LIBERTY UNIVERSITY
SCHOOL OF MUSIC

Strategies to Encourage Continued Choral Participation Among Adolescent Male Students

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By

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Abstract

This project overviewed a mixed methods research study, which examined the ways in which choral participation among adolescent male students could be encouraged by choral directors. The paper examined the history of male choral participation, common theories regarding male voice classification, as well as how choral participation among adolescent male students could be encouraged by the education of a voice change process. A vocal study of one hundred and seventeen biological male singers at Westside Middle School Academy in Danbury, Connecticut was used to study the validity of numerous male voice change theories. This study documented the transformation of the male students' vocal ranges and tessituras. The author proposed that continued choral participation among adolescent male students may be encouraged by the middle school choral director in terms of innovative strategies that help the students track their vocal development, range and tessitura. The author also proposed that students who develop the skills to track their vocal range and tessitura will be more inclined to actively participate in vocal warm-ups, class rehearsal, and lessons designed to teach students about the male voice change.

Contents

Chapter 1: Introduction

The disinterest and misunderstanding of the adolescent male voice change have suppressed the creativity and musical expression of countless men throughout history. While progressive music educators have started to eradicate the stigmas created by these behaviors to opt for a more inclusive choral environment, observers of middle school choirs will notice an uneven ratio of male to female students. This ratio has been seen to grow more unevenly into the later adolescent years and eventually into high school. While one could hypothesize that the voice change is the leading catalyst behind the male choral exodus in secondary school, the author of this paper has proposed that the topic requires further research and discussion.

At the elementary school level, choral directors welcome any student who wishes to participate in singing. Mizener questioned 542 children in grades three through six concerning their attitudes toward singing and choir participation. According to Mizener, 45% of the children surveyed communicated that they would like to sing in a school choir.[1] Additionally, a robust 78% enjoyed singing in alternative settings (i.e. singing along with the radio, karaoke etc.).[2] For most elementary students, participating in choir is a positive and inclusive experience. Mizener's study found no correlation between singing skill and attitudes toward school choir participation. He credited quality instruction in the elementary classroom, such as unpitched percussion for rhythmic exercises and drills, use of singing games to engage students musically, and finding songs that are in a limited, comfortable range for upper elementary students as reasons for increased positive attitudes toward school music.[3]

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[1] Charlotte P. Mizener, "Attitudes of children toward singing and choir participation and assessed singing skill," *Journal of Research in Music Education*, 41, no. 3 (1993): 233-245

[2] Ibid.

[3] Ibid.

It would make sense that young males and females who participate in elementary choral programs would willingly choose to enroll in secondary choral programs. However, Pognowski noted the increasingly negative attitudes toward school music as children advance by age and grade level.[4] Consistent with Mizener, Pognowski discovered no relationship between musical aptitude and attitudes toward school music. There was, however, a moderately high correlation between global attitudes toward music and attitudes toward school music, as well as a student's beliefs about their own musical ability.[5] Austin found that students with higher levels of musical self-esteem were more likely to participate in school music.[6] Austin noted that the musical self-esteem of the typical female student is much higher than the typical male student, due the insecurities that occur during the male voice transformation.[7] The truth is many boys lose interest in singing during their voice change, not because "they can't sing" but because they think they can't sing.

Anne Karpf stated, "From the moment we open our mouths and begin to speak...our voice is doing something terrifyingly intimate, leaking information about our biological, psychological and social status."[8] Karpf believed that it is the job of the choral director to help young males remain confident in their voice.[9] In his article, *"Encouraging Male Participation in Chorus,"* Steven M. Demorest discussed techniques for teachers that could help motivate

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[4] L. M. Pogonowski, "Attitude assessment of upper elementary students in a process-oriented music curriculum." *Journal of Research in Music Education*, 33, no.4, ,(1985): 247-257

[5] Ibid.

[6] J. R Austin, "The relationship of music self-esteem to degree of participation in school and out of-school music activities among upper-elementary students." *Contributions to Music Education*, 17, (1990): 20-31.

[7] Ibid.

[8] Anne Karpf, *The human voice: how this extraordinary instrument reveals essential clues about who we are.* (New York, NY: Bloomsbury Pub, 2006), 100.

[9] Ibid.

adolescent males in the choral classroom.[10] Demorest proposed that "singing involves taking a somewhat personal risk-not an easy thing for adolescents who already feel rather insecure. Peer pressure also intensifies around this time, and in the eyes of an adolescent boy, choir may not have the prestige of other activities."[11] Instead of addressing these issues with stimulating rehearsals, exposure to male vocal ensembles and patience, many choral directors have continued to exile voices that do not fit within the traditional four-part, SATB mold. Unbeknownst to these choral directors, the voice ranges and tessituras of most adolescent and full-grown males do not fall within the traditional choral tenor and bass ranges.[12] However, before music educators begin to educate students on the male voice transformation, they must first educate themselves. According to Leon Thurman, "the more we know about the voice change, the greater the chances boys will develop their interest in and dedication to the expressive rewards of singing."[13] These sorts of teachers have recognized that by educating male students about their voice change, they are de-mystifying the entire process.[14] This paper has examined common theories regarding male voice classification, as well as how choral participation among adolescent male students could be encouraged by the education of a voice change process.

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[10] Steven M. Demorest, "Encouraging Male Participation in Chorus" *Music Educators Journal* 86, No. 4, (Jan., 2000): 38-41.

[11] Steven M. Demorest, "Encouraging Male Participation in Chorus" *Music Educators Journal* 86, No. 4, (Jan., 2000): 38-41.

[12] John Cooksey, *Working with the Adolescent Voice*. (St. Louis, MO: Concordia Pub, 1999), 24-26.

[13] Leon Thurman, "Boy's Changing Voices: What Do We Know?" *ACDA Online Publications*, 52, no. 9 (2016), 11.

[14] Doreen Fryling, "Keeping the Boys Singing: How You Can Make a Difference" *NAfME Online Publications* (December 2015)

Background of Topic

In the beginning of a typical school year, vocal ranges of a sixth-grade choral class should resemble an elementary school ensemble. Most students (both male and female) still appropriately fit into the standard Soprano and Alto ranges. Considering most two-part octavo arrangements use these ranges as a guideline, the voice testing process is more simplistic. Male students, who are generally more comfortable singing in their unchanged head voice, could be placed in the Soprano section, while male students who are more comfortable singing in their unchanged chest voice could be placed in the Alto section. Students who are just beginning their vocal transformation would still appropriately fit within the range of an Alto. When a male student could no longer sing in the Alto range, a director would make a decision whether to put the student in their own section or sing in octaves with the other voice parts.[15] Choral directors would additionally diagnose if the student has the musical or emotional capability to follow either instruction. These issues continue as young men age, as the tessitura of males could range multiple octaves by the end of eighth grade.[16] Some solutions to this involve asking the students to sing out of range to balance the sections or instructing male students to cease singing until their voice could be clearly classified into a vocal range. These practices could not only discourage the male from participating in choir, but potentially damage their vocal mechanism.[17] Progressive music educators have understood that these questions and concerns could not be addressed until they have educated themselves about the male voice transformation. The first step is understanding the physical changes that occur with puberty and

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[15] John Cooksey, *Working with the Adolescent Voice*. (St. Louis, MO: Concordia Pub, 1999), 24-26.

[16] Ibid.

[17] Simon Ravens, *The Supernatural Voice: A History of High Male Singing.* (Suffolk, England: Boydell and Brewer, November 2014), 4-10.

its effect on the voice.[18] Simon Ravens provided a detailed explanation of how the vocal mechanism works. He explained the following:

> "When viewed through a stroboscope, in our modal voice the vocal folds are seen to make contact with each other completely during each vibration, closing the gap between them fully, if just for a very short time. This closure cuts off the escaping air. When the air pressure in the trachea rises as a result, the folds are blown apart, while the vocal processes of the arytenoid cartilages (the pair of tissue-masses on the sides of the larynx, to which the vocal cords are attached) remain held together. This closure creates an oval shaped gap between the folds, and some air escapes, lowering the pressure inside the trachea. Rhythmic repetition of this movement, a certain number of times a second, creates a pitched note."[19]

In her article, *"Which Sung Pitch is Best For Boys During Voice Change"* Jenevora Williams provided additional insight into how the vocal mechanism is affected by puberty. "As the larynx enlarges during adolescence, most boys will follow the descending pitch of their speaking voice and move to singing vocal parts with a lower pitch range."[20] After having been properly educated regarding the biology of the male voice mechanism, directors could compare and contrast traditional and current practices regarding the male changing voice.

Throughout history, the vocal and physical mistreatment of male singers have led to the negative stigma around male singing.[21] From the ninth century until the mid 1800's, the castrati supplemented female vocalists who were forbidden to perform in churches and other musical productions.[22] The castrati were later replaced by "high male singers" who were

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[18] Ibid.

[19] Simon Ravens, *The Supernatural Voice: A History of High Male Singing.* (Suffolk, England: Boydell and Brewer, November 2014), 4-10.

[20] Jenevora Williams et al. "Which Sung Pitch is Best For Boys During Voice Change. " *Journal of Voice,* (January 2020)

[21] Simon Ravens, *The Supernatural Voice: A History of High Male Singing.* (Suffolk, England: Boydell and Brewer, November 2014), 4-10.

[22] B.A. Robinson, "Roman Catholic Policies on Castration: Castrated Choir Boys, ~1500 to 1903. The Roman Catholic Church's Policies on Castratism" *Religious Tolerance*, (2007)

forced to sing through their vocal transformation in order to retain their "child-like" range.[23] Twentieth century choral practices, however, pivoted entirely, often suggesting for males to stop singing during their adolescent years.[24] Fortunately, modern research has started to show the benefits of consistent practice, as well as aiding male students through their voice change. Educators now have learned new information on how choral educators should properly train young male voices and present that information to young male students in order to increase their engagement and participation in choir. While the adolescent male changing voice has been a well-researched topic, this thesis has presented new perspectives on the issue.

Problem Statement

Adolescent males have been observed to be less likely to continue participating in choral ensembles compared to female singers. Research to explain and solve this disparity has primarily focused on promoting popular music, as well as student-centered activities. Nevertheless, there has been little research to explore why male singers become disengaged at the adolescent level. To gain a fuller understanding of why adolescent males are less likely to continue in choral ensembles, an in-depth qualitative and quantitative research was required. A focus on student data and feedback has shown to help develop more theories as to why this choral exodus occurs. In addition, it has shown to help teachers develop techniques that could help increase male participation and engagement in choir.

Purpose Statement

This project aimed to better understand the reasons why adolescent males may choose

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[23] Simon Ravens, *The Supernatural Voice: A History of High Male Singing.* (Suffolk, England: Boydell and Brewer, November 2014), 4-10.

[24] Steven M. Demorest, "Encouraging Male Participation in Chorus" *Music Educators Journal* 86, No. 4, (Jan., 2000): 38-41.

to stop participating in choir, as well as researched the techniques that could help combat this trend. Quantitative and qualitative methods were used to gain in-depth insight into the range, tessitura, and vocal confidence of one hundred and seventeen biological male students at Westside Middle School Academy in Danbury, CT. This data was compared to past and present literature with the hope of providing the reader with techniques to retain and educate their male students.

Research Questions

The following research questions have been investigated in this study:

RQ1: What are the benefits of male students learning about vocal range and tessitura during adolescent voice change?

RQ2: What strategies could be implemented by the middle school choral director to encourage continued choral participation among adolescent male students?

The first research question asked, "What are the possible benefits of male students learning about vocal range and tessitura during adolescent voice change?" According to Doreen Fryling, young male students will regain confidence in their voices if they feel they have control.[25] She stated that choral directors must educate young males to correctly assess their ability. This process involved providing adolescent male students with techniques to evaluate themselves, either against their own growth or in comparison to others.[26]

The second research question asked, "What strategies could be implemented by the

[25] Doreen Fryling, "Keeping the Boys Singing: How You Can Make a Difference" *NAfME Online Publications*, (December 2015): 1.

[26] Ibid.

middle school choral director to encourage continued choral participation among adolescent male students?" In some cases, students will only receive choral exposure through school participation. Since instructional time is often limited, choral directors are often forced to choose between the "process" or the "product."[27] The "process" is a focus on providing each student with a high quality, individualized classroom education. This involves spending more time and energy building pedagogical understanding through intensive music training. A choral director's emphasis on the "product" values the performance opportunity over the in-class instruction.[28] A balance between the "process" and "product" could lead to the most optimal singing voice education.

Working Hypotheses

A possible result to the first research question has been presented in working hypothesis 1 and was tested as part of this study:

RQ1: What are the possible benefits of male students learning about vocal range and tessitura during adolescent voice change?

H1: The hypothesis for this question stated that possible benefits of the male students learning about vocal range and tessitura during adolescent voice change may include more active participation in vocal warmups and rehearsal, as well as a positive attitude toward continuation in singing.

A possible result to the first research question has been presented in working hypothesis 2 and was tested as part of this study:

[27] Melissa Hurst, "Performance Assessments: Product vs. Process, presentation from Psychology 102: Educational Psychology, (Charlottesville, VA: University of Virginia, September 2012)

[28] Ibid.

RQ2: What strategies could be implemented by the middle school choral director to encourage continued choral participation among adolescent male students?

H2: Strategies that could be implemented by the middle school choral director to encourage continued choral participation among adolescent male students may include tracking student progress, small group and gender-specific instruction, as well as frequent voice testing.

It is important to note that an education on the male voice change and tracking procedures must be individualized. Xander Kritzinger stated that "Boys develop in varying ways and experience their voice changes differently. Some will experience a sudden lowering in pitch and others will experience a gradual lowering without noticing a drastic change."[29] This personalized style of education could help build confidence in the young male singer. Educator Patrick Freer agreed with the importance of allowing adolescents students to feel in control of their voice change. He stated that adolescent boy singers have expressed a need to feel that they are in control of both their learning and their moment-to-moment vocal contributions in the choral rehearsal."[30] The sense of confidence and control could allow students to explore their range and timbre during warmups and rehearsal, helping them to discover their own unique voice.

Summary

Both qualitative narrative data and quantitative data were gathered from one

[29] Xander, Kritzinger, "A critical literature review on male voice mutation" (Stellenbosch, South Africa: Stellenbosch University, April 2019)

[30] Patrick K. Freer, "The Changing Voices of Male Choristers: An Enigma . . . To Them" (Georgia State University, GA: ScholarWorks, 2016)

hundred and seventeen adolescent, biological male singers at Westside Middle School Academy in Danbury, Connecticut. Students were between the age of ten and fourteen, [sixth to eighth grade]. This study documented the transformation of the adolescent male vocal range and voice tessitura. In addition, the study observed maturation of the human voice as a function of age characterized by changes in pitch, volume, and a variety of tone qualities.[31] Students who participated in this vocal study were tested during the middle of the academic school year. Qualitative data was gathered regarding one's choral experience, as well the confidence in their vocal ability. Assessing the student's vocal ranges and tessituras, as well as their confidence and experience level, provided valuable narrative information that allowed the teacher to assess emotional factors that may compromise a student's interest in choral participation. In her article, *"Organizing the Chaos: Managing the Middle School Choir"* Lynn Swanson discussed similar techniques on how to address the emotional aspect of the male voice transformation. Swanson stated how male students often express their vocal frustration through poor classroom behavior or dropping out of choir. She encouraged teachers to cultivate a sense of family and teamwork in the classroom. According to Swanson, "When everyone invests and trusts each other, working towards that common goal becomes much easier."[32]

[31] M L. Harriesa**,** et al, "Changes in the male voice at puberty" *Archives of Disease in Childhood*, 77, no.

[32] Swanson, Lynn. "Organizing the Chaos: Managing the Middle School Choir" *ACDA Online Publications* (November 2018): 1.

Chapter II: Literature Review

The purpose of this chapter was to examine existing literature that highlighted the benefits of voice change education and choral engagement techniques for the adolescent male. The first section addressed historical trends regarding the male voice change that created the stigma of male choral participation. Section two explored the voice classification theories of Irvin Cooper, Duncan McKenzie and Fredrick Swanson to the most commonly accepted theory of John Cooksey. The third section provided evidence in support of the connection between tracking vocal development and male choral participation. The fourth section provided evidence in support of the connection between small group vocal instruction and male choral participation. The final section addressed methods of lesson planning using the National Association for Music Education (NAfME) General Music Standards so that choral directors could utilize voice tracking and small group instruction techniques in their curriculum.

With the popularity of polyphonic church music growing in the mid to late 16th century, church music directors and composers expressed a need for higher, treble voices. This need was partially due to the fact women were not permitted to perform in the Roman Catholic church. This instruction is found the following passage in the New Testament:

> "Women should remain silent in the churches. They are not allowed to speak, but must be in submission, as the law says. If they want to inquire about something, they should ask their own husbands at home; for it is disgraceful for a woman to speak in the church. A woman should learn in quietness and full submission. I do not permit a woman to teach or to assume authority over a man; she must be quiet."[33]

[33] 1 Corinthians 14:34-35 (NIV)

Initially, the voices of young boys and adult male falsettists were utilized to perform treble parts.[34] However, most children's voices and falsettists were not able to achieve the vocal power to match the rest of the ensemble. The first official announcement of castration for singing came in 1589, when Pope Sixtus V stated that four eunuchs had joined the choir of St Peter's, in Rome.[35] The Catholic church remained deeply conflicted in its position on castrati. While church law banned deliberate amputations of any part of the human body[36] church leaders looked the other way for the need of higher, more powerful singers.[37]

The unique power and timbre of the castrati voice was a result of male bodies' development post-procedure. According to author Roger Freitas,

> "Typically, when a male hits puberty, the growth of the larynx causes the speaking voice to lower in pitch and develop greater power due to increased testosterone, the total length of the male vocal cords grows from a prepubertal mean value of 17·35 mm to 28·92 mm in the adult, an increase of 63%, whereas female vocal cords increase by only 34% (from a mean of 17·31 mm to 21·47mm). Testosterone initially produces oedema and vascular injection of the vocal cords, followed by a permanent thickening due to the accumulation of collagenous and elastic tissue."[38]

These changes contribute further to the lowering of vocal pitch. If one is castrated, their larynx will not thicken, thereby not dropping the pitch of their voice. When scientists examined the anatomy of a castrato, (post-mortem) they noticed that the width of the larynx was the size of a child, yet the length compared to a woman Soprano. The pharynx and oral cavity allow the voice to have full-grown resonating chambers, to allow the voice to develop power with proper

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[34] Simon Ravens, *The Supernatural Voice: A History of High Male Singing.* (Suffolk, England: Boydell and Brewer, November 2014), 4-10.

[35] B.A. Robinson, "Roman Catholic Policies on Castration: Castrated Choir Boys, ~1500 to 1903. The Roman Catholic Church's Policies on Castratism" *Religious Tolerance*, (2007)

[36] Leviticus 19:28 (NIV), Leviticus 21:18 (NIV), Leviticus 22:22 (NIV)

[37] B.A. Robinson, "Roman Catholic Policies on Castration: Castrated Choir Boys, ~1500 to 1903. The Roman Catholic Church's Policies on Castratism" *Religious Tolerance*, (2007)

[38] Roger Freitas, "The Eroticism of Emasculation: Confronting the Baroque Body of the Castrato," *The Journal of Musicology,* 20, no. 2, (Spring 2003): 210.

training.[39] While it was technically illegal to perform castrations, castrati were encouraged to present themselves for the choir claiming to have lost their genitals through a 'tragic accident'. Pope Clement VIII who reigned from 1592 – 1605 opined that "the creation of castrati for church choirs was to be held *ad honorem Dei* [to the honor of God]."[40] Pope Clement VIII argued that the castrati outshone the reedier and thinner timbre of the falsettists and also the comparatively transient beauty of the boy choristers.[41] After the Pope's official acknowledgement and acceptance of castrati, the castrato voice gained mass popularity in western Europe due to parents seeking upward mobility.[42] By 1640, castrati were members of all the major choirs of Italy. Religious leaders and theologians continued to debate the morality of castration throughout the 17th and 18th centuries.[43] While some theologians such as Paul Laymann (1574 -1635) condemned the practice, religious leaders continued to reaffirm the act of castration to honor God. The Sicilian Jesuit Thomas Tamburini (1591-1675) affirmed: "…it is lawful, provided that there is no mortal danger to life, and that it is not done without the boy's consent…"[44] He reasoned that "they served the common good by singing the divine praises more sweetly in churches…"[45] Rober Sayer, an English Benedictine moralist of the late 16th century, reasoned that the voice was a faculty more precious than virility as it distinguished man from the animals and justified doing without impiety what was necessary to suppress virility to

[39] Ibid.
[40] Ibid.
[41] James L. Franklin, "The castrati: a physician's perspective, part 1" *Hektoen International*, 2, no. 2, (Spring 2010)
[42] Ibid.
[43] Ibid.
[44] Ibid.
[45] Ibid.

enhance the voice. According to Sayer, new Sopranos were considered necessary in the praise of God.[46]

The castrati also took precedence during the growth of Italian Opera in the 17th century. Since most professional singers were found in church choirs, it was common that they also participated in opera. However, as there became a higher demand for castrato soloists, the rate of castration increased. Poorer families had their sons castrated in hopes they would become wealthy performers and aid them out of poverty. While thousands of castration procedures occurred, only a few of the castrati received the level of fame they and their families desired. Boys who showed vocal promise entered a conservatory, where they intensively studied voice for up to ten years. The top castrati prodigies would go on to become huge international stars in the opera community.[47]

It was not until the reign of Pope Clement XIV (1769 – 1775) that the law banning intentional castration became more regularly enforced.[48] Anyone who was caught performing castration or was associated with the practice was excommunicated by the church. In an additional effort to eliminate this practice, he permitted women to sing in both the churches and the theaters of the Papal States. While castrati continued to perform until the end of the 19th century, the practice of castration for singing, as well as the popularity of opera seria began to dwindle. To this day, the mystery of the castrati and high male singing continues to intrigue the vocal community. In 1946, the term "countertenor" was coined by musician Michael Tibbet to

[46] Ibid.

[47] James L. Franklin, "The castrati: a physician's perspective, part 1" *Hektoen International*, 2, no. 2, (Spring 2010)

[48] Ibid.

describe the unique voice of Alfred Deller, a performer with the Canterbury Cathedral.[49] While most modern-day countertenors can imitate the sounds of the castrati through the use of falsetto, irregularities in vocal development only allow a select few to effortlessly sing in the Alto range using their chest voice.

Since the act of castration is deeply rooted within the history of male singing, the author declaration of proposed that the emasculating stigma behind male choral participation may have started with Pope Clement XIV condemning castration for musical purposes. While modern day efforts to "re-glorify the masculine voice" have worked within the solo classical and popular music performance realm, a continual imbalance of male and female singers in secondary school choirs provided evidence that this stigma still affects the adolescent male's decision to participate and/or remain in choir. This stigma might not have occurred within the music department itself, but rather circulated within the culture of school or the family and friends of the student. Competing with this stigma, along with a frustrating voice change process, will most likely discourage the male singer in continued choral participation.[50] The choral director plays an important role in not only educating the students about the male voice change, but educating the students about the history behind the stigma, so that it can be understood and overcome.

Before the mid-twentieth century, many music directors promoted the idea that adolescent boys should refrain from singing once their voice mutation begins.[51] These directors argued that singing during the voice change would cause physical harm, as well as disrupt the voice during

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[49] Simon Ravens, *The Supernatural Voice: A History of High Male Singing.* (Suffolk, England: Boydell and Brewer, November 2014), 4-10.

[50] Doreen Fryling,"Keeping the Boys Singing: How You Can Make a Difference" *NAfME Online Publications*, (December 2015): 1.

[51] F. J. Swanson, *The male singing voice ages eight to eighteen.* (Cedar Rapids, IA: Laurance Press, 1977)

mutation.[52] When the young boy had finally settled into a vocal range that resembled the typical Tenor or Bass voice, they were once again welcomed back into the choral setting.[53] Swanson indicated that one reason for this perspective might have been that the conductors of all male choirs in Europe were educationally ill equipped to deal with the idiosyncrasies of the mutational voice.[54] Furthermore, Swanson believed that it was simply easier to ask young males to sit out rather than study the tendencies of the adolescent male voice mutation or design repertoire for the changing voice.[55] Since the mid-twentieth century, there has been significant progress within the field of music education, particularly at the adolescent level. The research of music educators Irvin Cooper, Duncan McKenzie and Frederick Swanson (and later continued by John Cooksey) provided evidence for the inclusion of adolescent male in the choir. Their research connected the stages of male puberty as a result of the body's natural hormonal changes, to the adolescent voice mutation. These men observed tone quality, range limitations, and physical characteristics associated with the male changing voice.[56] Additionally, each man developed a classification system for male vocal development, as well as provided voice training and repertoire recommendations for the male changing voice. The following section analyzed the classification systems of Duncan McKenzie, Irvin Cooper, and Frederick Swanson's and compared it to the widely accepted system of John Cooksey.

In the 1950's, music educator and researcher Irvin Cooper began his research regarding the adolescent male vocal development and choral participation in the classroom. While working

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[52] Ibid.
[53] Ibid.
[54] F. J. Swanson, *The male singing voice ages eight to eighteen.* (Cedar Rapids, IA: Laurance Press, 1977)
[55] Ibid.
[56] Sally Hook, "VOCAL AGILITY IN THE MALE ADOLESCENT CHANGING VOICE," (Columbia, MO, University of Missouri—Columbia, 2005)

as a music supervisor within the Montreal Public School District, Cooper observed that many of the adolescent boys were not involved in the music making process. Young boys who were not able to cope with the Soprano and Alto ranges, dealt with consistent voice cracking or chose to remain silent. Some of these students were instructed to remain silent, as Canadian music educators at the time adhered to the principle that having boys sing during their voice change was detrimental.[57] These individuals were labeled as "non-singers" by directors and were often discarded in musical pursuits.[58] However, Cooper often heard the exiled adolescent males singing in more casual environments such as lunch or free periods during the school day. Intrigued by this discovery, Cooper invited a group of local middle school boy scouts to his home for a campfire and dinner. His goal was to test the theory that adolescent boys were indeed capable of singing on pitch without causing damage to the voice. Accompanying the boys on his piano, Cooper asked them to sing a familiar melody of a popular song. In the song's original key, most of the boys sang considerably off-pitch. However, when Cooper transposed the song upwards and downwards, more boys were able to match pitch when performing the melody. Cooper noted that adolescent males had difficulty singing in ranges that were inaccessible to their changing voices.[59] Using the information, he began to realize that much of standard SAB (Soprano, Alto, Baritone) choral repertoire performed in middle school classrooms were outside the ranges and tessitura of the male changing voice. In 1965, Cooper theorized that male voice mutation process had begun to occur much earlier in development, hence most of the music and materials written for

[57] Don Collins, *The Cambiata Concept.* (Conway, AR: Cambiata Press, 1981): 2

[58] Phillip Holland Stockton, "A Historical Study Of Irvin Cooper: Choral Music Educator And Founder Of The Cambiata Concept" (Oxford, MS: University of Mississippi, 2013)

[59] Ibid.

adolescent voices in previous eras were outdated and unusable.[60] Alto parts were typically written in ranges too high for the changing voice, while the extensive range of Baritone parts poorly represented the limited vocal flexibility of young male singers. Cooper also began to criticize the segregation of "singers" and "non-singers" within the classroom, as it created issues with behavior, effort and engagement within the classroom. In an attempt to help create a more inclusive choral environment for adolescent male voices, Cooper labeled the changing voices of the choir as *cambiata*, deriving from the Italian word *nota cambiata*, which translates to changing note.[61] This theory became known as the Cambiata Concept, which promoted the idea of gradual progression of the voice change. Cambiata voices start as child-like in timbre, quickly becoming richer and thicker. During this transitional period, the lower range of the singing voice extended downward in which the male lost access to his higher register. This process, while varying from student to student, typically began in the seventh grade. Accordingly, a large percentage of boys in the eighth grade were expected to be included in the cambiata or Baritone stages of the voice change.[62] The Cambiata Concept called into doubt the previous theories of adolescent male exclusion from choral settings. Before the term cambiata was developed, the common label for a changing male voice was "Alto-Tenor" developed by educator Duncan McKenzie. This term was used to describe those whose singing range was not high enough for an Alto or low enough for Tenor.[63] However, Cooper adamantly opposed the term "Alto-Tenor," stating that it did not

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[60] Irvin Cooper and Karl O. Kuersteiner, *Teaching Junior High School Music* (Boston, MA: Allyn and Bacon, Inc., 1965).

[61] Phillip Holland Stockton, "A Historical Study Of Irvin Cooper: Choral Music Educator And Founder Of The Cambiata Concept" (Oxford, MS: University of Mississippi, 2013)

[62] John M. Cooksey, "The Development of a Contemporary, Eclectic Theory For The Training And Cultivation of The Junior High School Male Changing Voice: PART I: EXISTING THEORIES," *The Choral Journal* , Vol. 18, No. 2 (October 1977): 5-14.

[63] Ibid.

accurately describe the range of the changing voice.[64] Cooper affirmed that the label Cambiata gave the boys a sense of pride, rather than being labeled as an Alto, traditionally regarded as a female voice classification.[65] When grouping students, Cooper identified each boy's voice according to range, classifying it accurately as Soprano, Cambiata, Baritone or Bass. Cooper provided detailed ranges that were accessible by these changing voices.[66] Below is a table outlining the vocal ranges of these classification (see figure 1).

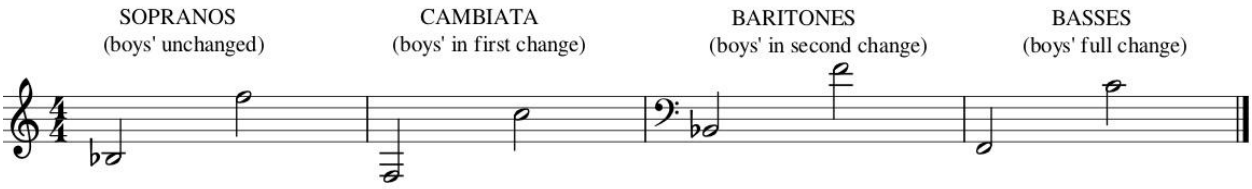

Figure 1: Vocal ranges of adolescent males according to John Cooper.
Source: Irvin Cooper and Karl O. Kuersteiner, *Teaching Junior High School Music* (Boston, MA: Allyn and Bacon, Inc., 1965).

Boys who tested within the Soprano (or unchanged) vocal range were able to sing between the notes Bb3 and F5. It is important to note that Cooper did not differentiate female voices in middle school choir, recommending that all females join unchanged male voices in the Soprano section. Those who tested within the Cambiata vocal range were able to sing between the notes F3-C5. According to Cooper, this first stage of mutation lasted anywhere from a few months to two years.[67] Boys who tested within the Baritone vocal range were able to sing between the notes Bb-F5. Cooper clarified that the young Baritone had little resemblance to the adult Baritone voice, often lacking in vocal power and agility, especially for articulating fast moving pitches

[64] Ibid.
[65] Ibid.
[66] Ibid.
[67] John M. Cooksey, "The Development of a Contemporary, Eclectic Theory For The Training And Cultivation of The Junior High School Male Changing Voice: PART I: EXISTING THEORIES," *The Choral Journal*, Vol. 18, No. 2 (October 1977): 5-14.

separated by wide intervallic leaps. He discouraged the terms Bass and Tenor to describe these voices, as most adult voices did not emerge until high school.[68] Educator Kenneth Phillips stated the following about the Cambiata Concept, "The Cambiata approach prescribes that 90 percent of all boys' voices change and lower according to a common pattern: first change to Cambiata in seventh grade, and second change to Baritone in eighth grade"[69] Students that tested within the Bass vocal range were able to sing between the notes F2 and C5. However, it was rare that students demonstrated a completely changed or Bass voice until high school. Cooper advised directors to voice test in groups rather than individually. Cooper stated that when Cambiata voices test individually, they will often present an aural illusion of sounding an octave lower than is actually the case. This was due to the unique timbre of the Cambiata voice, which presented as more mature without a significant drop in pitch. When heard individually, Cooper worried that a director may misidentify the octave in which the boy was singing. He stated that a director could confirm the correct octave by comparing the boy's voice with a completely changed Bass or Baritone singing in the lower octave.[70] Cooper commented more on this phenomenon below.

> "The number of cambiata voices classified in error as light basses is legion. As a result of this, some ridiculous malpractices are perpetuated, because boys so classified actually sing a bass part an octave higher than written, with an upper limit of printed middle c. In such cases the group sings SATB material with boys' voices in the second change (baritones) singing the tenor part, while voices in the first change sing the bass part which in reality sounds higher than the tenor. The sound is most disconcerting. Youngsters sense it does not sound right and appear self-conscious and uncomfortable."[71]

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[68] Ibid.

[69] K. Phillips, *Teaching kids to sing.* (New York, BY: Schirmer Books, 1992.)

[70] John M. Cooksey, "The Development of a Contemporary, Eclectic Theory For The Training And Cultivation of The Junior High School Male Changing Voice: PART I: EXISTING THEORIES," *The Choral Journal*, Vol. 18, No. 2 (October 1977): 5-14.

[71] John M. Cooksey, "The Development of a Contemporary, Eclectic Theory For The Training And Cultivation of The Junior High School Male Changing Voice: PART I: EXISTING THEORIES," *The Choral Journal* , Vol. 18, No. 2 (October 1977): 5-14.

Cooper's preferred method of voice testing was to instruct all the males to sing a well-known tune such as Jingle Bells. He suggested starting in the key of Bb Major, as the students would immediately select the octave that is most comfortable to them.[72] Cooper was able to quickly identify which students were performing in the lower octave(s) and classify them as changing voice Baritones. The process was then repeated up to the key of Gb major. He then identified which students were singing intervals located between the lower and upper octave and classified them as Cambiata. Students who were still able to perform the upper octave melody in Gb major were classified as Sopranos, or as boys who had not entered the voice change.

After classifying the male vocal ranges, Cooper called for directors to appropriately integrate these various male voices in with the female voices. Cooper believed that most SAB and SATB choral music did not properly represent the changing voices in the classroom, as standard Tenor and Bass ranges were generally too low for Cambiatas and Baritones. While female voices and unchanged voices could appropriately fit within the Soprano and Alto ranges, the Cambiata's range falls between the traditional Alto and Tenor ranges, making neither part attainable. In addition, traditional Bass parts did not appropriately represent the newly-changed voice Baritone. Forcing the Cambiatas or Baritones to sing in the extreme highs and lows of their range led to vocal strain and potential voice cracks. Cooper's Cambiata Concept called for the reform of the standard section labels to avoid these issues, proposing that middle school choral sections be labeled Soprano 1, Soprano 2, Cambiata, and Baritone. Throughout his career Cooper arranged many pieces using the SSCB format and advocated for music educators to adapt their repertoire for the changing voice in the classroom. In these arrangements, Soprano 1 represented the typical

[72] Phillip Holland Stockton, "A Historical Study Of Irvin Cooper: Choral Music Educator And Founder Of The Cambiata Concept" (Oxford, MS: University of Mississippi, 2013)

head-voice dominant, female or unchanged male singer. Soprano 2 represented the typical chest-voice dominant female or unchanged male singer. Cooper stated that placing the unchanged voice in middle school choir is often just as problematic as the changing voice. He stated that this is likely due to the social stigma that males with unchanged voices are not considered as masculine as those who have entered or completed puberty.[73] Cooper recommend that directors strategically place Boy Sopranos near other Boy Sopranos, to eliminate the misunderstanding that Soprano 1 and Soprano 2 are the "girl" sections. The Cambiata section represented students in the first stage of the changing voice, while the Baritone section represented students in the second stage of the changing voice and fully changed voices.

Once students had been appropriately placed in choral sections that represent their vocal ranges, Cooper suggested several criteria that should be considered when selecting music for changing voices. These categories include: vocal range, the way individual parts are written, intervallic progressions, articulation speed, appropriateness of text, and the musical integrity of the piece.[74] Cooper believed it was imperative for music to be created specifically for changing voices rather than attempting to have the voices fit music written for adults or changed voices.[75] He began to develop "melody part-songs" which choral pieces were more appropriate for changing voices. The image below is an excerpt from one of those pieces, titled Gloria. (see figure 2).

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[73] Cooper, Irvin. *Changing Voices in Junior High: Letters to Pat*. New York, NY: Carl Fisher, 1953.

[74] Phillip Holland Stockton, "A Historical Study Of Irvin Cooper: Choral Music Educator And Founder Of The Cambiata Concept" (Oxford, MS: University of Mississippi, 2013)

[75] Phillip Holland Stockton, "A Historical Study Of Irvin Cooper: Choral Music Educator And Founder Of The Cambiata Concept" (Oxford, MS: University of Mississippi, 2013)

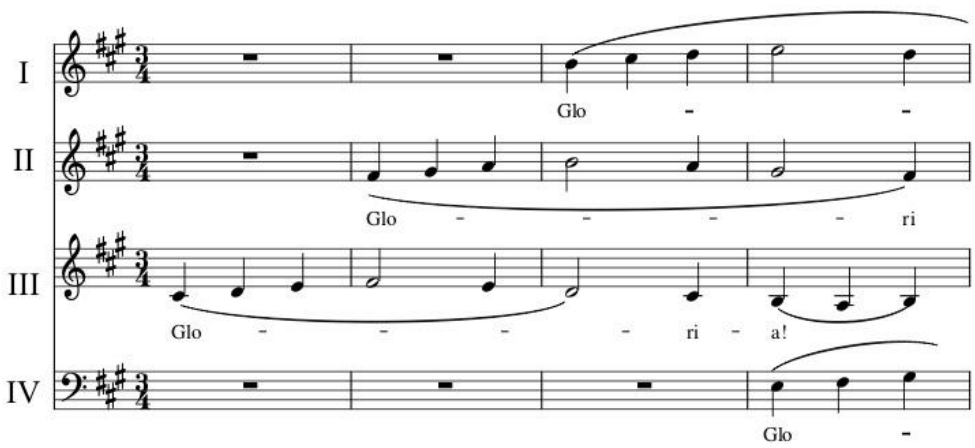

Figure 2: Excerpt: "Gloria" by John Cooper.
Source: Cooper, Irvin. *Tunetime for Teentime*. New York, NY: Carl Fisher Inc, 1952.

While Cooper recommended the Soprano 1, Soprano 2, Cambiata and Baritone section labels for this piece, here he utilized generic part labels in the case that the director may want to adapt their section labels to his SSCB vocal ranges. This short, 13 measure piece imitated the structure of classical canon entrance and was placed in A-major. The four-part arrangement style gets the students singing in a range that is tailored to their tessitura. This piece utilized simple harmonic and notational rhythm throughout, introducing a new section after each measure. Cooper began with the Cambiata entrance to highlight the changing voices within the choir. Cooper encouraged directors to feature the Cambiata section whenever people. "If the Cambiata voice is classified properly, and is allowed to develop within its own particular range, it will become the pitch-anchor for the rest of the choir. Cambiata learns their notes more quickly and seldom varies in pitch thereafter."[76] The melody moved from section to section throughout the piece, so that students could practice serving different harmonic and melodic functions. Cooper also designed melody part-songs for two and three parts. The arrangements were typically

[76] John M. Cooksey, "The Development of a Contemporary, Eclectic Theory For The Training And Cultivation of The Junior High School Male Changing Voice: PART I: EXISTING THEORIES," *The Choral Journal* , Vol. 18, No. 2 (October 1977): 5-14.

designed for fifth through seventh grade choirs. The image below is an excerpt from one of those pieces, titled Santa Lucia (see figure 3).

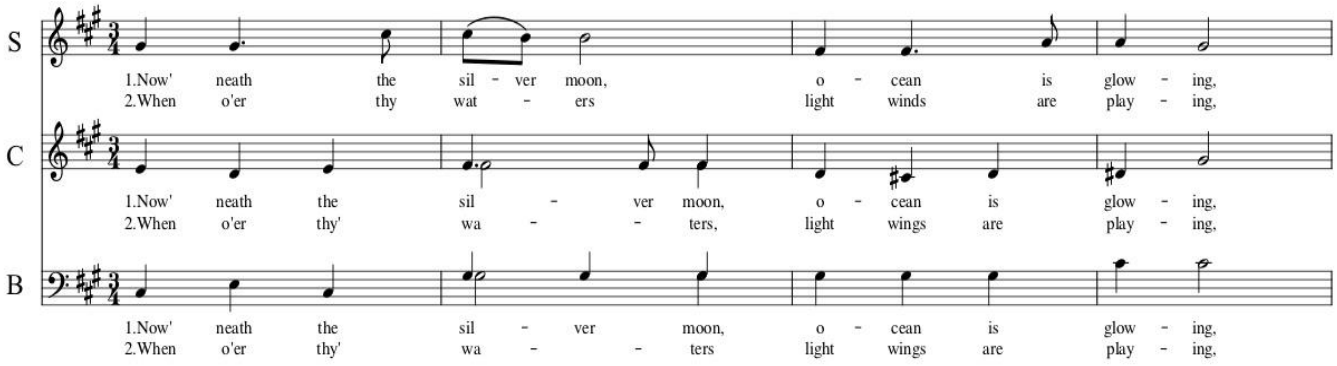

Figure 3: Excerpt: "Santa Lucia" by John Cooper.
Source: Cooper, Irvin. *Songs for Pre-Teentime.* (New York, NY: Carl Fisher Inc, 1956.

Like Gloria, Santa Lucia adhered to the ranges and tessituras set for each section by Cooper. In this piece, the Sopranos (girls and unchanged males) were challenged with the melody, which features more-complex rhythms, intervals and text. However, like most of Cooper arrangements, the Cambiata voices utilized stepwise motion and simple rhythmic phrases. This piece also contained a Baritone part containing common Bass line intervals such as major third, perfect fourth and perfect fifths. The Baritone line was meant to be learned on either solfege or a neutral syllable, such as "Ah" or "Oo." The director had the choice to add the text when he or she believed the notes and rhythms had been learned properly. Cooper stated that the goal of his compositions was to provide interesting singing material within the tessitura for all voices. Cooper accomplished this through tonal and rhythmic variation, as well sharing the melody throughout the piece. Cooper stated "too often the inner voices of a chorus merely fill a supporting role for the more fortunate Sopranos...in these songs, every part has an independent

tune of its own to sing."[77] Cooper created numerous arrangements with contrapuntal voice parts for all adolescent voices, both boys and girls. This created a melodically pleasing choral part that was easier to grasp than typical choral parts that function harmonically within a small range.[78] When choosing or arranging repertoire, Cooper suggested that choral directors be mindful of the limited vocal flexibility of the changing voice. His arrangements often avoided melismatic passages that require students to sing several notes to one syllable of text. He also encouraged directors to assess the appropriateness of text and the overall value of the music. "Conductors must be aware of the text that adolescents are expected to sing, and the director should make an effort to find music with text that is approachable to junior high students and is also a text that is relatable to them."[79] Cooper encouraged directors to present students with themes that were appropriate to their age level or challenge students with pieces in foreign languages. Cooper's arrangements often avoided unison singing, as it was difficult to find a common range for all voices in different phases of the change. While the Baritone and Soprano tessituras worked for unison singing in octaves, the Cambiata tessitura did not fit in either the upper or lower octave. In addition, Cooper also warned teachers against choosing repertoire that

contained interval leaps larger than a major 6th, as well as augmented intervals. These intervals, according to Cooper, were very difficult for changing voices to sing and were to be avoided when possible.[80] Cooper's Cambiata Concept helped to question many of the traditional fallacies when

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[77] Irvin Cooper and Karl O. Kuersteiner, *Teaching Junior High School Music* (Boston, MA: Allyn and Bacon, Inc., 1965).

[78] Ibid.

[79] Phillip Holland Stockton, "A Historical Study Of Irvin Cooper: Choral Music Educator And Founder Of The Cambiata Concept" (Oxford, MS: University of Mississippi, 2013)

[80] Alexander A. Looney, "A Comprehensive Study of the Male Voice Mutation" (Akron, OH: University of Akron, 2015)

working with adolescent boys, providing evidence that if proper range and tessitura were maintained during singing, their voices would be capable of beautiful singing.[81] The Cambiata Concept has continued to be utilized under the music publishing company, Cambiata Press. Founded by Don Collins, a former student of Cooper, Cambiata Press has published a multitude of arrangements using the SSCB labels.

While Irvin Cooper was influential among the three pioneers of adolescent male voice research, the first research promoting the idea of adolescent male participation in choir was conducted by music educator Duncan McKenzie. McKenzie began his career as a teacher in the public schools of Montreal, served as the manager of the music department of Oxford University Press, and later became the chairman of the music Department of Douglas College from 1943 to 1952.[82] McKenzie's research provided evidence that the speaking voice is the first signal of the voice change and that the speaking voice also acts as a predictor for the progression of the voice change.[83] He argued that exclusion of adolescent males from choir was unnecessary, as long as young males avoided the extremities of the vocal range. McKenzie's classifications for the male voice change ranged from the unchanged voice to the fully changed voice; Soprano I, Soprano II, Alto, Alto-Tenor and Baritone. Below is a table outlining the vocal ranges of these classifications. (see figure 4).

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[81] Stockton, Phillip Holland, "A Historical Study Of Irvin Cooper: Choral Music Educator And Founder Of The Cambiata Concept" (2013). Electronic Theses and Dissertations. Pg 3.

[82] Don Collins, *The Cambiata Concept.* (Conway, AR: Cambiata Press, 1981)

[83] Phillip Holland Stockton, "A Historical Study Of Irvin Cooper: Choral Music Educator And Founder Of The Cambiata Concept" (Oxford, MS: University of Mississippi, 2013)

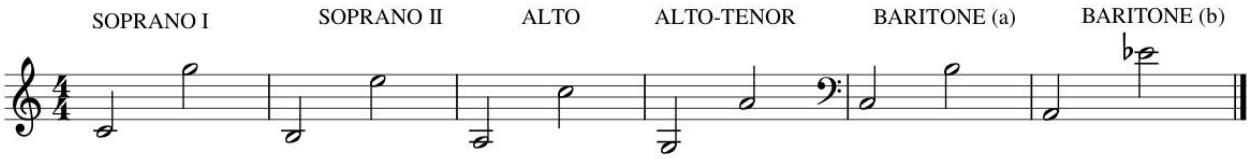

Figure 4: Vocal ranges of adolescent males according to Duncan McKenzie
Source: John M. Cooksey, "The Development of a Contemporary, Eclectic Theory For The Training And Cultivation of The Junior High School Male Changing Voice: PART I: EXISTING THEORIES," *The Choral Journal*, Vol. 18, No. 2 (October 1977): 5-14.

Boys who tested within the Soprano I vocal range were able to sing between the notes C3 and G5. Those who tested within the Soprano II vocal range were able to sing between the notes B3 and E5. Boy Altos were able to sing between the notes A3-C5. Throughout the Soprano I, Soprano II and Alto stages the male voice retained its brighter, androgynous quality. However, McKenzie developed the term "Alto-Tenor" to describe the range and unique timbre of a voice that does not resemble either a boy or young man. The Alto-Tenor became the focal point of McKenzie's methodology, deemed as the "Alto-Tenor Plan."[84] McKenzie believed that all male voices go through this stage of development. The vocal range of an Alto-Tenor began from a G3 and could extend up to A4. He also observed the development of a timbre peculiarly associated with the changing voice before deeming the voice an Alto-Tenor, as some Boy Altos were able to access notes a low as F#3. The speaking voice was the most reliable indicator of the change; as its pitch lowered, so did the range of the singing voice, the former slightly preceded that of the latter.[85] Other indicators of this development included a darker, heavier and raspier timbre

[84] John M. Cooksey, "The Development of a Contemporary, Eclectic Theory For The Training And Cultivation of The Junior High School Male Changing Voice: PART I: EXISTING THEORIES," *The Choral Journal* , Vol. 18, No. 2 (October 1977): 5-14.

[85] Duncan McKenzie, *Training the Boy's Changing Voice.* (New Brunswick, New Jersey: Rutgers University Press, 1956)

to the students' singing and speaking voice. In the beginning of this stage, the male singing voice would comfortably lie within most of Alto range. Over time the voice would lower in pitch and the singer would lose access to his upper register. During this gradual change, the developing muscles of the larynx thickened, which often led to frequent voice cracks and breaks in pitch. This stage led to vocal uncertainty for male singers and was often the most pivotal to the development of the young male singer. Eventually, the range and timbre of the voice would take on that of a Baritone. These students were able to sing between the notes C3 and B3. Through proper training, the young Baritone was able to expand his singing range upwards and or downwards from A2 to Eb4. Most voices eventually settled into the higher, medium or lower ends of the Baritone range. However, some voices began to shift upward into the Tenor range or downward into the Bass range. The emergence of a true Tenor or Bass rarely occurred during adolescence. McKenzie's research also showed that a dramatic transition from Alto-Tenor to Baritone lasting one year or less typically resulted in an adult voice settling as a lower Baritone or Bass. On the contrary, a transition from Alto-Tenor to Baritone lasting longer than a year typically resulted in an adult voice settling as a Tenor.[86]

McKenzie expressed a desire for music educators to help young boys anticipate, prepare and navigate their voice change. McKenzie advocated for frequent voice testing to help directors choose appropriate repertoire and vocal exercises that cater to the changing voices in the classroom. McKenzie expressed concern when placing changing voices within the traditional SATB choral model. While new Alto-Tenors were placed in the Alto section with other

[86] John M. Cooksey, "The Development of a Contemporary, Eclectic Theory For The Training And Cultivation of The Junior High School Male Changing Voice: PART I: EXISTING THEORIES," *The Choral Journal* , Vol. 18, No. 2 (October 1977): 5-14.

unchanged male and female voices, they gradually lost the higher notes necessary to perform within the section. Some directors chose to transition the singer into the tenor section, which likely consisted of other gradually-lowering Alto-Tenor voices. However, McKenzie warned that Alto-Tenor voices alone lacked the strength and quality to balance out the other sections.[87] Instead, McKenzie was a proponent of all-male choirs to improve choral participation and group camaraderie. He would exclusively work with changing voices using the TTBB format, similar male glee clubs and barbershop ensemble. McKenzie stated that the TTBB was the best use of literature for the Alto-Tenor voice. This allowed the Alto-Tenor to start at Tenor I and progress downward in part assignment as the voice changed.[88] This type of repertoire, as well as warmups focusing on downward vocalization, helped Alto-Tenors gradually extend the lower notes of their singing range.

Another pioneer in the field of male changing voice classification was Frederick Swanson. Swanson began his career as the director of the Moline Illinois Boys Choir in the late 1950's. He dedicated his efforts to developing methodology for middle school music education, specifically the adolescent changing voice. In his 1959 doctoral dissertation, Swanson discussed the correlation between the male voice change and the physical and sexual characteristics of puberty. He stated the most useful predictor of voice change was the development of primary and secondary sexual characteristics, such as the growth of pubic hair. Swanson's study, while controversial, was able to provide evidence of correlation between the two variables.[89] While

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[87] Ibid.

[88] Duncan McKenzie, *Training the Boy's Changing Voice.* (New Brunswick, New Jersey: Rutgers University Press, 1956)

[89] John M. Cooksey, "The Development of a Contemporary, Eclectic Theory For The Training And Cultivation of The Junior High School Male Changing Voice: PART I: EXISTING THEORIES," *The Choral Journal,* Vol. 18, No. 2 (October 1977): 5-14.

physical and sexual development among adolescents is typically gradual, Swanson noted that the voice changes much more rapidly. He stated that at the onset of voice mutation, a male voice may drop an octave or more over the period of a few months or even weeks[90] This phenomenon became the focal point of Swanson's Adolescent Bass Theory, his attempt to classify the adolescent voices of the middle school choir. Below is a table outlining the vocal ranges of his classification documented in his book *Music Teaching in the Junior High and Middle School,* where he discussed curriculum, teaching strategies, and recruitment within middle school choral settings. (see figure 5)

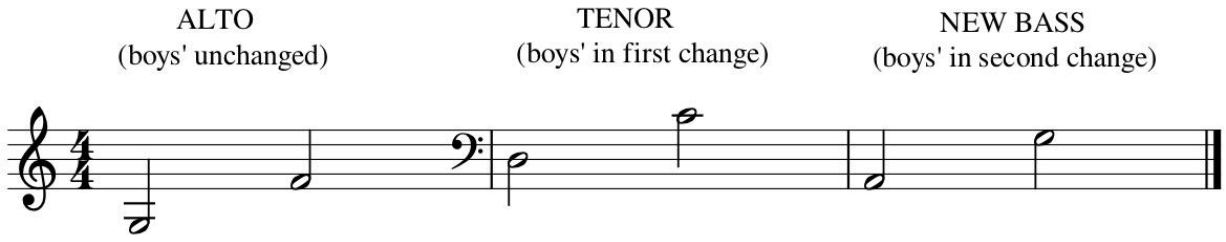

Figure 5: Vocal ranges of adolescent males according to Frederick Swanson
Source: Frederick Swanson, *Music Teaching In the Junior High and Middle School*. (Hoboken, NJ: Prentice Hall, 1973)

Unlike Cooper, Swanson advocated for individual voice testing rather than group testing. To test vocal ranges, Swanson first observed the students speaking voices to identify students who have begun their voice mutation. He then chose a key that best suited the student's vocal stage and asked the students to sing a familiar tune, such as My Country Tis of Thee in multiple keys modulating upward and downward. Swanson then documented the student's vocal range and if the student had access to a head voice or falsetto. Students who tested within "Boy Alto" or unchanged vocal range were able to sing between the notes G3 and F5. Students who tested

[90] Frederick Swanson, *The male singing voice ages eight to eighteen.* (Cedar Rapids, IA: Laurance Press 1977)

within the "tenor" or changing voice range were able to sing between the notes D3 and E4. Students who tested within the "Bass range" were able to sing between the notes A2 and G3 and are classified as "New Basses." Swanson believed that 30 to 40 percent of "Boys Altos" became "New Basses" immediately when the voice changed, likely over the period of a few weeks. [91] This dramatic change typically resulted in a limited vocal range favoring the lower register, explaining why some adolescent boys were able to comfortably sing notes as low as E2. While most New Basses had a phonation gap around C4 where no tones could be produced, they demonstrated limited access to their head voice and falsetto, which had the potential to extend their vocal range. The "Tenor" voice represented the slight majority of male students whose voice change happen more gradually, over the period of multiple months. Swanson described the changing or Tenor voice as one that "combined falsetto and full voice to produce an unusual quality and color of sound."[92] While it was likely that the changing voice would deepen to a "New Bass," some voices permanently settled within the Tenor vocal range. Swanson referred to these voices as "True Tenors."[93] Swanson advocated for specific vocal instruction for the male students starting in middle school. To provide a proper education on the changing voice, Swanson stated that teachers must segregate boys from the girls to provide attention and vocal training specific to their development. If possible, Swanson recommended that boys and girls be divided into separate classes to cater to the specific needs of each gender in regards to the voice mutation.[94] In a split classroom setting, he dedicated more time to gender-specific techniques for

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[91] Don Collins, *The Cambiata Concept.* (Conway, AR: Cambiata Press, 1981)

[92] John M. Cooksey, "The Development of a Contemporary, Eclectic Theory For The Training And Cultivation of The Junior High School Male Changing Voice: PART I: EXISTING THEORIES," *The Choral Journal* , Vol. 18, No. 2 (October 1977): 5-14.

[93] Ibid.

[94] Ibid.

students in varying voice change stages. For unchanged male voices, he differentiated between their head voice and chest voice, as well as provided an in-depth explanation of the vocal and physical changes that would occur over the following years. Swanson helped gradually changing voices anticipate the emergence of their adult voice by exercising the voice at the bottom of their vocal range. For New Basses, he helped to merge their falsetto and chest voice registers to expand their vocal range. Swanson recommended teachers have Basses vocalize from their falsetto down through the break area or passaggio, so that the head and chest voice could be merged. This process was extensive, as in the initial stages of this exercise, the voice, approaching the area of silence from above, dropped a complete octave. Eventually, the two voices overlapped, and for a time the young man produced singing tones over a range of three octaves. [95] If complete class separation was not possible, Swanson encouraged frequent sectional rehearsals with male students to address vocal issues specific to their changing voice and vocal development. Swanson also suggested frequent voice testing, at least every six weeks, to ensure that rapidly changing male voices were not misclassified.[96] As for repertoire selection, Swanson felt that the choral music of the 1950's did not properly represent the limited vocal ranges of the male adolescent voice. Swanson encouraged choral directors to arrange their own pieces or modify arrangements for changing voices and New Basses. Swanson's arrangements utilized a SACB format, (Soprano, Alto, Cambiata, and Bass) to cater varying male and female voices of the choir.[97] Boy Altos who felt more comfortable singing in their head voice were to be placed in the Soprano section, while

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[95] Ibid.

[96] Phillip Holland Stockton, "A Historical Study Of Irvin Cooper: Choral Music Educator And Founder Of The Cambiata Concept" (Oxford, MS: University of Mississippi, 2013)

[97] John M. Cooksey, "The Development of a Contemporary, Eclectic Theory For The Training And Cultivation of The Junior High School Male Changing Voice: PART I: EXISTING THEORIES," *The Choral Journal* , Vol. 18, No. 2 (October 1977): 5-14.

those who felt more comfortable singing in their chest voice were to be placed in the Alto section. Swanson recommended the use of the Cambiata section to represent the gradually changing voices within the choir. Vocal lines for changing voices featured small, stepwise intervals located towards the bottom of the vocal range to gradually anticipate their vocal development. For a novice choir containing "New Basses," vocal lines featured small, stepwise intervals located within the tessitura. Over the course of a school year, New Basses were challenged with parts that included short phrases that extend into the lower and upper extremes of the vocal range.

The most widely accepted research regarding male voice classification was conducted by John Cooksey in the 1970's. John Cooksey began his career as a public school teacher in Tampa, Florida, and later served as a professor of Music Education at the University of Utah, Memphis State University, and California State University-Fullerton.[98] His eclectic approach borrowed primarily from Cooper's research, however, the research of McKenzie and Swanson was also credited in the development of his own personal classification system. Cooksey addressed the need for more quantitative research from within music education that included the medical community. He recommended speech and language pathology studies that would give more information on the physical changes the voice undergoes, not just the realized effects.[99] Cooksey sought to conduct research using a larger sample of adolescent males, including unchanged, changing and post-change voices. Prior research by Cooper, Swanson and McKenzie had focused primarily on the changing voice, with very limited research dedicated to the initial and final stages of the male voice change. Cooksey sought to conduct more controlled

[98] Alexander A. Looney, "A Comprehensive Study of the Male Voice Mutation" (Akron, OH: University of Akron, 2015)

[99] Phillip Holland Stockton, "A Historical Study Of Irvin Cooper: Choral Music Educator And Founder Of The Cambiata Concept" (Oxford, MS: University of Mississippi, 2013)

experiments to test whether the voice related to other physiological changes in the body during adolescence. Along with current research from outside the field of music education including medicine, speech pathology, laryngology and endocrinology, Cooksey was able to provide evidence that mutation is dependent upon several other physiological changes that occur in the body during adolescence.[100] This and prior research, as well as extensive voice testing, helped Cooksey develop his Contemporary Eclectic Theory for Male Adolescent Voice Change, often referred to as a simply, Contemporary Eclectic Theory. The basic framework of this classification system defined the male student's range, tessitura, register delineation, and timbre as primary factors for the voice development. He divided the male voice mutation into six stages: Unchanged, Midvoice I, II and IIA, New Baritone, and Developing Baritone. Below is a table outlining Cooksey's classification. (see figure 6).

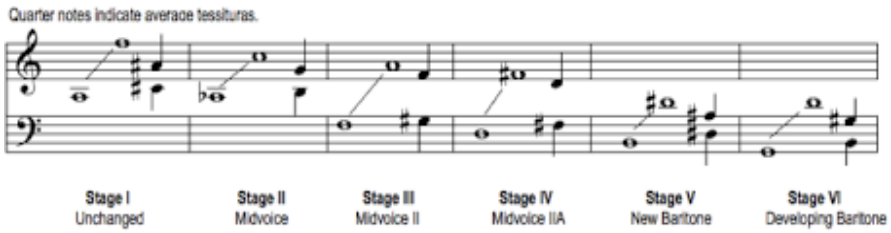

Figure 6: Vocal ranges of adolescent males according to Duncan McKenzie
Source: Wayman, John "Identification of the Adolescent Male Voice: Unchanged vs. Falsetto" *International Journal of Research in Choral Singing, 6,* (2018), 66-68.

Students who tested within the unchanged vocal range were able to sing between the notes A3 and F5. Unchanged voices were able to create pure clear tones in the upper register of the voice and showed no evidence of lowering in speaking or singing pitch. The unchanged stage was

[100] Phillip Holland Stockton, "A Historical Study Of Irvin Cooper: Choral Music Educator And Founder Of The Cambiata Concept" (Oxford, MS: University of Mississippi, 2013)

also known as the pre-pubertal stage of voice mutation. Boys typically showed no physical signs of puberty (increased height, facial hair, protuberance of the larynx).[101] Students who classified as Midvoice I were able to sing between the notes Ab3 and C5. While Midvoice I's still retained the timbre and majority of vocal range of the unchanged voice, the higher notes of the student's vocal range begin to disappear. Students in this stage often demonstrated early signs of puberty such as increased height, weight, facial hair and protuberance of the larynx.[102] Students who classified as Midvoice II were able to sing between the notes F3 and A4. In this stage the student's vocal timbre began to show evidence of voice mutation, becoming darker, heavier and often raspier. Students who classified as Midvoice IIA were able to sing between the notes D3 and F#4. Cooksey referred to these stages as the "height of the pubertal period," where he noticed dramatic voice cracking and difficulty matching pitch. The New Baritone demonstrated a significant drop in pitch [B2 - D#3] and more limited tessitura. The vocal range of a Developing Baritone continued to expand downward (G2 -D3) as well as demonstrated resonance and timbre of an adult male. Cooksey called middle school "a crucial time for voice training and development."[103] He stated repertoire selection and frequent voice testing as the key element to properly navigating this stage. Like his predecessors, Cooksey agreed that many traditional SATB parts did not properly represent the changing voice ranges and stages of Cooksey's classification. The voice of Midvoice I often struggled with the vocal flexibility needed in the upper register to properly sing most Alto parts. Midvoice II and IIA's sat uncomfortably in between the Alto and Tenor ranges. New Baritones often had difficulty with the lower notes associated with a Bass part in SATB

[101] Phillip Holland Stockton, "A Historical Study Of Irvin Cooper: Choral Music Educator And Founder Of The Cambiata Concept" (Oxford, MS: University of Mississippi, 2013)

[102] Ibid.

[103] Ibid.

voicing, as well as struggled with limited vocal agility and difficulty negotiating fast-moving parts. Settling Baritones often struggled fitting into either the Tenor voice or Bass voice, while the tessitura of most adult males remained in the Baritone range. Cooksey, like his predecessors, encouraged choral directors to choose repertoire that appropriately fit all the stages of the male voice mutation. However, he did not strictly endorse any specific section labels or groupings of changed and unchanged male and female voices. It was most important that the vocal part of changing voices males was concise; utilizing small, stepwise intervals and easy rhythms.

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CHAPTER THREE: METHODS

A study of one hundred and seventeen students at Westside Middle School Academy was conducted to document the vocal transformation of adolescent males. This information was then re-evaluated using the classifications of Irvin Cooper, Frederick Swanson, and Duncan McKenzie. Cooksey's research was then compared to these previous understandings of the male voice transformation. The study hoped to identify modern trends of the male voice mutation that were not addressed in Cooksey's research or subsequent research from previous decades. The goal of this data was to provide evidence for the hypothesis; "Strategies that could be implemented by the middle school choral director to encourage continued choral participation among adolescent male students which may include tracking student progress, small group instruction and frequent voice testing." The author believed that validating Cooksey's classification system as the most representative of adolescent voices would help middle school choral directors more appropriately group students in vocal sections. This information would also help directors choose repertoire that better represents the wide variety of vocal ranges, tessituras, and timbres found among adolescent males. The author hoped to use the data collected to provide evidence for a second hypothesis; "Possible benefits of the male students learning about vocal range and tessitura during adolescent voice change may include positive attitude toward continuation in singing, active participation in vocal warmups and interest in private voice lessons." The author believed that choral directors could utilize Cooksey's classification system to provide strategies for male students to test and track their own vocal ranges. This information could help to provide male students with more confidence

when navigating their voice mutation. This chapter presented the methods, which encompassed the design, research questions, setting, participants, procedures, and the researcher's role. The author also described his guiding principles for ethical research and how credibility, dependability, confirmability, and transferability were achieved in his data collection. Finally, the author presented the ethical considerations taken to ensure that participants were well informed about the methods and processes. Both quantitative and qualitative research were utilized for this study. A quantitative approach was appropriate for this study to provide an accurate representation of the student vocal range and tessitura. A qualitative approach was appropriate for this study to help examine and categorize students based on their student's vocal timbre. By acquiring data about the student's vocal range, tessitura and timbre, the author was able to draw comparisons between the classification systems of Cooksey, Cooper, McKenzie and Swanson.

The setting for this mixed methods study was a public middle school in Danbury, Connecticut. Westside Middle School Academy, hereafter referred to as WSMSA, was a school of approximately 750 students. When deciding a sample for a study, the author utilized purposeful sampling to call for individuals who could best inform about a studied problem.[104] The first requirement for participation in this study was that the student was enrolled in a sixth, seventh, or eighth grade choir class at WSMSA. The second requirement for participation in this study was that the student was a biological male. Anyone who did not meet these two requirements were ineligible to participate in this study.

While all biological male students who participated in this study identified as male, the

[104] Ibid.

author had the following protocol prepared for students who did not identify as such. In the instance that a biological male student had identified as non-binary, the author would have encouraged that student to fully participate in study. In the instance that a biological male student had undergone or was undergoing hormone therapy to transition to female, the author would have inquired about the student's comfort level in participating in the study. If the transitioning student opted to participate, their data would have been recorded but not factored into the comparisons between the classification systems of Cooksey, Cooper, McKenzie and Swanson. Lastly, in the instance that a biological female student who had undergone or was undergoing hormone therapy to transition to male expressed interest in the study, the author would have made a special expectation for that transitioning student to participate. Likewise, their data would have been recorded but not factored in with the other biological male data.

The first step in acquiring the desired sample began with a verbal recruitment at the end of a choral rehearsal. The author explained the purpose of the study to the male students and communicated that they were eligible to participate. The author then clearly communicated the procedures that took place if the students chose to participate. In order to encourage participation, the author advertised a grade incentive for students who accepted the invitation. The author then asked the students if they would be interested in participating in the study. Students who were interested in participating were emailed a consent form to be signed by a parent or guardian. If a student was under the age of thirteen, the student was also required to complete and sign an assent form, demonstrating their understanding of the study and willingness to participate. If a student chose to not participate in the study, they were not emailed a consent or assent form, and provided with an additional opportunity for a bonus grade. The recruitment email began with a personal

introduction from the author to the participant and their families, as well as an explanation of the purpose, procedures, and incentives for participating in the study. This email also provided the deadline data for submitting the signed consent and assent forms. The consent form attached to the email began with a formal invitation to participate in the study, followed once again with procedures and time table if the student chose to participate. The form explained the benefits and risks of participation for both the student and teacher, as well as shared a statement on how the teacher will protect personal information. The author also provided an explanation on how to withdraw from the study if desired. Lastly, contact information for the author, as well as the Liberty University Institutional Review Board was provided for parents or guardians who may have questions or concerns about the student. The bottom of the form required a printed student name and parent/guardian signature, confirming the student's willingness to participate. A signed and completed assent form was required of students under the age of thirteen, which required these students to state the name and purpose of study, the name of the person who is conducting the study, and the reason they were invited to participate. In addition, they were asked about the voluntary nature of the study, as well as who to contact with any questions or concerns. Similar to the consent form, the assent form required a printed student name and parent/guardian signature, confirming the student's willingness to participate. The author received signed consent forms from one hundred and seventeen biological adolescent male students who are currently enrolled in a choral class at WSMSA. The study included forty sixth graders ranging from ages 11-12, thirty-six seventh graders ranging from ages 12-13 and forty-one eighth graders ranging from ages 13-14. Each student who opted to participate scheduled a voice testing appointment during their lunch period.

To begin the voice test, the author first demonstrated a five-note solfege pattern [Do, Re, Mi, Fa Sol, Fa, Mi, Re, Do] as well as an upward modulation. The author chose an appropriate starting pitch for the singer based on prior knowledge of the student's choral section (Soprano, Alto, Tenor or Baritone). Accompanied by a piano, the male student began the solfege pattern starting in a designated key and modulated upward. If a male showed an inability to access his head voice, the author began the pattern on a lower pitch. An inability to access his head voice possibly meant that the singer was entering his initial stages of the voice mutation. However, this scenario also occurred due to a lack of vocal confidence or experience. If a student's vocal range was smaller than an octave, the author modified the warmup to a three-note [Do, Re, Mi, Re, Do] warm-up as needed. The author then recorded the student's highest sung pitch and repeated the warmup process with a downward modulation. The author documented the student's lowest sung pitch, as well as the student's tessitura. The tessitura was based on the singing range that was most comfortable for the student. In addition, the author considered the timbre characteristics associated with Cooksey's voice types. This helped to identify students whose vocal range overlapped between voice types.

The author then spent two to three minutes conducting the voice test, as well as documenting the student's vocal range, tessitura, and a short description of their vocal timbre. Once all data was compiled, the teacher categorized each of these voices using Cooksey's classification system. Students whose range and tessitura fell between A3-F5 were marked as an unchanged male voice. The timbre of these of the voices were light, flexible, and androgynous; showing no noticeable signs of a vocal change. Students whose range and tessitura fell between

Ab3-C4 were marked as a Midvoice I. The timbre of these voices was lighter, but these students demonstrated vocal strain and lost flexibility in the higher part of their range. Students whose range and tessitura fell between F3-A4 were marked as a Midvoice II. Students whose range and tessitura fell between D3-F#4 were marked as a Midvoice IIA. The timbre of these voices was significantly darker and raspier than Midvoice I's and unchanged voices. Students whose range and tessitura fell between B2-D#3 were marked as a Newvoice or New Baritone. Students whose range and tessitura fell between G2-D4 were marked as a Developing Baritone. The timbre of these voices began to take on the quality of a full-grown adult male.

The author the compared Cooksey's classification to the classification of Irvin Cooper. Students whose vocal range fell between a Bb3-F5 were marked as a Boy Soprano. This label best resembled Cooksey's unchanged voice stage. The timbre of these of the voices were light, flexible, and androgynous; showing no noticeable signs of a vocal change. Students whose range fell between F3-C5 were marked as a Cambiata or changing voice. This label best resembled Cooksey's three Midvoice stages. The timbre of these voices showed noticeable signs of a vocal change, such as voice cracking and loss of vocal flexibility and range. Students whose range and tessitura fell between Bb2-F4 were marked as a Baritone or changed voice. This label best resembled Cooksey's New Baritone stage. The timbre of these voices began to take on the quality of a full-grown adult male. Students whose range and tessitura fell between F2-C4 were marked as a Bass or developing changed voice. This label best resembled Cooksey's Developing Baritone stage. These voices continued to demonstrate stronger vocal control and confidence compared to New Baritones.

The author then compared Cooksey's classification to the classification of Duncan McKenzie. Students whose vocal range and tessitura fell between a C4 and G5 were marked as a Soprano I. The timbre of these voices showed no noticeable signs of a vocal change, as well as demonstrated comfort singing in one's head voice. Students whose range fell between B3-E5 were marked as a Soprano II. The timbre of these voices similarly showed no noticeable signs of a vocal change, however these students demonstrated more comfort singing in their chest voice. The Soprano I and II label best resembled Cooksey's unchanged voice stage. Students whose vocal range and tessitura fell between A4 and C5 were marked as an Alto. The timbre of these voices also had little to no noticeable signs of a vocal change in the lower register, however these males experienced difficult singing in the upper register. McKenzie's Alto label best resembled Cooksey's Midvoice I stage. Students whose vocal range and tessitura fell between a G3 and G4 were as an Alto-Tenor and best resembles Cooksey's Midvoice II stage. Students whose range and tessitura fell between C3 and B3 were marked a New Baritone or a changed voice. Alto-Tenor and New Baritone voices demonstrated a significantly darker and heavier timbre compared to the Sopranos and Altos. Students whose range and tessitura fell between A3 and Eb3 were marked a Developing Baritone or a post-change voice.

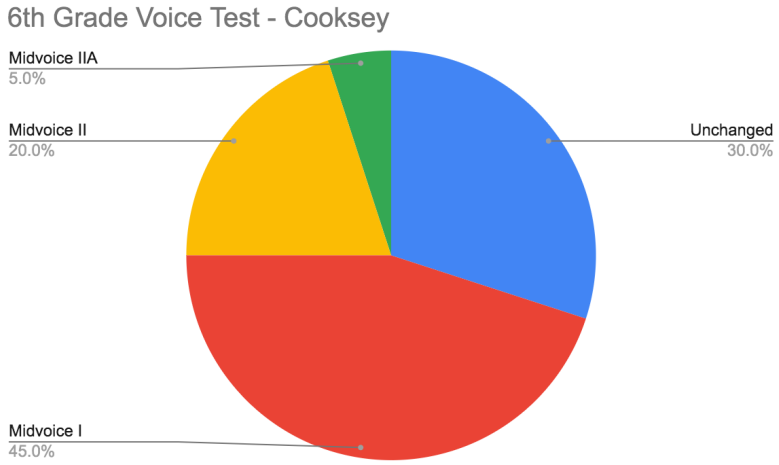
Lastly, the author compared Cooksey's classification to the classification of Frederick Swanson. Students whose range and tessitura fell between G3-F5 were marked as a Boy Alto. This section was a combination of unchanged voices, along with students demonstrating noticeable signs of vocal change, including vocal strain in the higher part vocal range and potentially a darker timbre. The Boy Alto label presented by Swanson most

resembled Cooksey's Unchanged, Midvoice I and Midvoice II stages. Students whose range and tessitura fell between D3-E4 were marked as a Tenor. The timbre of these voices were significantly darker and heavier compared to the unchanged and pre-changing Boy Alto voices. The Tenor label presented by Swanson most resembled Cooksey's Midvoice IIA stage. Students whose range, and tessitura fell between A2-G3 were marked as a Bass. The voices resembled the timbre of a full-grown adult male. The Bass label presented by Swanson most resembled Cooksey's New Baritone and Developing Baritone stages.

In the following chapter, the author analyzed the data compiled using Cooksey's classification, to identify potential trends and outliers regarding the adolescent male voice. Cooksey's classification system will then be compared to Cooper, Swanson and McKenzie, in order to confirm that Cooksey's system provides the most accurate descriptions of a student's range, tessitura and timbre.

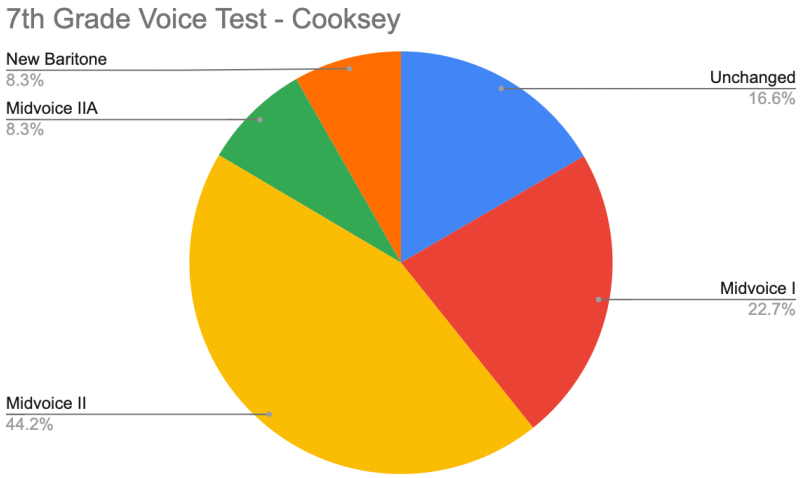
CHAPTER FOUR: ANALYSIS AND APPLICATION OF DATA

The graph below showed the results from the sixth-grade study using Cooksey's classification.



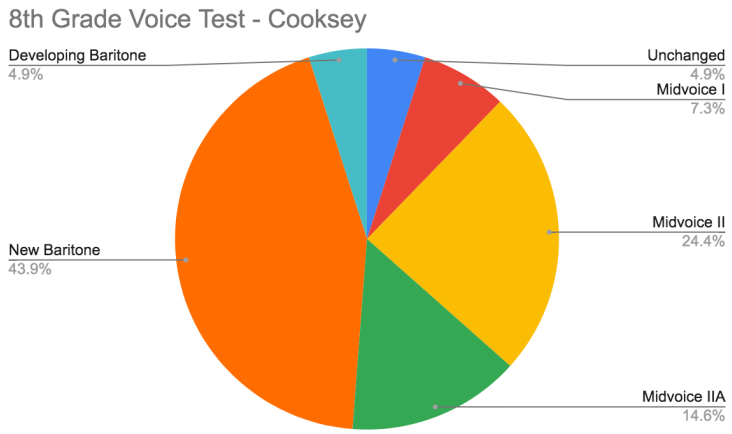
In the sixth grade, only thirty percent of male voices were identified unchanged. Comparatively to Fisher's 2010 study, data showed that 70% of male students entering sixth grade had either showed signs of a vocal change (Midvoice I) or were in the middle of their voice transformation (Midvoice II or IIA). When identifying unchanged voices and Midvoice I's, the author noticed that most students demonstrated the light, flexible, androgynous quality described by Cooksey. However, most Midvoice I's began experiencing vocal strain around Eb4 to G4, which helped the author identify which students belonged in each category. Students who tested as a Midvoice II or Midvoice IIA made up 25% of the sixth grade. Observing for a darker timbre helped to categorize students, considering many demonstrated very limited vocal ranges. In the sixth grade, no students had tested as a New Baritone or Developing Baritone. This research showed evidence of earlier-puberty among males, as earlier research showed the signs of voice

mutation (Midvoice I/ Midvoice II) first occurring in seventh grade.[105] The graph below showed the results from the seventh-grade study using Cooksey's classification.



The data for seventh grade showed a much broader spectrum of vocal ranges compared to sixth grade. 16.7% percent of male voices remained unchanged compared to the 30% of the sixth grade. 22.8% of students began to demonstrate signs of vocal change (Midvoice I) compared to 45% of sixth grade. The most dramatic increase was the number of students who demonstrated changing voices (Midvoice II and Midvoice IIA) up 52.8% from 25% in sixth grade. In addition, three students demonstrated the vocal ranges and tessitura representative of New Baritones. The timbre of these students resembled that of a full-grown adult male to confirm this label. The graph below showed the results from the eighth-grade study using Cooksey's classification.

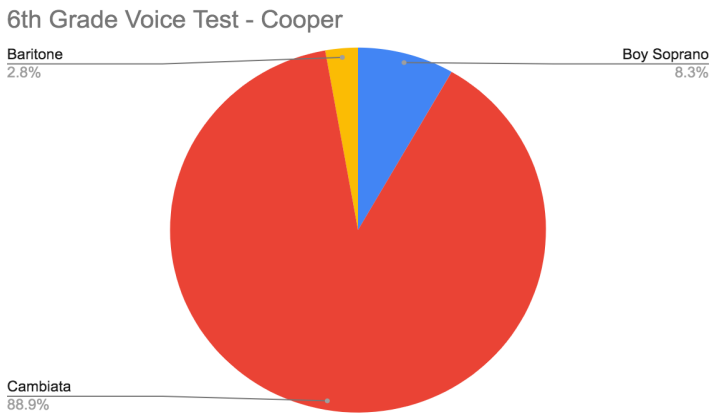
[105] Phillips, K. (1992). Teaching kids to sing. New York, New York: Schirmer Books.



Eighth grade was the only group to demonstrate all six of Cooksey's voice types (Unchanged, Midvoice I, Midvoice II, Midvoice IIA, New Baritone, Developing Baritone) The data showed a dramatic increase in changed voices and post-change voices compared to the 8% of seventh grade. In eighth grade, the majority of students (48.8%) demonstrated vocal ranges and timbres representative of New Baritones and Developing Baritones. These students represented voices that have completed their initial adolescent voice change. The author was able to differentiate the two Developing Baritones from the rest of New Baritones due to the fact that these students completed their initial voice change in the latter part of their sixth-grade year. Since sixth grade, the vocal ranges of these two students have continued to gradually expand upward and downward. Their speaking and singing voices resembled the timbre of an adult male and they continue to demonstrate stronger vocal control and confidence. Midvoice II and Midvoice IIA's represented the other large percentage (39%) of eighth grade voices. Only 7.3% of the eighth grade tested in the Midvoice I category compared to sixth grade (45%) and seventh grade (22.2%). Less than 5% of eighth grade students tested as unchanged voices compared to 30% of the sixth grade

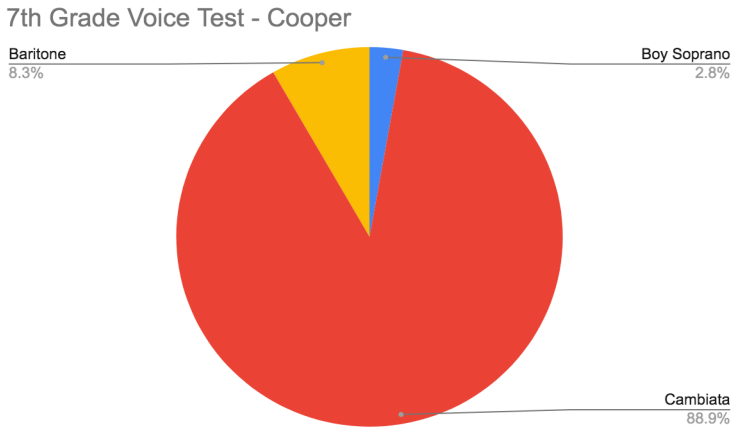
and 16.7% percent of the seventh grade.

The graph below showed the results from the sixth-grade study using Cooper's classification.



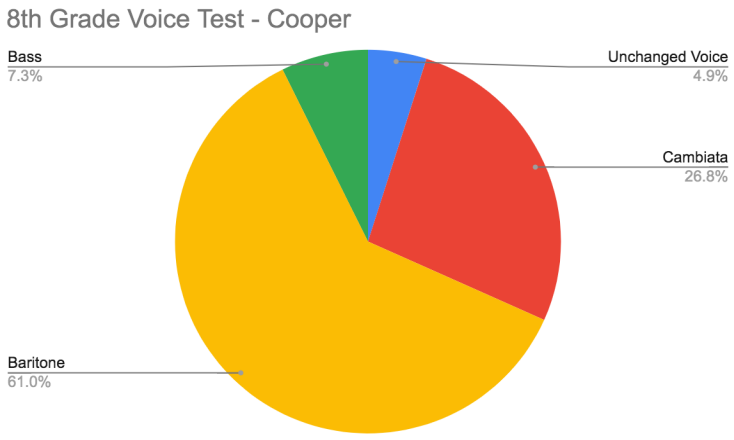
Using Cooper's vocal ranges, only 8.3% percent of the sixth-grade students were labeled as Boy Sopranos or unchanged voices. This is significantly less than the 30% of sixth grade students labeled as unchanged voices using the Cooksey classification. Many students classified as unchanged voices in Cooksey's system were unable to sing above a C5, potentially due to a lack of head voice training and experience. This provided the reason for many of these unchanged voices being placed in Cooper's Cambiata section instead of Boy Soprano. The data in sixth grade showed that almost all (88.9%) of the voices in sixth grade were Cambiata, otherwise changing voices. Using Cooksey's classification, this was the equivalent of combining the chest voice prominent Unchanged voices, Midvoice I and Midvoice II voices into one section. However, many of the higher Cambiata voices (Unchanged and Midvoice I) did not demonstrate the vocal timbre particularly associated with changing voices. In addition, these students were not able to comfortably sing notes

lower than an A3. Only one student was labeled as a Baritone using Cooper's classification. However, using Cooksey's classification this student would have been labeled as Midvoice IIA, with a timbre resembling a changing voice, not the timbre of a post-change adult male. While this student's vocal range (C#3- E4) resembled the Baritone range presented by Cooper, much of the student's lower range lacked the volume and resonance necessary to be placed in his own choral section. The author noted that issues may arise if a director chooses to use this classification in a sixth-grade choir. The Cambiata section would consist of unchanged, pre-changing, and changing voices. These voices each require unique education and vocal training. Educators should stress head voice development and present challenging rhythmic and intervallic repertoire for unchanged voices. However, choral educators typically are encouraged to emphasize the lower end of the vocal range for pre-changing and changing voices. This helps develop chest voice resonance and foreshadow the lower notes continually being accessed during their voice mutation. Repertoire for these changing voices should be limited in vocal range, with easier rhythms and stepwise motion. The range of some higher unchanged Cambiata voices may fall between C#4-A#4, while lower Cambiata voices (Midvoice II) may demonstrate tessituras that fall between G#3 and F4. These would leave a small overlap between C#-F# to choose repertoire that fits all the voices comfortably. In addition, the section would likely demonstrate a wide variety of vocal timbres that may cause unchanged and pre-changing voices to artificially imitate the darker timbre of the changing voices; creating consistent issues with pitch and intonation. The graph below showed the results from the seventh-grade study using Cooper's classification.



The results of the seventh-grade study showed to be almost identical to the sixth-grade study. In both studies, 88.9% percent of the students tested as Cambiata voices. There was a slight increase (8.3%) of Baritone voices compared to sixth grade (2.8). Unlike sixth grade, the Baritones in the seventh grade did demonstrate the vocal range, tessitura, and timbre associated with changed voices. Only one student in the seventh grade tested as an unchanged voice and no students tested as a Bass voice. In this study, the author had similar concerns about the chest voice prominent, pre-changing, and changing voices all being placed in the same section. The author also questioned the similarity of both sixth and seventh grade data using the Cooper classification system. There were noticeably more pre-changing voices in the sixth grade compared to seventh grade. The timbre of these voices was almost identical to the unchanged voices in the lower and middle part of the singing range. The majority of the seventh grade showed more significant signs of voice mutation. The timbre of these voices was noticeably darker and demonstrated a lack of vocal flexibility. However, because Cooper did not differentiate between the pre-changing and changing voices in his classification, these voices are grouped in the same section. This is a

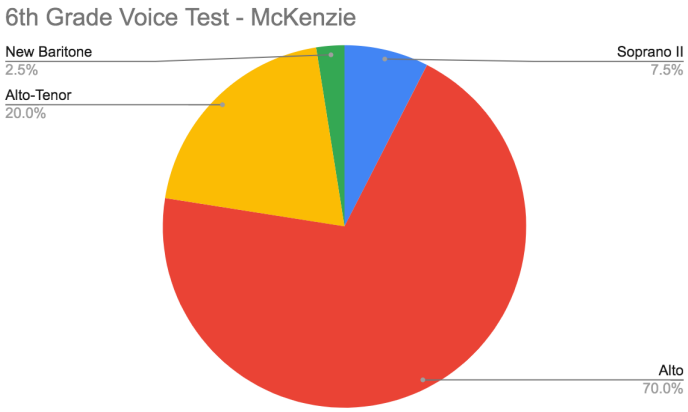
major contrast to Cooksey classification system, which provided specific labels for these unique voice stages; Midvoice I for pre-changing voices and Midvoice II/IIA for changing voices. The graph below showed the results from the eighth-grade study using Cooper's classification.



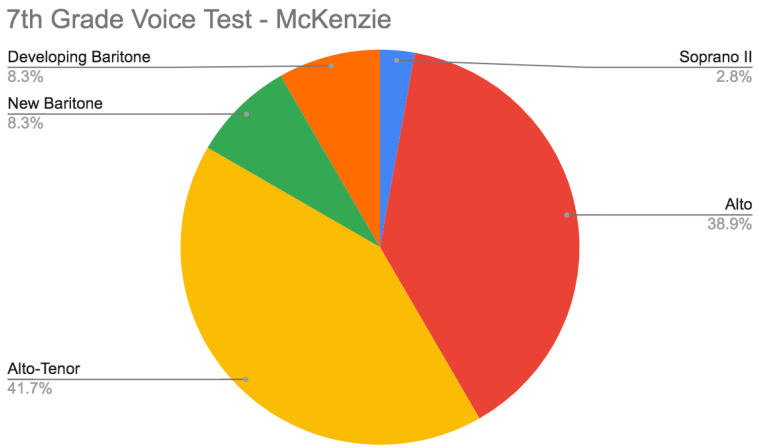
The eighth grade Cooper classification data showed more similarity to Cooksey's. Both classifications labeled 4.9% of students as unchanged voices. They also both identified pre-changing and changing voices; 26.8% using Cooper's classification (Cambiata) and 31.7% using Cooksey's classification (Midvoice I and Midvoice II). In addition, both showed a significant increase in changed and post-change voices from seventh grade into eighth grade. Cooper's classification showed a Baritone increase from 8.3% to 68.3%, while Cooksey's classification shows an increase from 8.3% to 48.8%. The larger percentage of Baritones using Cooper's classification was partially due to the fact that those classified as Midvoice IIA in Cooksey's classification were unable to reach the higher notes necessary to sing in the Cambiata section, therefore they were placed in the Baritone section. However, the author had concerns that many of these later-stage changing voices

would still not be able to reach the lower notes required to appropriately sing in the Baritone section. The tessitura of some later-stage changing voices (Midvoice IIA) fell between F#3-D4, while Baritone or changed voices demonstrated tessituras that fell between D#3-A#3. These left small overlap between D#3-F#3 to choose repertoire that would fit all the voices comfortably. If a director chose to place the small number of Bass voices within this Baritone section, he or she would be unable to choose repertoire that was accessible for all the voices simultaneously. The author had concerns about combining changing, changed, and post change voices into one choral section, due to the fact each these voices require unique education and vocal training techniques. For changing voices, the author recommended that educators develop chest voice resonance and foreshadow the lower notes continually being accessed during a students' voice mutation. However, newly-changed and post-change voices should be challenged to expand the vocal range upward, bridging the phonation gap between their lower and upper chest voice, and eventually their head voice or falsetto.

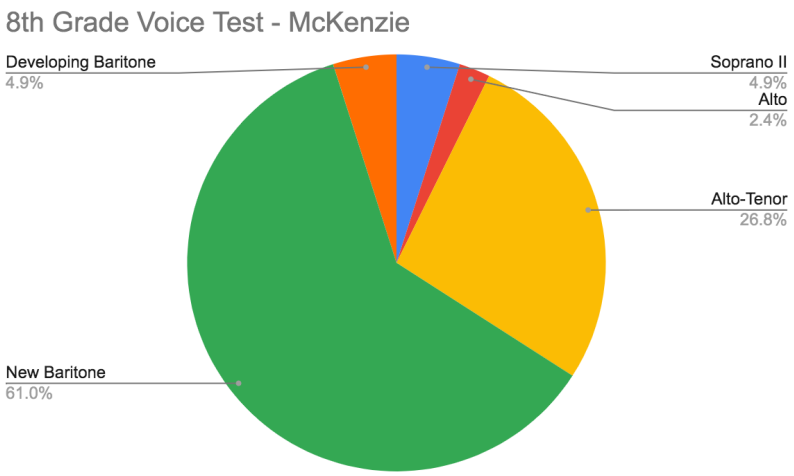
McKenzie shared similarity in range, tessitura and timbre to Cooksey's labels. Range and tessitura information was organized by grade. The following graph showed the results from the sixth-grade study using McKenzie's classification.



Using McKenzie's classification, a large majority (77.5%) of sixth grade voices were identified as unchanged or pre-changing voices. This shared similarity to the data compiled using Cooksey's classification, which showed that 75% of students had unchanged or pre-changing voices. In addition, both classifications identified exactly 20% percent of changing voices. Using this classification, students were placed in sections that properly represented their range, tessitura, and timbre. The following graph showed the results from the seventh-grade study using McKenzie's classification.

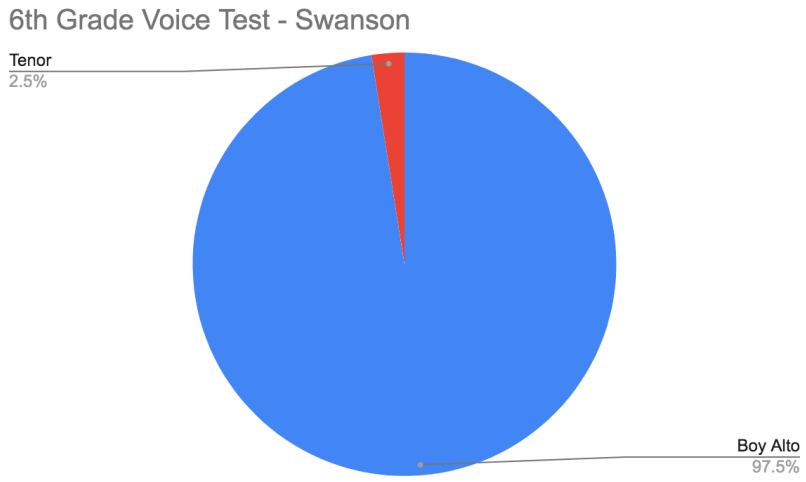


McKenzie's classification identified 41.7% as unchanged or pre-changing voices. This again showed similar to the results of Cooksey's seventh grade data which showed that 39.3% of students had unchanged or pre-changing voices. The models continued to draw comparisons in seventh grade when analyzing changing voices. McKenzie's classification identified 41.7% of the voices as Alto-Tenors compared to Cooksey's system which identified 44.2% as Midvoice II's. Both systems also identified Baritone voices that have begun to take on the range, tessitura and timbre of a full-grown adult male. The following graph showed the results from the eighth-grade study using McKenzie's classification.



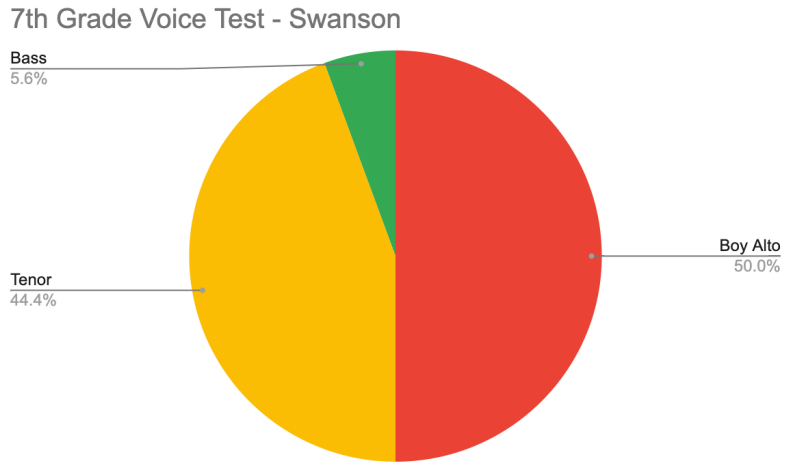
For the eighth grade, McKenzie's classification continued to resemble the data recorded using the Cooksey classification. McKenzie's system classified 7.3% of voices as unchanged and pre-changing voices, compared to Cooksey's 12.2%. McKenzie's system classified 26.4% of voices as changing voices compared to Cooksey's 24.4%. However, one contrast between these two systems was the categorization of later-stage changing voices. McKenzie identified these voices as New Baritones while Cooksey's uses the label Midvoice IIA. Using McKenzie's classification, 61% of voices were identified as New Baritones, while only 43.9% of students were labeled as New Baritones using Cooksey's classification. Similar to Cooper's model, the author had concerns about combining actively changing, changed, and post-change voices into one choral section, because these voices would require unique education and vocal training techniques. The tessitura of some later-stage changing voices (Midvoice IIA) fell between F#3-D4, while New Baritones, as described by McKenzie, demonstrated tessituras that fell between C3-B3. This only left a small overlap between F#3-B#3 to choose repertoire that fit all the voices

comfortably. If a director chose to place the small number of Developing Baritone voices within a singular Baritone section, he or she would have a difficult time choosing repertoire that was accessible for all the voices simultaneously. In addition, the section would demonstrate a wide variety of vocal timbres that may cause changing voices to artificially imitate the darker timbre of the changed and post-change voices, creating consistent issues with pitch and intonation. The graph below shows the resulted from the sixth-grade study using Swanson's classification.



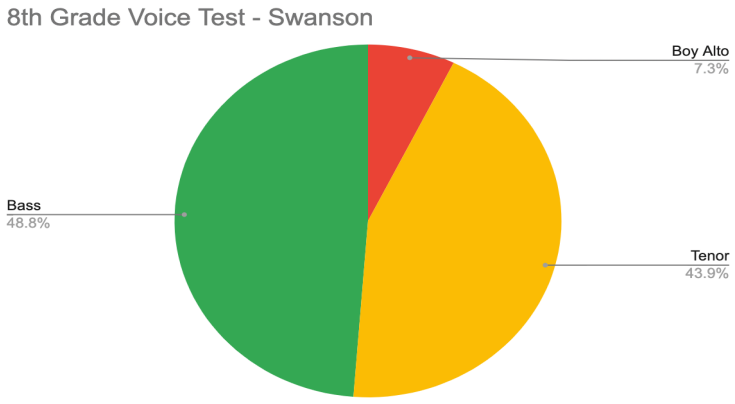
Using the Swanson classification, almost all (97.5%) of voices were labeled as Boy Altos. There was only one voice according to Swanson's vocal ranges that was identified as a Tenor. The author had concerns about application of this label in sixth grade because the Boy Alto section would have consisted of unchanged, pre-changing and changing voices. Each of these voices require unique education and vocal training, as described previously in the analysis of Cooper's classification. The tessitura of the higher unchanged voices fell between C#4-A#4, while changing voices (Midvoice II) demonstrated tessituras that fell

between G#3 and F4. This only left a small overlap between C#4-F#4 to choose repertoire that would fit all the voices comfortably. The wide variety of vocal timbres would likely create consistent issues with pitch and intonation, as described in the analysis of Cooper's classification. In addition, the author warned against placing a singular Tenor in his own vocal section. The graph below showed the results from the seventh-grade study using Swanson's classification.



The data showed a dramatic decrease from 97.5% to 50% of Boy Altos in seventh grade. It also showed a significant presence of Tenors, increasing from 2.5% in sixth grade to 44.4% in seventh grade. This is in contrast to 8.3% of Midvoice IIA's labeled using Cooksey's classification, which is the label that most resembled Swanson's Tenor range. There were only two voices according to Swanson's vocal ranges that were identified as Basses, each demonstrating the timbre of a full grown-adult male. The author's previous concerns about the Boy Alto label applied to the seventh-grade study as well. In addition, the

author advised against placing the two Bass voices alone in their own vocal section. The graph below showed the results from the eighth-grade study using Swanson's classification.



The data continued to show a dramatic decrease from 50% of Boy Altos in seventh grade to only 7.3% in eighth. The percentage of Tenors remained consistent; 44.4% in seventh grade compared to 43.9% in eighth. This is in contrast to 8.3% of Midvoice IIA's labeled using Cooksey's classification, which was the label that most resembled Swanson's Tenor range. While the sixth and seventh grade data showed little resemblance to Cooksey's classification, the eighth-grade study identified similar trends in the significant increase of changed and post-change voices. Swanson identified 48.8% of students as having changed or post-change voices. This was identical to the New and Developing Baritones identified using Cooksey's classification. Additionally, the range of the Bass voice (A2-B3) as described by Swanson more precisely represented the ranges of the changed and post-changed voices in all grades, as compared to Cooksey's ranges (G2-D#3). While having concerns about the application of Boy Alto and Tenor labels, the author suggested that music educators

could utilize Swanson's Bass range to help choose repertoire that is accessible for changed voices.

The author concluded from this study that Cooksey's classification system best represented the various stages of the adolescent male voice. The tessituras outlined by Cooksey were designed to represent the limited vocal ranges of pre-changing and changing voices. This allowed for directors to more precisely categorize each voice. When comparing pre-changing/early changing voices, Cooper identified the range of a Cambiata as an F3-C5, a total of twenty semitones. McKenzie identified the range of an Alto as A3-C5, a total of sixteen semitones. Swanson identified the range/tessitura of a Boy Alto as G3-F5, a total of twenty-three semitones. Cooksey identified the ranges of a Midvoice I as Ab3-C5, a total of seventeen semitones. However, he provided a more specific tessitura for a Midvoice I of B3-G3. This nine-semitone range best represented the pre-changing voice ranges that were tested in this study. In comparison of range in later stage changing choices, Cooper identified the range of a Baritone as a Bb2-F4, a total of twenty semitones. McKenzie identified the range of a New Baritone as C3-B3, a total of twelve semitones. Swanson identified the range/tessitura of a Tenor as D3-E4, a total of fifteen semitones. On the other hand, Cooksey identified the tessitura for a Midvoice IIA as F#3-D4, a total of nine semitones. Similar to the pre-changing voices, the tessitura identified by Cooksey best represents the later-stage change voice ranges that were tested in this study. By providing more precise ranges and tessituras for each category, choral directors could ensure that they have categorized students more appropriately to their voice type. The author did note however that Swanson's ranges for changed and post-change voice were more precise than

ranges outlined by Cooksey. Cooksey's classification system also best represented the various stages of the adolescent male voice through the specific groupings of vocal timbres. In Cooksey's classification system, all unchanged voices demonstrated a timbre that was light, flexible, and androgynous while showing no noticeable signs of a vocal change. All students who tested as Midvoice I demonstrated vocal strain and loss of flexibility in the higher part of their range. Those identified as Midvoice II and Midvoice IIA demonstrated a significantly darker and raspier timbre compared to Midvoice I's and unchanged voices. The timbre of voices labeled as New Baritone and Developing Baritones demonstrated the quality of a full-grown adult male. However, those identified as Cambiata and Baritone voices using Cooper's classification demonstrated a wide variety of vocal timbres associated with different stages of vocal development. The same observation was made for the Swanson's Boy Alto and McKenzie's New Baritone labels.

While the classification system developed by John Cooksey provided evidence to be the more precise method of categorization among adolescent male voices, the theories of Cooper, McKenzie, and Swanson are not to be completely discarded. Cooper's Cambiata Concept and McKenzie's Alto-Tenor theory were the first attempts to understand the changing male voice and how it could be applied and utilized in choral settings. Swanson's Adolescent Bass Theory provided answers regarding the timeline of voice mutation, as well as valuable insight on how to train newly-changed male voices. Their research was pivotal to the inclusion of adolescent male participation in choir, as well as the subsequent research of John Cooksey.

Using Cooksey's classification system, the author recommended that a choral director

begin by voice grouping students in vocal sections that are most appropriate for their voice types and stages. These groupings can vary depending on the age and skill level of the students. The author suggested that before a director has determined the appropriate part assignment for adolescent male voices, he or she must similarly assess the vocal range, tessitura, and timbre of the female students. While the voice testing method as described in Chapter Three provided a precise representation of each student's vocal characteristics, the author recognized that it was unrealistic to assume that a choral director will have the time to test each individual voice in a one-on-one environment. The author acknowledged Cooper's preferred method of voice testing, as described in Chapter Two, as an effective strategy to quickly identify changing and changed voices. The director can begin by introducing a well-known tune and starting in Bb Major, the director will be able to quickly identify the changed voices (New and Developing Baritones) that are performing in the lower octave. As the director continues to modulate up to the key of Gb major, the director will identify the male changing voices (Midvoice II and Midvoice IIA) that are singing intervals located between the lower and upper octave. A director must then decide how he or she will integrate the unchanged and pre-changing male voices in with the female voices. The author suggested to initially group these students on their vocal range, tessitura and timbre, ignoring differences of biological sex. Unchanged males and female voices who demonstrated head voice prominence should be grouped together. Similarly, unchanged males and female voices who demonstrated chest voice prominence should be grouped together. Pre-changing voices (Midvoice I) may require an individual voice test, as many students in this stage are likely to demonstrate a limited vocal range. Students who experienced light to moderate

vocal strain in the upper register should be initially grouped in with the chest voice prominent voices. Pre-changing voices who experienced heavy to extreme vocal strain in their upper register should be grouped in with the changing voices. The vocal range and tessitura of the pre-changing voices should be continually monitored by the director through frequent individual and small group voice testing. After grouping the students, it is important that a director chooses a label for each group that will help the students identify their voice type and stage. A director should also develop a short male and female description for each label, to provide students with an explanation as to why they were placed in a specific vocal section. These short descriptions will help male students track their vocal progress, as well as foreshadow the vocal change that will soon begin to take place. Directors may choose to translate Cooksey's classification to traditional section labels: Soprano, Alto, Tenor and Baritone. If a director chooses to use the traditional labels in his choir, the author has recommended that the Soprano section consist of unchanged male and female students who felt comfortable using their head voice. Unchanged male and female students who felt more comfortable singing in their chest voice will likely be best suited in the Alto section. Students who tested as Midvoice I should begin in the Alto section, until their vocal timbre and range begin to demonstrate a changing voice or the vocal strain in their upper register starts to become too extreme. In sections containing both male and females, the author encouraged to place the female students behind the male students. While females experience their own voice change or maturation, it is not nearly as dramatic as their male counterparts. The author has found that female Soprano and Altos can provide the necessary vocal support and confidence to the unchanged and pre-changing male voices in the section. In addition,

placing the male voices in the front will allow a director to more easily identify signs that may warrant a section switch. For example, an unchanged male Soprano who begins to experience vocal strain in their upper register or lose access to his head voice could be easily identified and be moved to the Alto section. Similarly, a pre-changing Alto who begins to demonstrate the timbre of a changing voice could be switched into the Tenor section. Students who tested as a Midvoice II or Midvoice IIA should be placed in the Tenor section, which is designated for male changing voices. Students who tested as a New or Developing Baritone should be placed in their own separate section.

When making grouping decisions, the author encouraged directors to prioritize the vocal information compiled from the student's voice test. While it is tempting to include qualitative feedback in this decision, having students regularly sing out of range could cause significant vocal damage to the singer. In addition, section misplacement may put a student in a position where he or she would not properly mature as a choral musician. A common situation that a middle school choral director may encounter would be when an unchanged voice male begins to grow envious of his changing voice and changed voice counterparts. This envy typically grows stronger in seventh and eighth grade, as a majority of the male voices have already changed or are in the process of changing. In an attempt to switch sections prematurely, an unchanged voice may try to deceive the director by claiming that the Soprano or Alto part is too high for their voice. If this situation occurs, the director could provide this student with an independent voice test that examines his lower vocal range. Barham and Nelson stated when performing notes below a A3, a student with an unchanged

voice will begin to duck their heads and growl almost inaudibly.[106] After ensuring that the student has demonstrated an unchanged voice; the director should warn about the harm that could be caused from over-singing in the lower extremes of the vocal range. The director could also attempt to bolster the young man's esteem by explaining how valuable he is to his current vocal section. This feedback will help to foster confidence and pride in the voice stage that the student is currently in. Another problem that could be likely to occur would be the Soprano and Alto sections overpowering the Tenors and Baritones. Choral directors may be tempted to place chest voice prominent female singers in the lower sections to balance the choir. Nevertheless, the author has warned against this practice, as it is potentially dangerous for the vocal development of the female singer. While occasional doubling of the Tenor and Alto part may be necessary, Barham and Nelson stressed that chest voice prominent females should instead sing literature that encourages the development of head voice.[107] Some directors may choose to incorporate other section labels such (Trebles, Midvoice, Cambiata, etc.) which will help to reinforce the vocal stage the student is currently in. Furthermore, the author encouraged the application of traditional labels to help prepare students for high school and college level ensembles. It is important for male students to understand that male voice continues to change and develop throughout one's life. With maturity and proper vocal training, the young Baritone's range and tessitura will continue to expand. In some instances, a gentleman's voice will shift upwards towards the adult Tenor range. Other voices will continue to shift downward towards the adult Bass range. While these voice types typically

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[106] Terry Barham and Darolyne Nelson, *The Boy's Changing Voice, New Solutions for Today's Choral Teacher.* (New York, NY: Alfred Publishing, 1991), 8

[107] Terry Barham and Darolyne Nelson, *The Boy's Changing Voice, New Solutions for Today's Choral Teacher.* (New York, NY: Alfred Publishing, 1991), 15.

do not develop until high school or college, a director should be encouraged to educate students on the vocal change that will take place after adolescence.

While the Cooper voice testing model helped to quickly and efficiently group and label students, it did not provide student specific information regarding their vocal range and tessitura. This information is crucial to decide appropriate repertoire, especially for sections that contain pre-changing, changing, and post-change male voices. This is because many of these voices demonstrate a limited vocal range and tessitura, as well as inability to perform vocal lines with complex rhythms and large intervals between notes. As mentioned previously, it is not realistic for a choral director to individually test each student's vocal range and tessitura, multiple times throughout the year in person. Individual, one-on-one voice test are also often uncomfortable for most novice singers, especially those who are experiencing or beginning to experience a voice mutation. However, the author suggested that student information be acquired more efficiently using technology. In his article, “The Positive Effects of Technology on Teaching and Student Learning,” educator Kevin C. Costley described how technology has a positive impact on student learning and engagement. “Because of the arrival of new technologies rapidly occurring globally, technology is relevant to the students. Technology provides meaningful learning experiences. Technology also provides hands-on learning opportunities that could be integrated into all school curricular areas, including mathematics, reading, science, and social studies as well as other academic subjects. It gives students opportunities to collaborate with their peers resulting in learning from each other. These factors combined

could lead to a positive impact on student learning and motivation."[108] The author proposed that through the use of technology, the anxiety regarding the voice testing process diminishes. In addition, the use of technology allows students to efficiently track their progress which will help increase their confidence and participation in the choral classroom.

To begin the process of virtual voice testing, the author developed a lesson that instructed students on how to record their voices. The author provided multiple methods of recording that utilized all types of modern technology. Doreen Fryling stated, "With the increasing availability of high-quality recording devices (phones, tablets), teachers could easily record singers and create vocal portfolios for them to listen and respond to."[109] The author researched and taught methods of voice recording that are low to no cost for the student and their families. This ensured that all students, regardless of socio-economic status, could participate in the activity. The author also provided additional tutorials for students who may choose to record with more expensive equipment. Providing student choice allowed students to utilize a recording method that best suited their personal situation. Similar to Cooper's method, the author then instructed the students to record themselves singing a well-known song. The students were instructed to begin on a starting note that they believed was comfortable for their singing voice. The author recommended the song Happy Birthday, as the song's octave range would provide an accurate representation of the student's tessitura and timbre. This song also helped the author identify if a student could easily access his or her head voice, as well as if the students could maintain tonality. In the

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[108] Kevin C. Costley, "The Positive Effects of Technology on Teaching and Student Learning" (Russellville, Arkansas Arkansas Tech University, 2014), 2-3.

[109] Doreen Fryling, "Keeping the Boys Singing: How You Can Make a Difference" *NAfME Online Publications,* (December 2015)

instance a student was unable to perform Happy Birthday due to religious or cultural restrictions, the student was instructed to perform and record a song of their choice. This recording was assigned as homework and was completed individually. Students who were uncomfortable recording

their voice virtually requested an alternative in-person voice test with the director during a free period or lunch wave.

Once the author received the students' recordings, he documented the following information in a spreadsheet; the students name, their vocal tessitura, a short description of their vocal timbre, and the vocal section that was most appropriate for their voice type. For male students, the author also identified their voice change stage according to Cooksey. The figure below demonstrated how this could be documented for male and female students.

Name of Student	**Tessitura**	**Timbre**	**Choir Section**	**Voice Change Stage (Male)**
[Male Student #1]	A3-G4	Light, demonstrated vocal strain in higher register.	Alto	Midvoice I (Pre-changing voice)
[Male Student #2]	Bb2-G3	Heavier, resonant, resembles an adult male.	Baritone	New Baritone (Changed voice)
[Male Student #3]	E3-C#4	Darker, raspy	Tenor	Midvoice IIA (Later-stage changing voice)
[Female Student #1]	Bb3-Bb4	Chest voice prominent, no demonstration of head voice.	Alto	N/A

The author acknowledged that the individual voice testing data could potentially affect the student groupings and labels that were initially developed using Cooper’s group

testing method. The author encouraged educators to make necessary adjustments as early as possible during the school year in order to avoid confusion that may arise from the misclassification of student voices. It is also important that adolescent male voices are tested frequently throughout the school year. In their book, "*The Boy's Changing Voice - New Solutions for Today's Choral Teacher"* Terry Barham and Darolyne Nelson stated that "boys' voices should be tested six to eight weeks or even more frequently during the school year."[110] Barham and Nelson encouraged directors to utilize full group, small group, and individual voice testing methods to accomplish this goal. In their book, both Barham and Nelson presented unique testing methods that could help the directors track their student's voice development. To identify which student may require an immediate voice test, they recommended a director should observe a student's speaking voice, as it is was fairly reliable indicator of vocal change, according to Cooksey [111] Directors should also observe any noticeable drop in pitch, as well as identify potential signs of vocal fatigue, such as raspiness and voice cracking. Barham and Nelson recommended a group voice testing process where students simply speak the words "hello" to the director. The director would then document the exact pitch of the spoken word. Since one's natural speaking voice typically lies at the bottom of the vocal range, this method allowed directors to document student vocal progress in a low stress environment. Other indicators that a voice test was necessary was if a student demonstrated an increase in breathiness or shows physical signs of strain in the upper register. This included tightening neck muscles and occasional jutting jaws as boys

[110] Terry Barham and Darolyne Nelson, *The Boy's Changing Voice, New Solutions for Today's Choral Teacher*. (New York, NY: Alfred Publishing, 1991), 8

[111] Ibid.

compensated for reduced ranges and poor breath support.[112] The author suggested that choral educators should also provide techniques to help students reflect on their own vocal progress. To help simplify the vocal tracking process for the students, Barham and Nelson reduced Cooksey's six categories to four. (see figure 7).

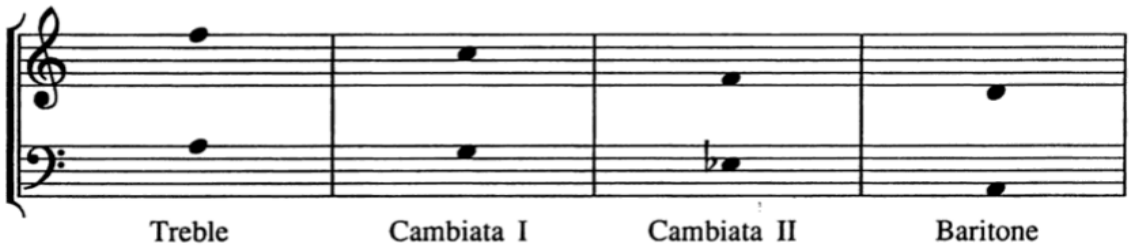

Figure 4: Categories and Ranges of Boys Changing Voices
Source: Terry Barham and Darolyne Nelson, *The Boy's Changing Voice, New Solutions for Today's Choral Teacher.* (New York, NY: Alfred Publishing, 1991), 6.

Barham and Nelson's categories were heavily influenced by the work of Cooper, Swanson, McKenzie, and Cooksey. Students whose range and tessitura fell between A3-F5 were marked as a Treble male voice. This was the exact range of an unchanged voice as described by Cooksey, as similar to the ranges of Cooper's Boy Soprano and Swanson's Boy Alto label. Students whose range and tessitura fell between G3-C4 were marked as a Cambiata I. Barham and Nelson utilized Cooper's term "Cambiata" to describe a boy's changing voice prior to becoming a Baritone.[113] The Cambiata I range was almost identical to the Midvoice I range as described by Cooksey, and similar to the ranges provided for Cooper's Cambiata voice, and McKenzie's Alto voice. Students whose range

[112] Terry Barham and Darolyne Nelson, *The Boy's Changing Voice, New Solutions for Today's Choral Teacher.* (New York, NY: Alfred Publishing, 1991), 10.
[113] Terry Barham and Darolyne Nelson, *The Boy's Changing Voice, New Solutions for Today's Choral Teacher.* (New York, NY: Alfred Publishing, 1991), 8.

and tessitura fell between Eb3-F4 were marked as a Cambiata II. This category is most comparable to the ranges provided for Cooksey's Midvoice IIA and Swanson's Tenor voice. Students whose range and tessitura fell between A2-D4 were marked as a Baritone. The Baritone range described by Barham and Nelson is almost identical to Cooksey's Developing Baritone and Swanson's High School Baritone range.

While the author still encouraged directors to track adolescent male voices using Cooksey's classification, he suggested that directors have the students utilize the condensed categories presented by Barham and Nelson to more easily track their own vocal range. He suggested that directors educate the students on the categories of male changing voice as described by Barham and Nelson, as well as the ranges and timbres associated with each label. This is crucial for helping each student understand the individuality of his or her voices and its potential contribution to the ensemble.[114] In addition, the author recommended a director translate the voice data compiled using Cooksey's classification to Barham and Nelson's categories, so that it could be shared with the students. Finally, the author proposed a director would share this data to a shared online resource that allows the students to track their vocal development. For example, the author depicted the easy of using online databases like Google Suite for teachers and directors alike to create and share resources, as well as provide instant feedback to students. The figure below demonstrated how this could be documented for all students, regardless of sex or gender.

[114] Terry Barham and Darolyne Nelson, *The Boy's Changing Voice, New Solutions for Today's Choral Teacher.* (New York, NY: Alfred Publishing, 1991), 10.

Month	Grade	Tessitura	Choir Section	Voice Change Stage (Males Only)
September	6th	Bb3-A3	Alto	Cambiata I (Early-stage changing voice)
January	6th	A3-G#3	Alto	Cambiata I (Early-stage changing voice)
June	6th	F#3-D#3	Tenor	Cambiata II (Later stage changing voice)
September	7th	D#3-C#4	Tenor	Cambiata II (Later stage changing voice)

The figure above allowed teachers to document their students' voice test data starting from the beginning of sixth grade. Using the previously described voice testing process, the author recommended that directors provide immediate feedback to the students about their vocal tessitura, their assigned choral section, their voice change stage according to Barham and Nelson and short description of that stage. Over a three-year period of utilizing, the author proposed that students would be able to track and analyze their own vocal development, which would help them develop a sense of control over their voice change. In addition to voice tracking strategies, additional online resources provided by the director include definitions and explanations of various vocabulary associated with changing voices, as well as interactive activities for students to explore. The director may also choose to provide audio and video links of famous/well-known singers who represent the range, tessitura and timbre associated with certain voice types. Fryling suggested that directors motivate high achieving students to self-evaluate their voice in terms of range and tessitura. She stated that "the self-evaluation process will help male students develop a stronger sense of vocal control, as well as increase motivation and confidence in their singing voice.[115] To accomplish this, Fryling recommended

[115] Doreen Fryling, "Keeping the Boys Singing: How You Can Make a Difference" *NAfME Online Publications,* (December 2015)

that directors choose to incorporate basic piano skills and note reading into their instruction. The director could provide strategies on how the students could identify the letter name of each piano note, as well as the octave classification of the note they are playing. Once a director has confirmed that a student has the ability to match pitch from a note on the piano, the students could begin to document their vocal range on their own. The student will be instructed to start in the middle of their vocal range, matching each note on a neutral syllable. The students will continue this process upward until they cannot vocalize any higher. The students will then identify the pitch and octave of the note and repeat the process to identify their lowest sung note. The students will then document this information in an online resource provided by the director. Students may also choose to identify their vocal tessitura by providing the vocal range that was most comfortable for their voice. These strategies will encourage and motivate students to individually track their vocal progress, as well as help them feel as though they have control over their voice change. Using this method, students will be able to continue tracking their vocal progress throughout the summer vacation. Students who do not have access to piano or keyboard at home would be instructed to utilize the various virtual piano websites found online. The figure below demonstrated how this could be documented for all students, regardless of sex or gender.

Date of Voice Test	**Lowest Note Sung**	**Highest Note Sung**	**Tessitura**	**Voice Change Stage (Biological Males Only)**
4/11/2021	A2	D#4	C3-Bb3	Baritone
6/1/2021	G#2	D#4	C3-Bb3	Baritone
9/24/2021	G#2	E4	Bb2-Bb3	Baritone
11/3/2021	G2	F4	Bb2-C4	Baritone

The figure above allowed students to document their own voice test data and share that data with their choral director. The author suggested that developing the ability to voice test independently will encourage students to track their own vocal progress during the summer months. Additionally, he proposed that some students will be motivated to expand their range and tessitura once they observe vocal progress being made. In addition to tracking quantitative data, the author recommends that directors provide opportunities for students to provide qualitative feedback to help express their levels of confidence. Fryling stated that this feedback is essential for both the teacher and student, "as it will help to take the fear out of voice change, reassuring the male students that what they are going through is completely normal." She continued "if they feel as though they are the only one who has ever gone through this dramatic change, dropping out will seem like a logical conclusion."[116] In the authors experience, sharing this feedback during small group instruction helped to build a bond between classmates, creating a safe and positive environment. Constant reassurance in the normalcy of the situation helped to build confidence, as well as enthusiasm for rehearsal and performance.

Dr. Robert Marzano, one of the pioneers of student tracking wrote in the article, *"The Art and Science of Teaching / When Students," Track Their Progress,"* how students could more effectively reach specific learning goals through this style of evaluation. Marzano instructed the teacher to design a system to simplify the tracking progress for the student. This could be accomplished through the use of online applications that are shared with the

[116] Marzano, Robert. *"The Art and Science of Teaching / When Students Track Their Progress," (Health and Learning, 67, no 4, December 2009), 86-87*

students. Next, the teacher must help the students to identify the goal of the self-assessment. For example, a student learning goal might be, "I will be able to identify and document the pitch of my lowest and highest singing note." A second student learning goal might be, "I will be able to identify my voice change stage and choral section based on my range and tessitura." During an assessment such as a voice test, Marzano encouraged the teacher to be as unobtrusive as possible to make sure that student feedback remains authentic. If the teacher had designed an appropriate organizational system for this process, the student should be able to complete the voice test and self-evaluation with minimal interjection from the director. After the voice test has taken place, the student should then provide written feedback about their successes and concerns. Dr. Sally Hook stated that "fluctuations in range, tone quality, and the ability to move the voice easily cause some boys to think that they could no longer sing. It is the responsibility of music educators to share information with their students about what is normal during adolescent vocal mutation."[117] Marzano also suggested that teachers develop "pre-written" feedback choices as an alternative to open-ended responses. According to Marzano, "a well-constructed system of track allows for a relatively accurate measure of a student's level of understanding through both a demonstration, in which students demonstrate their skill at a procedure or their understanding of information, and a probing discussion, in which the teacher asks individual students to explain their understanding."[118] The author proposed that teachers utilize the data feedback to implement positive change in the

[117] Sally Hook, "VOCAL AGILITY IN THE MALE ADOLESCENT CHANGING VOICE," (Columbia, MO: University of Missouri—Columbia, 2005)

[118] Marzano, Robert. *"The Art and Science of Teaching / When Students Track Their Progress," (Health and Learning, 67, no 4, December 2009), 86-87*

classroom. Frying suggested that taking the proper steps to provide adolescent male students with techniques to evaluate themselves, will demonstrate an increase of motivation and confidence among adolescent male singers.[119]

Once directors have obtained the specific data related to the vocal development and confidence of their students, they could begin to choose repertoire. Trotta addressed the factors that choral directors must consider when choosing repertoire, many of which revolve around the male voice change. Trotta stated that, "choosing repertoire is perhaps the most important aspect of developing successful rehearsals and performances."[120] He emphasized one mistake a middle school choral director often make is choosing repertoire that is not compatible with the pre-changing and changing voices within the choir. Trotta specifically warned against arrangements labeled SAB (Soprano, Alto, Baritone). According to Trotta, "these arrangements are not appropriate for adolescent ensembles because they are typically written for adult choirs. Trotta advocated for music labeled as "Three Part Mixed" which is written specifically for the changing voice." Often directors are not aware of the limitations of the changing voice, which include limited vocal range and flexibility, as well as a difficulty navigating sudden register shifts.[121] Barham and Nelson encouraged directors to consider the following hierarchy of evaluating and choosing repertoire. Directors should be primarily concerned with the range and tessituras written for adolescent male voices. These vocal parts should accurately represent the vocal ranges and tessituras of the students who are performing

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[119] Doreen Fryling, *"Keeping the Boys Singing: How You Can Make a Difference" (*NAfME Online Publications, December 2015), 1.

[120] Michael John Trotta, "*Selecting Age Appropriate Repertoire"* Accessed December 3, 2020.

[121] Terry Barham and Darolyne Nelson, *The Boy's Changing Voice, New Solutions for Today's Choral Teacher.* (New York, NY: Alfred Publishing, 1991), 13.

the repertoire. For example, most of the male students in the beginning of sixth grade either demonstrate an unchanged voice or are showing early signs of their voice transformation. In this scenario, Trotta recommended that the choral director choose a two-part arrangement that matches the majority voices in the classroom.[122] Most two-part arrangements contain one higher pitched and one lower pitched vocal line, however some arrangements do not differentiate between ranges. Vocal rounds are also regularly utilized as repetition in early sixth grade to help introduce polyphony and vocal independence. If a repertoire meets this requirement, it should then be evaluated for its adaptability. Middle school directors often are required to modify the pitches and rhythms of certain musical phrases to meet the skill level of their ensemble. It is necessary that selected repertoire have an ability to be adapted, due to the constant vocal change within the middle school classroom. Barham and Nelson described this process as "going with the vocal majority and adapting for the vocal minority."[123] For example, to accommodate for changing or changed voices in the sixth grade (Midvoice II or lower) directors could utilize octave displacement to modify a vocal phrase. This involves shifting the assigned pitch down an octave to allow these students to perform a more comfortable range. If a majority of the changing voices do not have capability to match pitch down the octave for the entire piece, a director could utilize note division with octave displacement. This involves repeating a pitch one octave higher or lower while shortening the rhythmic value by one half. The figures below demonstrated how these changes could be notated.

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[122] Michael John Trotta, "*Selecting Age Appropriate Repertoire"* Accessed December 3, 2020.

[123] Terry Barham and Darolyne Nelson, *The Boy's Changing Voice, New Solutions for Today's Choral Teacher.* (New York, NY: Alfred Publishing, 1991), 6.

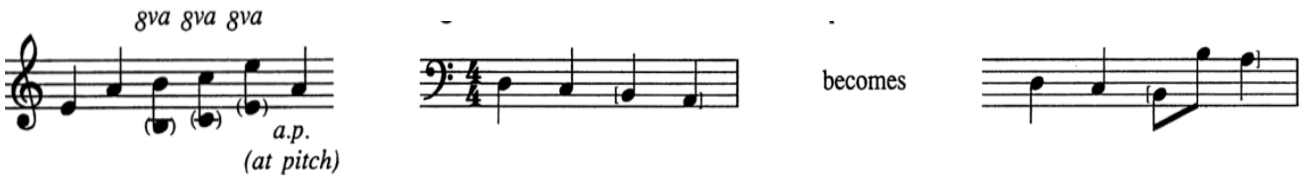

Figure 4: Octave Displacement
Source: Terry Barham and Darolyne Nelson, *The Boy's Changing Voice, New Solutions for Today's Choral Teacher.* (New York, NY: Alfred Publishing, 1991), 14.

Another way a choral director can modify a piece is through the use of transposition. This process requires the director to first transcribe the piece into a notational software. Then a director can then move all the pitches up or down to a key that better represents the vocal ranges of each section. While this process can be time consuming for directors who are not fluent with notational software, the author discouraged performing repertoire in a transposed key that is different to what is written. If a director chooses to transpose a piece without communicating this information to his choir, students will begin to develop false pitch associations with certain vocal registers. For example, a Baritone may associate his passaggio, or vocal break register with the pitch D4. However, if the piece is being performed a major third higher than notated, a student may become confused as to why he is entering his passaggio register on the pitch Bb3. This can be confusing, especially intermediate level and advanced singers, who rely on these pitch associations to prepare for certain vocal phrases.

If a piece does not contain a part for changing or changed voices or has a part that is written in a non-accessible range, the author encouraged directors to compose or rearrange the vocal line. The author proposed that teacher who compiles student data regarding student vocal ranges and tessituras will have the necessary information to write a vocal line that appropriately represents the range and skill level of the changing and changed voice section.

The author suggested directors compose vocal lines that imitate the function found within most choral repertoire for each voice part. For example, a Baritone line should include skips and leaps centered around the first, fourth, and fifth scale degrees. The director could work with the Baritone section to reinforce the perfect fourth and fifth intervals that are commonly associated with these scale degrees. In eighth grade, the director may choose to challenge the Baritone voice section with the common octave leap found at the end of perfect cadences. When writing parts, the director should also consider proper voice leading and the number of the voice parts that are appropriate for the choir. A director may choose to change the number of voice parts after assessing the choir's skill level and vocal ability. Lastly, a director must also consider the intrinsic worth and educational value of the selected repertoire. For all age groups, the author suggested that choral directors avoid choosing repertoire that is too easy or challenging for the ensemble, as it could lead to frustration and a lack of motivation among the singers. The text also plays an important role in the determining value of a selected piece. Directors should examine the text of the repertoire to ensure that it is age appropriate for the age and skill level of choir. Barham and Nelson encouraged directors to observe and correct any editorial problems that may distract or confuse students during the music learning process. This could include issues with the layout of notation or the readability of text.

It is also of importance for choral directors to educate themselves on how the male voice is affected by puberty. One of the leading researchers in the field of adolescent voice is Dr. Nancy Walker, who currently serves as a music professor at the University of North Carolina-Greensboro. In their article, *"Women Teaching Men: Taking the Mystery Out of Male Pedagogy,"* Dr. Walker and Dr. Carla LeFreve explained how the male and female vocal

mechanisms differ, as well as provided instructional techniques for adolescent ensembles. According to the article, once a male had reached vocal puberty, they almost exclusively sang in their chest voice, otherwise known as "thyro-arytenoid dominant." Walker stated, "The way males move into head voice is mostly acoustical; they never let go of the 'chest' voice sensation completely. Men experience voice 'cracks' more often due to this chest voice/heavy mechanism predominance. In addition, male voices often change later in life compared to female voices."[124] Walker and LeFevre also encouraged a variety of vocal warmups designed to develop adolescent male voices. These warmups addressed common issues with vibrato, extraneous noise or breathiness, resonance, timbre, diction, vocal register, intonation, tongue depression or general tension.

In their article, *"Women Teaching Men: Taking the Mystery Out of Male Pedagogy,"* Dr.'s Nancy Walker and Carla LeFerve provided examples of vocal warmups designed for the adolescent male voice. These warmups called for students to physically manipulate their tongue, larynx and jaw to develop a kinesthetic understanding of their vocal mechanism. For example, their warm-up "Up and Over" called for the students to place a large straw, chopstick, or similarly shaped item under their tongue, allowing the tip to rest on the teeth. Then the director demonstrated vowels to be first spoken and then sung in this position. The goal of the exercise was to discourage the retraction of both the tip and the root. [125]Another example was the "Tongue Tension Check." This warm up called for students to place their

[124] Dr. Nancy Walker and Dr.. Carla LeFreve, *"Women Teaching Men: Taking the Mystery Out of Male Pedagogy,"* National Association of Teachers of Singing Online Publications, 2014

[125] Dr. Nancy Walker and Dr.. Carla LeFreve, *"Women Teaching Men: Taking the Mystery Out of Male Pedagogy,"* National Association of Teachers of Singing Online Publications, 2014.

thumb under the fleshy part of the chin and rest the side of the forefinger just above the chin and below the bottom lip. The teacher then instructed the students to pinch the thumb and forefinger to check for tension while singing. If the bulge pressed against the thumb, the tongue was extremely tense. If this was the case, students were instructed to press upward with the thumb to release the tongue and allow it to move more into the mouth.[126] These warm-ups, while effective for adolescent males, are equally as effective for female students, as well as adult singers of all sex and genders. Walker also recommended that teachers develop literacy skills will help students build confidence in their musical ability.[127] Lastly, Walker called for teachers to recognize the value of providing students with a well-rehearsed and prepared performance. "The sense of accomplishment and camaraderie acquired from a performance is a method used for inspiring middle school music students. Celebrating progress, no matter how small or seemingly insignificant, lets vulnerable and often unconfident students know that they are capable of greatness."[128] The author of this paper recommended that teachers also emphasize the "process" by providing recognition to students who have gone above and beyond during rehearsal. This recognition could be some type of an award, or something informal such as a classroom or concert "shout out." The author proposed that music teachers who are able to find an appropriate balance between the "process" and the "product" may be more efficient in engaging the young male singer. In the authors experience, adolescent boys effectively discovered the joy of singing through

[126] Ibid.
[127] Ibid.
[128] Music and Arts Contributors, *"Motivating Middle School Musicians"* Music and Arts Online Publications, 2019.

camaraderie with their peers during rehearsals and performance.

CHAPTER FIVE: CONCLUSION

Over the past seventy years, researchers have made significant progress regarding how choral educators should approach the male voice mutation. Progressive music educators, such as Cooper, McKenzie, Swanson, and Cooksey, strived to establish a more inclusive, educational environment, where young male singers were encouraged to explore their changing voice without criticism. Dilworth stated that "these researchers have attempted to uncover the various stages of vocal development in adolescent males and the results of these studies have served as foundational material for the teaching philosophies and methodologies that are used in general and choral music classrooms today."[129]

The first research question of the paper asked "What strategies could be implemented by the middle school choral director to encourage continued choral participation among adolescent male students?" The hypothesis was, "Strategies that could be implemented by the middle school choral director to encourage continued choral participation among adolescent male students may include tracking student progress, small group and gender-specific instruction, as well as frequent voice testing." Each strategy in the above hypothesis demonstrated effectiveness at encouraging continued choral participation among adolescent male students. The author proposed that developing methods of tracking student progress should be the primary concern of choral educators who wish to encourage a positive choral environment. The study outlined in Chapter Three and Four provide evidence that John Cooksey's classification system most appropriately represents the vocal stages of adolescent males. The author suggested that providing an education of this classification system would

[129] Rollo Dilworth, *"Working with Male Adolescent Voices in the Choral Rehearsal: A Survey of Research-Based Strategies"* Choral Journal, 52 no. 9, 2012, 22.

equip students with necessary information to apply their own vocal characteristics to a corresponding stage. The author encouraged individual voice testing, especially in the beginning of the school year, so that the choral directors could conduct a thorough assessment of the student's vocal range, tessitura and timbre. Properly assessing the adolescent boy's voice will allow the choral director to determine his particular stage of vocal development and thus enable him to be placed on the proper vocal part in the rehearsal.[130] Once compiled, the author recommended directors to communicate the voice testing data with students. Through the use of an online voice journal or portfolio, choral directors could provide an interactive resource for the students to track their vocal progress, as well as provide instructional videos and activities to deepen understanding of the adolescent changing voice.

Once students have been placed in their initial vocal sections, the author stressed the importance of frequent voice testing throughout the school year. This was to ensure that students were performing in a range that is appropriate for their vocal development. The author encouraged choral directors to utilize in-person independent and group testing during rehearsal when necessary. In-person voice testing should take place in a one-on-one and small group environment. Occasional one-on-one voice testing should be conducted if a teacher notices a significant change in the student's speaking or speaking voice. Choral directors should also strive to create an environment when students are encouraged to express their vocal concerns to the teacher. A one-on-one voice test can be specifically designed for the individual student that allows the teacher to diagnose the student's vocal

[130] Rollo Dilworth, *"Working with Male Adolescent Voices in the Choral Rehearsal: A Survey of Research-Based Strategies"* Choral Journal, 52 no. 9, 2012, 26.

issue, as well as come up with a solution to address the issue. Potential vocal issues could include a sudden drop in pitch, regular voice cracking, or issues accessing certain vocal registers.

The author proposed that small group and gender-specific instruction could also be utilized to encourage continued choral participation among adolescent male students. Irvin Cooper's initial research regarding the male voice mutation demonstrated evidence that a gender-specific vocal instruction provided numerous benefits for both male and female students, especially at the middle school level. As students often become more self-aware about their changing bodies they often revert inwards, they often become hesitant to vocally participate in rehearsal. In addition, physical, emotional and sexual development begin to present unique scenarios in the choral classroom resulting in perceived judgement. These factors tend to be amplified as students associate with the opposite sex. The author recommended that to reduce or eliminate these factors, choral directors should consider male exclusive and female exclusive ensembles when designing a choral program. Dilworth stated that in more recent years of literature and debate on the subject, numerous researchers and pedagogues have espoused favorable opinions regarding single-gender rehearsals at the middle school level. Advocates for the all-male rehearsal configuration offered several advantages such as the reduction or elimination of gender-related social problems.[131] Gender-specific vocal ensembles allowed choral directors to address topics and vocal issues that specifically pertain to the male or female anatomy. For males, gender-specific vocal topics could include the male changing voice, the history of castrati and its negative effect on

[131] Rollo Dilworth, *"Working with Male Adolescent Voices in the Choral Rehearsal: A Survey of Research-Based Strategies"* Choral Journal, 52 no. 9, 2012, 27.

the perception of male singing, use of falsetto voice, and expanding vocal range. For females, choral directors could discuss the female voice maturation process, the differences between head voice and chest voice, the whistle register, and vocal harm caused by imitating female pop singers, especially those that utilize poor vocal technique. The author also promoted that gender-specific ensembles allow choral directors to choose more-appropriate repertoire. For example, literature for adolescent male changing voices should have limited vocal ranges and rhythmic complexity. This level of repertoire is most appropriate for adolescent changing and changed voice males, as it allows them to adapt to their rapidly changing vocal ranges, tessitura and timbres. However, standard SATB repertoire often does not provide an appropriate challenge for the adolescent female singer. An all-female ensemble could be presented with repertoire that presents more advanced choral themes such as register switches between head voice and chest voice, blending of vocal timbres, and staggered breathing.

As for behavior management, Dilworth stated that while adolescent males are more likely to act out, choral directors should not be intimidated by the presence of an all-male ensemble. "In an all-male setting, young men are less self-conscious and, thus, more easily persuaded to sing, an adolescent male chorus is another means by which to keep interest in singing strong among pubertal boys. The esprit de corps that is established creates a bond beneficial to the entire music program."[132] If a split classroom is not possible, the author encouraged the choral director to explore regular opportunities for gender-specific rehearsals,

[132] Rollo Dilworth, *"Working with Male Adolescent Voices in the Choral Rehearsal: A Survey of Research-Based Strategies"* Choral Journal, 52 no. 9, 2012, 27.

instructional periods and voice testing. Small group voice testing, as described in Chapter Two, should be also encouraged. Using the method as described by Cooper, a choral director would be able to quickly identify who the unchanged, changing, and changed voices are within the choir and group them appropriately. Choral directors should also be encouraged to provide self-assessment strategies that allow students to evaluate their vocal progress independent from the teacher. These strategies will help the student develop a sense of control regarding their change of voice, enhancing their personal accountability, motivation, curiosity, and engagement in the choral classroom. The author recommended that choral directors explore cross-curricular instruction with health teachers, guidance counselors, and school psychologists to help teach about the student's physical, emotional, and social development, as well as provide strategies for students to cope with these changes.

The second research question asked "What are the possible benefits of male students learning about vocal range and tessitura during adolescent voice change?" The hypothesis for this question was that possible benefits of the male students learning about vocal range and tessitura during adolescent voice change may include more active participation in vocal warm-ups and rehearsal as well as positive attitude toward continuation in singing. When instructional time is limited, choral directors are often forced to choose between the "process" or the "product." The "process" is a focus on providing each student with a high-quality, individualized classroom education. This involves spending more time and energy building pedagogical understanding through intensive music training. As it pertains to the male voice change, a teacher who emphasizes the "process" will provide an understanding of

the voice change that will encourage adolescent males to more actively participate in vocal warm-ups and rehearsal. This goal could be achieved through various strategies, beginning with demonstration and modeling. The primary way students will learn is through imitation. The author recommended that the director should be diligent in his or her modeling of vocal phrases, ensuring that consistently utilizing proper vocal technique and clearly producing each designate note and rhythm. A positive attitude toward continuation in singing can also be encouraged by nonmusical factors. In his article, "Working with Male Adolescent Voices in the Choral Rehearsal: A Survey of Research-Based Strategies" author Rollo Dilworth encouraged choral directors to also address emotional, psychological, and developmental needs of the adolescent male through the lens of choral education.[133] He notes that "teenage boys have fragile egos; their masculine identities are only beginning to formulate; thus, it is important to utilize language that will allow them to feel comfortable during rehearsal. It is crucial to nurture their self-esteem and help them recognize their overall growth, personally during the year."[134] The author encouraged directors to provide a basic education of male voice change to the female to help encourage a more positive choral environment. This exchange of information will result in mutual support of male colleagues during their voice change in adolescence. Barham and Nelson stated that "Educating the girls in the process of male vocal development mitigates the problems which could occur in daily rehearsals, such as observations of noticeable voice cracking. It is common knowledge that boys will go to

[133] Rollo Dilworth, *"Working with Male Adolescent Voices in the Choral Rehearsal: A Survey of Research-Based Strategies"* Choral Journal, 52 no. 9, 2012, 29.

[134] Ibid.

great lengths to keep from voice cracking in mixed company. Girls at this age offer strong moral support for their male peers 'vocal challenges. Boys will take pride in their personal growth when they are comfortable in mixed chorus rehearsals."[135] In return, the author encouraged choral directors to provide male students with information regarding the female voice change process. This information will help male students continue to understand the physical differences between the male and female vocal development. Lastly, the author recommended that choral directors apply the voice testing methods utilized in this paper or develop their own method of testing utilizing John Cooksey's classification system. Choral directors should become familiar with the range, tessitura, and timbre of each male and female voice in his or her ensemble. Since each adolescent voice and voice change remains unique to the individual, frequent testing will ensure that the director is providing the proper guidance through instruction and section grouping.

The author proposed that application of the strategies presented in this paper would help to eliminate the stigma of male singing, encourage choral participation at the adolescent level, and help music educators achieve their goal of retaining male students in choral activity throughout their school experience. That being said, there are still many evolving factors that need to be considered regarding this topic. A study by Cooper in 1965 showed significant evidence that the male voice mutation process had begun to occur much earlier in development compared to earlier generations. Since the 1980's, multiple researchers have conducted their own studies to see how this theory had evolved. Joanne Rutkowski's 1981 study confirmed Cooksey's classification system, but noted that the students entered the

[135] Terry Barham and Darolyne Nelson, *The Boy's Changing Voice, New Solutions for Today's Choral Teacher.* (New York, NY: Alfred Publishing, 1991), 11.

Midvoice stages at an earlier age than previously reported. She also discovered that boys were completing the latter stages of the voice change at an earlier age than Cooksey's methodology proposed.[136] Mary Groom's 1984 study also found that boys were entering the voice change at an earlier age than reported by Cooksey. Groom also found a great rate of change over the summer months, potentially due to the increased physical activity and decreased singing activity.[137] A 1999 study by Janice Killian showed that early signs of voice change could begin as early as the fifth grade, supporting the conclusion that boys enter puberty and voice change at an earlier age.[138] Until this study, the changing voice was exclusively believed to be a middle school issue, however Killian advocates for elementary school choral directors to address the changing voice. A more recent study in 2010 by Ryan A. Fisher showed that 46% of fourth grade, 62% of fifth grade, and 67% of sixth grade students would be classified in one of the Midvoice or changing voice stages using Cooksey's method, continuing to provide further evidence that boys are entering the voice change at an earlier age.

Another factor to be considered is how a student's race or ethnicity may impact their age of vocal mutation. While the student sample utilized in this study was taken from a diverse, urban school setting, the author did not obtain any specific information regarding race or ethnicity for this study. A 2012 study by the American Academy of Pediatrics showed that "The mean age of genital development was 10.14 years for white boys. Studies

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[136] Joanne Rutkowski, "The Junior High School Male Changing Voice: Testing and Grouping Voices for Successful Singing Experiences." *Choral Journal, 22, No. 4* (December 1981): 11-15.

[137] Mary D. Groom, "A Descriptive Analysis of Development in Adolescent Male Voices During the Summer Time Period" (Buffalo, NY: University of Buffalo, 1984): 80-84.

[138] Janice Killian, "A Description of Vocal Maturation Among Fifth-and Sixth-Grade Boys." *Journal of Research in Music Education*, 47 no. 4 (Winter 1999): 357-369

from the 1930's to the 1970's report mean ages for white boys at this stage ranging from 11.5 to 11.8, thus starting puberty 1.4 to 1.7 earlier. [139] This change was even more dramatic among boys of color, as African-American boys began to show genital development at 9.14 in 2012, compared to 11.2 in the 1970's. Hispanics boys entered this stage at 10.04 years, compared to 12.4 years in studies from the early 1980's, over a two-year difference.[140] Trends in data would likely demonstrate that puberty among adolescent males is occurring even earlier than the ages document in these studies.

Another educational trend that must be considered is the growing number of adolescent students who self-identify as a gender or sex different from the one that they were assigned at birth. Since all of the biological male students utilized in this study identified as male, the author did not obtain any specific vocal information from any student who identified as non-binary, gender-fluid, or transgender. While there is very little data detailing how hormone therapy may affect the gender-transitioning adolescent singing voice, the author promoted the same methods of vocal tracking to students who do not fit traditional gender molds. Accurate testing data could ensure that students are grouped in appropriate sections that are representative of their voice. The use of the gender-neutral labels presented in this chapter will help create a more gender-inclusive classroom environment.

These topics detailed in the conclusion of this paper should be considered by choral educators, as well as those that research the adolescent changing voice. The author suggests that future research regarding adolescent male engagement in choir more closely examine

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[139] Ruben J. Rucoba, "Boys to men, Male puberty starting earlier" *American Academy of Pediatrics,* 33, no. 12 (December 2012)

[140] Ruben J. Rucoba, "Boys to men, Male puberty starting earlier" *American Academy of Pediatrics,* 33, no. 12 (December 2012)

the factors that earlier age of puberty, race, and gender-fluidity could have on the adolescent male voice change. In addition, the author calls for future choral educators to innovate the vocal tracking methods presented in this paper in addition to further incorporate elements of music technology into rehearsal and performance when necessary. Lastly, the author calls on choral educators to share their effective teaching practices and research findings with educational community, so that more teachers can continue to adapt to the ever-changing socio-emotional demands of the student population.

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