage the conscious and intentional release of the breath (i.e., breath control). Recordings will be taken capturing the length of each child’s breath at the beginning and end of the study.

**Teaching Children Individually**

This study will use methods studied in a classroom in Susan Kenney’s previous research and move that research into a private vocal lesson setting. Debra Hedden adds support for this approach. She states, “Evidence suggests that children may sing more accurately when singing alone than when singing with others.”171 In another study, Hedden suggests, “Singing in different media, using both individual and group singing, can assist singers in acquiring accuracy. Singing individually aids the child in hearing his or her own voice without other voices obscuring it.”172

And according to James Merrill, “Singing alone is essential for young children because they can hear themselves and learn how to adjust their voices to sing the correct pitch.”173 “The ability to pitch the voice accurately is learned through singing solo,” Greenhalgh adds. “When we sing with a piano or recorded backing track, we ‘lean’ on the pitch provided.”174

---

The ability to assess pitch matching, rhythm, and breathing is best assessed in a one-on-one, teacher-student setting. “Singing solo with no accompaniment of any kind helps to secure voice control and develop pitch-matching skills, so it is important to offer many opportunities for solo responses right from the start,” Zoey Greenhalgh instructs. She continues, “The opportunities become more formal as confidence and skill development.”

**Privacy**

Children’s identities will be protected. No names will be used in the completed project; numbers will only identify children. This study is contingent on Liberty University’s IRB approval. Before beginning the study, parents must complete consent forms, including consent to record their children’s voices.

**End-of-Study Questions**

Qualitative case studies often incorporate open-ended questions to provide a more holistic view of the findings. However, as this study involves children who may or may not be able to articulate clear answers to many open-ended questions, this study will ask three yes-or-no questions and one open-ended question, as follows:

1. Do you feel your singing voice has improved since you started singing with [the researcher]?
2. Did you enjoy how the lessons were taught?
3. Do you enjoy singing more now than when you started singing with [the researcher]?

---

4. What have been your favorite parts of singing lessons with [the researcher]?

Parents will be invited to comment, as well, if desired.

Projected Limitations of the Study

The ability to effectively teach children depends on the ability of the instructor to engage the children. Additionally, children may not be invested in the study and may have difficulty following directions. This will especially apply to younger children, though each child’s ability to focus and each child’s appreciation of music and singing is different.

Questions and Hypotheses

This study is meant to offer music educators an effective, natural, and fun method of teaching children to sing. The world of music education needs better understanding of how to teach children to sing. By examining the usefulness of this method, this research will help determine the merit of introducing it into individual singing lessons for children. The primary and secondary research questions for this study are as follows:

*Could Susan Kenney’s method for teaching children to sing be implemented successfully when applied to teaching children on an individual basis?*

Susan Kenney recommends that teachers invite children to “sing alone as frequently as possible.”¹⁷⁶ By singing individually, children will be able to hear better if they are pitching their singing correctly, thus avoiding a dependence on the tunefulness of others. Children will

---

¹⁷⁶ Kenney, “Teaching Young Children How to Sing,” 55.
also receive more attention in other areas of music, such as rhythm and breathing, which will assist them in singing overall. When proper singing instruction is provided, the children’s confidence will grow.

*Will implementing this method in children’s individual singing lessons improve their pitch, rhythm, and breathing?*

Kenney’s method gives a particular focus on pitch and breathing. Children are taught, in step-by-step fashion to align the body, breathe deeply from the belly, and engage the diaphragm through breathing and vocalization. Then they are directed to sing one pitch, then two, then a phrase. As children progress, they will be singing longer and longer phrases. The eventual introduction of structured music with lyrics and beats will mean that children are then exposed to rhythm. Given long enough exposure and individual correction, children’s pitch, rhythm, and breathing will all improve with this method.
Chapter Four: Research Findings

Pitch

Of all three areas measured, pitch improved most consistently and dramatically across the board. One child went from singing zero pitches in tune to singing all eight pitches in tune. Another went from singing zero on-tune pitches to two in-tune. Only Child #9 regressed, singing only one pitch in tune at the end of the study, versus the two he sang in on pitch at the beginning of the study. Three children sang equally in pitch at the beginning and end of the study. Overall, the group pitch accuracy average improved from 45.83% accuracy at the beginning of the study to 80.2% at the end. The following table reflects the pitch of each child at the beginning and end of the study.

The pitch children sang most accurately was Do (C4), their beginning and ending pitch (30.6% of accurate pitches sung). The next most precise pitch of the study was Mi (E4) (26%),
followed by So (G4) (22.3%) and Do (C5) (20.7%). Child #7, a 10-year-old male, was taught in a group singing class that if a pitch felt too high, he should drop down with his voice and sing it an octave lower. However, as the range of this pitch exercise fell easily within the range of a young singer (C4-C5), the researcher encouraged him to open the back of his throat (as if he were yawning) on the higher notes and use his “ring sing” voice. By the study's end, he could do so successfully without hurting his voice and improved his pitch accuracy. This discomfort with “high” notes perhaps reveals a desire many older boys (9-11 years old) have to sound more grown up, and also demonstrates an unfamiliarity these boys have with their still maturing natural registers.

Rhythm

When recording for rhythm assessment, children were asked to sing to a metronome set to 118 per quarter note (allegretto), singing the first complete verse of “This Little Light of Mine.” At their first recording of the song, children had already practiced it 5-6 times, both in the initial group lesson and in the first individual lesson, as a quick review. Four children improved in the rhythm portion of this study, five regressed, and three had the same results at the beginning and end of the study. However, the group average improved from 82.05% accuracy at the beginning of the study to 84.62% accuracy at the end (the percentage equaling the number correct out of a total of 39 beats tested). The most frequent mistake the children made was not sustaining notes to their full length and thus coming in too early on the following phrase. The following table reflects the percent rhythmic accuracy of each child from the beginning to the end of the study.
At times, the children seemed to exhibit an indifferent attitude towards staying on beat. Perhaps this was a result of tiredness or distraction. The high percentage of rhythmic accuracy at the beginning of the study, in comparison to the children’s beginning pitch accuracy could be due to a strong cultural preference towards pop, rap, and other music whose emphases lie more in the rhythm of the song than the chord progressions, melody, or words.

Breathing

Children’s improvement in breath control was measured by how long they could sustain a “hiss” sound without taking a breath. All but two of the twelve children studied improved. Child #1 sustained his breath one second less at the end of the study than at the beginning. Child #5 measured the same at the beginning and end of the study. The following table reflects the change in breath duration for each child from the beginning to the end of the study.
Measurement was taken from a recording of their breathing and calculated to the nearest second. Children were given the same instruction from the beginning to the end of the study. They ranged from 9-45 seconds duration of hiss at the beginning of the study to 12-50 seconds by the end.

Different Singing Outcomes for Boys and Girls

Girls in this study (#2, #4, #5, #6, #11, #12) were more apt to sing on the pitch than the boys, singing as a group average of 62.5% accuracy at the beginning of the study, and 93.5% accuracy at the end of the study. In contrast, boys sang at 27.08% and 66.67%, respectively. The improvement in both is impressive, however, it is interesting to note that girls began the study at close to the same percentage of pitch accuracy in which the boys ended. The following table compares the change in pitch accuracy between boys and girls from the beginning to the end of the study.
Girls began with lower accuracy but showed more improvement than the boys rhythmically, starting with 79.91% accuracy and ending with 84.19% accuracy. Boys began with 84.19% accuracy and finished with 82.9% accuracy. In this instance, girls ended with the same percentage of rhythmic accuracy in which the boys began. The following table compares the change in rhythmic accuracy between boys and girls from the beginning to the end of the study.
Older boy students started and improved the most in breathing over this study. Boys began with a cumulative total of 141 seconds and ended with 166 seconds (a 17.7% increase). Girls began with a cumulative total of 70 seconds and ended at 81 seconds, a 15.7% overall increase in length of time sustaining a breath. The following table compares the total length of exhale between boys and girls from the beginning to the end of the study.
Different Singing Outcomes for Older and Younger Children

This study confirms Hedden’s findings that pitch matching improves with age. Older children improved more on average than younger children in pitch. Eight-, nine-, and ten-year-olds (#1, #2, #3, #6, #7, #8, #10, and #11) began the study with 44.12% pitch accuracy and ended with 79.41% pitch accuracy. In contrast, six- and seven-year-olds (#4, #5, #9, and #12) began with 46.875% and ended with 71.875%. Hedden further explains, “…there were significant differences favoring older singers in terms of accuracy in pitch matching. The younger children were far less accurate (2.5 semitone deviations) than the older singers (0.5 semitone deviation), suggesting that maturation played a key role in the increased accuracy.”

The following table compares the change in pitch accuracy between older and younger children from the beginning to the end of the study.

---


178 Ibid., 54.
Younger children struggled more with timing. The younger children averaged 71.79% rhythm accuracy at the study's beginning and 74.36% accuracy at the end. Older children began at 87.18% rhythmic accuracy and ended the study with 88.14% accuracy. Both groups showed a small percentage of improvement. The following table compares the change in rhythmic accuracy between older and younger children from the beginning to the end of the study.
Eight-, nine-, and ten-year-olds started at a combined total of 154 seconds of sustained breath to 191 seconds by the end of the study (a 24% increase). Six- and seven-year-olds began with a cumulative 53 seconds and finished with 58 seconds (a 9.4% increase). This is likely due to the increased size, strength, and lung capacity of older children. The following table compares the total length of exhale between older and younger children from the beginning to the end of the study.
End-of-Study Question Results

The Yes / No end-of-study questions (“Do you feel like your singing voice has improved since you started singing with the [the researcher]?”; “Did you enjoy how the lessons were taught?” and “Do you enjoy singing more now than when you started singing with [the researcher]?”) resulted in a “Yes” response from every child to every one of the three questions. In answering the last question, “What have been your favorite parts of singing lessons with [the researcher]?”; children’s varying replies included: “breathing,” “singing,” “This Little Light of Mine,” “Country Roads,” “everything,” “group lesson,” “the ‘Threw it Out the Window’ song,” “The last lesson with the cups,” “my solo,” “I loved the cup song, and my favorite part was singing ‘Wonderwall,’” “Singing ‘This Little Light of Mine,” “I like to sing more now. Take [thank] you for teichin [teaching] me. I love singinng [singing] lesions [lessons].” [sic]

Parents responded: “It was a great experience for the kids. They really enjoy it and it makes us so happy to hear them sing along. Thank you.”; “She enjoyed her lessons! Thank
you!”; “[#9] has always been so shy, but I know his singing lessons have helped him realize he can perform in front of others—and he has found his voice.”; “I can hear [#10]’s voice now when he sings. He can be a mumbler when asked to sing, but I know he can do it now.”; “He is at the age or attitude of having to put on a cool front, but he gained so much. I know he has a better overall understanding of music and singing.”; “My girls love [the researcher] and can’t wait for her to come. I feel like this is great confidence-building for them. They love to sing but will be more comfortable, and I love the higher range with a nicer tone. [The researcher] is so sweet with them.”; and “[The researcher] was awesome! My daughter can’t wait for her to come, and her voice has more confidence.”

**Discussion**

Total average results of this study show development in all three categories of pitch matching, rhythm, and breathing. This study reveals more remarkable pitch improvement in girls and children 8-10 years old. It also supports Hedden’s finding that children’s pitch-matching ability appears to improve with age. Rhythm improves overall, but while boys began the study stronger rhythmically, their end-of-study results dropped by 1.29 percentage points. In contrast, girls began the study scoring lower in rhythm but showed significant improvement by the end of the study. Boys showed more substantial progress in breathing over eight weeks, but overall, children 8-10 years old also developed greater breath control over eight weeks than younger children. Answers to end-of-study questions were additionally all positive.

---

In the children’s responses to the end-of-study questions, they specifically mentioned that singing popular music selections was one of their favorite aspects of this study. Indeed, children’s enthusiasm for singing grows when learning popular music. However, somewhat surprising was their enthusiasm for nursery rhymes, folk songs, and other music when it was presented repeatedly and became more familiar to them. Music educators should consider their power in exposing children to music for this reason and not allow students to solely dictate the curriculum. Most children and adolescents do not prefer classical music, folk songs, or show tunes simply because they are foreign genres to them. But as this music is offered repeatedly and lovingly, students will gradually understand and enjoy multiple genres of music.
Chapter Five: Conclusion

The results of this study show clear improvement in children taught using Susan Kenney’s “Seven Steps for Developing Successful Singing and Listening Habits,” on a one-on-one basis. An average of total results shows development in all three areas studied: pitch matching, rhythm, and breathing. Answers to end-of-study questions were additionally all positive. This study adds merit to Kenney’s method of teaching children to sing and provides further evidence of the strength of teaching children individually.

This project began with a desire to find a successful, useful method of teaching children how to sing. Children today often learn the foundations of music education in school music classes. In these classes, they are also exposed to world music, if they are lucky. Hopefully, they also enjoy a catalog of fun songs and learn to appreciate music. A good general music teacher is accomplishing these goals. However, most children in music education today are not taught how to sing. This study successfully tests a method of teaching children to sing naturally.

The answer to “What will be the effect of implementing the singing methods in Susan Kenney's ‘Teaching Children to Sing: One School's Experience’ in children ages 5 - 10 years old on an individual basis over eight weeks?” is improvement! Children showed overall development in the areas of pitch, rhythm and breathing, and enjoyed the process. Although some of the older children were openly skeptical at first of both the warm-ups and any music that was not considered “popular music,” by the end of the study many of them expressed sorrow that it was ending.

Age and gender did play a significant role in the results of this study. Girls were much more likely to listen and react positively to the method, whereas boys struggled more to pay

---

180 Kenney, “Teaching Young Children How to Sing,” 54.
attention, sing openly, and engage in the warm-ups. The results show girls performed better at pitch matching than boys. Boys, however, performed more strongly in the areas of rhythm and breathing. By the end of the study, boys overall regressed in their ability to sing on beat, while girls displayed rhythmic improvement. Older children typically demonstrated greater skill and improvement in pitch, rhythm and breathing over the course of the study. Brophy asserts, “singing accuracy improves with age,” and, “Effects of gender have been mixed, with some researchers finding that girls sing more accurately than boys.”

This study supports these findings.

Children universally showed more enthusiasm for popular music at the beginning of the study. By the end of the study, however, several children expressed a preference for a specific folk song or children’s song which was taught in the course of the study. Older children were more likely to strongly prefer popular music than younger children. Such a preference probably has to do with more prolonged exposure to popular music. Incorporating many types of music into a child’s music education early on is important, therefore, in giving them a desire to explore various genres of music further as they get older.

In an article entitled “On the Voice,” Francis Cathlina names several vital principles upon which solid voices are built. These are choral warm-ups, “posture, breathing and support, and tone.” She further explains that a young singer’s self-esteem can partially depend on viewing themselves as “worthy, talented and special” and that “individual vocal development can foster

---

Learning to sing healthily therefore provides a means whereby children can cultivate a natural ability to love themselves. Considering the benefits and the potential for positive results, further study and implementation of this method and other natural singing methods will be well worth the effort.

Relationship of the Results to the Literature Review

Due to the differences that exist between the adult and the child larynx, teaching children to sing must be done in a fun, intentional, and natural way. Using Susan Kenney’s method for teaching children to sing naturally, lessons in the study also focused on scaffolded learning which focused on pitch matching, breath management, and rhythm skills. In accordance with the AATS’s 2003 statement, these lessons were provided with a creative, fun, and playful approach, and incorporated games in additions to scales and triads.

Due to their limited range, children in this study only sang music keyed to stay within the range of low G to high E (G3 to E5). Lessons were designed to systematically develop the young voice using exercises safe for the child larynx. Further, this study incorporated mentally and emotionally age-appropriate music for the children to sing.

No reported vocal injuries occurred during this study. Additionally, end-of-study questions showed that the children and parents universally enjoyed the exercises and music. As children enjoy music lessons, their enthusiasm for singing appropriately increases.

---


184 “NATS Visits AATS,” 378.
Limitations

Several of the children involved in this study participated in multiple extracurricular activities in addition to the eight-week voice lessons. This may have caused excessive tiredness and distraction in some children, especially younger children. Some children simply did not begin this study with an interest in music. One child repeatedly brought up his other interests in baseball and math, which he clearly felt were superior to music. The lack of interest, distraction, and tiredness of several of the children could have affected the results. Additionally, for those with little interest in music, there may have existed a correlating lack of performance.

Distraction and/or tiredness could be one cause of poor rhythmic progress over the course of this study. Children began this study with a higher percentage of rhythmic accuracy than pitch accuracy. The culture’s preoccupation with pop music could account for the higher rhythmic proficiency from the start. The children began the study with an overall 82.05% accuracy at the beginning of the study and ended the study with 84.62% rhythmic accuracy. Perhaps because the children started with a higher percent rhythmic accuracy than pitch accuracy, there was less room for improvement.

Busy music educators who observe the need for teaching children to sing may feel they have no time or energy to implement this method. However, Kenney’s approach can be used as a “warm up” every day for children before they sing. When incorporated as part of the normal routine, children quickly anticipate the actions and instructions, and Kenney’s Seven Steps take on average about six minutes to complete. This method will empower and motivate children and give them a foundation for stronger, better, and more intentional singing.

Ideally, this method would be used with children individually. A music educator in a typical public-school environment would not have the resources to give children this
individualized attention. However, perhaps in time individual singing lessons for young children will be as sought after as individual piano lessons are. Or perhaps school music budgets could provide a salary for a music teacher assistant who could provide such individualized attention to children.

Considerations for Future Study

Future studies are recommended to understand why fewer children improved rhythmically despite the rhythm exercises implemented and despite the substantial improvements in pitch and breathing. One explanation could be that Kenney’s method does not explicitly address rhythm but teaches children to use their voices, sing pitches, and learn melodies. Theoretically, singing, pitch, and melody will also inherently improve rhythm, as beats, pulses, and patterns all exist within the melody. Though rhythm was the least improved of the three musical areas analyzed, the overall total average of rhythmic improvement in this study was positive. It would be beneficial to study a larger sample of children in the future using the Kenney method to see if the results remain consistent with the findings of this study.

Follow-up studies could be done to understand the reasons behind girls’ stronger pitch accuracy in this study. A better understanding, also, of boys’ stronger results in breath control and rhythm in this study could be researched. While in this study boys regressed rhythmically while girls improved, girls ended the study with the same percent of times correctly singing on beat with the same percent in which the boys in this study began.

If scheduling limitations could be remedied, this study would benefit from application over an extended period. This would help determine whether the improvements seen in pitch, rhythm, and breathing would continue in the long term, or whether the children would at some
point plateau. Given the implications for music education, long-term implementation of this method would be valuable in determining this study’s viability in schools or as an adaptable program for children’s private vocal lessons.

One of the intrinsic benefits to this study is the resulting confidence the children develop in their own voices. Because of this confidence, their singing improves their desire to continue singing as a hobby grows over time. The 10-year old boy in this study who did not feel comfortable singing in his “ring-sing” or high voice, for example, learned that not only could he reach a C5 comfortably, he could also sound good doing it! He walked away with more joy and confidence in himself. Children who are exposed to this method could learn to embrace the sound of their own voices instead of negatively comparing their voices to other children or what they hear on the radio.
Bibliography


Dalal, Priti G. MD, FRCA; David Murray, MD; Anna H. Messner, MD; Angela Feng, MD; John McAllister, MD; David Molter, MD. “Pediatric Laryngeal Dimensions: An Age-Based Analysis.” Anesthesia & Analgesia 108, Issue 5 (May, 2009): 1475–1479.


### Appendix

**Table 1. Seven Steps for Developing Successful Singing and Listening Habits**

<table>
<thead>
<tr>
<th>The Steps</th>
<th>What To Do</th>
<th>Why Do It</th>
<th>What To Expect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1: Energize and align the body</td>
<td>Wiggle, stretch, reach, spin—so that every part of the body is noticed and activated. Draw attention to tall posture, lifting from the waist up. Rather than let children freely move, invite them to imitate you.</td>
<td>To prepare body for singing To focus the mind To align the body</td>
<td>Young children love to move and are good imitators. Expect them to imitate what you do and most often they will. Remind those who begin to lose control to copy exactly what you do, including a freeze shape.</td>
</tr>
<tr>
<td>Step 2: Love the breath</td>
<td>Sit or stand tall with breastbone lifted creating a sense of openness and wonder. Imagine smelling beautiful flowers as you inhale then slowly exhale. Try putting arms out in front as though hugging a huge tree. When you breathe in, enlarge the circle to the side. Breathe out keeping the arms open. Imagine an inner tube around the waist. Fill it with air</td>
<td>To bring oxygen to every cell of the body To enhance posture To feel an open sensation of confidence and beauty</td>
<td>Children love to imagine and imitate. Remind them to follow your actions.</td>
</tr>
</tbody>
</table>
Step 3: Play with the voice

Imitate animal sounds, mechanical sounds and other environmental sounds. Chant nursery rhymes with expressive voice. Talk in a very high, mouse-like voice. Make sliding sounds with the voice. Rather than letting children make any sounds they want, invite them to imitate exactly, your sounds. Your fire engine siren, for example. Focus on their listening, remembering, then imitating.

To feel the sensation of the higher and lower voice vibration in the head and body. To experience the wide range of the voice. To relax the vocal mechanism, helping the voice become flexible. To experiment and play with the voice. To listen and imitate.

Some children may make louder sounds, than is desirable. Remind them that this is a listening exercise to see if they can imitate you exactly. They may need to be reminded for several days, but eventually they will come to imitate with precision.

Step 4: Sing one pitch

Try sliding from vocal play into singing one pitch in the high range of the voice. Consider singing C above middle C or even higher. If the class does not match, invite them to LISTEN. Focusing on the ear is more effective than on the voice. If a majority is not matching the

To feel the difference between vocal play and singing. To feel the sensation of a higher voice singing vibration in the head and body. To match pitch by engaging the ears. To feel the sensation of being in tune. To tune the cells.

If children have been expected to imitate carefully during Step 3, most will be able to imitate the pitch you sing, especially in the upper voice. Remind them to listen first so their brains know exactly what to tell the voice to do.
pitch, they need more vocal play. NOTE: One thing children might sense when they sing in tune with someone else is that they cannot hear themselves. Learning to “feel” in tune is important because it is harder to “hear” yourself.

Step 5: Sing two pitches

Sing the pitch from Step 4 followed by a lower one. (C to Bb or C to A). Invite the children to LISTEN before singing.

To feel the sensation of changing pitches
To listen and remember
To match pitch

Some children may have difficulty doing this at first. Keep reminding them to listen carefully so the brain knows what to tell the voice. Perfection may take months. Consistency is the secret.

Step 6: Sing a short phrase

Choose a song such as Mary Had a Little Lamb. “Loo” the first phrase of the song (C Bb Ab Bb C) and ask class to imitate. If children do not sing accurately, invite them to LISTEN and then try again.

To feel the sensation of a series of pitches in flow
To listen and remember
To match a series of pitches

If children have trouble changing pitches, they will probably have trouble with Step 6. Keep reminding the class to listen first.
| Step 7: Add words to the phrase | Add words to the phrase you sang in Step 6. Adding words complicates the production of pitch. Those who do not sing easily need practice singing on “loo” or some other syllable before adding words. Do not expect the entire class to immediately sing this step accurately, as it will take time. | To feel the sensation of combining consonants and vowels to pitch To listen and remember To match pitch | This seems to be the most difficult step. More children will struggle with this step in the beginning. Continue to remind them to listen. Some children may not perform at this level until Grade 1, but most will be successful by the end of the year. |

185 Kenney, “Teaching Young Children How to Sing,” 54-55.
End-of-Study Questions for “Teaching Children to Sing: An Eight-Week Study”

by Kathleen Riggs

1. Do you feel like your singing voice has improved since you started singing with [the researcher]?
2. Did you enjoy how the lessons were taught?
3. Do you enjoy singing more now than when you started singing with [the researcher]?
4. What have been your favorite parts of singing lessons with [the researcher]?

Parents Comments (if any):
IRB #: IRB-FY21-22-1200
Title: Teaching Children to Sing: An Eight-Week Study
Creation Date: 6-13-2022
End Date:
Status: Approved
Principal Investigator: Kathleen Riggs
Review Board: Research Ethics Office
Sponsor:

Study History

<table>
<thead>
<tr>
<th>Submission Type</th>
<th>Initial</th>
<th>Review Type</th>
<th>Expedited</th>
<th>Decision</th>
<th>Approved</th>
</tr>
</thead>
</table>

Key Study Contacts

<table>
<thead>
<tr>
<th>Member</th>
<th>Role</th>
<th>Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kathleen Riggs</td>
<td>Principal Investigator</td>
<td>Contact</td>
</tr>
<tr>
<td>Kathleen Riggs</td>
<td>Primary Contact</td>
<td>Contact</td>
</tr>
</tbody>
</table>
Parental Consent

Title of the Project: Teaching Children to Sing: An Eight-Week Study
Principal Investigator: Kathleen Riggs, Master of Music Education: Music Studies Student, Liberty University.

Invitation to be Part of a Research Study

Your child is invited to participate in a research study. Participants must be at or between the ages of 5 and 10 years old at the time of the study and must not have any vocal or hearing impairments. Participation in this research project is voluntary.

Please take time to read this entire form and ask questions before deciding whether to allow your child to take part in this research project. If you decide to let your child be involved in this study, this form will be used to record your permission.

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

Your child will be asked to participate in a research study tracking their progress through the one-on-one implementation over a two-month period (eight weeks) of Susan Kenney’s “Seven Steps for Developing Successful Singing and Listening Habits.” (See article attached.) The purpose of this study is to apply a group singing method to individual students and track the results it has on their pitch, rhythm and breathing.

What will participants be asked to do in this study?

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

1. Student will be asked to attend two group lessons and six individual lessons (these eight lessons must be completed within a period of eight weeks). The researcher will schedule group lessons that best accommodate the schedules of the participants. The private lessons will likewise be scheduled at regular times (if possible) within the eight-week period that are convenient to both the researcher and the participants. The group lessons will familiarize the students with the teaching methods and the learning environment, and will build enthusiasm for singing. The private lessons will be used to encourage individual learning, to focus on areas of learning that will best encourage their singing skills, and to track and record their progress. Group lessons will last approximately 50 minutes each and private lessons will last 30-45 minutes each.

2. Students will be recorded during their private lessons using a recording device. Students will be aware of the recording, but the recording device will be hidden from view so as not to intimidate the participants.
3. At the end of the study, participants will be asked four questions; three yes or no questions and one open ended question. These questions will be provided for your reference. It should take approximately five minutes to answer these questions.

### How could participants or others benefit from this study?

The direct benefits participants should expect to receive from taking part in this study are improvement in their pitch, rhythm and breathing. They may also gain more confidence in their singing abilities, and ideally experience greater joy in singing.

This study is not meant to determine vocal capability or talent. Results of the study will be provided to parents upon request.

### What risks might participants experience from being in this study?

Because the singing method used in Susan Kenney’s “Seven Steps for Developing Successful Singing and Listening Habits,” employs natural singing methods for children, the risks to the children’s vocal cords are minimal. This means the risks are comparable to the risks your child would encounter in everyday life. The songs provided will all be within the normal singing range for five- to ten-year-old children, and they will be encouraged to sing fully by breathing deeply and opening their mouths to allow more sound to escape. The use of shouting while singing will be strongly discouraged as it can damage vocal cords.

### How will personal information be protected?

All records of this study will be kept confidential. Research records will be stored securely in a password-protected laptop, and only the researcher will have access to the records.

Participants will be identified by Student #[1,2,3], and not by their names. In the final project paper, your children will also be identified as Student #[1,2,3]. The recordings will be in the form of .m4a files, and will be recorded using the Windows 11 audio recording app. Lessons, recordings, and questions at the end of the study will be administered in researcher’s home.

At the completion of this project, all records and data used for this study will be retained for three years, after which they will be destroyed. The data, identified by student number and not name, will be referred to in researcher’s final master’s project.

Only the researcher will have access to participant recordings. No other individual will have access to them, except the parents of the participant (upon request).
How will participants be compensated for being part of the study?

Participants will not be compensated for participating in this study. The researcher will likewise not be compensated for this project.

Is study participation voluntary?

Participation in this study is voluntary. Your decision whether or not to allow your child to participate will not affect your or his or her current or future relations with Liberty University. If you decide to allow your child to participate, she or he is free to not answer any question or withdraw at any time without affecting those relationships.

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

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

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

The researcher conducting this study is Kathleen Riggs. You may ask any questions you have now. If you have questions later, you are encouraged to contact her at _________ or __________. You may also contact the researcher’s faculty sponsor, Dr. Samantha Miller at ____________.

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

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

Disclaimer: The Institutional Review Board (IRB) is tasked with ensuring that human subjects research will be conducted in an ethical manner as defined and required by federal regulations. The topics covered and viewpoints expressed or alluded to by student and faculty researchers are those of the researchers and do not necessarily reflect the official policies or positions of Liberty University.
By signing this document, you are agreeing to allow your child to be in this study. Make sure you understand what the study is about before you sign. You will be given a copy of this document for your records. The researcher will keep a copy with the study records. If you have any questions about the study after you sign this document, you can contact the study team using the information provided above.

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

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

____________________________
Printed Child’s/Student’s Name

____________________________
Parent’s Signature                Date
Child Assent to Participate in a Research Study

What is the name of the study and who is doing the study?
The name of the study is “Teaching Children to Sing: An Eight-Week Study” and the person doing the study is Kathleen Riggs.

Why is Kathleen Riggs doing this study?
Kathleen Riggs wants to know if a children’s singing method used by Susan Kenney in “Seven Steps for Developing Successful Singing and Listening Habits,” on individual children for a period of eight weeks will improve children’s pitch, rhythm, and breathing skills.

Why am I being asked to be in this study?
You are being asked to be in this study because you are at or between the ages of 5 and 10 years old.

If I decide to be in the study, what will happen and how long will it take?
If you decide to be in this study, you will participate in two group lessons with other children (about 50 minutes each), and six individual lessons (about 30-45 minutes each) within a period of eight weeks total. You will also be asked some questions once all of the lessons are done.

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

What if I have a question?
You can ask questions any time. You can ask now. You can ask later. You can talk to the researcher. If you do not understand something, please ask the researcher to explain it to you again.

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

________________________________________________________________________
Signature of Child                                   Date

________________________________________________________________________
Signature of Witness                                 Date

Kathleen Riggs
Dr. Samantha Miller

Liberty University Institutional Review Board, 1971 University Blvd, Green Hall 2845, Lynchburg, VA 24515, irb@liberty.edu