An examination of middle school band students' ability to match pitch following short-term vocal technique training

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AN EXAMINATION OF MIDDLE SCHOOL BAND STUDENTS’ ABILITY TO MATCH PITCH FOLLOWING SHORT-TERM VOCAL TECHNIQUE TRAINING

A Thesis

Submitted to the Graduate Faculty of Louisiana State University and Agricultural and Mechanical College in partial fulfillment of the requirements for the degree of Master of Music

in

The College of Music and Dramatic Arts

by

Abby Lyons South
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Abstract

The purpose of this study was to examine middle school band students’ ability to sing and play their instruments in tune following short-term vocal technique instruction. In a posttest-only design, individual participants listened to three-note stepwise sequences produced digitally and performed them in three ways—sung on the syllable /Zu/, sung on /Zi/, and played on the instrument. Performances were recorded and analyzed for cent deviation from equal-tempered tuning (reference A=440). Results showed a significant 3-way interaction among pitch direction, performance condition, and pitch, with the most inaccurate playing happening after the first time participants sang the pitch sequence. Singing accuracy, however, was quite poor throughout.

An interview was conducted with all participants at the conclusion of the 6 weeks instructional period to better understand their perceptions of singing in the band rehearsal. Answers revealed that both the student and teacher participants’ perceived growth in the students’ singing accuracy, group instrumental intonation, overall awareness of pitch, and student-led tuning as a result of the instruction, despite these results not being reflected in the performance data.

While it is a widely accepted belief that singing in the instrumental music setting aids in intonation, this was not the case under the conditions of this study. Further investigation is warranted to determine the best way to implement vocal instruction in the instrumental rehearsal.
Introduction

“If you can sing it, you can play it.” This generalized expression is a common one heard among school band directors in reference to rehearsing an instrumental ensemble. In Rehearsing the Band (Williamson, 1998), the conductors of elite university band programs cited singing as a sound rehearsal technique to aid in the performance of intonation. H. Robert Reynolds wrote that “Groups that sing will surely be better” (p. 65) and that “singing can be used through the course of a rehearsal; and it works so well that you almost feel guilty, because it’s too easy!” (p. 66). John Whitwell invoked a respected conducting teacher in commenting about his belief in singing: “I learned from Elizabeth Green the importance of instrumentalists singing to develop what she called tuning ‘radar’: the ability to hear a pitch before it is played” (p. 80). Allan McMurray wrote about why he has his groups sing: “They’re all dealing with the same instrument (no confusing valves or keys) and they never seem to sing too loud, so they can hear and match more things” (p. 60). These conductors of highly advanced musicians find singing to be beneficial and important in their rehearsals, but they offer little insight into the specific vocal techniques they employ. How do their students sing? What syllables do they use? Do their students have previous vocal training? What do they do with those instrumentalists who can’t seem to match pitch when singing? These conductors seem to be in agreement as to the importance of singing, but none, at least in this collection of conductors, seems to be concerned with the mechanics of it.

In his 1996 Music Educators Journal article entitled “To Sing or not to Sing in Instrumental Class,” music education professor Mitchell Robinson wrote “Most music educators would agree that singing is an activity critical to the development of musical
understanding . . . Why is it, then, that many band and orchestra directors are reluctant to incorporate vocalization activities into their instrumental programs?” (p. 17). According to Robinson, this reluctance to sing may be attributed to lack of personal and pedagogical vocal training, available rehearsal time, and confidence in one’s ability to provide a sufficient vocal model. Robinson’s writing seems to indicate that many band and orchestra directors are not singing with their students. If this is in fact the case, it would appear that what is being asked of college instrumentalists, as put forth by Williamson (1998), is not part of the education provided by secondary instrumental music teachers.

One need only to look at widespread methods of beginning band instruction to realize that singing is not a consistent presence in the elementary and junior high instrumental classrooms either. Wolbers (2002) wrote “when a child begins the study of a band or orchestra instrument, the use of the singing voice in class is often overlooked” (p. 37). It is common practice for beginning and middle school directors to use band method books as their basic means of instruction. Paschall (2006) wrote a thesis reviewing the most popular beginning band method books available at the time, analyzing the inclusion of elements of comprehensive musicianship, including singing. Out of the six method books analyzed, five made no mention of singing. Method books are often sold for profit. If the most popular method books are not including singing, this could be considered a reflection of the desired content of the many band directors buying these books.

While Robinson’s (1996) article does not speak to the happenings of every school band program in America, and all teachers are free to incorporate whatever they would like to above and beyond that which is included in method books, that Robinson was
compelled to write such an article and that method book instruction is so prevalent in beginning classes may be signs of a vocalization-less trend in instrumental music education.

If high school and middle school band directors are not singing with their students, where are these students first exposed to singing in schools? One might have to look back to the general music classes offered at the elementary level to find out where these collegiate instrumental musicians were taught to sing. In some cases, these classes may have been the last singing experience these students had prior to the university.

Well-established methods and strategies of musical instruction for young and beginning musicians such as those created by Zoltan Kodaly (Adam & Kodaly, 1971), Emile Jaques-Dalcroze (Jacques-Dalcroze, 1913), and Carl Orff (Orff & Walter, 1963) are often found in elementary music classrooms. The Kodaly approach, Hungarian in origin, is based on the belief that singing, not instrumental proficiency, is the basis for broad musical literacy. While commonly thought of in America as a predominantly vocal method, perhaps because of the strong presence of solmization, the Kodaly system was designed with the belief that singing and playing an instrument are not separate entities (Howard, 1996, p. 27). In fact, Kodaly’s objectives were “to aid in the well-balanced social and artistic development of the child, and to produce the musically literate adult – literate in the fullest sense of being able to look at a musical score and think sound, to read and write music as easily as words” (Choksy, 1974, p. 15). Kodaly’s method of instruction aimed to foster comprehensive music education, not simply vocal education.

Developed in Switzerland, the Dalcroze approach to music education involves three elements: “Eurhythmics, which teaches concepts of rhythm, structure, and musical
expression through movement; Solfège, which develops an understanding of pitch, scale, and tonality through activities emphasizing aural comprehension and vocal improvisation; and Improvisation, which develops an understanding of form and meaning through spontaneous musical creation using movement, voice and instruments” (dalcrozeusa.org). One goal of the Dalcroze approach is to use these three components to develop the inner ear, train the body as the physical “instrument,” and allow creativity to lay the foundation of true musicianship, not just note literacy, singing, or movement.

Carl Orff’s approach to music education includes a variety of musical experiences and is based on the philosophy that music is inseparable from movement and speech (Shehan, 1986, p. 29). This German approach, known as “Schulwerk,” is heavily influenced by the work of Dalcroze, incorporating speech-rhythms and chants, folk songs, movement, improvisation, and xylophones. One major goal of the approach is to foster creativity in students (Mark & Gary, 2007).

Suzuki (Suzuki, 1983) and Trendafil Milanov (Milanov, 1979) developed instrumental music approaches that share similar core values with Kodaly, Dalcroze, and Orff, including placing emphasis on ear training and singing throughout the learning process. Suzuki’s teachings place heavy emphasis on developing a child’s ear from the first moments of his life by submerging the child in an environment filled with ‘in tune’ singing and music (Suzuki, 1983). Calling his teaching style the ‘mother-tongue’ approach, this Japanese culture-influenced approach is based on the notion that musical aptitude is not inherited, but rather occurs through suitable environmental conditions (Suzuki, 1983). Suzuki purported that if a child were exposed to repeated in-tune singing of lullabies by his mother, that child would in turn be able to sing in tune later in life. In
turn, if a child were exposed to out-of-tune singing of lullabies as a baby he would most likely sing out-of-tune as an adult. Suzuki’s teachings call for surrounding a child with good models of musicianship, and having that child practice what he hears over and over again until it is mastered, much in the same way that a child learns his first language or mother-tongue.

Originating in Bulgaria, the Milanov approach to violin calls for rote singing of folk songs before performing them on instruments (Milanov, 1979). Milanov believed the simplest way for children to learn music is by singing songs with text, and adding body movement to it (Bujes, 2013, p. 49). Once the songs are internalized the children learn to play them on their instruments, combining solfege, theory, and singing by ear. In this sequential approach to instrumental music education, singing must come first.

A common thread among these five systems of music education is belief in the importance of developing aural skills, either by repeatedly listening to and imitating in-tune music or by learning rote songs through singing and movement. The major goal of all five is to foster musicianship, not simply teach literacy or technique. These Hungarian, German, Swiss, Bulgarian, and Japanese approaches have each played a role in directing the course of contemporary music education (Shehan, 1986) and have been successfully adapted for use in American classrooms. Unfortunately, not all American students have the opportunity to take general music classes and receive instruction in these deep-rooted and successful approaches.

In a 2003 Music Educators Journal article, music education professor Colleen Conway described the many challenges a beginning band or strings teacher faces when dealing with children who have experienced little to no general music instruction:
“Consequently, some instrumental teachers cannot assume that children entering the band or orchestra classroom have experienced the musical-readiness activities necessary for success in instrumental music” (Conway, 2003, p. 27). Also realizing this lack of music ready activities prior to the instrumental classroom, Turpin (1996) encouraged instrumental music teachers to embrace the methods of Kodaly, Dalcroze, and others in their classrooms. Howard (1996) provided a brief outline for how an instrumental music teacher might incorporate Kodaly methods into the instrumental rehearsals. Turpin (1996), however, acknowledged lack of training in these areas for instrumental educators as an obvious drawback.

Celebrated music educator, Edwin Gordon, also recognized this problem and developed another widely accepted method of music instruction, designed specifically for American music students but sharing core values with the Kodaly, Orff, Dalcroze, Milanov, and Suzuki, approaches. His early research in the psychology of music learning led to the development of a prescribed learning sequence for beginning musicians in American schools (Shehan, 1986, p. 29). Gordon’s music learning theory is built around the concept of audiation, defined as “the ability to hear and comprehend music for which there is no sound” (Gordon, 1993, p. 3). He cites the combination of aural and oral learning as the basic foundation of discriminatory learning in music, ultimately leading to a sense of tonality and skill development in audiation.

According to Gordon, achievement at the aural/oral level involves a student, among other things, singing along with what he is hearing (Gordon, 1993). He encourages teachers to incorporate music learning activities into the first few minutes of every rehearsal, and to dedicate the remainder of the rehearsal to applying these activities
to music performance. Believing that patterns, not individual pitches, are the basic units of meaning in music, Gordon places heavy emphasis on singing short tonal patterns in major and minor modes, and making verbal associations with each pitch to a syllable before notation is introduced. “Unless students, regardless of chronological age, know how to use their singing voices, they will not profit as much as they should from instruction” (p. 213). In Gordon’s approach, singing is core to musicianship and must precede instrumental music education. He offers the following explanation as to when a music student is ready to learn an instrument:

When a student has developed a sense of tonality, a sense of meter, a vocabulary of tonal patterns, and a vocabulary of rhythm patterns to the extent that he can sing with acceptable intonation at least tonic and dominant patterns in major and minor tonalities . . . he is ready to begin the study of a music instrument. (Gordon, 1989, p. 289)

Gordon’s system of sequential music learning has strongly influenced the writings of instrumental music educators, materials included in some current method books, and philosophical trends in American music education. Music education professor and author Colleen Conway encourages instrumental music teachers to “consider the importance of audiation skills in the first instrumental music lessons” (2003, p. 27). In an article entitled Teaching Audiation in Instrumental Classes, music professor and music learning theory specialist Bruce Dalby (1999) provided an outline of how instrumental music educators might gradually incorporate Gordon’s music learning theory and audiation-based instruction into the classroom, citing singing as the most important recommendation. Music education professors Richard Grunow and Christopher Azzara collaborated with Edwin Gordon to develop a comprehensive instrumental method designed to develop audiation skills. The authors state that, in this method, the students
“will simultaneously be learning two instruments – the audiation instrument (in her head) and the executive skill instrument (the instrument in her hands)” (Grunow, Gordon, & Azarra, 2001). Shehan (1986) wrote “the Gordon approach provides the materials and structure for successful basic general music and instrumental programs.” Gordon’s writings have also generated considerable discussion in the research community, creating opportunities for focused dialogue among general music, choral, and instrumental teachers (Grashel, 1991, p.30).

It appears that in common practice, singing is often incorporated on a whim, used as a means to reach the end goal of good instrumental intonation. But Gordon and his contemporaries believe that accurate singing is a fundamental musicianship skill to be acquired long before one plays an instrument. In *The Process of Education* (1960), Bruner advised “the curriculum of a subject should be determined by the most fundamental understanding that can be achieved of the underlying principles that give structure to that subject” (p. 31). In *A Sound Approach to Teaching Instrumentalists*, Schleuter defines this foundation in music as a vocabulary of tonal and rhythm patterns (1997), the first of which are acquired through singing. Like Gordon, Schleuter believes that learning tonal patterns is the best way to develop a sense of tonality and audiation skills, and that both should be established before a student begins to play an instrument. Schleuter suggested that the instrumental teacher think of himself as a vocal teacher as well, incorporating singing into rehearsals and possessing the capability to diagnose and correct vocal problems as soon as they arise. He did not, however, offer any insight into vocal technique. Instead, he referred the instrumental director to the work of choral pedagogue Ken Phillips. In reference to tuning with instrumentalists, Schleuter wrote
“Performing with acceptable intonation is basically an outgrowth of tonal audiation” (p. 149). In other words, instrumental directors must also be vocal directors, and instrumentalists will only be able to play in tune to the extent that they can audiate, or sing, in tune.

Clearly, Gordon’s concepts of audition and the emphasis he places on singing have influenced many in the field. But even Gordon’s writings lack information on the mechanics of teaching singing. As the title of his book suggests, Learning Sequences in Music is focused on the order of instruction and the central principles of his system (sequence, whole/part/whole curriculum/, focus on patterns, contrast, context, and movement). The book includes information about what to teach, when to teach it, why to teach it, and provides a sequential method designed to teach audiation skills (giml.org). Gordon offers information to the reader about the speaking and singing ranges of young students and inexperienced singers. He provides specific tonal patterns and key suggestions for specific stages of development, as well as the level of challenge associated with said tonal patterns. He offers insight as to how one might incorporate the system into instrumental classes. He does not, however, offer information about vocal technique or how to teach a child to sing.

Given the importance placed on aural skills and vocalization in well established and successful approaches to music education, and the long held belief by successful practitioners that singing in the instrumental setting is valuable, it is no surprise that “Singing, alone and with others, a varied repertoire of music” is listed as the first of nine standards for all of music education included in the March 11, 1994 document entitled the National Standards for Arts Education (MENC, 1994). A 1997 National Assessment
of Educational Progress, however, showed that American music students performed poorly in the area of creating and performing, including singing (Cassidy, 1997).

There appears to be a disconnect between what is being asked of instrumental music students at the most advanced stage of their education and the music education that is provided to them in primary and secondary schooling. It should be noted here that exposure to school music is not a prerequisite for singing ability. People can learn to sing in the home, at church, and through a variety of experiences outside of school. The present study, however, deals with school music education and is therefore focused on the vocal and instrumental experiences of children within the school setting.
Review of Literature

Previous research has suggested that vocalization in an instrumental setting may positively influence the performance of intonation (Elliott, 1974). Studies examining the effect of vocalization on global performance achievement of instrumentalists can be categorized into two broad categories based on the type of vocal training incorporated into the study: First, there are studies that include neutral syllables, humming, or unspecified types of singing in the vocal treatment (e.g., Elliott, 1974; Smith, 1984). Second, there are studies that incorporate tonal pattern training, and/or verbal or physical associations into the instruction (e.g. Grutzmacher, 1987; Lee, 1996). The studies included in the following review of literature will be organized according to both the age group of participants as well as to the type of vocalization employed in the prescribed vocal treatment.

Advanced Musicians as Participants

Smith (1984) investigated the benefits of singing in the instrumental classroom by studying the effects of vocalization on the intonation of 94 college wind players. Smith asked all subjects to perform four instrumental etudes under two different performance conditions. One condition instructed participants to simply play the etudes. The other instructed the participants to vocalize through the music for 30 seconds prior to performance. Any type of vocalization (humming, neutral syllable singing, solfege) was acceptable. Smith found no significant difference in intonation between the performances using vocalization and those that did not. He suggested further research investigating the effect of vocalization on the intonation of wind players at various levels of development,
the relationship of vocal to instrumental intonation, and comparisons in pitch perception between woodwind and brass players.

While Smith’s work with collegiate instrumentalists did not yield an improvement in played intonation following free, unguided singing, Sheldon (1998) chose to investigate how singing might impact other areas of performance of college-aged instrumentalists. Working with 30 undergraduate instrumental music education majors, Sheldon studied the effects of contextual sight-singing and aural skills training on error detection abilities. Participants were assigned to experimental and control groups and received identical training with the exception of 50 extra minutes of sight singing per week in the experimental group. This sight reading involved band literature excerpts and incorporated movable Do solfège syllables and hand signs. At the conclusion of the 11-week treatment period all participants were tested for error detection ability in one-, two-, and three-part excerpts of band music. Experimental group participants scored significantly higher on the posttest than control group participants in overall error detection, indicating that contextual sight-singing and moveable Do solfège syllables may have positive impact on error detection skills. While in common practice singing is often thought of only as a tool to improve instrumental intonation, this study indicates that singing in the instrumental rehearsal has benefits beyond intonation.

Schlacks (1981) and Bennett (1994) studied the effects of vocalization on instrumental intonation of high school student musicians. Schlacks (1981) examined the effects of neutral syllable vocalization and interval training on the intonation of high school wind players. Bennett (1994) studied the effects of humming on the performance
of intonation by high school band students. Neither found significant differences in subjects’ pitch accuracy between pre- and posttests.

Smith (1984), Schlacks (1981), and Bennett (1994) yielded no significant improvement in performance achievement following their vocal treatment with advanced students. The lack of positive outcomes could be a result of research design, an outside variable, or, it could be attributed more to attrition than to the actual instruction received. “Students who struggle with instrumental performance would most likely be among the less accurate players; they may also be more likely to drop music instruction” (Morrison, 2000). Perhaps these studies showed no positive gains because those who would have struggled to sing and play in tune, and would have potentially benefitted the most from a vocal treatment, have dropped out of these music programs. This notion might shed light on why college band directors seem unconcerned with the mechanics of singing. Could it be that these directors have “benefitted” from attrition rather than comprehensive music education programs? If so, are we teaching musicianship in primary and secondary schools, or simply ‘weeding’ out those who cannot already sing and play in-tune?

**Beginning and Middle School Students as Participants**

The following studies investigated the effects of a vocal treatment on the instrumental performance of younger, developing musicians. McGarry (1967) worked with junior high students, conducting a teaching experiment to measure the extent to which vocalization contributed to the development of selected instrumental music performance skills. Participants in this study included 74 junior high school students divided into two treatment groups. Both groups received melodic notation instruction for 14 weekly sessions, but the experimental group sang pitch letter names before performing
melodies on their instruments. A pre- and posttest of performance achievement using the Watkins-Farnum Performance Scale (1954) was administered. Results showed no significant difference between treatment groups, however, the lowest achieving students in the experimental group showed higher gains than those of the same ability in the control group.

Davis (1981) found that tonal-verbal vocalization involving scale degree numbers had significant positive effects on the musical performance achievement of beginning band students. Ninety-three fifth and sixth grade band students were split into three experimental and three control groups and received 19 weekly training sessions. The experimental groups took part in either neutral syllable (singing) on the syllable “la” and scale degree numbers, self-evaluation practice, or a combination of both. The control groups were taught in a manner involving no vocalization and determined by their specific teacher. While singing appeared to have a positive effect on the performance achievement of beginning fifth grade band students there was no significant effect on the sixth graders’ performance achievement. The findings of this study are in line with Smith’s (1984) findings that singing may not have a positive impact on the performed intonation of more advanced players.

When Elliott (1974) investigated the effect of vocalization (neutral syllable singing) on the sense of pitch of beginning band students, the results indicated that regular participation in a band class could have a positive effect on a child’s sense of pitch. Elliott’s subjects were 196 beginning wind players from six public schools, divided randomly into experimental and control groups. Both groups received standard method book instruction (symbol-to-sound literacy instruction) for one year, but the experimental
group vocalized exercises on a neutral syllable before performing them on their instruments. While all participants increased their aural skills, pitch discrimination ability, tonal recall, and overall sense of pitch, Elliott found that children who participated in band classes where vocalization was a daily practice had more significant gains than those in the control groups. Interestingly, private piano study appeared to positively affect the sense of pitch of students in both groups, but regular participation in an outside vocal ensemble did not.

Using a slightly different approach to singing in the instrumental classroom, Dunlap (1989) studied the effects of singing lyrics on the musical achievement of beginning fifth-grade instrumental students. Participants in this study included 92 beginning fifth grade band students, randomly assigned to experimental or control groups. The instructional period lasted 14 weeks. The control group performed solely on instruments while the experimental group sang melodies with lyrics before playing them on instruments. No significant differences were found between the control and experimental groups, however a positive correlation was found between pitch accuracy and aural-visual discrimination, performance achievement, and overall musical aptitude.

Coveyduck (1998) investigated vocalization and its effect on the intonation of beginning instrumentalists. The participants in this doctoral study were 67 sixth grade band students separated into two treatment groups. Everyone took daily instrumental group lessons for four months. Instruction for the two groups was identical, with the exception that the experimental group incorporated three minutes of singing on neutral syllables during each session. Upon data analysis Coveyduck discovered that participants with previous experience in vocal training had distorted her results and ultimately found
that the treatment in her study had no significant effect on intonation. She did, however, suggest that her findings indicated previous vocal training could positively influence instrumental performance of intonation.

Of the research studies included thus far, Elliott (1974) and Smith (1984) appear to be the most frequently cited. Interestingly, Elliott’s study yielded positive outcomes while Smith’s did not. One might suggest that the young age of Elliott’s participants meant they had more to gain from a study of this type than did the college students of Smith’s study, or that Elliott’s study included a broader population of students who had not yet reached a predictable drop out threshold in their band experience. Morrison suggested that attrition may result in better intonation by advanced groups. Elliott’s research indicates, however, that with daily, systematic vocal instruction all students may improve in the performance of pitch accuracy, thus laying a strong foundation for good instrumental intonation. Smith’s study seems to indicate that simply singing passages of music does not aid in instrumental intonation when performing those same passages.

**Verbal Association and Tonal Pattern Studies**

The following studies examined the effects of a vocal treatment involving verbal or physical associations on the performance of very young instrumentalists. Lee (1996) studied the effects of vocalization on achievement levels of selected performance areas found in elementary instrumental bands. Forty-eight beginning instrumental students received three half-hour group instrumental lessons per week for six weeks. Participants were randomly placed into control and experimental groups. Control instruction involved traditional notation-focused instruction while the experimental instruction involved vocalized tonal patterns using solfège syllables. A comparison of pre- and posttest results
indicated a positive correlation between vocalized tonal pattern training and both articulation and phrasing achievement in beginning wind instrumentalists’ performance of band music.

Grutzmacher (1987) found that solfège and tonal pattern training involving harmonization and vocalization had a positive effect on the melodic sight-reading ability and aural recognition of beginning brass and woodwind instrumentalists. Subjects included 48 fifth and sixth grade band students who were randomly divided into experimental and control groups. A pre-test was given to participants involving the Iowa Tests of Musical Literacy in Tonal Aural Perception and Tonal Reading Recognition. The control group subjects received instruction involving symbols and notation, with an emphasis on technical skill development, while the experimental groups were instructed with aural and printed tonal patterns in major and minor keys, incorporating harmonization and singing. Following 14 weekly half-hour sessions, post-tests identical to the pre-test along with a sight-reading component were administered. A comparison of test results showed the tonal pattern participants scored significantly higher in all areas.

McDonald (1987) compared Gordon’s “Empirical Model of Learning” to a traditional notation based method of instruction relative to the music aptitude and performance achievement of third-grade recorder students. Subjects were tested using Gordon’s Primary Measures of Music Audiation (1979). Experimental groups learned songs and tonal patterns through rote teaching followed by the introduction of notation, while control group participants were instructed solely through notation. At the conclusion of the treatment period all subjects took a posttest identical to the pre-test and were measured for performance achievement. The results indicated no significant
changes in tonal aptitude from pre- to posttest, but the tonal pattern method of instruction proved to be more effective than the control method in recorder performance achievement.

MacKnight (1975) also incorporated the concept of sound before symbol into her study, investigating the effects of solfège and tonal pattern training on the sight-reading and aural-visual discrimination of beginning wind players. Participants included 90 fourth-grade beginning wind players divided into control and experimental groups. The control group received method book instruction, incorporating “finger-symbol” associations to learn new pitches while the experimental group learned new pitches through solfège syllables sung on tonal patterns designed by MacKnight. After 32 weekly half hour sessions, tonal pattern training had a positive effect on both sight-reading and audio-visual discrimination. MacKnight also noted that the tonal pattern method proved more effective in increasing overall growth of music performance achievement among the low achieving members of the experimental groups compared to the low achieving members of the control group.

To summarize the research reviewed thus far, the studies involving neutral syllables or unguided singing found no significant differences in the performance of intonation. Elliott (1974) is an exception. The participants in this study demonstrated gains in their overall sense of pitch. Interestingly, Elliot’s study was the longest in duration (1 year in comparison to 19 weeks and under). The studies employing Gordon’s Music Learning Theory and concept of tonal pattern training and verbal/physical associations proved to have the most positive outcomes, particularly with developing musicians.
Additionally, it appears that vocalization within the instrumental classroom does not negatively impact any area of global performance achievement at any stage of development. In studies where no significant differences were found between pre and posttest in the areas of tonal aptitude and performance achievement following a vocal treatment, substantial gains were made by the lowest performing members [McGarry (1967), McDonald (1987), MacKnight (1975)]. These research findings indicate that, given appropriate instructional methods for sufficient periods of time and with developing musicians, vocalization based on Gordon’s model may have a positive effect on the training of instrumentalists (Bernhard, 2003), including performance of intonation.

Gordon’s model includes pitch perception as the first step to developing audiation skills. One might assume that pitch perception would have a strong correlation to pitch performance. In The Psychology of Musical Talent, Carl Seashore purported that the perception of even the smallest difference in pitch “is a fundamental capacity in musical talent . . . and one must be guided by such hearing in playing and singing” [p. 42, as cited in Pedersen and Pedersen, (1970)]. This relationship between pitch perception and pitch performance has been the topic of a number of research studies with differing outcomes. Boardman (1964), Zwissler (1971), Watts, Moore, & McCaghren (2005) supported the notion that singing accuracy and tonal perception strongly relate to one another. Geringer (1983) found that pitch-matching ability may have more to do with physical development than training and discrimination may involve skill, suggesting that perception and performance were separate entities. Yarbrough, Morrison, & Karrick (1997) found no significant relationship between the tuning performance and pitch perception of high school wind players.
These conflicting results are the products of highly controlled experiments with clear goals, involving individual testing done in ideal sonic circumstances. If this type of research is unable to establish a positive correlation between perception and performance, it seems dubious for instrumental directors assume that a positive relationship would exist between singing and instrumental performance in authentic situations, especially given the lack of vocal instruction that appears to be present in school.

In a perception and pitch-matching study, Demorest & Clements (2007), identified three groups of singers: certain, uncertain, and inconsistent. The inconsistent singers performed nearly identical to the certain singers on the perception task, indicating that there are factors inhibiting the ability to match pitch even if perceptual skills are present. If we are going to ask our students to sing in instrumental classes, we must not only consider the best methods of vocal instruction, we must also consider the factors affecting singing accuracy. In the middle school setting, one of the biggest impediments to pitch matching is the changing voice.

Voice change is a fact of life among middle school students, band members included. During this time boys experience significant physiological changes to their vocal mechanism (Killian, 1999), with the resultant voice being, on average, an octave lower than the unchanged voice and substantially more robust (Cooksey, 1992). The process of changing voice is a challenging one, including, limitations of range, breathiness of sound, incomplete phonation in sections of the range, inability to control pitches, lack of vocal stamina, and limited control of vocal loudness (Barresi & Bless, 1984; Cooksey, 1992; Cooper & Kuersteiner, 1970; McKenzie, 1956; Swanson, 1981, as
Adolescent females experience a subtle, but no less significant, voice change (May & Williams, 1989). Gackle (1991) lists the symptoms of female voice change as insecurity of pitch, development of noticeable register breaks, increased huskiness, decreased and inconsistent range capabilities, and voice cracking. In a 1991 Choral Journal article, she outlines three distinct stages of female voice change. The Cooksey and Gackle stages each provide choral directors with invaluable information for successfully working with adolescent singers facing the challenges of voice change. It would seem that instrumental directors who incorporate singing into the classroom would benefit no less from this information.

In band, something as small as a trumpet player forgetting to extend the third valve slide, a clarinet player not using the right hand when playing in the throat register, or a tuba player forgetting to use the fourth valve when possible, can have enormous impact on the overall intonation of an ensemble. Good intonation when singing calls for the same attention to detail. Something as small as the shape of the lips when singing vowels can significantly affect pitch (Daugherty & Brunkan 2013). Specific posture, breath support, tongue placement is required for success in choir equally as in band. Yet, these details, as well the challenges associated with voice change and the sequential instruction seemingly necessary for singing to affect instrumental intonation, seem to be lost in the statement “If you can sing it, you can play it”.

Based on the writings included in this review of literature, it appears that developing systematic, sequential vocal instruction based on the writings of choral
pedagogues such as Phillips, Cooksey, and Gackle, instrumental music education specialists such as Gordon and Schleuter, as well as established systems of music instruction such as Kodaly, may aid instrumental directors in successfully implementing vocal instruction into their classrooms. This type of vocal instruction designed specifically for instrumentalists could benefit all areas of global performance achievement, in particular intonation.

Therefore, the purpose of the present study was to examine middle school musicians’ ability to sing and play in tune following short-term vocal technique instruction.

The research questions were:
1. To what extent does singing in a group instrumental music setting affect intonation while playing an instrument?
2. To what extent does sung syllable type (/u/ versus /i/) affect performance of intonation while playing an instrument?
3. What are the perceptions of the teacher relative to her ability to effectively implement vocal instruction in the instrumental rehearsal?
4. What are the student participants’ perceptions of vocal technique instruction in the instrumental rehearsal?
Method

Exemption from institutional oversight was requested and approved. A copy of parent consent forms, child assent forms, as well as documentation of the middle school principal’s approval of this study can be found in Appendix G.

Participants

Student participants ($N = 17$) were middle school wind instrument players who had been in a local public school band program for at least one year. They were distributed across grade level as follows: 6th grade ($n = 3$), 7th grade ($n = 7$), and 8th grade ($n = 7$). They were distributed across instruments as follows: flute ($n = 3$), clarinet ($n = 4$), alto saxophone ($n = 3$), bass clarinet ($n = 1$), trumpet ($n = 5$), and trombone ($n = 1$). Eight of these students had one or more years of experience singing in a choir.

The music teacher participant (the student participants’ regular music teacher) is female with 5 years of teaching experience as a band director and one semester as a general music teacher. Her experience includes bachelor’s degrees in music education and clarinet performance and a master’s degree in music education. She participated in an SATB mixed choir in high school, took a semester of vocal technique training as part of her undergraduate degree, and sang in the SAI chapter choir for four years of college. She also taught a four and five year old choir for 3 years at a local church. Her instrumental ensembles have consistently earned superior ratings at district and state festivals, which is a measure of success within the music education community. In addition, she has received recognition for teaching excellence from the local, regional level professional symphony orchestra.
The middle school chosen for this study, at the time of the research, comprised a highly transient population with a student enrollment of approximately 720 students, 70% of whom were identified as traditional or low achieving and 30% as gifted. A majority of enrolled students qualified for free or reduced lunch. The student body was diverse, including a balanced mix of Caucasian, African-American, Asian, and Hispanic students. These demographics were reflected in the band program, which included both traditional and gifted students. The school had an active band, choir, and strings program. Out of the 720 students in the school, 120 were in the band, with 50 in the advanced ensemble used for this study.

All fifty members of the advanced band group participated in the vocal instruction. Eight percussionists were not included in the posttest because of their non-wind instrument status. Of the remaining 42 students, 41 returned consent forms. Eleven were members of the pilot test group. Their data were not analyzed, however, the transcriptions of their exit interviews are included in Appendix F-2.

Because room availability and school scheduling were prohibitive, I was able to involve 23 of 30 possible participants in the main study. Following administration of the posttest, the pitch data from six additional students were excluded. The notes of two instruments, the tuba and E-flat contra alto clarinet, were lower than the default frequencies set for analysis. This excluded two students. Two students lacked the basic skills on their instruments to perform the required instrumental tasks. Two students’ data were excluded because of technology problems.
Vocal Instruction

Participants rehearsed two to three times per week for 90 minutes in a heterogeneous setting, and in two separate classes. Prior to the study, vocalization was used sporadically to teach phrasing, articulation, and identification of melodic line. Vocalization was not part of the typical daily warm up or rehearsal. In order to prepare students for the singing that would constitute the independent variable of the present study, students received vocal instruction during band classes two to three times per week for a 6-week period. The instruction was designed to complement the instrumental warm-ups already in place. At the conclusion of the 6-week period a per-student posttest involving singing and playing an instrument was conducted, and both the students and teacher took part in an exit interview.

Vocal instruction was conducted by the music teacher participant in a typical rehearsal environment. In line with Gordon’s (1993) suggestion that learning sequence activities take place in the first few minutes of a rehearsal, the vocal instruction was conducted at the beginning of each band class. This instruction, developed by the researcher, involved several types of vocal exercises found in Teaching Kids to Sing (Phillips, 1994), Choral Pedagogy (Smith & Sataloff, 2010), The Solo Singer in the Choral Setting (Olson, 2010), and Finding Ophelia’s Voice, Opening Ophelia’s Heart (Gackle, 2011). It included breathing exercises to encourage efficient breath support; lip trill exercises designed to aid with the transition from speaking to singing voice and identification of head and chest voice; humming and singing of descending tonal patterns on the syllables ZOO (phonetic symbol /u/) and ZEE (phonetic symbol /i/) as well as solfège syllables to warm up the vocal mechanism and aid in pitch recognition; and voice
range stretching exercises involving singing arpeggios in a variety of keys. Appendix A shows the daily vocal instruction exercises and a timetable of the actual instruction.

The consonant ‘z’ was chosen to eliminate the possibility of a glottal attack, identified as unhealthy, particularly for the adolescent voice (Gackle, 2011). I chose ‘z’ because it is fricative (Howard & Murphy, 2008), closely resembling the size of the aperture and motion of the tongue when articulating a note on most wind instruments. The vowels /u/ and /i/ were chosen based on their pedagogical, articulatory, and acoustic functions (Howard & Murphy, 2008). The vowel /u/ is naturally resonating, often used with beginning singers, and calls for tongue placement that is high and farthest back (Titze, 2000). It is considered one of three corner vowels, requiring an extreme placement of the tongue (Titze, 2000). The vowel sound /i/, another corner vowel, calls for tongue placement opposite of /u/: highest and farthest forward. These opposite tongue placements result in opposing second formant frequencies, which may cause them to be perceived as slightly different pitches even when sung on the same note (Titze, 2000). Because the present study deals with intonation, the possibility that the pitch of vowel sounds may be perceived differently was important.

In order to document and verify actual procedures, vocal instruction sessions were video recorded using a Sony Handycam DCR-SX44 camera. The camera was placed consistently in the back left corner of the room, behind the percussion section, providing a clear picture of the entire ensemble and teacher participant. The investigator, a candidate for the master’s degree in music education with 7 years of full time, successful beginning and middle school band teaching experience, and a doctoral candidate in music education with 9 years of full time, successful middle school band teaching experience,
observed 30% of the videos together. Working in tandem, vocal instruction events were defined, timing criteria determined, and sequence of events developed per rehearsal. The remaining 70% of the videos were event-scripted independently based on the established guidelines. Event scripts were then exchanged, compared, and amended until agreement was met. This verification process yielded the “picture” of the vocal instruction experience shown in Table 1, with instructional periods being divided into five categories: Teacher verbalization, breathing activities, instrumental performance, vocal performance, and other. Teacher verbalization included all teacher instructions or feedback that were either over 10 seconds long or directed the students to a new activity. Breathing activities and instrumental, and vocal performance are self-explanatory. The ‘other’ label was used for classroom interruptions and chatter.

Table 1. Vocal Instruction Events (Percent of Total Time Spent in Warm-up)

<table>
<thead>
<tr>
<th>Event Type</th>
<th>Class A %</th>
<th>Class B %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher Verbalization</td>
<td>49.38</td>
<td>49.73</td>
</tr>
<tr>
<td>Breathing Exercises</td>
<td>12.19</td>
<td>13.65</td>
</tr>
<tr>
<td>Vocal Exercises</td>
<td>24.65</td>
<td>23.68</td>
</tr>
<tr>
<td>Instrumental Exercises</td>
<td>12.15</td>
<td>10.88</td>
</tr>
<tr>
<td>Other</td>
<td>1.63</td>
<td>2.06</td>
</tr>
</tbody>
</table>

Percentages of time spent in each behavior category are similar for both classes. Nearly half of vocal instruction time was spent in teacher verbalization, which is not surprising given that students were unaccustomed to singing, especially singing in a certain way, in band warm-ups. The next highest percentages were in the vocal exercises category, many of which were directly related to breathing exercises (the third highest percentage category). The teacher provided a vocal model, on average, 5.72 times each class period.
In all, 27 of 31 instructional periods were recorded. I watched every one repeatedly in order to develop event scripts, which were verified by a doctoral candidate with 9 years of experience as a band director. The four missing videos included one video with no sound, and three class periods where the battery was dead or the student helper forgot to engage the record button. Each video lasted between 5 and 40 minutes, with the amount of new material being introduced dictating the length of instruction. The total amount of recorded instructional video was 5 hours, 16 minutes, and 34 seconds. A complete set of vocal instruction event scripts can be found in Appendix C.

**Interview and Posttest**

At the conclusion of the 6-week instructional period, an exit interview and posttest were conducted with each student participant during regularly scheduled band classes. Three separate rooms were used based on availability and proximity to the band room. Interview questions were designed to gather information about previous vocal and instrumental experience, participant attitudes about and perceptions of singing as concert band members, and overall reaction to the training experience. A list of interview questions for the student participant interviews is included in Appendix F-1.

The posttest involved two elements. The first was a voice change/stage assessment. The goal of collecting these data was to determine voice range using the Cooksey stages (Killian, 1999) in an effort to examine the nature of voice change among males and females in a middle school band setting, and whether it may relate to the performance of intonation while playing their instruments. The second element involved participants’ listening and responding, by playing and singing, to an aural stimulus.
Development of Aural Stimulus

A three–note, stepwise sequence served as the aural stimulus for this portion of the posttest. A three-note sequence was used as a preferred option to one or more isolated notes, which are removed from any sense of authentic music making. To acknowledge the fact that authentic music-making both ascends and descends, participants responded to both an ascending and descending set of the same three-note sequence.

Wind instruments, by nature of the harmonic series and physical construction, tend to play a number of notes out of tune unless the player makes physical adjustments, either to the instrument or with their own bodies. This ability to adjust is acquired through years of experience and instruction. As a result, these problematic notes are often played out of tune by inexperienced musicians and contribute to intonation problems of young ensembles. It seemed prudent to include these notes in a study of middle school band students’ intonation; therefore, each three-note sequence included a typically out-of-tune note as its second note. This allowed participants to begin the sequence on a stable note for their instrument. The typically out-of-tune notes were selected based on the researcher’s experience as a middle school band director, discussions with the teacher participant, and information given in Tuning the Band (Jurrens, 1991).

An aural stimulus and related spoken instructions were recorded in sequence to ensure consistency of experience across participants. Previous research has indicated the importance of an appropriate model in eliciting good pitch-matching (Yarbrough, Green, Benson, & Bowers, 1991, p. 23). The choice of model in the band setting is a challenging one, given the number of different octaves and timbres present in the instruments of the band. Because Ely (1992) and Cassidy (1989) found that timbre made no difference in
intonation responses of instrumentalists, the choice was made to use a digital piano to provide an in-tune and consistent stimulus for all participants.

The piano used for both the sequences and the voice range and change assessment was part of the PreSonus Studio One 2.5 Professional audio workstation software. The “Electric Grand” Virtual Instrument sound provided the model. Very little decay was employed, allowing for strong reference notes. Participants wore HD7 headphones, allowing them to hear instructions and reference pitches without being distracted by outside noise. This also allowed the use of a metronome to encourage tempo and note length consistency without interfering with the recording.

The aural stimulus was strategically placed in an octave above all sung or played pitches so that when participants sang in their comfortable octave, no one would have the advantage of responding (with voice or instrument) to a unison stimulus. There is evidence in tuning research (e.g., Byo, Schlegel, & Clark, 2011) that stimulus octave affects responses. To whatever degree tuning to a non-unison is disadvantageous, every participant in the present study was equally disadvantaged by listening to an octave-above model, one in which no one sang or played.

Demorest & Clements (2007) asserted that reference pitches are best placed in an octave dictated by voice stage and range. While this was not possible using the recorded stimulus of the present study, participants were instructed to sing in a comfortable octave and were given the opportunity to find that octave by singing in it prior to testing. The starting note of each sung sequence was played twice before the entire sequence, with the participants given the instructions “Make yourself sound as much like the piano as you can. If you can’t sing that high, sing the notes where you are most comfortable. You may
hum or sing along to find the starting note in an octave that is best for you.” It should be noted here that during the 6-week instructional period the teacher participant worked with boys with changing voices on matching pitch at the octave.

The aural stimulus was recorded in half notes at 60 BPM, and a metronome was used to promote tempo consistency. This tempo was chosen to ensure that each played or sung note was of sufficient duration to be analyzed for frequency and cent deviation. This tempo also ensured that even participants with poor breath support could sustain the notes as required. Participants were also asked to slur from note to note when they played their instrument. It was hoped that slurring would serve to minimize dips in pitch at note changes as well as increase the likelihood that notes would be held their full value.

**Procedures**

Pilot testing was informative concerning procedures. It prompted several changes to the procedures proposed in the prospectus. Explanations of these changes are integrated into the presentation of procedures below.

During the posttest, administered individually, an exit interview was conducted first to establish a rapport with the participant. I then asked the participant to join me in performing lip trills for 10-20 seconds to warm up the voice. As an assessment for voice range and stage of voice change, the participant attempted to match pitch with ascending and descending sequences, beginning on D4, a note identified by Gordon (1993) as a comfortable starting pitch for most inexperienced singers.

To warm up the instrument, the participant played through a set of slurs found in the band book. The selected slurs were part of both the typical instrumental warm up and
the vocal treatment. I then provided a sheet of music containing two staves. The first staff included the ascending pitch sequence, and the second staff included the descending pitch sequences.

To ensure the playing of correct notes, participants were asked to name and finger each of the three notes prior to playing. In the pilot test, several participants played incorrect notes even after an opportunity for silent practice. For the present study, participants played each sequence one time on their instrument after naming and fingering but before the recording process began. I corrected incorrect notes at this time.

It was important to ensure the participant began with an in-tune instrument. To accomplish this, he or she played and held a tuning note until a handheld tuner set to frequency A=440 indicated overall sharpness or flatness. The participant made physical adjustments on the instruments until the tuning note registered as in-tune. The selected tuning notes were pre-determined pitches described by pedagogues to be the best tuning notes for each instrument (Jurrens, 1991). They were also the same tuning notes used regularly in class. A complete list of tuning notes can be found in Appendix E.

To test the effects of singing on participants’ ability to play in tune, participants listened to and performed the ascending and descending pitch sequences, each under three performance conditions. As shown in Table 2, participants (1) listened to the sequence, then played the sequence; (2) they listened, sang the sequence on the syllable /Zu/ or /Zi/, then played, and (3) listened, sang on the syllable /Zi/ or /Zu/ (whichever was not sung previously), and played a final time.
Table 2. Order of Aural Stimulus and Response

<table>
<thead>
<tr>
<th>Performance</th>
<th>Condition 1</th>
<th>Listen</th>
<th>Play</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance</td>
<td>Condition 2</td>
<td>Listen</td>
<td>Sing A</td>
</tr>
<tr>
<td>Performance</td>
<td>Condition 3</td>
<td>Listen</td>
<td>Sing B</td>
</tr>
</tbody>
</table>

Note: Participants followed this sequence of tasks twice, once for ascending pitches and once for descending pitches.

Because comparisons were made between playing after hearing an in-tune stimulus and playing following participant vocalization on two separate syllables, participants always began with Condition 1. To control for order effect, the syllable aspect of performance condition (ZI, ZU) and pitch direction (ascend/descend) were counterbalanced by alternating orders.

In pilot testing, many participants struggled to find the correct starting pitch the first time they sang, but were more comfortable the second time. Several commented that they felt “caught off guard” by being asked to sing the first note after hearing the whole sequence. Several asked to hear the first note again. To alleviate this problem in the main study, the recorded instructions were stopped before the second performance condition began (listen-sing-play). I played the first note of the sequence two times, asking the participants to hum along. This proved to be helpful.

**Data Collection and Analysis**

The audio recording process utilized PreSonus Studio One 2.5 Professional digital audio workstation software, AudioBox USB interface, M7 microphone, and HD7 headphones. Instructions to students and pitch sequences were prerecord, ensuring consistency for each student test. The audio from each student was recorded on an
individual track as a .wav file (44,100HZ, 24-bit mono), and coded based on instrument, test number, singing pitch order (Zi or Zu first), and pitch sequence (ascending or descending).

Files were exported to Audacity, and the middle one second of each performed pitch was analyzed to eliminate pitch fluctuations found at the attack and decay. Following procedures reported by Byo, Schlegel, and Clark (2011), Audacity and Praat software were used to assess mean frequency and pitch accuracy of every sung and played note. Mean frequency was then plugged into a frequency to cent deviation calculator found at www.petersontuners.com.

The PreSonus Studio One 2.5 Professional audio workstation software, proved to have significant advantages in this type of study. The prerecorded, instrument-specific, in-tune stimulus and vocal instructions were set up on separate, but labeled, tracks, making it easy to quickly select the necessary set of instructions and reference pitches as each participant entered the room. The headphones helped to eliminate outside noise and made it possible for a metronome, already included in the program and set to run in time with the recordings, to be used. The AudioBox USB interface, and M7 microphone provided sophisticated recordings that were viable even with a large amount of background noise.

The on screen picture of the microphone ‘read’ allowed me to know immediately if a particular player/singer was singing too softly/loudly and guided me in the necessary adjustments to ensure a quality, usable recording. The spectrograph of recorded waves was immediately visible. This not only provided visual confirmation that a recording was being ‘taken’, it also proved to be an object of interest for the participants, leading into to
discussions about how the picture on the screen related to the sounds they were creating. None of these things would be possible with a simple recorder and digital synthesizer set up.

Minus a few isolated instances of my computer ‘freezing’ up, it was easy to stop and start recordings when outside interruptions proved to be too loud to record, as well as to stop and provide reference pitches before performance condition 2. Even with the stopping and starting of recordings, all files of performance conditions 1, 2, and 3 were saved to the same tract, allowing for easy export to Audacity as long sound files.

**Interviews**

The posttest consisted of interview and performance phases. The interview functioned to establish rapport, gather demographic information about each participant, and gain insight into participants’ perception of the vocal experience. Thirty-four participants were interviewed. This number included 17 participants who took part in all aspects the present study, 11 pilot testing participants, and 6 participants whose data was not usable in statistical analysis. The interviews were semi-structured in that I used interview questions (see Appendix F-1) as starting points but, in an attempt to collect rich information, prompted participants to develop their answers. Interview verbalizations were transcribed (see Appendix F-2) and analyzed through an open and closed coding process (Creswell, 2007). For each question, I read and re-read participants’ answers while being alert to the possibility of commonalities among responses.

The teacher participant took part in an interview as well. Because of conflicting schedules, this interview took part in two phases. The first was a questionnaire conducted via e-mail. A follow up interview was conducted over the telephone, serving as a member
check. This interview was purely informational and used as a means of triangulation to establish trustworthiness (Creswell, 2007). Questions were designed to attain the teacher’s perspective of the student’s reaction to the vocal instruction, from beginning to end; to find out if the design of the vocal instruction was user-friendly, practical, and/or beneficial to program, and to understand the biggest challenges she found in implementing the program. Both the written responses and a transcription of the phone interview can be found in Appendix F-3.

Finally, data were collected in the form of field notes. In the process of repeatedly watching 27 videos for event-scripting, making on-site rehearsal visits, and conversing with the teacher participant, I recorded my observations.
Results

The purpose of this study was to examine middle school band students’ ability to sing and play their instruments in tune following short-term vocal technique instruction. In a posttest only design, individual participants listened to three-note stepwise sequences and performed the sequences in three ways—sung on the syllable /Zu/, sung on /Zi/, and played on the instrument. Each sequence contained a note known to be typically out of tune for the specific wind instrument being played. Performances were recorded and analyzed for cent deviation from equal tempered tuning (reference A = 440).

The original intention was to analyze both singing and playing; however, because 88% of participants sang incorrect notes, sung pitches were not included in the pitch accuracy analysis. Additionally, vocal range of the majority of students was not assessable because of the overall lack of ability of participants to match pitch. Most students were able to vocally reproduce D4 (or D3, depending on voice stage), and reproduce the contour of ascending and descending pitches played on the virtual piano, but only a handful were able to actually match pitch to these ascending and descending lines. Two participants repeatedly sang the same note regardless of ascending or descending condition in the vocal range assessment. As a result, no analysis was conducted that included vocal range or voice change assessment.

Instrumental performance of three-pitch, stepwise sequences occurred in three contexts: 1) pitches that were selected strategically according to instrument, 2) pitches that both ascended and descended, and 3) sing-play combinations that yielded three performance conditions—a) listen/play, b) listen/sing A/play, and c) listen/sing B/play
with A representing the syllable Zu (or Zi) and B representing the syllable not sung for A.

For future reference, L-P, L-SA-P, and L-SB-P will represent a, b, and c (above) respectively.

A Three-Way ANOVA with repeated measures (2 pitch directions x 3 performance conditions x 3 pitches) was calculated. The results are presented in Table 3.

Table 3
Three-Way ANOVA with Repeated Measures for Pitch Direction, Performance Condition, and Pitches

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F Value</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pitch Direction</td>
<td>1</td>
<td>302.01</td>
<td>302.013</td>
<td>2.79</td>
<td>0.11</td>
</tr>
<tr>
<td>Error</td>
<td>16</td>
<td>1727.52</td>
<td>107.97</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performance Condition</td>
<td>2</td>
<td>4832.64</td>
<td>2416.32</td>
<td>12.95</td>
<td>&lt; .00</td>
</tr>
<tr>
<td>Error</td>
<td>32</td>
<td>5969.04</td>
<td>186.53</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pitch</td>
<td>2</td>
<td>240.06</td>
<td>120.03</td>
<td>0.89</td>
<td>0.41</td>
</tr>
<tr>
<td>Error</td>
<td>32</td>
<td>4299.87</td>
<td>134.37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pitch Direction x Performance Condition</td>
<td>2</td>
<td>480.24</td>
<td>240.12</td>
<td>2.2</td>
<td>0.12</td>
</tr>
<tr>
<td>Error</td>
<td>32</td>
<td>3479.14</td>
<td>108.72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pitch Direction x Pitch</td>
<td>2</td>
<td>394.43</td>
<td>197.219</td>
<td>2.20</td>
<td>0.12</td>
</tr>
<tr>
<td>Error</td>
<td>32</td>
<td>2834.44</td>
<td>88.57</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performance Condition x Pitch</td>
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<td>352.32</td>
<td>88.08</td>
<td>1.14</td>
<td>0.34</td>
</tr>
<tr>
<td>Error</td>
<td>64</td>
<td>4945.61</td>
<td>77.27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pitch Direction x Performance Condition x Pitch</td>
<td>4</td>
<td>1259.40</td>
<td>314.85</td>
<td>4.12</td>
<td>&lt; .00</td>
</tr>
<tr>
<td>Error</td>
<td>64</td>
<td>4886.94</td>
<td>76.35</td>
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</tbody>
</table>
No significant difference due to the main effect of pitch direction was found \( F(1, 16) = 2.79, p = .11 \). Participants played similarly out of tune whether ascending \((M = 13.17, SD = 11.44)\) or descending \((M = 15.16, SD = 12.54)\). A significant difference due to the main effect of performance condition was found \( F(2, 32) = 12.95, p < .00 \). The test for Least Significant Differences was used for post hoc comparisons. Participants played significantly more out of tune \( (p < .05) \) during the second performance condition \( (L-SA-P, M = 19.76, SD = 15.24) \), which called for playing after singing the first time, than either playing after listening \( (L-P, M = 11.79, SD = 15.24) \) or playing after singing the second time \( (L-SB-P, M = 10.94, SD = 8.57) \). There was no significant difference between L-P and L-SB P \( (p > .05) \) No significant differences due to the main effect of pitch were found \( F(2,32) = .89, p = .419 \). Even though one pitch of the three-tone sequence was known to be typically out of tune on each instrument, pitch 1 \( (M = 13.82, SD = 12.27) \), pitch 2 \( (M = 15.38, SD = 11.16) \), and pitch 3 \( (M = 13.30, SD = 13.30) \) were performed with similar intonation.

No two-way interactions were significant \( (p > .05) \). A significant 3-way interaction was found \( F(4, 64) = 4.12, p < .00 \) among pitch direction, performance condition, and pitch, and is represented in Figure 1. In both ascending and descending directions, the second playing condition, which was also the first playing condition where participants sang before they played, was the least in tune of the three performances. This is most noticeable when the melodic line was descending. The first playing condition (preceded by listening) and the third playing condition (preceded by singing for the second time) resulted in more accurate intonation. It is interesting that the second pitch, the one that was targeted as a pitch typically out of tune on each instrument, was not
consistently played more out of tune than the other two pitches. In fact, it was only more noticeably out of tune in the third playing condition (L SB P) when the melodic line ascended and in the second playing condition (L SA P) when the melodic line descended. Overall, intonation seemed best and most stable on the first performance condition—the one that was not preceded by singing.

Figure 1. Interaction Among Pitch Direction, Performance Condition, and Pitch
The tendency overall was to play sharp. Out of 306 total notes played, 134 were sharp (44%), 86 were flat (28%), and 86 (28%) were in tune. Cent deviations of +/- 5 of 0 were labeled as in tune (Byo, Schlegel, & Clark, 2011). Table 4 includes a listing of overall sharp, flat, and in-tune responses for each pitch, under each performance condition, and for both ascending and descending responses.

Table 4. Number and Percentage of Sharp, Flat, and In-tune Responses

<table>
<thead>
<tr>
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<th>Pitch 1</th>
<th>Pitch 2</th>
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<tr>
<td><strong>Condition 1 LP</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ascending</td>
<td>S 4 7 8</td>
<td>F 6 4 10</td>
<td>I 4 5 8</td>
</tr>
<tr>
<td>Descending</td>
<td>S 5 11 8</td>
<td>F 4 2 5</td>
<td>I 4 4 10</td>
</tr>
<tr>
<td><strong>Performance Condition 1 LP</strong></td>
<td>S</td>
<td>F</td>
<td>I</td>
</tr>
<tr>
<td>Total Ascending</td>
<td>25 (49.02%)</td>
<td>12 (23.53%)</td>
<td>14 (27.45%)</td>
</tr>
<tr>
<td>Total Descending</td>
<td>23 (45.01%)</td>
<td>16 (31.37%)</td>
<td>12 (23.53%)</td>
</tr>
<tr>
<td>Grand Totals</td>
<td>48 (47.06%)</td>
<td>28 (27.45%)</td>
<td>26 (25.49%)</td>
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<th>Pitch 1</th>
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<tbody>
<tr>
<td><strong>Condition 2 LSAP</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ascending</td>
<td>S 4 8 4</td>
<td>F 10 3 11</td>
<td>I 3 6 5</td>
</tr>
<tr>
<td>Descending</td>
<td>S 10 5 6</td>
<td>F 4 3 5</td>
<td>I 4 6 4</td>
</tr>
<tr>
<td><strong>Performance Condition 2 LSAP</strong></td>
<td>S</td>
<td>F</td>
<td>I</td>
</tr>
<tr>
<td>Total Ascending</td>
<td>21 (41.18%)</td>
<td>16 (31.37%)</td>
<td>14 (27.45%)</td>
</tr>
<tr>
<td>Total Descending</td>
<td>25 (49.02%)</td>
<td>13 (25.49%)</td>
<td>13 (25.49%)</td>
</tr>
<tr>
<td>Grand Totals</td>
<td>46 (45.10%)</td>
<td>29 (28.43%)</td>
<td>27 (26.47%)</td>
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<table>
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<th>Pitch 1</th>
<th>Pitch 2</th>
<th>Pitch 3</th>
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</thead>
<tbody>
<tr>
<td><strong>Condition 3 LSBP</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ascending</td>
<td>S 5 5 7</td>
<td>F 13 2 2</td>
<td>I 4 6 7</td>
</tr>
<tr>
<td>Descending</td>
<td>S 5 4 8</td>
<td>F 9 4 4</td>
<td>I 4 8 5</td>
</tr>
<tr>
<td><strong>Performance Condition 3 LSBP</strong></td>
<td>S</td>
<td>F</td>
<td>I</td>
</tr>
<tr>
<td>Total Ascending</td>
<td>22 (43.14%)</td>
<td>13 (25.49%)</td>
<td>16 (31.37%)</td>
</tr>
<tr>
<td>Total Descending</td>
<td>18 (35.29%)</td>
<td>16 (31.37%)</td>
<td>17 (33.33%)</td>
</tr>
<tr>
<td>Grand Totals</td>
<td>40 (39.22%)</td>
<td>29 (28.43%)</td>
<td>33 (32.35%)</td>
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Interview and Field Note Findings

While the statistics do not reveal positive outcomes, they also do not provide a complete picture of the impact of the vocal instruction. In a posttest-only design, one is able to assess accuracy, but not growth over time. In the present study, however,
interviews and field observations provided interesting qualitative information about the influence of the vocal program on participants. By transcribing all 34 student participant interviews and using open and closed coding (Creswell, 2007), I was able to identify a number of emergent themes. Trustworthiness was established by comparing student responses to both the information gathered in the teacher interview and to my field notes. This process of triangulation revealed a more positive outcome than what was found in statistical analysis of the posttest.

Several overarching themes were found: (a) Participants demonstrated an initial negative reaction to vocal instruction. (b) Once the participants accepted the program as routine, their attitudes, confidence, and singing accuracy improved. (c) Over time, the students demonstrated an improved awareness of pitch. (d) The group appeared to successfully transfer the skills acquired in the vocal warm ups to instrumental music performance, developing their overall musicality, particularly in regards to intonation and phrasing. In what follows, these large themes serve as subheadings. Within each section, sub-themes are presented and discussed.

**Initial Negative Reaction to Instruction**

Vocal instruction began on February 19. Because of my university schedule I was unable to be present on this day. I called the teacher participant that evening to inquire about the students’ reaction to the vocal exercises and to find out if she was successful in implementing the first few elements. She informed me that she was able to get through the majority of the material but expressed concern over the students’ general response, stating that they were quite silly and reluctant to participate. We agreed that this was the
expected initial outcome given that a majority of these students had no prior vocal experience. We agreed to touch base following the next instructional period.

The teacher participant and I spoke again after the second day of implementation, and according to the teacher, it was no better. While more of the students willingly participated, the energy in the room was frenzied. She felt that the students did not seem interested in welcoming the vocal exercises as a legitimate and worthwhile element of their daily instruction, and mentioned that several students complained after class that they did not join choir because they could not sing and they did not want to sing in band class. She commented that she felt a majority of these students were nervous about singing. We agreed to push forward, hoping that with experience the students would become more comfortable with singing and would embrace the vocal instruction.

In the videos of the first week of instruction, students expressed what appeared to be their discontent regarding singing with poor posture, lots of chatter, pointing and laughing at one another, or simply refusing to participate. Several students could be heard asking on the second day of instruction “Why do we have to do this?” One student said “This is dumb.” And another “I can’t sing. I don’t want to sing. I can’t even do the lip trills.” Additionally, the students were not able to match pitch very well, particularly in the percussion section.

These observations revealed a sub-theme: Preference for singing was dependent on perception of ability to sing. This sub-theme was also present in the student participant interviews. When asked “Do you like to sing? At home? In the car, etc?” a clarinet player responded with “No. Whenever I sing I feel like I’m, like, really out of tune and it doesn’t sound good.” Another replied, “No. I don’t really like singing . . . because I don’t know
how.” On the other hand, a student with 5 years of choral experience expressed her love of singing, which she found “fun,” both in the choir and in band. When asked to think about the first day that her teacher asked the students to sing, this particular student described the day as “chaotic.” She went on to say “Well, not a lot of people in the band like to sing, so many of them were silly with it and many of them just didn’t like to.” It appears students who felt comfortable with singing had a more positive initial reaction to the vocal instruction than those who had no prior positive experience with singing.

This negative reaction to the vocal program was nearly unanimous. Other popular words used to describe the first day of vocal instruction were “nervous,” “embarrassing,” “bad,” and the most popular, “awkward.” A saxophone player commented “I was nervous because I thought we would have to sing individually and I thought that somebody was going to make fun of me, maybe, if I messed up!” Another answered “I was a bit nervous . . . I just don’t think I can sing that well.” A female student described the experience as “embarrassing, because we were out of tune and were singing different pitches.” A male described the experience as “shocking” because “My voice kept cracking and it just sounded horrible for me.” In comparing these interview responses to the teacher and my observations, two sub-themes emerged: (a) Personal singing was viewed apprehensively, with participants voicing negative sentiments about the process of singing in band and (b) a dislike for the aural product.

An additional, and surprising, sub-theme emerged in watching those first few videos and comparing them to the student responses to the first few interview questions: Students displayed a lack of recognition of the relationship between band and choir. They expressed this sentiment directly to the teacher, were recorded making statements about
band and choir in class, and even answered the question regarding singing in band on the first day with comments about it being “strange.” One student mentioned “I was thinking it was kind of weird because we were in band class, not in choir. Why would we be singing in band?” Several students also reported that they did not join choir because they couldn’t sing well and didn’t appreciate or see the value of being asked to sing in band class.

It appears that many students did not possess confidence in their singing ability prior to the instruction. As a result, many chose not to sing in their personal lives and not to join choir. They, in turn, were less than cooperative when asked to sing in band class. This lack of both confidence in their personal ability to sing, as well as a cooperative effort in attempting to do so, may have caused them to perceive their singing as poor. This perception only furthered their dislike of singing. Because the majority of these students had little to no school vocal experience prior to this instructional period, many of them were surprised that it would be included in the instrumental setting, not understanding the relationship between the choral and band world. Subsequently, it appears that some became nervous about the possibility of failing at the task, especially when they did not understand why they were being asked to perform it.

These four sub-themes—(a) preference for singing was dependent on perception of ability to sing; (b) students displayed a lack of recognition of the relationship between band and choir; (c) students were nervous about the process of singing in band; and (d) students disliked the aural product—considered together make it easy to understand the initial negative reaction to the vocal instruction. Interestingly, however, over the course of the instruction, this negative, dissociated sentiment toward singing appeared to change.
Improved Attitudes, Confidence, and Singing Accuracy

By the third week, the students began to demonstrate behavior that appeared to indicate they were more comfortable with the vocal instruction. In the videos, I could see that posture improved; side chatter decreased; and both the teacher participant and I felt the students’ singing accuracy improved. (The doctoral candidate who helped to verify the teaching events in the videos also made this observation.) The camera was placed nearest to the percussion section. Early on these students were not able to match pitch and consistently laughed at each other when someone sang inaccurately. By the third week, these students could be heard and seen giving each other tips about how to better match pitch. Additionally, a few students, percussionists and some in other sections, who were initially unwilling to sing individually when asked, gained the confidence to do so. The teacher participant can be heard complimenting their effort, growth in confidence, and improvement in pitch.

The teacher participant believed that a majority of the students accepted the instruction over time, which led to a better product. She remarked: “I saw tremendous changes in their attitudes. By the end, there were very few who were still refusing to take it seriously, though these were the same students who did not take very much in band seriously. Most began to treat singing as a regular part of their routine. I felt that the classes sang much better at the end of the semester than in the beginning – their confidence was up and their confident singing led to more confident playing.”

In the fourth and fifth week of instruction, an even greater shift in the students’ demeanor could be seen on video. Continued improvement in singing accuracy was audible. Side chatter was nearly eliminated. And the students reacted with excitement and
positive energy when the teacher introduced solfege syllables! This acceptance and enthusiasm about vocal instruction was in stark contrast to the students’ initial negative and hesitant reaction.

Emerging themes during these weeks of instruction were (a) Participants began to accept the vocal program as part of the daily routine. (b) Participants’ attitudes toward the instruction improved, resulting in a better effort. (c) This better effort improved singing and pitch accuracy. (d) Improved singing and pitch accuracy triggered growth in participants’ confidence. These deeply intertwined themes were acknowledged by the teacher participant, the researcher, and the doctoral candidate who verified the teaching events.

The students were aware of these changes, as well. When asked to describe singing in band class following six weeks of instruction, popular responses were “improved,” “part of the routine,” and “fun.” One student elaborated, “Well, a lot of people . . . have matured and a lot of people have improved . . . and their confidence level has raised.” Another commented, “Everybody’s voice has, like, developed. And, like, we sing a whole lot better as a group.” Interestingly, even those who felt they had not progressed individually, mentioned that the group had improved. One student commented “I think the same of my voice. I don’t really like it and I don’t really like singing . . . But as it went on we [the band] got more confident and we learned how to sing better.”

The themes identified so far seem to indicate that with daily vocal instruction, the student participants were much more positive about the act of singing and their perspective shifted from concern about personal performance to recognition of the band’s progress. This new-found confidence proved to be hugely important, appearing to enable
the participants to perform better as a group. Better performance appeared to help develop better attitudes about singing, eventually leading to acceptance of the vocal instruction. This acceptance then created a more suitable environment for instruction, allowing for more positive outcomes, both in singing and in instrumental performance.

**Improved Awareness of Pitch**

One of the most positive outcomes noted by students, the teacher participant, and myself was a greater awareness of pitch, manifesting itself in student-led tuning and student commentary on the band’s intonation during class and in performances. When asked if she noticed differences in how she listened when singing or playing her instrument, one student commented that prior to instruction she knew how to play different pitches on her instrument, but never understood how to “make my voice at different pitches . . . I understand now that there is, like, one pitch that’s right, but that you can be sharper or flatter and you can get closer to it.” When asked if she was better at hearing if whether she was sharp or flat she said “Yes, well much better than I was before!” Several students noted that they now tuned on their own and with each other regularly, something they did not do before. A particularly salient response in regards to how singing in band affected listening was given by an 8th grade flute player: “Well, I could sorta, like, have a feel of whether someone was flat or sharp but only if it was, like, outlandishly sharp or flat. But now I can tell if it is just a little.” Another flute player commented that he could actually “feel” when someone was out of tune now because he listens so intensely. Several students commented that because they could hear sharp and flat better, many members of the band now tuned on their own instead of waiting for their teacher to correct pitch problems.
Several sub-themes became clear in reading these student responses: (a) Participants strongly believed the vocal instruction helped them develop a better awareness of pitch. (b) This better awareness of pitch inspired the students to begin tuning themselves. These sub-themes could have been present simply because the students wanted to provide what they perceived to be the right answers in an effort to “please” the adults involved in the process, but the teacher and I both observed behaviors indicating that the students were becoming increasingly more aware of pitch over the 6 week period. In regards to tuning, the teacher noted that “They [students] were much more independent and active in tuning themselves, which led to better rehearsals and better performances.” She attributed this to both the awareness of pitch brought on by the vocal activities, and the sheer number of times pitch was mentioned in class as a result of the instruction. She also mentioned that the students became more vocal about what they were hearing, commenting when they recognized poor intonation. This was something that did not happen prior to the vocal instruction.

In the videos, I could also see an increase in the number of students who made adjustments on their own after playing through the slur exercises. I noted that particularly in the trumpet and flute sections, students were beginning to direct each other to play notes in unison during ‘down time’ in order to determine the best adjustment solutions as a section. Instrumental pitch accuracy also improved immensely over the course of instruction, something noted by both the teacher participant and me. Judges at the district and state festival performances, both of which took place during the final weeks of the instructional period, consistently complimented the group on their intonation and musical
phrasing. According to the teacher participant, these were comments not consistently received in previous festival experiences.

**Developing Musicality**

I included several articles in the review of literature that indicated vocalization in the instrumental classroom could have a positive influence on aspects of global performance achievement beyond intonation. In this study, the increase in confidence while singing appeared to lead to the development of necessary global performance achievement skills, including awareness of pitch and student-led tuning. The increase in awareness of pitch found in this study supports Elliott’s (1974) findings, indicating that vocalization may improve the sense of pitch of beginning band students. Additionally, there appeared to be a correlation between the vocal warm up activities and better performance of phrasing by the students, supporting Lee’s (1996) findings that vocalization in the band setting can positively influence phrasing.

Adjudicators at the previously mentioned festivals commented positively about the group’s ability to play complete phrases. In the follow up interview, the teacher participant said “One of my more positive, consistent comments [from judges at festival] was about musicality and good phrasing. Breathing exercises played a huge role in that.” Statements made in the student interviews supported the belief that breathing exercises were beneficial to the overall musicianship of the group. A number of participants commented that the breathing exercises helped them to focus and control their air, allowing them to play longer, sing clearer, and both play and sing higher. One student said “I am much more breath-oriented . . . more conscious about the breaths that I take.” One participant felt he was able to transfer his newfound breath control from these
exercises to band music, stating the band was now able to play full phrases without having to “stop and breathe every measure.”

In comparing the judges’ comments regarding musicality to student and teacher participants’ interview responses and my onsite observations, one theme emerged: The group appeared to successfully transfer the skills acquired in the vocal warm ups to instrumental music performance, developing their overall musicality, particularly in regards to intonation and phrasing. Once the students gained confidence and accepted the instruction, their awareness of pitch and breath grew, and, as a result, their intonation and musicality when playing their instruments as a group seemed to improve. Statistical analysis did not reflect this finding, indicating that more time may be needed for these skills to transfer to an individual setting, or that the posttest procedures need to be reconsidered for future studies.

**Teacher’s Perspective on Implementation of Instruction**

A goal of this study was to design and implement a practical and pedagogically sound vocal instruction program designed specifically for middle school band students. When asked about the design of the vocal program and its relative ease of implementation, the teacher participant replied “I found the training well thought out and easy to follow” and commented that she planned to use it from “day one” next year and with all age groups, not just the advanced group. “I now feel that a light has been turned on and the ‘how to’ and motivation for singing is clearer to me.” Robinson (1996) cited lack of personal and pedagogical vocal training as an impediment to instrumental teachers incorporating vocal instruction into their programs. It appears the design of this vocal instruction, and the explanations provided to the teacher for the reasoning behind
choosing specific vocal exercises, enabled the instructional program to be successfully implemented.

When asked about challenges associated with incorporating the vocal instruction into her rehearsals, the teacher participant cited the changing voice as the biggest challenge. “I tried to keep those kids matching pitch in some sort of octave situation or if, you know, they could match pitch in the octave everyone else was singing but that was gonna be impossible for about a handful. That was tricky there. I didn’t always know what to tell them.” In the interview process several boys also alluded to struggling with “cracking” voices. During the posttest several boys expressed concern about how small their range was, and that their voices “went out” when attempting to sing in the upper register. Additionally, in the videos it was easy to hear a number of the boys struggling to match pitch in the upper octave. Over the course of the instruction, however, the number of incorrect pitches as a result of the changing voice seemed to decline.
Discussion

The purpose of this study was to examine middle school band students’ ability to sing and play in tune following short-term vocal instruction. While both the student and teacher participants felt there was growth in their awareness and performance of intonation vocally and instrumentally, statistical analysis showed otherwise. Singing accuracy was so poor it could not be analyzed, and a general lack of the ability to match pitch prevented assessment of voice change and voice stage.

Intonation seemed best and most stable on the first performance condition, the one that did not include singing. The second performance condition (L-SA-P) yielded a significantly more out of tune response than the first or third performance condition. This is a striking result given the widely accepted belief that singing in the instrumental classroom results in improvement in the performance of intonation. In this study, singing appeared to have the opposite effect. Performance condition 1(L-P) and performance condition 3 (L-SB-P) had similar results. A possible explanation for this would be that performance condition 1 was the most familiar for the participants and performance condition 3 benefitted from the participants’ having already sung once and experienced the stimulus twice prior. The overall tendency to play sharp was in line with previous research indicating a “preference for sharpness” (Geringer, 1978; Geringer & Witt, 1985, Morrison, 2000).

No significant differences were found between the ascending versus descending sequences. The target pitch proved to be only slightly more out of tune than the others, but intonation was poor throughout. And because the singing accuracy was so poor, there was no way to determine whether a particular vowel sound (/zu/ vs. /zi/) influenced
intonation. Further testing in regards to the influence of perceived pitch of sung vowels on instrumental intonation is needed.

While no one sang well, those with one or more years of choir experience performed slightly better than those with none. Choir members sang wrong pitches on 34% of all notes, while those without vocal experience sang inaccurate pitches on 56% of all notes. There was only a difference .19 difference in average cent deviation between the two groups when playing. Coveyduck (1998) suggested that previous vocal experience may have a positive effect on instrumental performance. The results of the present study do not support that finding.

There are several explanations for the poor pitch accuracy when singing, the first being related to the octave placement of the aural stimulus. The stimulus was placed an octave above the respective instrument’s sounding pitch. Perhaps if it were placed in a better octave for tuning, such as Bb4 (Byo et al., 2011), or in an octave based solely on the individual participant’s voice stage and range (Demorest & Clements 2007), participants would have been more successful with singing. Given that the notes included in the three-note sequence were strategically selected based on their “performability” by middle school instrumentalists and to include both stable and target pitches, the number of available notes from which to choose was limited.

Additionally, while the pre-recorded stimulus compromised ideal octave placement, it did ensure consistency for all participants. It also replicated the less-than-ideal octave variables found in an authentic band setting. Within the band, students who play the tuba and other low reed instruments may be asked to play in one octave, sing in another, and match to a vocal model in yet another. The same could be said of students
who play soprano instruments and are male with a changed voice or have a male instructor. Octave placement of stimulus remains problematic both for future studies of this nature and for band directors as they choose the most effective way to implement singing in their complex environment. Further testing is required in this area and perhaps future studies of this kind should include fewer instruments in an effort to isolate the best aural stimulus and octave placement for each.

Second, a strength of the present study was that it occurred in an authentic school setting, providing a true picture of all the challenges associated with genuine middle school music rehearsals, but the strength of the study may have also compromised the students’ ability to perform well. Three separate rooms were used for testing, each presenting their unique challenges regarding recording conditions. Experiences in all three rooms included many interruptions via the school intercom and shouting in the hall. One room was located next to the choir room, and there was a significant amount of bleed through of both piano sounds and singing. Previous research has indicated that young students match pitch better to a voice than an electronically produced sound (Hermanson, 1971). It is therefore viable to think that some of these students may have matched pitch to the singers next door over the virtual piano of the study. Headphones were used in an attempt to counteract the noise, but several students commented that they were distracted by it nonetheless.

Third, the students were asked to perform the new skill of singing in front of me, a relative stranger. I served as a guest conductor for an after-school rehearsal before the study began and made an effort to be on campus as often as possible throughout the duration of the study. Attending rehearsals, however, proved to be challenging with my
personal university schedule being in near direct conflict with the band’s rehearsal schedule. As a result, I believe my presence in the room during the posttest may have had a negative impact on the participants’ level of comfort. Additionally, nearly every student complimented the band’s overall growth in singing even if they did not recognize positive growth in themselves. This could indicate that a confidence that was present in the group setting was not there in the individual setting.

Fourth, solfege syllables were used as part of the sequential instruction in class, but they were not included in the posttest. Based on Gordon’s (1993) writings about the importance of patterns and verbal associations, the students may have been more successful with singing had solfege syllables, patterns, or melodies been included. The three-note sequence out of melodic context may have negatively impacted the participants’ ability to sing accurately. It should be noted here that the participants practiced singing ascending and descending whole and half steps on /zu/ and /zi/ in their final week of instruction in preparation for the posttest. Given the poor performance of students, this may not have been sufficient practice to aid in successful performance of the posttest procedures. This is, however, an authentic representation of what happens in many band rooms. In my personal observations, students are often asked to sing passages of band music with the belief that doing so will aid in instrumental intonation, but without any prior vocal instruction both the singing and subsequent playing are often unsuccessful in regards to improved intonation.

Last, these participants were ill-prepared as a result of lack previous vocal instruction, and, at least initially, were uninterested in singing. Six weeks of instruction was not enough time to make great strides in vocal performance or tonal aptitude. Nearly
40 different elementary schools, public and private, feed into the middle school used for this study. A number of these schools do not offer general music to their students. I failed to ask the participants about general music experience in the elementary setting, focusing instead on their choral experience. In an effort to attain data regarding general music programs that fed into the middle school used for the present study, I contacted the school board and several local teachers. I was told that while general music is a requirement, music is not always taught by a certified music teacher and there is no set curriculum that specifically includes singing or note reading. Furthermore, district-wide budget cuts had completely eliminated a number of general music courses within the district, and I was unable to acquire information regarding which schools had active general music programs.

Some might suggest a study of longer duration, perhaps replicating Elliott’s (1974) with middle school students. While such a study would no doubt be beneficial in developing a better understanding of the best way to implement vocalization in the instrumental setting, I believe the results of this study indicate a strong need for active and focused general music classes, as well as opportunities to sing in choir before instrumental music education begins in the schools. This supports the writings of Gordon (1993), Schleuter (1997), and Conway (2003).

Voice change was mentioned as challenging by both male participants and the teacher participant. The teacher commented that the majority of the changing voices were in the percussion section. She was surprised by these students’ inability to match pitch in any octave, given that they were required to tune the timpani in her class, and did so successfully. While trying to understand how they could tune well but not sing well, she
said “they can tune things . . . so I know they can hear it and I know they can internalize pitch. . . I mean, they’ve got good ears.” This is a textbook case of the difference between pitch perception and pitch performance (Geringer, 1983).

While the percussionists were not all interviewed for this study, the teacher participant remarked in conversation that many of them were becoming frustrated with the instruction. It was easy to hear the percussionists struggling to sing on the videos, given the placement of the camera, and it was even easier to see their exasperation when they were not successful. Morrison (2000) questioned whether improved intonation was a result of training, maturation, or attrition. Demorest and Clements state “Pitch-matching problems persisting past the elementary years have a negative effect on an individual’s perception of his or her musicality” (2007, p. 191). Clearly, voice change is a challenging time, and it appears the psychological impact of the struggle associated with singing during this time may negatively influence a child’s opinion of their abilities as well as their decision to continue on in a music program. This highlights the need for instrumental directors to be able to assess and manage the challenges associated with voice change if singing is to be successfully incorporated in the instrumental classroom.

I found it to be quite intriguing that so many of the student participants did not initially recognize the natural relationship between choir and band, or singing and playing an instrument. While this sheds a light on the obvious and detrimental divide between the choir and band world and their respective directors, it also reveals a lost opportunity. There is much shared technique between vocalists and instrumentalists, and we could stand to learn a great deal from each other. One of the goals of this study was to design an
implement a vocal instruction program designed specifically for band students. The ease of implementation and perceived benefits related to this study, indicate that more of a relationship between the choir and band worlds in our schools would be advantageous.

Another interesting observation made during the course of the study included flute players struggling with performing lip trills. In discussing this unexpected challenge, the teacher participant and I came to the conclusion that the embouchure required to play the flute is vastly different from the lip placement required to perform lip trills. Given that the flute section was the only section that seemed to struggle with this activity, we assumed that muscle memory and conditioning played a role. But this made us wonder: What other similar and opposing physiological relationships might we find between vocal and wind instrument technique? A future study investigating the relationship between vocal and instrumental techniques could reveal rather insightful information!

The current study used the PreSonus Studio One 2.5 Professional audio workstation software. As described in the method section, this software proved to be highly advantageous in developing the aural stimulus and in recording the posttest. Mean frequency is required for statistical analysis in a study of this type, but this program does not provide this information. Therefore, exportation to Audacity and Praat was still required. Should mean frequency for individual notes be available in the future in this software, the need for exportation to another program would be eliminated, drastically reducing the amount of time and work necessary for analysis, thus making this software invaluable not only in regards to the aural stimulus and the process of recording, but to analysis as well.
In sum, sequential, systematic, daily singing based on the writings of choral pedagogues but designed for band students appeared to have a positive impact on nearly all involved, in spite of the initial negative reaction. The teacher participant identified the sequential instructions as easy to use and plans to continue to implement them with all grade levels in the future. Perceptions about singing ability changed in a positive direction for nearly all student participants, and confidence in singing grew. Even those who did not admit that they were more self-assured individual singers recognized growth in the group’s singing ability. In addition, the group’s awareness of pitch and vocal and instrumental intonation appeared to have drastically improved over the 6 week period. These are all positive outcomes directly attributed, by both the student and teacher participants, to the vocal instruction. These outcomes deal with growth, however, and growth and accuracy are not one in the same. As a result, statistical analysis of accurate playing and singing in a posttest-only design did not reflect the same positivity found in the participants’ perceptions of the experience.

Under the conditions of the present study, intonation seemed best and most stable on the first performance condition—the one that was not preceded by singing. This inaccurate performance seems to support the premise of the present study: The statement “If you can sing it, you can play it” is over simplified to the point of negligent. If these students who received 6 weeks of intense vocal instruction were unable to sing and play in tune, how can we expect the instrumentalist with no vocal experience to profit from simply singing in instrumental class without incorporating systematic vocal instruction? We must address the how-to of singing if we are to reap any benefit from incorporating it into our instrumental rehearsals.
Given the short timeframe of instruction, it seems that future studies conducted in this area should be of longer duration. This is supported by the findings of Elliott (1974). Including a pretest to chart overall growth would be beneficial. Future studies may also want to incorporate tonal patterns in the posttest, or to focus on a specific group of instruments in an effort to eliminate the problem of octave placement of the in-tune stimulus. A survey of university courses in vocal technique available for, or geared towards, instrumental majors may shed additional light on as to why so few instrumental instructors feel comfortable singing with their classes. That combined with investigation of the attitudes of pre-service and in-service instrumental educators about the perceived need for education in vocal techniques would make for an interesting discussion. There appear to be ample research findings regarding the benefits of systematic and sequential vocalization in the instrumental setting. Discussions like this, and future studies in this area, could shift the conversation from the importance of the presence of singing in the instrumental classroom, to the importance of how to sing in the instrumental classroom.
References


Appendix A  
Daily Vocal Instruction

Posture/Alignment/Physical warm up

Breath (To work towards efficient breath support)
- Hands on hips, reverse from natural position; thumbs to the front.
- Breathe in for a specific number of beats, keeping shoulders down and expanding the abdomen and chest. Exhale for the same or progressively greater number of beats, either on ‘s’ and ‘sh’
  - ‘s’ requires pressurized air, similar to the air needed to play an instrument
  - ‘sh’ requires greater control of the breath
- Rib cage remains open and buoyant. Abdominal muscles contract.

Transition of speaking to singing voice
- Hands remain on hips.
- Non-pitched lip trills: Breathe in for x amount of beats and exhale on lip trills with no specified pitch.
- Pitched lip trills: The director traces the shape of waves with an extended and pointer finger. Higher pitches to be performed at the crest of the waves and lower pitches at the trough, sliding into each.
  - Begin each lip trill with the syllable ‘br’
  - Students should work for as much range as possible.

Lip slurs/Long tones
- These exercises are played on the instruments.

Descending sol-do pattern (To warm up voice and help with pitch accuracy)
- Puppy whine to find head voice
  - To be employed only in the first few sessions until students have found their head voices and understand how to use them.
- Breathe slowly in through nose and Hum Descending Sol-Do of lip slur
- Lip trill + buzz: Descending Sol-Do of slur
- Same pattern as above, but sung on syllables ‘/zu/’ and ‘/zi/’
  - /zu/ in the beginning feels safer, opens the throat
  - /zi/ is more projected
  - Equal time should be spent on both syllables.
  - Introduction of solfège syllables will take place once a comfort with singing has been achieved, serving as the verbal association of the tonal pattern in line with Gordon’s *Learning Sequences in Music*

*Note:* The hum, lip trill, descending /zu/-/zi/ exercises are repeated in whatever keys the students are working in during their warm up. The keys of F and Eb will be the easiest for the students so these keys will be used in the beginning of the training and each time a new exercise is introduced.

Voice stretching
- Students will perform an ascending arpeggio in the same key as above, using two different syllables:
  - /zu/ for open resonant sound
  - /zi/ for pressurized, focused air
# Appendix B

## Schedule of Instruction

*Note that the breaks in dates are for the Mardi Gras holidays and the Easter holidays. School is not in session during these breaks.*

<table>
<thead>
<tr>
<th>Week 1</th>
<th>Introduction of technique</th>
</tr>
</thead>
<tbody>
<tr>
<td>February 19</td>
<td></td>
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<tr>
<td>February 21</td>
<td></td>
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<tr>
<td>March 1</td>
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<tr>
<td></td>
<td>• Posture and Breathing</td>
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<tr>
<td></td>
<td>• Lip trills</td>
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<td></td>
<td>• Understanding head voice vs. chest voice</td>
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<table>
<thead>
<tr>
<th>Week 2</th>
<th>• Posture and Breathing</th>
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<tbody>
<tr>
<td>February 25</td>
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<td>February 27</td>
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<tr>
<td></td>
<td>• Lip trills</td>
</tr>
<tr>
<td></td>
<td>• Understanding head voice vs. chest voice</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Week 3</th>
<th>Addition of humming sol-do patterns</th>
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<tbody>
<tr>
<td>March 7</td>
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<table>
<thead>
<tr>
<th>Week 4</th>
<th>Addition of singing sol-do patterns on /Zu/</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 11</td>
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<tr>
<td>March 13</td>
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<thead>
<tr>
<th>Week 5</th>
<th>Addition of singing sol-do patterns on /Zi/ and /zi/</th>
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<tbody>
<tr>
<td>March 18</td>
<td></td>
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<tr>
<td>March 20</td>
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<td>March 22</td>
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</table>

<table>
<thead>
<tr>
<th>Week 6</th>
<th>Cont. sol-do on /zu/ and /zi/</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 2</td>
<td></td>
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<tr>
<td>April 4</td>
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<table>
<thead>
<tr>
<th>Week 7</th>
<th>Addition of solfege and arpeggiation exercises</th>
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<tbody>
<tr>
<td>April 1-5</td>
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<table>
<thead>
<tr>
<th>Week 8</th>
<th>Continue and addition of singing ascending and descending pitch sequences on two different syllables in preparation for the posttest.</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 8-12</td>
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<tr>
<td><em>LEAP testing, rehearsal schedule TBA Not recorded</em></td>
<td></td>
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<table>
<thead>
<tr>
<th>Post – Test</th>
<th>Weeks of April 15, April 22, April 29, May 7</th>
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</table>
Appendix C
Teaching Event Scripts

February 19 3B (10:30)
0:00 - 1:01 Verbalization and vocal model
1:01 - 1:41 Group performance breathing and continual verbalization
1:41 - 2:03 Verbalization
2:03 - 3:16 Group performance breathing and continual verbalization
3:16 – 4:01 Verbalization
4:01 - 4:13 Group performance breathing and continual verbalization
4:13 – 4:45 Verbalization and vocal model
4:45 - 5:00 Group vocal performance lip trills
5:00  - 5:21 Individual vocal performance lip trills and verbalization
5:21 – 5:26 Group vocal performance lip trills
5:26 - 5:33 Other
5:33 - 5:41 Verbalization and vocal model
5:41 - 6:56 Group/section vocal performance lip trills and continual verbalization
6:56 - 7:12 Verbalization and vocal model
7:12 - 7:32 Group vocal performance lip trills and continual verbalization
7:32 – 8:01 Individual vocal performance/Section performance and continual verbalization
8:01 - 8:25 Other
8:25 - 8:33 Group vocal performance lip trills
8:33 - 9:18 Verbalization and vocal model
9:18 - 10:02 Group vocal performance lip trills and continual verbalization
10:02 - 10:30 Verbalization
February 19 4B (10:09)
0:00 - 1:17 Verbalization and vocal model
1:17 - 2:00 Group performance breathing and continual verbalization
2:00 - 2:28 Verbalization
2:28 - 2:57 Group performance breathing and continual verbalization
2:57 - 3:19 Verbalization and vocal model
3:19 - 4:53 Group performance breathing and continual Verbalization
4:53 - 5:40 Verbalization and Vocal model
5:40 - 5:54 Group vocal performance lip trills
5:54 – 6:17 Other
6:17 - 6:38 Individual/section vocal performance lip trills and continual verbalization
6:38 - 7:01 Verbalization and vocal model
7:01 – 7:39 Individual/section vocal performance lip trills and continual verbalization
7:39 - 7:58 Group vocal performance lip trills and continual Verbalization
7:58 - 8:50 Verbalization and vocal model
8:50 - 9:12 Group vocal performance and continual verbalization
9:12 - 9:39 Other
9:55 - 10:09 Verbalization
February 21 3B (10:52)
0:00 - 0:20 Other
0:20 - 0:56 Verbalization and Vocal model
0:56 - 1:18 Group performance breathing and continual verbalization
1:18 - 1:44 Verbalization and vocal model
1:44 – 3:23 Group performance breathing and continual verbalization
3:23 - 4:16 Verbalization
4:16 - 4:31 Group performance breathing and continual Verbalization
4:31 - 4:41 Verbalization
4:41 - 4:50 Group vocal performance lip trills
4:50 - 5:28 Verbalization and vocal model
5:28 - 5:54 Section vocal performance lip trills and continual verbalization
5:54 - 6:21 Verbalization
6:21 - 6:57 Group vocal performance lip trills and continual verbalization
6:57 - 9:04 Verbalization and Vocal model
9:04 - 9:13 Group vocal performance puppy whine
9:13 - 10:22 Individual vocal performance puppy whine and continual verbalization
10:22 - 10:28 Group vocal performance puppy whine and continual verbalization
10:28 - 10:52 Verbalization
February 21 4B (15:21)
0:00 - 0:27 Verbalization and vocal model
0:27 - 1:17 Group performance breathing and continual verbalization
1:17 - 1:32 Verbalization
1:32 - 2:15 Group performance breathing and continual verbalization
2:15 - 2:41 Verbalization
2:41 - 3:51 Group performance breathing and continual verbalization
3:51 - 4:22 Other
4:22 - 4:36 Verbalization
4:36 - 4:48 Group performance breathing and continual verbalization
4:48 - 5:36 Verbalization
5:36 - 5:51 Group performance breathing and continual verbalization
5:51 - 6:06 Verbalization
6:06 - 6:12 Group vocal performance lip trills
6:12 - 6:58 Verbalization, vocal model
6:58 - 7:17 Group vocal performance lip trills
7:17 - 8:15 Section vocal performance lip trills and verbalization
8:15 - 8:55 Verbalization
8:55 - 9:23 Group vocal performance lip trills and continual verbalization
9:23 - 12:08 Verbalization and vocal model
12:08 - 12:14 Group vocal performance puppy whine
12:14 - 12:24 Verbalization
12:24 - 12:27 Group vocal performance puppy whine
12:27 - 12:40 Verbalization and vocal model
12:40 - 12:46 Group vocal performance puppy whine
12:46 - 12:55 Verbalization
12:55 - 14:46 Individual vocal performance puppy whine and continual verbalization
14:46 - 14:52 Group vocal performance puppy whine
14:52 - 15:21 Verbalization
February 25 3B (8:20 + 9:20)
0:00 - 0:24 Group performance breathing and continual verbalization
0:24 - 0:41 Verbalization
0:41 - 1:24 Group performance breathing and verbalization
1:24 - 1:44 Verbalization
1:44 - 2:15 Group performance breathing and continual verbalization
2:15 - 3:33 Verbalization
3:33 - 3:38 Group vocal performance lip trills and verbalization
3:38 - 6:53 Section/Individual vocal performance lip trills and continual verbalization
6:53 - 7:00 Verbalization
7:00 - 7:19 Group vocal performance lip trills and verbalization
7:19 - 7:34 Verbalization
7:34 - 7:55 Group vocal performance lip trills and verbalization
7:55 - 8:20 Verbalization, set up change, other
Video turned off
Video turned back on
0 - 1:23 Group instrumental performance lip slur
1:23 - 1:35 Verbalization
1:35 - 1:46 Group vocal performance puppy whine
1:46 – 3:14 Individual/section vocal performance and vocal demonstration puppy whine
3:14 - 3:53 Verbalization
3:53 - 3:59 Group instrumental performance
3:59 - 4:35 Verbalization and vocal model
4:35 - 4:51 Group vocal performance lip trills
4:51 - 5:13 Verbalization and vocal model
5:13 - 5:45 Group vocal performance lip trills sol - fa - mi - re - do of the slur
5:45 - 5:52 Verbalization and vocal model
5:52 - 6:04 Group vocal performance hum sol - fa - mi - re - do of slur
6:04 - 6:25 Verbalization and vocal model
6:25 - 7:15 Group vocal performance sing /zi/ and /zu/ on sol - fa - mi - re - do of slur and continual Verbalization
7:15 - 7:25 Verbalization
7:25 - 7:32 Group instrumental performance lip slur
7:32 - 7:43 Verbalization and vocal model
7:43 – 7:56 Group vocal performance lip trills of slur,
7:56 - 8:03 Vocal model
8:03 - 8:07 Group vocal performance lip trills sol - fa - mi - re - do of slur
8:07 - 8:13 Vocal model and verbalization
8:13 - 8:23 Group vocal performance hum sol - fa - mi - re - do of slur
8:23 - 8:32 Verbalization and vocal model
8:32 - 8:58 Group vocal performance sing on /zu/ and /zi/ sol - fa - mi - re - do (2X each) and continual verbalization
8:58 - 9:20 Verbalization
February 25 4B (10:06 + 8:18)
0:00 - 0:15 Verbalization
0:15 - 0:32 Group performance breathing
0:32 - 0:48 Verbalization
0:48 - 1:11 Group performance breathing
1:11 - 1:24 Verbalization
1:24 - 2:02 Group performance breathing and continual verbalization
2:02 - 2:20 Verbalization and vocal model
2:20 - 2:27 Group performance breathing
2:27 - 3:13 Verbalization
3:13 - 3:23 Group performance breathing
3:23 - 3:41 Verbalization
3:41 – 4:25 Group performance breathing and verbalization
4:25 - 4:42 Verbalization
4:42 - 5:13 - Group performance breathing and verbalization
5:13 - 6:04 Verbalization and other
6:04 - 6:22 Group lip trills vocal performance and verbalization
6:22 - 8:45 Section/individual lip trills vocal performance, continual verbalization
8:45 - 8:55 Verbalization
8:55 - 9:30 Group lip trills vocal performance and continual verbalization
9:30 – 9:59 Verbalization, other
9:59 - 10:06 Fire alarm.
Video turned off at this time.
Video turned back on
0:00 - 0:13 Verbalization
0:13 - 1:05 Group instrumental performance and continual verbalization
1:05 - 1:12 Verbalization
1:12 - 1:20 Section instrumental performance and verbalization
1:20 - 1:37 Verbalization
1:37 - 1:45 Group instrumental performance
1:45 - 1:58 Verbalization and vocal model
1:58 – 2:10 Group vocal performance puppy whine
2:10 - 2:58 Section vocal performance puppy whine, verbalization
2:58 - 3:14 Verbalization
3:14 - 3:22 Group instrumental performance
3:22 - 3:32 Verbalization and vocal model
3:32 - 3:52 Group vocal performance lip trills on slur, continual verbalization
3:52 - 4:04 Verbalization and vocal model
4:04 - 4:16 Group vocal performance hum slur and continual verbalization
4:16 - 5:00 Section vocal performance hum slur and continual verbalization
5:00 - 5:06 Group vocal performance hum slur and continual verbalization
5:06 - 5:24 Verbalization and vocal model
5:24 – 5:47 Group vocal performance hum sol - fa - mi - re - do of the slur and continual verbalization
5:47 - 6:11 Verbalization and vocal model
6:11 - 6:34 Group vocal performance sing sol - fa - mi - re - do of the slur on /zu/ and continual verbalization
6:34 - 7:34 Section/individual vocal performance sing sol - fa - mi - re - do of the slur on /zu/ and continual verbalization
7:34 - 7:39 Group vocal performance sing sol - fa - mi - re - do of the slur on /zu/ and continual verbalization
7:39 - 7:48 Verbalization and vocal model
7:48 - 8:08 Group vocal performance sing sol - fa - mi - re - do on /zi/ and /zu/ and verbalization
8:08 - 8:18 Verbalization
February 27 3B (Same as 4B but did not get recorded)

February 27 4B (14:18)
0:00 - 0:05 Verbalization
0:05 - 0:13 Group performance breathing and verbalization
0:13 - 0:32 Verbalization
0:32 - 1:21 Group performance breathing and continual verbalization
1:21 - 1:37 Verbalization
1:37 - 1:51 Group performance breathing and continual verbalization
1:51 - 2:07 Verbalization
2:07 - 2:21 Group performance breathing and continual verbalization
2:21 - 2:44 Verbalization
2:44 - 2:58 Group performance breathing and continual verbalization
2:58 - 3:18 Verbalization
3:18 - 4:20 Group performance breathing and continual verbalization
4:20 - 4:33 Verbalization
4:33 - 4:45 Group vocal performance lip trills and verbalization
4:45 - 5:01 Verbalization and vocal model
5:01 – 5:44 Group lip trills vocal performance and continual verbalization
5:44 - 6:09 Verbalization
6:09 - 6:56 Group instrumental performance lip slur
6:56 - 7:11 Verbalization
7:11 - 7:17 Group instrumental performance lip slur
7:17 - 7:31 Verbalization and vocal model
7:31 – 8:09 Group vocal performance lip trills of slur and continual verbalization
8:09 - 8:33 Verbalization and vocal model
8:33 - 8:52 Group vocal performance lip trills sol - fa - mi - re – do of slur and Verbalization
8:52 - 9:10 Verbalization and vocal model
9:10 - 9:34 Group vocal performance hum sol - fa - mi - re - do and verbalization
9:34 - 10:15 Section and individual vocal performance hum sol - fa - mi - re - do and verbalization
10:15 - 10:21 Group vocal performance hum sol - fa - mi - re - do and Verbalization
10:21 - 10:40 Verbalization and vocal model
10:40 - 10:57 Group vocal performance sing sol - fa - mi - re - do of slur on /zu/ and verbalization
10:57 - 11:08 Verbalization and vocal model
11:08 - 11:27 Group vocal performance sing sol - fa - mi - re - do of slur on /zi/ and continual verbalization
11:27 - 11:39 Verbalization
11:39 - 12:00 Group instrumental performance lip slur and verbalization
12:00 - 12:07 Vocal model
12:07 - 12:34 Group vocal performance lip trills of slur and verbalization
12:34 - 12:40 Vocal model
12:40 - 13:00 Group vocal performance hum slur and verbalization
13:00 – 13:06 Vocal model
13:06 - 13:36 Group vocal performance hum sol - fa - mi - re - do and verbalization
13:36 - 13:42 Vocal model
13:56 - 14:02 Vocal model
14:02 - 14:08 Group vocal performance sing sol - fa - mi - re - do on /zi/ and verbalization
14:08 – 14:18 Verbalization
March 1 3B (11:56)
0:00 - 0:13 Verbalization
0:13 - 1:45 Group performance breathing and verbalization
1:45 - 2:02 Verbalization
2:02 - 2:23 Group performance breathing and verbalization
2:23 - 3:23 Verbalization
3:23 - 3:51 Group performance breathing and verbalization
3:51 - 4:41 Verbalization and vocal model
4:41 - 5:09 Group vocal performance lip trills
5:09 - 5:45 Verbalization
5:45 - 6:32 Group instrumental performance lip slur
6:32 - 7:24 Verbalization
7:24 - 7:30 Group instrumental performance lip slur
7:30 - 7:39 Verbalization and vocal model
7:39 - 7:44 Group vocal performance lip trills on slur
7:44 - 7:53 Verbalization and vocal model
7:53 - 8:06 Group vocal performance of lip trills on sol - fa - mi - re - do and continual verbalization
8:06 - 8:20 Verbalization, vocal model
8:20 - 8:37 Group vocal performance hum sol - fa - mi - re - do of slur and verbalization
8:37 - 8:43 Verbalization, vocal model
8:43 - 9:02 Group vocal performance sing on /Zu/ sol - fa - mi - re - do of slur and verbalization
9:02 - 9:06 Verbalization
9:06 - 9:24 Group vocal performance sing /zi/ sol - fa - mi - re - do and verbalization
9:24 - 9:34 Verbalization
9:34 - 9:40 Group instrumental performance lip slur
9:40 - 9:47 Vocal model
9:47 - 9:52 Group vocal performance lip trills of slur
9:52 - 9:58 Vocal model
9:58 - 10:03 Group vocal performance lip trills on sol - fa - mi - re - do and verbalization
10:03 - 10:08 Vocal model
10:08 - 10:13 Group vocal performance hum sol - fa - mi - re - do
10:13 - 10:19 Vocal model
10:19 - 10:24 Group vocal performance of sing /Zu/ sol - fa - mi - re - do
10:24 - 10:29 Vocal model
10:29 - 10:34 Group vocal performance of sing /zi/ sol - fa - mi - re - do
10:34 - 10:41 Verbalization
10:41 - 10:55 Group instrumental performance lip slur and Verbalization
10:55 - 11:00 Vocal model
11:00 - 11:07 Group vocal performance lip trills of slur
11:07 - 11:12 Vocal model
11:12 - 11:18 Group vocal performance lip trills sol - fa - mi - re - do
11:18 - 11:24 Vocal model

80
11:24 - 11:28 Group vocal performance hum sol - fa - mi - re – do of slur,
and 2X in /zi/, continual verbalization
11:51 - 11:56 Verbalization
March 14B (11:11)
0:00 - 0:12 Verbalization
0:12 - 0:59 Group performance breathing, continual verbalization
0:59 - 1:28 Verbalization
1:28 – 1:42 Group performance breathing and continual verbalization
1:42 - 2:23 Verbalization
2:23 - 3:03 Group performance breathing
3:03 - 4:11 Verbalization
4:11 - 4:34 Group performance breathing
4:34 - 4:56 Verbalization
4:56 - 5:41 Group instrumental performance lip slur
5:41 - 5:48 Verbalization
5:48 – 6:09 Group vocal performance lip trills
6:09 - 6:13 Vocal model
6:13 - 6:20 Group instrumental performance lip slur
6:20 - 6:27 Vocal model
6:27 – 6:35 Group vocal performance lip trills of slur
6:36 - 6:37 Verbalization
6:37 - 6:44 Group instrumental performance lip slur
6:44 – 6:51 Vocal model
6:51 – 6:58 Group vocal performance lip trills sol - fa - mi - re - do of slur
6:58 - 7:00 Verbalization
7:00 - 7:18 Group instrumental performance of lip slur and continual verbalization
7:18 – 7:25 Vocal model
7:25 – 7:30 Group vocal performance lip trills of sol - fa - mi - re - do of slur
7:30 – 7:41 Verbalization and Vocal model
7:41 - 7:49 Group vocal performance hum sol - fa - mi - re - do and continual verbalization
7:49 - 7:55 Vocal model
7:55 - 8:00 Group vocal performance sing /Zu/ sol - fa - mi - re - do of slur
8:00 - 8:09 Vocal model and verbalization
8:09 - 8:14 Group vocal performance sing /zi/ sol - fa - mi - re - do of slur
8:14 - 8:22 Verbalization
8:22 - 8:33 Group instrumental performance lip slur
8:33 - 8:40 Verbalization
8:40 - 8:46 Group vocal performance lip trills of slur
8:46 - 8:53 Group instrumental performance lip slur
8:53 - 8:55 Verbalization
8:55 - 9:00 Group vocal performance lip trills of the slur
9:00 - 9:22 Verbalization
9:22 - 9:36 Group vocal performance lip trills of slur
9:36 - 9:54 Group vocal performance lip trills of sol - fa - mi - re - do of slur and vocal model
9:54 - 10:00 Group vocal performance hum sol - fa - mi - re - do
10:00 - 10:02 Verbalization
10:02 - 10:07 Group instrumental performance lip slur
10:07 - 10:22 Verbalization, vocal model
10:22 - 10:27 Group vocal performance hum sol - fa - mi - re - do of slur
10:27 - 10:29 Verbalization
10:29 - 10:36 Group instrumental performance of lip slur
10:36 - 10:50 Group vocal performance hum sol - fa - mi - re - do of slur
10:50 - 11:07 Group vocal performance sing sol - fa - mi - re - do of slur on /zi/ and /zu/
11:07 - 11:09 Verbalization
11:09 - 11:11 Other
March 7 3B (14:41)
0:00 - 0:04 Other
0:04 - 0:27 Verbalization
0:27 - 0:53 Group performance breathing
0:53 - 1:16 Verbalization
1:16 - 1:30 Group performance breathing
1:30 - 1:56 Verbalization
1:56 - 2:14 Group performance breathing
2:14 - 2:30 Verbalization
2:30 - 2:48 Group performance breathing
2:48 - 3:21 Verbalization
3:21 - 3:39 Group performance breathing
3:39 - 6:11 Verbalization
6:11 - 6:58 Group instrumental performance lip slur
6:58 - 7:48 Verbalization
7:48 - 7:56 Group instrumental performance
7:56 - 8:01 Vocal model
8:01 - 8:08 Group vocal performance lip trills of slur
8:08 - 8:14 Verbalization
8:14 - 8:21 Group vocal performance lip trills of sol - fa - mi - re - do of slur
8:21 - 8:25 Verbalization
8:25 - 8:31 Group instrumental performance lip slur
8:31 - 8:34 Verbalization
8:34 - 8:39 Group vocal performance lip trill of sol - fa - mi - re - do of slur
8:39 - 8:41 Verbalization
8:41 - 8:47 Group instrumental performance lip slur
8:47 - 8:53 Vocal model
8:53 - 8:58 Group vocal performance lip trills sol - fa - mi - re - do of lip slur
8:58 - 9:06 Verbalization
9:06 - 9:12 Group vocal performance hum sol - fa - mi - re - do
9:12 - 9:19 Verbalization
9:19 - 9:23 Group vocal performance sing /Zu/ sol - fa - mi - re - do
9:23 - 9:34 Verbalization
9:39 - 9:41 Verbalization
9:41 - 9:48 Group instrumental performance of lip slur
9:48 - 9:51 Verbalization
9:51 - 9:56 Group vocal performance sing /Zu/ sol - fa - mi - re - do
9:56 - 10:05 Verbalization
10:05 - 10:09 Group vocal performance sing /zi/ sol - fa - mi - re - do
10:09 - 10:17 Verbalization
10:17 - 10:22 Group instrumental performance lip slur
10:22 - 10:30 Vocal model
10:30 - 10:47 Group vocal performance lip trills of lip slur and lip trills of sol - fa - mi - re - do
10:47 - 11:04 Verbalization and vocal model
11:04 - 11:09 Group vocal performance hum sol - fa - mi - re - do of slur
11:09 - 11:16 Verbalization
11:16 - 11:22 Group vocal performance sing sol - fa - mi - re - do of slur on /zu/
11:22 - 11:28 Verbalization
11:28 - 11:33 Group vocal performance sing /zi/ sol - fa - mi - re - do
11:33 - 11:41 Verbalization
11:41 - 11:56 Group instrumental performance lip slur, lip trills of slur
11:56 - 12:13 Verbalization
12:13 - 12:24 Vocal model and group vocal performance lip trills on sol - fa - mi - re - do, hum sol - fa - mi - re - do
12:24 - 12:55 Verbalization
12:55 - 13:06 Group vocal performance sing sol - fa - mi - re - do of slur on /Zu/ and /zi/
13:06 - 13:11 Verbalization
13:11 - 13:18 Group instrumental performance lip slur
13:18 - 13:37 Group vocal performance lip trills the slur, lip trills sol - fa - mi - re - do of the slur, hum sol - fa - mi - re - do of slur
13:37 - 13:40 Verbalization
13:58 - 14:11 Group instrumental performance of lip slur
14:11 - 14:21 Group vocal performance hum sol - fa - mi - re - do of slur
14:21 - 14:35 Group vocal performance sing sol - fa - mi - re - do on /zu/ and /zi/
14:35 - 14:41 Verbalization, other
March 7 4B
0:00 – 0:42 Instrumental performance lip slur
0:42 – 1:27 Verbalization
1:27 – 1:44 Group performance breathing
1:44 – 2:10 Verbalization
2:10 – 2:23 Group performance breathing
2:23 – 3:38 Verbalization
3:38 – 3:58 Group performance breathing
3:58 – 5:19 Verbalization
5:19 – 5:37 Group performance breathing
5:37 – 6:14 Verbalization
6:14 – 6:44 Group performance breathing
6:44 – 8:50 Verbalization
8:50 – 9:32 Instrumental performance lip slur
9:32 – 10:17 Verbalization
10:17 – 10:33 Instrumental performance lip slur
10:33 – 10:40 Vocal Model
10:40 – 10:47 Group vocal performance lip trills of slur
10:47 – 10:53 Vocal model
10:53 – 11:00 Group vocal performance hum slur
11:00 – 11:10 Verbalization and vocal model
11:10 – 11:14 Group vocal performance hum sol - fa - mi - re - do of slur
11:14 – 11:20 Vocal Model
11:20 – 11:25 Group vocal performance sing sol - fa - mi - re - do on /zu/
11:25 – 11:33 Verbalization
11:33 – 11:38 Group vocal performance sing sol - fa - mi - re - do on /zu/ and /zi/
11:38 – 11:53 Verbalization
11:53 – 12:00 Group instrumental performance lip slur
12:00 – 12:05 Section instrumental performance lip slur
12:05 – 12:13 Verbalization
12:13 – 12:33 Group instrumental performance
12:33 – 12:40 Vocal model
12:40 – 12:45 Group vocal performance lip trills of slur
12:45 – 12:58 Verbalization
12:58 – 13:03 Group vocal performance lip trills sol - fa - mi - re - do of slur
13:03 – 13:05 Verbalization
13:05 – 13:08 Group vocal performance hum sol - fa - mi - re - do of slur
13:08 – 13:13 Verbalization
13:13 – 13:34 Group instrumental performance lip slur
13:34 – 13:37 Verbalization
13:52 – 14:09 Verbalization
14:09 – 14:14 Group vocal performance sing sol - fa - mi - re - do on /zi/
14:14 – 14:21 Verbalization
14:21 – 14:27 Group instrumental performance lip slur
14:27 – 14:30 Verbalization
14:30 – 14:35 Group vocal performance lip trills slur
14:35 – 14:41 Verbalization
14:41 – 14:46 Group vocal performance lip trills sol - fa - mi - re - do of slur
14:46 - 14:47 Verbalization
14:47 – 14:51 Group vocal performance hum sol - fa - mi - re - do of slur
14:51 – 14:53 Verbalization
14:53 – 14:57 Group vocal performance sing sol - fa - mi - re - do of slur on /zu/ and /zi/
14:57 – 15:10 Verbalization
15:10 – 15:24 Group instrumental performance lip slur
15:24 – 15:27 Verbalization
15:27 – 15:32 Group vocal performance lip trills of slur
15:32 – 15:34 Verbalization
15:34 – 15:38 Group vocal performance hum slur
15:38 – 15:45 Verbalization
15:45 – 15:51 Group instrumental performance lip slur
15:52 – 15:54 Verbalization
15:54 – 15:58 Group vocal performance hum lip slur
15:58 – 16:01 Verbalization
16:01 – 16:13 Group vocal performance hum sol - fa - mi - re - do of slur
16:13 – 16:15 Verbalization
16:15 – 16:36 Group vocal performance sing sol - fa - mi - re - do on /zu/ and /zi/
16:36 – 16:39 Verbalization
16:39 – 17:03 Group instrumental performance lip slur
17:03 – 17:12 Vocal model
17:12 – 17:18 Group vocal performance sing sol - fa - mi - re - do of slur on /zu/
17:18 – 17:23 Vocal model
17:23 – 17:27 Group vocal performance sing sol - fa - mi - re - do of slur on /zu/
17:27 – 17:37 Verbalization
March 11 3B (7:47)
No sound

March 11 4B (10:09)
0:00 - 1:22 Verbalization
1:22 - 2:01 Group performance breathing
2:01 - 2:22 Verbalization
2:22 - 2:37 Group performance breathing
2:37 - 3:07 Verbalization
3:07 - 3:22 Group performance breathing
3:22 - 4:08 Verbalization
4:08 - 4:23 Group performance breathing
4:23 - 4:54 Verbalization and setup change
4:54 - 5:03 Group instrumental performance lip slur
5:03 - 5:56 Verbalization
5:56 - 6:36 Group instrumental performance
6:36 - 6:49 Verbalization
6:49 - 7:03 Group instrumental performance lip slur
7:03 - 7:05 Verbalization
7:05 - 7:13 Group vocal performance lip trills of slur
7:13 - 7:14 Verbalization
7:14 - 7:19 Group vocal performance hum slur
7:19 - 7:31 Verbalization
7:31 - 7:43 Group vocal performance hum the slur
7:43 - 8:07 Group vocal performance sing sol - fa - mi - re - do on /zu/ and /zi/
8:07 - 8:21 Verbalization
8:21 - 8:28 Group instrumental performance lip slur
8:28 - 8:37 Group vocal performance lip trills of the slur
8:37 - 8:48 Group vocal performance lip trills sol - fa - mi - re - do of slur
8:48 - 8:55 Group vocal performance hum sol - fa - mi - re - do of slur
8:55 - 9:00 Verbalization
9:00 - 9:04 Group instrumental performance of lip slur
9:04 - 9:09 Verbalization
9:09 - 9:13 Group vocal performance sing sol - fa - mi - re - do of slur on /zu/
9:13 - 9:27 Verbalization and vocal model
9:38 - 10:09 Verbalization
March 13 3B (6:57)
0:00 - 0:14 Verbalization
0:14 - 0:34 Group performance breathing and continual verbalization
0:34 - 0:49 Verbalization
0:49 - 1:10 Group performance breathing
1:10 - 1:25 Verbalization
1:25 - 1:39 Group performance breathing
1:39 - 1:54 Verbalization
1:54 - 2:01 Group performance breathing
2:01 - 2:11 Verbalization
2:11 - 2:28 Group performance breathing
2:28 - 2:48 Verbalization
2:48 - 3:37 Group instrumental performance lip slur with continual verbalization
3:37 - 3:46 Verbalization
3:46 - 3:54 Group instrumental performance lip slur
3:54 - 4:04 Group vocal performance lip trills of slur
4:04 - 4:12 Group instrumental performance lip slur
4:12 - 4:20 Group vocal performance lip trills of slur
4:20 - 4:23 Verbalization
4:23 - 4:28 Group vocal performance hum slur
4:28 - 4:33 Verbalization
4:33 - 4:38 Group vocal performance sing slur on /zu/
4:38 - 4:42 Verbalization
4:42 - 5:17 Group vocal performance sing sol - fa - mi - re - do of slur on /zu/ and /zi/
5:17 - 5:22 Verbalization
5:22 - 5:30 Group instrumental performance of lip slur
5:30 - 5:39 Group vocal performance lip trills of slur
5:39 - 5:48 Group vocal performance hum slur
5:48 - 5:55 Group vocal performance hum sol - fa - mi - re - do of slur
5:55 - 6:01 Verbalization
6:01 - 6:06 Group vocal performance sing sol - fa - mi - re - do of slur on /zu/
6:06 - 6:11 Verbalization
6:11 - 6:17 Group instrumental performance lip slur
6:17 - 6:24 Verbalization, vocal model
6:24 - 6:37 Group vocal performance sing sol - fa - mi - re - do of slur on /zu/ and /zi/
6:37 - 6:57 Verbalization
March 13 4B (7:47)
0:00 – 0:12 Verbalization
0:12 - 0:31 Group performance breathing
0:31 - 0:46 Verbalization
0:46 - 1:05 Group performance breathing
1:05 - 1:22 Verbalization
1:22 - 2:02 Group performance breathing
2:02 - 2:51 Group instrumental performance lip slur
2:51 - 3:55 Group instrumental performance lip slur
3:55 - 4:15 Verbalization
4:15 - 4:23 Group instrumental performance lip slur
4:23 - 4:28 Verbalization
4:28 - 4:38 Group vocal performance lip trills of slur
4:38 - 4:50 Verbalization
4:50 - 5:00 Group vocal performance hum slur
5:00 - 5:06 Group instrumental performance lip slur
5:06 - 5:25 Verbalization
5:25 - 5:32 Group instrumental performance lip slur
5:32 - 5:40 Group vocal performance hum lip slur
5:40 - 5:41 Verbalization
5:41 - 5:52 Group vocal performance hum sol - fa - mi - re - do of the slur, continual verbalization
5:52 - 6:00 Group instrumental performance lip slur
6:00 - 6:04 Verbalization
6:04 - 6:08 Group vocal performance hum sol - fa - mi - re - do of slur
6:08 - 6:16 Verbalization
6:16 - 6:25 Group vocal performance sing sol - fa - mi - re - do on /zu/
6:25 - 7:01 Section vocal performance sing sol - fa - mi - re - do on /zu/
7:01 - 7:11 Group vocal performance sing sol - fa - mi - re - do of slur on /Zu/
7:11 - 7:18 Group instrumental performance lip slur
7:18 - 7:36 Verbalization and vocal model
7:36 - 7:43 Group vocal performance sing sol - fa - mi - re - do on /zi/
7:43 - 7:47 Verbalization
March 18 3B (7:10)
*Student teacher*
0:00 - 0:10 Verbalization
0:10 - 0:24 Group performance breathing
0:24 - 0:36 Verbalization
0:36 - 2:02 Group performance breathing
2:02 - 2:24 Verbalization
2:24 - 2:42 Group instrumental performance lip slur
2:42 - 2:48 Verbalization
2:48 - 2:55 Group vocal performance lip trills on slur
2:55 - 3:04 Verbalization
3:04 - 3:10 Group vocal performance lip trills on slur
3:10 - 3:16 Verbalization
3:16 - 3:22 Group vocal performance lip trills sol - fa - mi - re - do of slur
3:22 - 3:31 Verbalization
3:31 - 3:39 Group instrumental performance of lip slur
3:39 - 3:51 Verbalization
3:51 - 3:57 Group instrumental performance of lip slur
3:57 - 4:03 Verbalization
4:03 - 4:10 Group vocal performance lip trills of slur
4:10 - 4:24 Verbalization
4:24 - 4:32 Group instrumental performance lip slur
4:32 - 4:35 Verbalization
4:35 - 4:40 Group vocal performance lip trills of slur
4:40 - 4:43 Verbalization
4:43 - 5:12 Group vocal performance lip trills of sol - fa - mi - re - do of slur, hum sol - fa - mi - re - do,
5:12 - 5:16 Group vocal performance hum sol - fa - mi - re - do of slur
5:16 - 5:49 Verbalization
5:49 - 5:57 Group instrumental performance lip slur
5:57 - 6:01 Verbalization
6:01 - 6:17 Group vocal performance sing lip slur and sol - fa - mi - re - do of lip slur on/zu/
6:17 - 6:34 Verbalization
6:34 - 6:42 Group vocal performance sing sol - fa - mi - re - do of slur on /zu/
6:42 - 6:52 Verbalization
6:52 - 7:10 Group vocal performance sing on /zi/ sol - fa - mi - re - do
March 18 4B (6:42)
*Student teacher
0:00 - 0:11 Group performance breathing
0:11 - 0:18 Verbalization
0:18 - 1:00 Group performance breathing
1:00 - 1:05 Verbalization
1:05 - 1:45 Group performance breathing
1:45 - 2:00 Verbalization
2:00 - 2:19 Group performance breathing
2:19 - 2:44 Verbalization
2:44 - 3:04 Group instrumental performance lip slur
3:04 - 3:10 Verbalization
3:10 - 3:22 Group vocal performance lip trills on slur
3:22 - 3:30 Group instrumental performance lip slur
3:30 - 3:35 Verbalization
3:35 - 3:42 Group vocal performance lip trills sol - fa - mi - re - do of slur
3:42 - 4:00 Group vocal performance hum sol - fa - mi - re - do of slur
4:00 - 4:14 Verbalization
4:14 - 4:22 Group instrumental performance lip slur
4:22 - 4:29 Group instrumental performance lip trills of slur
4:29 - 4:32 Verbalization
4:32 - 4:39 Group vocal performance lip trills sol - fa - mi - re - do of slur
4:39 - 4:47 Group vocal performance hum sol - fa - mi - re - do of slur
4:47 - 4:54 Section vocal performance hum sol - fa - mi - re do of slur
4:54 - 5:00 Group vocal performance hum sol - fa - mi - re - do of slur
5:00 - 5:08 Group vocal performance sing sol - fa - mi - re - do of slur on /zi/
5:08 - 5:18 Verbalization
5:18 - 5:27 Group instrumental performance lip slur
5:27 - 5:54 Verbalization
5:54 - 5:59 Group vocal performance sing slur on/zi/
5:59 - 6:21 Group vocal performance sing sol - fa - mi - re - do of slur on /zi/ and /zu/
6:21 - 6:27 Verbalization
6:27 - 6:34 Group vocal performance sing sol - fa - mi - re - do of slur on /zu/
6:34 - 6:42 Verbalization
March 20 3B (9:35)
0:00 - 0:07 Group performance breathing
0:07 - 0:15 Verbalization
0:15 - 0:24 Group performance breathing
0:24 - 0:39 Verbalization
0:39 - 0:52 Group performance breathing
0:52 - 1:39 Verbalization
1:39 - 1:50 Group performance breathing
1:50 - 2:05 Verbalization
2:05 - 2:29 Group performance breathing
2:29 - 2:53 Verbalization
2:53 - 3:13 Group performance breathing
3:13 - 4:08 Other *Student teacher now leading
4:08 - 4:56 Group instrumental performance lip slur
4:56 - 5:09 Verbalization
5:09 - 5:28 Group instrumental performance lip slur
5:28 - 5:31 Verbalization
5:31 - 5:37 Group vocal performance lip trills of slur
5:37 - 5:41 Verbalization
5:41 - 5:47 Group vocal performance lip trills sol - fa - mi - re - do of slur
5:47 - 5:52 Verbalization
5:52 - 5:58 Group vocal performance hum sol - fa - mi - re - do of slur
5:58 - 6:06 Verbalization
6:06 - 6:13 Group instrumental performance lip slur
6:13 - 6:25 Verbalization
6:25 - 6:32 Group instrumental performance lip slur
6:32 - 6:39 Group vocal performance lip trills of slur
6:39 - 6:49 Group vocal performance lip trills of sol - fa - mi - re - do of slur
6:49 - 7:08 Group vocal performance hum sol - fa - mi - re - do of slur
7:08 - 7:16 Verbalization
7:16 - 7:22 Group vocal performance sing sol - fa - mi - re - do of slur on /zi/
7:22 - 7:28 Verbalization
7:28 - 7:35 Group instrumental performance lip slur
7:35 - 7:45 Group vocal performance hum sol - fa - mi - re - do of slur
7:45 - 8:01 Group vocal performance sing sol - fa - mi - re - do of the slur on /zi/ and /zu/
8:01 - 8:08 Verbalization
8:08 - 8:14 Group instrumental performance of lip slur
8:14 - 8:23 Verbalization
8:23 - 8:28 Group vocal performance lip trills of lip slur
8:28 - 8:36 Group vocal performance lip trills sol - fa - mi - re - do of slur
8:36 - 8:50 Section vocal performance lip trills of sol - fa - mi - re - do of slur
8:50 - 8:59 Verbalization
8:59 - 9:05 Group vocal performance hum sol - fa - mi - re - do of slur
9:05 - 9:14 Verbalization
9:14 - 9:25 Group vocal performance sing sol - fa - mi - re - do of slur on /zi/ and /Zu/
9:25 - 9:35 Verbalization
March 20 4B(6:08)
*Student teacher led
0:00 - 0:59 Group performance breathing
0:59 - 1:05 Verbalization
1:05 - 1:43 Group instrumental performance lip slur
1:43 - 1:59 Verbalization
1:59 - 2:06 Group instrumental performance lip slur
2:06 - 2:10 Verbalization
2:10 - 2:14 Group vocal performance lip trills of slur
2:14 - 2:19 Verbalization
2:19 - 2:26 Group instrumental performance lip slur
2:26 - 2:35 Group vocal performance lip trills of lip slur
2:35 - 2:50 Group vocal performance lip trills sol - fa - mi - re - do of slur
2:50 - 3:00 Verbalization
3:00 - 3:04 Group vocal performance hum sol - fa - mi - re - do of slur
3:04 - 3:14 Verbalization
3:14 - 3:31 Group instrumental performance lip slur
3:31 - 3:39 Verbalization
3:39 - 3:46 Group instrumental performance lip slur
3:46 - 3:48 Verbalization
3:48 - 3:53 Group vocal performance lip trills of slur
3:53 - 4:06 Group vocal performance lip trills of sol - fa - mi - re - do of slur
4:06 - 4:12 Verbalization
4:12 - 4:25 Group vocal performance hum sol - fa - mi - re - do of slur
4:25 - 4:46 Group vocal performance sing sol - fa - mi - re - do on /zi/ and /Zu/
4:46 - 4:58 Verbalization
4:58 - 5:04 Group instrumental performance lip slur
5:04 - 5:19 Group vocal performance hum lip slur
5:19 - 5:25 Group vocal performance hum sol - fa - mi - re - do of slur
5:25 - 5:35 Verbalization
5:35 - 5:57 Group vocal performance sing sol - fa - mi - re - do of slur on /zi/ and /Zu/
5:57 - 6:08 Verbalization
March 22 3B(8:19)
* Student teacher led
0:00 - 2:25 Group performance breathing with continual verbalization
2:25 - 2:46 Other
2:46 - 2:53 Verbalization
2:53 - 3:40 Group instrumental performance lip slur
3:40 - 3:54 Verbalization
3:54 - 4:00 Group instrumental performance lip slur
4:00 - 4:04 Verbalization
4:04 - 4:08 Group vocal performance lip trills of slur
4:08 - 4:17 Verbalization
4:17 - 4:23 Group instrumental performance lip slur
4:23 - 4:25 Verbalization
4:25 - 4:32 Group vocal performance lip trills of slur
4:32 - 4:35 Verbalization
4:35 - 4:50 Group vocal performance lip trills of sol - fa - mi - re - do of slur
4:50 - 4:51 Verbalization
4:51 - 4:56 Group vocal performance hum sol - fa - mi - re - do of slur
4:56 - 5:01 Verbalization
5:01 - 5:04 Section vocal performance hum sol - fa - mi - re - do of slur
5:04 - 5:10 Verbalization
5:10 - 5:18 Group instrumental performance lip slur
5:18 - 5:23 Verbalization
5:23 - 5:28 Group vocal performance hum lip slur
5:28 - 5:33 Group vocal performance hum sol - fa - mi - re - do of slur
5:33 - 5:37 Verbalization
5:37 - 5:59 Group vocal performance sing sol - fa - mi - re - do of slur on /zi/ and /zu/
5:59 - 6:08 Verbalization
6:08 - 6:13 Group instrumental performance lip slur
6:13 - 6:15 Verbalization
6:15 - 6:21 Group vocal performance hum slur
6:21 - 6:34 Group vocal performance hum sol - fa - mi - re - do of slur
6:34 - 6:45 Group vocal performance sing sol - fa - mi - re - do on /zi/ and /zu/
6:45 - 6:52 Verbalization
6:52 - 6:57 Group instrumental performance lip slur
6:57 - 7:07 Verbalization
7:07 - 7:12 Group instrumental performance lip slur
7:12 - 7:13 Verbalization
7:13 - 7:18 Group vocal performance hum slur
7:18 - 7:33 Group vocal performance sol - fa - mi - re - do
7:33 - 7:41 Verbalization
7:41 - 8:09 Group vocal performance sing sol - fa - mi - re - do of slur on /zi/ and /zu/
continual verbalization
8:09 - 8:19 Verbalization
March 22 4B (5:46)
*Student teacher led
0:00 - 0:09 Other
0:09 - 0:18 Verbalization
0:18 - 1:40 Group performance breathing
1:40 - 1:49 Verbalization
1:49 - 2:32 Group instrumental performance lip slur
2:32 - 2:37 Verbalization
2:37 - 2:45 Group instrumental performance lip slur
2:45 - 2:50 Group vocal performance lip trills on slur
2:50 - 2:57 Verbalization
2:57 - 3:03 Group instrumental performance lip slur
3:03 - 3:05 Verbalization
3:05 - 3:11 Group vocal performance lip trills on slur
3:11 - 3:17 Group vocal performance lip trills sol - fa - mi - re - do of slur
3:17 - 3:28 Group vocal performance hum sol - fa - mi - re - do of slur, continual verbalization
3:28 - 3:38 Group vocal performance sing sol - fa - mi - re - do on /zi/ and /zu/
3:38 - 3:43 Verbalization
3:43 - 3:53 Group instrumental performance lip slur
3:53 - 3:57 Group vocal performance lip trills of slur
3:57 - 4:03 Verbalization
4:03 - 4:08 Group instrumental performance lip slur
4:08 - 4:11 Verbalization
4:11 - 4:16 Group vocal performance lip trills of slur
4:16 - 4:21 Group vocal performance lip trills of sol - fa - mi - re - do of slur
4:21 - 4:33 Group vocal performance hum sol - fa - mi - re - do of slur
4:33 - 4:55 Group vocal performance sing sol - fa - mi - re - do of slur on /zi/ and /zu/
4:55 - 5:05 Verbalization
5:05 - 5:11 Group instrumental performance lip slur
5:11 - 5:15 Verbalization
5:15 - 5:20 Group vocal performance hum slur
5:20 - 5:26 Group vocal performance hum sol - fa - mi - re - do
5:26 - 5:37 Group vocal performance sing sol - fa - mi - re - do of slur on /zi/ and /zu/
5:37 - 5:46 Verbalization
April 2 3B (27:06)
0:00 - 0:35 Verbalization
0:35 - 0:50 Group performance breathing
0:50 - 1:16 Verbalization
1:16 - 1:28 Group vocal performance lip trills and continual verbalization
1:28 - 1:40 Verbalization
1:40 - 2:24 Group vocal performance lip trills and continual verbalization
2:24 - 3:44 Verbalization
3:44 - 4:42 Group instrumental performance lip slur and continual verbalization
4:42 - 4:54 Verbalization
4:54 - 5:00 Section instrumental performance lip slur
5:00 - 5:09 Verbalization
5:09 - 5:18 Group instrumental performance lip slur
5:18 - 5:43 Verbalization
5:43 - 5:50 Group instrumental performance lip slur
5:50 - 6:03 Verbalization and vocal model
6:03 - 6:10 Group vocal performance lip trills
6:10 - 6:21 Verbalization
6:21 - 6:40 Group vocal performance lip trills on sol - fa - mi - re - do of the slur
6:40 - 6:44 Verbalization
6:44 - 6:50 Group vocal performance hum sol - fa - mi - re - do of the slur
6:50 - 9:16 Verbalization and vocal model
9:16 - 9:24 Group instrumental performance lip slur
9:24 - 9:33 Group vocal performance hum sol - fa - mi - re - do with teacher vocal model accompaniment
9:33 - 9:45 Verbalization
9:45 - 9:51 Group vocal performance hum sol - fa - mi - re - do with teacher vocal model accompaniment
9:51 - 10:04 Verbalization
10:04 - 10:34 Group vocal performance sing sol - fa - mi - re - do on solfege syllables
10:34 - 10:50 Verbalization
10:50 - 10:54 Group vocal performance sing sol - fa - mi - re - do on solfege syllables
10:54 - 11:28 Verbalization
11:28 - 11:55 Group instrumental performance mini scale and tonic arpeggio
11:55 - 12:35 Verbalization and vocal model
12:35 - 12:59 Section instrumental performance mini scale and tonic arpeggio
12:59 - 13:33 Verbalization and other
13:33 - 13:49 Section instrumental performance mini scale
13:49 - 14:01 Verbalization and vocal model
14:01 - 14:11 Section instrumental performance tonic arpeggio
14:11 - 14:40 Section instrumental performance mini scale
14:40 - 14:46 Verbalization
14:46 - 14:56 Section instrumental performance tonic arpeggio
14:56 - 15:24 Verbalization and other
15:24 - 15:40 Group instrumental performance mini scale
15:40 - 16:57 Verbalization, vocal model
16:57 - 17:19 Section instrumental performance mini scale
17:19 - 17:40 Verbalization, addresses individual fingering issue
17:40 - 17:57 Group instrumental performance mini scale
17:57 - 18:05 Vocal model and Verbalization
18:05 - 18:14 Group instrumental performance on tonic arpeggio
18:14 - 18:56 Verbalization and vocal model
18:56 - 19:14 Group vocal performance lip trills of mini scale and tonic arpeggio
19:14 - 19:21 Verbalization, vocal model
19:21 - 19:25 Group vocal performance lip trills of tonic arpeggio
19:25 - 19:59 Verbalization, vocal model
19:59 - 20:02 Group vocal performance lip trills of tonic arpeggio
20:02 - 20:17 Verbalization, vocal model
20:17 - 20:23 Group vocal performance hum of tonic arpeggio
20:23 - 20:50 Verbalization and vocal model
20:50 - 21:07 Group vocal performance hum mini scale and tonic arpeggio
21:07 - 21:11 Vocal model
21:11 - 21:15 Group vocal performance hum tonic arpeggio
21:15 - 22:18 Verbalization and vocal model
22:41 - 23:06 Group vocal performance tonic arpeggio on /zi/
23:06 - 23:32 Verbalization and vocal model
23:32 - 23:45 Group vocal performance mini scale /zu/
23:45 - 23:48 Vocal model
23:48 - 23:52 Group vocal performance tonic arpeggio /zu/
23:52 - 23:56 Vocal model
23:56 - 24:14 Group vocal performance tonic arpeggio /zu/
24:14 - 25:42 Verbalization and vocal model
25:42 - 25:59 Group instrumental performance mini scale and tonic arpeggio
25:59 - 27:06 Verbalization
April 2 4B (37:01)
0:00 - 1:14 Verbalization and vocal model
1:14 - 1:26 Group performance breathing
1:26 - 1:41 Verbalization
1:41 - 1:56 Group performance breathing
1:56 - 2:09 Verbalization
2:09 - 2:20 Group performance breathing
2:20 - 2:34 Verbalization
2:34 - 2:48 Group performance breathing
2:48 - 4:05 Verbalization and vocal model
4:05 - 4:20 Group performance breathing
4:20 - 5:29 Verbalization and vocal model
5:29 - 6:30 Group vocal performance lip trills with continual verbalization
6:30 - 7:09 Other
7:09 - 8:04 Group instrumental performance lip slur with continual Verbalization
8:04 - 8:25 Verbalization and other
8:25 - 8:34 Section instrumental performance woodwinds lip slur
8:34 - 8:49 Other
8:49 - 8:57 Section instrumental performance woodwinds lip slur
8:57 - 9:09 Other
9:09 - 9:18 Group instrumental performance lip slur
9:18 - 9:28 Verbalization
9:28 - 9:35 Group instrumental performance lip slur
9:35 - 9:53 Verbalization
9:53 - 10:01 Group instrumental performance lip slur
10:01 - 10:11 Verbalization and vocal model
10:11 - 10:29 Group vocal performance lip trills of slur
10:29 - 10:56 Verbalization
10:56 - 11:02 Group vocal performance lip trills of slur
11:02 - 11:07 Verbalization
11:07 - 11:12 Group vocal performance lip trills on sol - fa - mi - re - do of slur
11:12 - 11:20 Verbalization
11:20 - 11:26 Group vocal performance hum sol - fa - mi - re - do of slur
11:26 - 11:34 Verbalization
11:34 - 11:41 Group instrumental performance lip slur
11:41 - 11:52 Verbalization and vocal model
11:52 - 12:09 Group vocal performance hum sol - fa - mi - re - do of slur (2X)
12:09 - 14:51 Verbalization and vocal model
14:51 - 15:40 Group practice of naming solfege syllables and Verbalization
15:40 - 15:47 Group instrumental performance lip slur
15:47 - 15:50 Verbalization
15:50 - 16:06 Group vocal performance hum sol - fa - mi - re - do while teacher provides vocal model on solfege
16:06 - 16:20 Verbalization
16:20 - 16:25 Group vocal performance sing sol - fa - mi - re - do on solfege
16:25 - 16:34 Verbalization
16:34 - 16:39 Group vocal performance sing sol - fa - mi - re - do on solfege
16:39 - 18:04 Verbalization, vocal model
18:04 - 18:09 Group vocal performance sing sol - fa - mi - re - do on solfege
18:09 - 18:41 Verbalization
18:41 - 18:46 Group vocal performance sing sol - fa - mi - re - do on solfege
18:46 - 19:13 Verbalization
19:13 - 19:18 Group vocal performance sing sol - fa - mi - re - do on solfege
19:18 - 20:24 Verbalization and other
20:24 - 21:36 Group instrumental performance mini - scale and tonic arpeggio continual verbalization
21:36 - 22:22 Verbalization vocal model
22:22 - 22:36 Section instrumental performance mini - scale
22:36 - 22:46 Vocal model
22:46 - 23:10 Section instrumental performance tonic - arpeggio
23:10 - 23:35 Verbalization, vocal model
23:35 - 23:49 Section instrumental performance mini - scale
23:49 - 24:15 Verbalization, vocal model
24:15 - 24:30 Section instrumental performance mini - scale
24:30 - 24:57 Verbalization, vocal model, other
24:57 - 25:05 Section instrumental performance tonic - arpeggio
25:05 - 25:48 Other
25:48 - 25:54 Group instrumental performance mini - scale
25:54 - 26:02 Verbalization
26:02 - 26:17 Group instrumental performance mini - scale
26:17 - 26:31 Verbalization, vocal model
26:31 - 26:52 Group instrumental performance tonic - arpeggio
26:52 - 28:10 Verbalization and vocal model
28:10 - 28:29 Group vocal performance lip trills mini - scale
28:29 - 29:14 Verbalization and vocal model
29:14 - 29:30 Group vocal performance hum mini - scale
29:30 - 29:37 Verbalization, vocal model
29:37 - 29:40 Group vocal performance hum tonic arpeggio
29:40 - 29:56 Verbalization, vocal model
29:56 - 29:59 Group vocal performance hum tonic arpeggio
29:59 - 30:07 Verbalization and vocal model
30:07 - 30:10 Group vocal performance hum tonic arpeggio
30:10 - 30:28 Verbalization and vocal model
30:28 - 30:36 Group vocal performance hum mini - scale and tonic arpeggio
30:36 - 31:27 Verbalization and vocal model
31:27 - 31:36 Group vocal performance hum mini - scale and tonic arpeggio
31:36 - 32:36 Verbalization, vocal model
32:36 - 32:53 Group vocal performance sing mini - scale and tonic arpeggio on /zu/
32:53 - 33:10 Verbalization
33:10 - 33:25 Group vocal performance sing mini - scale and tonic arpeggio on /zi/
33:25 - 34:10 Verbalization
34:10 - 34:25 Group vocal performance sing mini - scale and tonic arpeggio on /zi/
34:25 - 34:31 Verbalization, vocal model
34:31 - 34:44 Group vocal performance sing tonic arpeggio on /zi/
34:44 - 35:33 Verbalization and practice assignments
35:33 - 37:01 Verbalization
April 4 3B (13:29)
0:00 - 0:09 Verbalization
0:09 - 0:38 Group performance breathing
0:38 - 0:54 Verbalization
0:54 - 1:08 Group performance breathing
1:08 - 1:34 Verbalization
1:34 - 1:50 Group performance breathing
1:50 - 2:20 Verbalization
2:20 - 3:01 Group vocal performance lip trills
3:01 - 3:31 Verbalization and other
3:31 - 4:21 Group instrumental performance lip slur
4:21 - 4:30 Verbalization
4:30 - 4:36 Section instrumental performance lip slur
4:36 - 4:42 Verbalization
4:42 - 4:49 Group instrumental performance lip slur
4:49 - 5:03 Verbalization
5:03 - 5:10 Group instrumental performance lip slur
5:10 - 5:22 Verbalization and vocal model
5:22 - 5:27 Group vocal performance hum the slur
5:27 - 5:45 Verbalization and vocal model
5:45 - 5:52 Group vocal performance hum the slur
5:52 - 6:00 Verbalization and vocal model
6:00 - 6:04 Group vocal performance hum sol - fa - mi - re - do of slur
6:04 - 6:26 Verbalization and vocal model
6:26 - 6:31 Group vocal performance sing sol - fa - mi - re - do of slur on solfege syllables
6:31 - 6:44 Verbalization
6:44 - 6:48 Group vocal performance sing sol - fa - mi - re - do of slur on solfege syllables
6:48 - 7:14 Verbalization
7:14 - 7:19 Group vocal performance sing sol - fa - mi - re - do of slur on solfege syllables
7:19 - 7:28 Verbalization
7:28 - 7:41 Intercom interruption
7:41 - 7:47 Group vocal performance sing sol - fa - mi - re - do of slur on solfege syllables
7:47 - 8:18 Verbalization and other
8:18 - 8:34 Group instrumental performance mini scale and tonic arpeggio
8:34 - 8:44 Verbalization and other
8:44 - 9:06 Group instrumental performance mini scale and tonic arpeggio
9:06 - 9:41 Verbalization, addresses discipline issue
9:41 - 10:03 Group instrumental performance mini scale and tonic arpeggio
10:03 - 10:10 Verbalization and vocal model
10:10 - 10:34 Group instrumental performance tonic arpeggio
10:34 - 11:28 Verbalization, other, vocal model
11:28 - 11:38 Group vocal performance lip trills mini scale and tonic arpeggio
11:38 - 12:21 Verbalization, Verbalization and vocal model
12:21 - 12:30 Group vocal performance hum mini scale and tonic arpeggio
12:30 - 12:58 Verbalization and vocal model
13:24 - 13:29 Verbalization

April 4 4B (Same as 3B but no recording available)
April 4 Afterschool rehearsal (8:53)
0:00 - 0:21 Group instrumental performance mini scale and tonic arpeggio
0:21 - 1:33 Verbalization and vocal model
1:33 - 1:52 Group instrumental performance mini scale and tonic arpeggio
1:52 - 2:25 Verbalization and vocal model
2:25 - 2:34 Group vocal performance lip trills mini scale and tonic arpeggio
2:34 - 3:06 Verbalization
3:06 - 3:15 Group vocal performance lip trills mini scale and tonic arpeggio
3:15 - 3:43 Verbalization
3:43 - 3:52 Group vocal performance hum mini scale and tonic arpeggio
3:52 - 4:13 Verbalization and vocal model
4:13 - 4:22 Group vocal performance hum mini scale and tonic arpeggio
4:22 - 4:31 Verbalization
4:31 - 4:39 Group vocal performance sing /zu/ on mini scale and tonic arpeggio
4:39 - 4:50 Verbalization and vocal model
4:50 - 5:14 Group vocal performance sing /zu/ and /zi/ on mini scale and tonic arpeggio
5:14 - 6:24 Verbalization, vocal model and solfege syllable practice
6:24 - 6:35 Group vocal performance sing solfege syllables on mini scale and tonic arpeggio
6:35 - 7:26 Verbalization and vocal model
7:26 - 7:36 Group vocal performance sing solfege syllables on mini scale and tonic arpeggio
7:36 - 8:04 Verbalization and solfege syllable practice
8:04 - 8:27 Group vocal performance sing solfege syllables on tonic arpeggio
8:27 - 8:36 Verbalization
8:36 - 8:44 Group vocal performance sing solfege syllables on mini scale and tonic arpeggio
8:44 - 8:53 Verbalization
Appendix D
Interview and Post-Test Procedures

*Because students will be taking the posttest during their usual rehearsal time, minimal warm up time will be needed.

1. Welcome and interview

2. Vocal warm up
   a. Researcher: “Will you do some lip trills with me?”
   b. Lip Trills performed 10-20 seconds

3. Voice change/voice range assessment
   a. Participants were asked to match pitch to the piano, beginning on D above middle C. This note is cited as the lowest note of non-singer’s comfortable singing range. (Gordon, 1993, p. 218)
   b. Once matched to this note, students were asked to match chromatically ascending notes until they are no longer comfortable, followed by chromatically descending notes. The participants’ comfortable singing range will be documented.
   c. In the pilot test, students were asked to match pitch in a variety of octaves based on the instrument they were playing. (If they played an instrument whose sounding range was not set comfortably in Bb4, they were asked to match in the octave in which they played.) Given the pilot test participants’ inability to match pitch in any octave, these task was eliminated in the current study.

4. Instrumental Warm up
   a. Participants played through lip slurs on p. 6 of their band books.

5. Note check
   a. Participants named, fingered, and played (one time) the notes included in the 3 note ascending and descending sequences.

6. Instrument tuning

7. Post – Test begins
   a. Students asked to listen to the 3-note sequence
      i. “Make yourself sound as much like the piano as you can. If you can’t sing as high as the piano, sing in an octave that is comfortable for you.”
   b. Students listen then play; listen to a reference pitch, Listen sing A, play; listen, sing B, play.
## Appendix E

### Selected Pitch Sequences and Tuning Notes

#### Selected Pitch Sequences

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Note Selection</th>
<th>Typical Intonation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flute</td>
<td>B4-C#5-D5</td>
<td>C# is typically sharp.</td>
</tr>
<tr>
<td></td>
<td>D5-C#5-B4</td>
<td></td>
</tr>
<tr>
<td>Clarinets*</td>
<td>F(Eb4)-G(F4)-A(G4)</td>
<td>These are throat register notes. All are typically sharp.</td>
</tr>
<tr>
<td></td>
<td>A(G4)-G(F4)-F(Eb4)</td>
<td></td>
</tr>
<tr>
<td>Saxophones*</td>
<td>C (Eb 4)-D (F4)- E (G4)</td>
<td>D is typically sharp.</td>
</tr>
<tr>
<td></td>
<td>E (G4)-D (F4) – C (Eb4)</td>
<td></td>
</tr>
<tr>
<td>Trumpets*</td>
<td>C (Bb3)-D (C4)-E (D4)</td>
<td>D is typically sharp.</td>
</tr>
<tr>
<td></td>
<td>E (D4)-D (C4)-C (Bb3)</td>
<td></td>
</tr>
<tr>
<td>Trombones</td>
<td>F3-G3-A3</td>
<td>G is typically a difficult note for the trombone players to find.</td>
</tr>
<tr>
<td></td>
<td>A3-G3-F3</td>
<td></td>
</tr>
<tr>
<td>Tubas</td>
<td>Bb1-C2-D2</td>
<td>C is typically sharp</td>
</tr>
<tr>
<td></td>
<td>D2-C2-Bb1</td>
<td></td>
</tr>
</tbody>
</table>

*Parenthesis designate sounding pitches

#### Selected Tuning Notes

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flute</td>
<td>F and Bb</td>
</tr>
<tr>
<td>Clarinets</td>
<td>C</td>
</tr>
<tr>
<td>Saxes</td>
<td>F#</td>
</tr>
<tr>
<td>Trumpet</td>
<td>C and G</td>
</tr>
<tr>
<td>Trombone</td>
<td>F and Bb</td>
</tr>
<tr>
<td>Tuba</td>
<td>F and Bb</td>
</tr>
</tbody>
</table>
Appendix F-1
Student Participant Interview Guide

I. Participant description
   Gender: M F
   1. What grade are you in?

   2. What is your major instrument?

   3. How many years have you played this instrument?

   4. How many years have you been in band? All at this school?

   5. Have you ever taken lessons on this or any instrument? How long?

II. Singing Experience and Perception

   1. Do you like to sing? How often do you sing? When do you sing? Where do you sing? What do you like to sing?

   2. Think back to the first day that your teacher asked to sing in band class. If you had to pick one word to describe that day, what would it be? . . . Tell me a little bit more about that. Why that word?

   3. And now, 6 weeks later, if you had to pick one word to describe it, what would that word be? . . . Tell me a little bit more about that. Why that word?

   4. Have you noticed changes in your singing or playing as a result of the vocal instruction?

   5. Have you noticed differences in the way you listen when you play your instrument now that you sing in band?

   6. Were the vocal exercises you did in class and the feedback your teacher gave you helpful? What was the most helpful?

   7. Is there anything else you would like to add?
Appendix F-2
Student Participant Interview Transcriptions

*Pilot Participants

Instrument ID: Percussionist 1
Grade: 8th
Years Playing Current School Instrument: 3
Other School Instruments: N/A
Years Playing Other School Instrument: N/A
All School Band Experience at Glasgow? Yes
Private Lessons on School Instrument? No
Years of Private Instruction: 0
Outside Instruments: N/A
Outside Instrument Private Lessons: Yes
Years of Private Lesson Instruction: N/A
Choir Experience: No
Where: N/A
Choir Experience in Years: 1 semester

Have you ever sung before this year?
Not until um, she um, started doing the um, in um

In class?
Yes

Do you like to sing?
Shakes head ‘no’

Not really?
Shakes head harder

Do you ever sing in the shower, in the car, in your bedroom?
Yea, yea, in the shower but not in front of people.

Why do you think you like it more at home than at school?
Because, um, probably because I’m by myself, and not everybody around.

If you had to use one word to describe it (singing) at school, what word would you use?
(Long pause) Ummmm, I don’t want to say embarrassing, but like (Long pause). If I had to use a word to describe singing at school?

Yes
Well, if you could sing in front of an audience or whatever, you are pretty confident, but . . .

So maybe you are just not as confident singing?
Smiles and shakes head no, very emphatically

Is it fun to sing at home
Yes

Do you feel like you've gotten better with singing over the semester?
Nods head positively

The very first day that you had to sing in class, what did you think?
What are we doing?!

And now when you sing in class, is it easier?
Yes, it is easier.
**A Zu, then Zi
Female

**Do you like to sing?**
*I can, it is just I can’t.*  **Laughs**

**So, is it new for you?**
Yea, okay.  **(Nods)**

**Do you sing at home?  Like in the shower or in the car or in your room?**
*Oh, yea*

**Do you have fun singing in those places?**
*Not really.  I mean it’s just like doing homework.*

**Oh, I’m not talking about when you’re practicing.  I’m talking about when you’re, say, listening to the radio and you are by yourself.*
*Oh, yea.*

**Do you ever sing when you’re by yourself?**
*Yes*

**It’s fun then, right?**
*Yes.  (Big smile and head nod)*

**So, tell me about the first time your teacher asked you to sing in class.  What was your thought process?**
*I was like ‘Oh My Gosh!’ , because like, my Mom says that sometimes I can ,like, have a low voice, because she was in all parish and in choir. She says I’m a good singer, but I don’t think so. So I was, like, “Hoo I ma be all outta tune and everything!”  **(Laughs and shakes her head)***
And now when you sing in class, do you feel more comfortable with it?
No (Laughs)

Do you feel like you’ve gotten better over the last 6 weeks?
Yea, like, uh, I know how everybody else sings and I know where I am.

Well, that’s important. Good. Very good. If you had to pick one word to describe singing at home and by yourself, what would it be... when you’re just jamming out by yourself.
Um a past-time? (Laughs and shrugs shoulders)

Okay. And if you picked one word to describe it in school, what would it be?
Ugh. (Pauses and looks around) Awkward.

Okay. Um. And do you think that singing has changed the way you listen in band class when you play? Do you notice different things now?
Yea, when we were doin the sol fa (pauses) thingy and uh, like, how we were, like, uh and I had to play with um beginning band yesterday because my teacher wasn’t there and they were doing the same thing and we had to play mi and we would sing and play it again and sing and play it and it liked help me. I didn’t know what note we were on but it helped me find it.

Have you noticed a difference in your playing since you’ve been singing?
I guess like, uh, when we were playing uh Incantation and Ritual (repeated it) the other day, Laura decided to oh, uh, tune the clarinets so that was what we were doing. Yea and uh, like, my teacher was like ‘Yay! y’all are in tune’ and I was like ‘oh, okay.’

Do you think singing might have helped you with that?
Yea (Big head nod)

Well, very good. We are going to get started with the next portion of this activity.
Instrument ID: Trombone 1
Grade: 7th
Years Playing Current School Instrument: 4
Other School Instruments: No
Years Playing Other School Instrument: 0
All School Band Experience at Glasgow? No
Private Lessons on School Instrument? No
Years of Private Instruction: 0
Outside Instruments: N/A
Outside Instrument Private Lessons: N/A
Years of Private Lesson Instruction: N/A
Choir Experience: No
Where: N/A
Choir Experience in Years: 0

**A Zi, then Zu
Male

Do you like to sing?
(Laughs) No ma’am.

Do you like to sing at home? Like in the shower or in the car or in your bedroom when nobody is around? Maybe sing along with the radio?
No. I don’t, I just don’t sing.

You don’t sing at all?
Nope (shakes head)

Okay. So tell me about the very first day your teacher had you sing in class. What were you thinking?
(Pauses) I was thinking it was kind of weird because we were in band class, not in choir. Why would we be singing in band?

And have those thoughts changed? Do you understand why your teacher has you sing in band now?
(Nods head)

What do you think about singing now?
That it helps me get in tune and stuff.

Can you tell me how it helps you?
Well, you can. Well you’re already, like, if you sing you can hear the note in your head and, like, know what to play before you do anything.

That’s a really good answer. If you had to pick one word to describe singing on the first day you sang in band class, what would it be?
(Laughs) Bad.

Okay. If you had to pick one word to describe it now?
Helpful

I like your answers. That’s pretty cool. We are going to move onto the next portion.
**D Zu, Zi
Female

Did you ever sing before you started singing in band class this year?
(Laughs) No

What about at home, like in the shower or in your room or in the car when nobody is around or when you are with your friends?
(Laughs) Um, kind of.

Kind of. OK. And if you had to pick one word to describe the way you sing when you are in that setting, at home or with your friends, how would you describe it?
Not very good (Laugh)

Not very good? But is it fun?
Yea. (Smiles)

Yea? Ok. The first day that your teacher had you sing in class, the very first day, what did you think?
(Shrugs shoulders and rolls eyes.) It was okay.

It was okay? Can you tell me a little bit more about that?
(Smiles) Um, it was just awkward.

Yea, so that might be the word you use to describe that day?
(Nods)

Okay, so now 6 weeks later, now that you’ve been singing in class how do you feel about it?
(Shrugs and pauses) I feel fine with it.
You feel fine with it? Is it easier?
Yea

Did the feedback your teacher gave you and the instructions she gave you, did that help you to feel more comfortable with it?
(Nods)

How would you say it has affected the way you play? Do you notice a difference?
Yea

Can you tell me a little bit about that?
I can play longer?

Really? That’s interesting. Can you say that again a little bit louder please so that we can make sure the audio recording picks you up?
I can play louder (laughs), I mean longer.

(Researcher adjusts microphone)

So do you feel pretty comfortable with singing now?
Umhm (nods)

If you had to pick one word to describe singing now, how would you describe it?
Still awkward. (Laughs)

Still awkward? Ok. (Laughs) Is it a little less awkward?
Yes

Okay, well we move onto the next thing.
Instrument ID: Clarinet 2
Grade: 8th
Years Playing Current School Instrument: 3
Other School Instruments: N/A
Years Playing Other School Instrument: N/A
All School Band Experience at Glasgow? No
Private Lessons on School Instrument? Yes
Years of Private Instruction: 1 semester
Outside Instruments: N/A
Outside Instrument Private Lessons: N/A
Years of Private Lesson Instruction: N/A
Choir Experience: No
Where: N/A
Choir Experience in Years: 0

**D Zi, then Zu
Female

Do you like to sing?
(Smiles and shakes head no) no

Do you ever sing at home in the shower or in your bedroom when nobody else is around?
No. (Smiles) I don’t really sing at all

You don’t sing at all? That’s okay. (Smiles) So, tell me a little about singing in class this semester. Tell me a little bit about your experience.
Well (pauses)

Speak up so the microphone on that can hear you.
Okay. You mean, like what we did?

Well tell me about the very first day of class when your teacher asked you to sing.
Well, we just buzzed our lips for a while and then we started singing. We would sing like one pitch first and we would just do it on /zu/ and then after we did that for awhile we started doing it like on the ‘do re mi’ and all those different ones and we started changing pitches when we did it.

So tell me on the first day, or the first week or so, if you had to pick one word to describe it what it was like, what would that word be?
(Smiles and laughs softly) Hard.

Okay. And if you had to pick one word now, what would that word be?
Um. . . Easier.
Do you feel like it has changed the way you sing? Do you feel like you’ve gotten better?
Yes. (Smiles) I understand, like, the different pitches now. (Moves hand up and down)

Can you explain that a little bit more for me? How do you know you understand?
Like, I could play my instrument on pitch or whatever, but I never really understood how to make my voice at different pitches. And it is easier now.

Do you think it has affected the way you play?
I think like, our, yea, as a class all of us know, understand, like, being on the same pitch and working together to make one pitch kind of. (Draws a big circle with her arms and brings hands together in front of her. Scrunches up eyes and cocks head to the side. Pauses)

I think that makes sense. Cool. So, do you think that you will sing more now?
Um, well, I don’t like want to be in choir or anything, ever, but its easier to sing now.

Well good. We are going to move on to the next part, but I’ve got to ask you one more thing. Did the training your teacher gave you, the words she gave you and the way you practiced it, did that help to make singing easier?
Yes

How so? Can you give me an example?
Well, like, before, I kind of knew what notes were but I didn’t really know that much about different pitches and like how sharp and flat things can be. And so, I understand now that there is like one pitch that’s right, but that you can be sharper (hands up) or flatter (hands down below her waist) and you can get closer to it.

Can you hear that now?
Yea. Well, better than I was.

Well learning is the most important thing so very cool. Is there anything you would like to add?
No. (Smiles)

Okay, well we are going to move onto the next portion.
Instrument ID: Clarinet 3
Grade: 8th
Years Playing Current School Instrument: 2
Other School Instruments: N/A
Years Playing Other School Instrument: N/A
All School Band Experience at Glasgow? Yes
Private Lessons on School Instrument? No
Years of Private Instruction: 0
Outside Instruments: N/A
Outside Instrument Private Lessons: N/A
Years of Private Lesson Instruction: N/A
Choir Experience: No
Where: N/A
Choir Experience in Years: 0

**A Zu, then Zi
Female

Have you ever been in choir?
No. I don’t sing very well.

Is that why you never joined choir, because you don’t think you sing well?
Nods

Well, do you like to sing?
Not really (Laughs)

Well, do you sing at home in the shower, in your room, in the car?
No

Do you sing with your friends?
Not really. (Laughs)

So, having never really sung before the first day in class when your teacher asked you to start singing, what were you thinking?
Ugghhh. . . That I would sound pretty bad, like too low.

If you had to pick one word to describe what it felt like on that day what would you pick?
Um. (Pauses) I have no idea.

Confusing? Hard? I’m going off words you gave since you said you were afraid you were going to sound bad?
I guess it was just a little confusing.

Have your thoughts changing about singing since that first day?
No.

No? Ok. So, if you had to pick one word to describe it now, how would you describe it?
*Um, it is still a little hard because she asks us to hit the high notes and I can’t really.*

So, you feel good with the low notes but have trouble with the high notes?
*(Nods)*

*Um, have you noticed any changes in the way you sing or the way you play?*
*Um, I play a little better but my singing hasn’t changed.*

But you’ve noticed a difference in the way you play?
*(Nods)*

*Well cool. That’s the whole goal. Have you noticed a difference in the way you listen? Are you able to hear things differently now that you sing?*
*Not really*

*Is it helpful? Is the feedback your teacher gives you helping you to understand?*
*(Nods)*

*Is there anything you would like to add? Anything else you want to tell me about singing?*
*No. *(Laughs and rolls her eyes.)**

Okay. Well we are going to move onto the next part.
**A Zi, then Zu**

Male

Do you like to sing?

*Like, sometimes*

Where do you like to sing?

*By myself when I am secluded by myself*

So, at home in your room in a car or something. Do you ever sing when you are with your friends?

*Sometimes*

If you had to pick one word to describe when you are singing like that, when you are singing by yourself or when you are with your friends, what word would you pick?

*Hmm. (Pauses and smiles) Cool.*

Okay. First day of class when your teacher had you sing in class, what did you think? If you had to pick a word to describe that day, what would it be?

*Okay*

Why ‘Okay’?

*Because it was kinda tough trying to get, like, the vocal exercises, to get 'em correct, to ugh sing them the proper way.*

If you had to pick one word for now, 6 weeks later, what word would it be?

*Awesome*

Awesome? So, you like it. Very cool. Tell me about that. Why do you think that it is awesome?
Because now, like, everybody’s voice has, like, developed. And, like, we sing a whole lot better as a group.

Yea? Do you feel like you play better?
(Nods and smiles)

Why do you think?
Because like, now, like our teacher says now, I can control my air better when I’m blowing into my horn.

So it helped a lot with your air?
Yes

Do you listen differently now when you are playing?
(Nods)

Can you describe how you listen now vs. before you were singing?
Um. Like, more, like closely. Like, to where I can like listen and like play the exact same notes.

So, you feel like you can listen and play the same note? That’s very cool. I like your answers. You have some good answers. All answers are good, but I just learned something from you.

Um, let’s see, do you feel like the training in class, doing it in class, helped you to become a better singer?
Yes ma’am.

Is there anything else you would like to add or tell me about?
Not really

Okay well we are going to move onto the next portion.
**Instrument ID:** Clarinet 4  
**Grade:** 7th  
**Years Playing Current School Instrument:** 2  
**Other School Instruments:** N/A  
**Years Playing Other School Instrument:** N/A  
**All School Band Experience at Glasgow?** Yes  
**Private Lessons on School Instrument?** No  
**Years of Private Instruction:** 0  
**Outside Instruments:** N/A  
**Outside Instrument Private Lessons:** N/A  
**Years of Private Lesson Instruction:** N/A  
**Choir Experience:** No  
**Where:** N/A  
**Choir Experience in Years:** 0  

**D, Zu, then Zi**  
**Male**

Do you sing outside of band class? Like at home, in the car, with your friends?  
*In the car sometimes and at church.*

Yea? At church in the congregation?  
*Yea*  

Do you like singing?  
*Yea*  

Tell me about when you sing. How does it make you feel?  
*Uh, I don’t know. I just enjoy it I guess. (Smiles)*

The first day that your teacher started singing in class, if you had to describe how it went with one word how would you describe how you felt?  
*It was fun.*

It was fun on the very first day? Cool. And tell me about what you liked about it.  
*Um, I don’t know. It was something new. So, it was fun to do.*

Cool. If you had to think of one word now, what word would you use?  
*Um (Long Pause) Fun, I guess. I mean.*

Still fun?  
*Yea (Smiles)*

Has it affected the way that you play or the way that you sing, this training that you’ve received in the last 6 weeks?  
*Yea, I think.*
Can you tell me about what you think? There is no right or wrong answer?
Like, we’re doin all the pitch things and its helped me like play the notes better and such.

How so do you think?
I don’t know.

You just feel like you’re doing it all better?
(Smiles and nods)

And the training that you got from your teacher, did it help you to sing better?
Yes

Was there anything that was hard for you that she helped you with?
Well, it was just singing, so it was just practicing it.

Okay we are going to move onto the next thing.
**D Zi, then Zu
Male

Do you sing anywhere outside of school? Like, in your room or in the car?
I don’t know. Maybe. (Smiles and looks down and laughs). Maybe in the shower.

If you had to pick a word to describe singing outside of school, one word to describe it what would it be?
(Pauses and looks around. Shrugs shoulders). Um, like creative.

Creative?
Yea

The very first day that your teacher asked you to sing in class, what did you think?
I mean, I could see why she would do that because, you know, if we’re gonna play instruments it’ll help me with my pitch and stuff.

So, were you excited to do it the first day, or just interested?
Hmm. I guess just interested.

If you had to pick one word to describe it for that first day what would that word be?
Strange (Laughs)

Strange? (Laughs) Ok. And now, 6 weeks later what would the word be?
I mean, I guess it was helpful.

Do you feel like you’ve gotten better at singing?
Umhmm. Yea.

Do you feel like you’ve gotten better at playing?
Would you say that there is difference now that you sing in the way that you play?
Yea

Why don’t you tell me a little bit about it.
Well, I guess I could, like, play a little better now. I guess I can control my pitch a little better now.

How do you think you do that?
Um, by, to, I don’t know how to, like, describe it. You, um (Waves hand in front of face). Like (Pauses)

Well, do you think you hear things better?
Yea. (Sighs and smiles)

Well cool. Is there anything else you would like to add?
Um, no, I’m good.

You’re good? Ok, well I have one more question for you. Do you feel like the training you got helped you through the process?
Nods

Do you feel like the step by step stuff we did in class helped you to be a better singer?
Yea.

How so?
Well, do you mean, like, the breathing exercises?

Yes, we started with breathing and then the lip trills, etc.
The breathing exercises kind of helped me control my air flow and um, and like control my air so that I don’t run out of air at a part. So, yea, ugh. (Pauses)

Anything else?
Nope.

Okay we are going to move onto to lip trills. Will you do some lip trills with me?
Instrument ID: Trombone 2
Grade: 7th
Years Playing Current School Instrument: 1
Other School Instruments: Trumpet
Years Playing Other School Instrument: 1
All School Band Experience at Glasgow? Yes
Private Lessons on School Instrument? No
Years of Private Instruction: 0
Outside Instruments: N/A
Outside Instrument Private Lessons: N/A
Years of Private Lesson Instruction: N/A
Choir Experience: Yes
Where: N/A
Choir Experience in Years: 2 or 3 years

**A Zu, then Zi
Female
*C Could not match pitch. Could not play the correct notes on the horn.

Do you like to sing?
Not really?

Do you ever sing at home when you are by yourself in the room on in the shower when nobody is around, or along with the radio?
(Nods) I do that. But I don’t really, like, sing, like, notes. Because I don’t know how.

You just sing along with the radio?
Yes ma’am.

Okay, so on the very first day of band when your teacher started to teach you guys how to sing, if you had to pick word to describe what it felt like, what would you say?
Interesting

Interesting? Tell me, why that word?
I just had never done that kind of stuff before. I never really, I mean I don’t really, I never really done music before, before this, so it was kind of different for me.

And now 6 weeks later how would you describe it?
Now I’m more used to it. It’s fun now that I know how to do it.

It’s fun now that you know how to do it! That’s cool. (Smiles) And, how would you describe the last six weeks? Tell me a little bit about singing. Has it changed the way you play or the way you listen?
I can listen to, like, how I sound better, like my tune and my pitch when I’m playing. When I’m doin lip slurs I know how to listen to see if I am in tune more.
Do you ever make adjustments when you are listening to see if you are in tune?
Yes ma’am.

You do? Can you tell me how you make adjustments? Can you tell when you are too high or too low.
Yes. I can blow more air or less air to change it.

Okay, well the first thing we are going to do now is some lip trills.
Instrument ID: Flute 2
Grade: 8th
Years Playing Current School Instrument: 3 years
Other School Instruments: N/A
Years Playing Other School Instrument: 0
All School Band Experience at Glasgow? Yes
Private Lessons on School Instrument?
Years of Private Instruction:
Outside Instruments: Piano, Drums
Outside Instrument Private Lessons: Regular private lessons with her dad
Years of Private Lesson Instruction:
Choir Experience: Yes
Where: Church
Choir Experience in Years: 1 month

**A Zi, then Zu
Female

Do you like to sing?
Yea, I guess so. I mean, I don’t know if I’m any good, but. (Pauses)

Well, when do you like to sing? When do you have fun singing?
Just, um, at home. (Pauses) I was in a musical.

You were in a musical? What musical were you in?
Beauty and the Beast

Very cool! And you had to sing in that obviously?
Yes

And did you enjoy it?
Umhuh. (Nods)

If you had to describe the very first day of singing in band class, think back to that very first day, what word would you use to describe it?
Funny. (says it slowly, hesitantly, then laughs)

Funny? Can you elaborate a little bit on that? Tell me a little bit more about why it was funny.
Well, I mean nobody could take it seriously. But our tone did get better, actually.

Okay. And now 6 weeks later when you sing in band class what word would you use to describe it?
Improved
I like that word. Improved. Ok. Tell me a little bit about the six weeks of training. What do you think you’ve learned? How do you think you listen differently now than before?

Uh, I think I pay more attention to the different instruments around me probably.

Do you hear a difference in yourself in the way that you play, now that you sing?

Well, a little bit.

Yea? And can you describe it?

Ugh. I just think that I’m better in tune with, in tune in general.

Okay. Is there anything else you would like to add that I haven’t asked you about? Things you’ve learned, enjoyed or things that were difficult.

Not really.

Okay, well we are going to move onto to lip trills.

* END OF PILOT PARTICIPANTS
**D Zu, then Zi
Female

**Do you like to sing?**
*Not really.*

**Do you sing at home or with your friends or in the shower or when no one is around or in the car?**
*(Strongly shakes head no)*

**So you never sing?**
*Well, maybe in the car sometimes.*

**If you had to describe what it feels like when you sing in the car, what does it feel like? Give me one word.**
*(Long pause and looks around)*

**Remember, there are no right or wrong answers.**
*Okay, well I think it sounds bad.*

**Okay. The very first day your teacher started teaching you this new singing technique, if you had to describe it in one word how would you describe it?**
*Weird. (Laughs)*

**And now 6 weeks later, what word would you use to describe it?**
*Well I’m sort of nervous to come here today because I just don’t sing very well.*

**Well, for this there is no right. There is no wrong. There is no pass and there is no fail. And you guys are all band students so I just want you to sing with as good and strong of a voice as you can and you can’t do anything wrong. I promise you. But in*
band class, think to band class, the first day you said was weird. How would you describe band class now?
I think I improved a bit.

Can you tell me a little bit about that?
Well, I started singing higher. (Big smile)

So, it has stretched your range?
(Nods)

Nice! Do you think it has helped you play at all?
I think it helped me play a bit. Like I can play higher notes.

Do you think it has changed the way you listen?
Not really.

Okay. And let me see if there are any other questions I’d like to ask you. Do you feel like the training your teacher gave you helped you to sing better? She gave you tips and tools and ideas.
Sort of.

Tell me a little bit about that.
Ugh, well, she gave me some techniques to sing, like the lip slurs, and it helped. Sort of.

Is there anything else you would like to add?
No ma’am.
**Instrument ID:** Trumpet 2

**Grade:** 7th

**Years Playing Current School Instrument:** 2

**Other School Instruments:** N/A

**Years Playing Other School Instrument:** N/A

**All School Band Experience at Glasgow?** Yes

**Private Lessons on School Instrument?** No

**Years of Private Instruction:** 0

**Outside Instruments:** N/A

**Outside Instrument Private Lessons:** N/A

**Years of Private Lesson Instruction:** N/A

**Choir Experience:** No

**Where:** N/A

**Choir Experience in Years:** 0

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**Do you like to sing?**

*Kind of. I’m not a very good singer*

---

**Where do you like to sing?**

*Church, mainly.*

---

**Do you sing at home or with your friends?**

*Yea*

---

**If you had to pick one word to describe singing outside of school, what would it be?**

*(Long pause) Um. Not that great. Because we don’t really have good voices but we just do it.*

---

**Do you have fun though?**

*Yes, we enjoy it.*

---

**If you had to pick one word for the very first day your teacher asked you to do this new type of singing in class, what would that word be?**

*Exciting*

---

**Can you tell me a little more about that?**

*Because she is going to fix our tone and how we play the music and my tone will be better than it was before.*

---

**So exciting is what you were thinking on the very first day. You’ve been doing it for 6 weeks now. What do you think about it now? If you had to pick a word now what would it be?**

*Simple. It’s pretty easy to adjust.*
Okay, so tell me a little bit about how you listen now. A little bit about how singing may have changed the way you listen or the way you play. It makes my tone sound better, a lot better, and because I know what the music sounds like and basically (laughs). I know what the notes sound like more than I did before and I don’t get them confused with other notes.

Pretty cool. Let me check to make sure I’ve asked you all the same questions I’m supposed to ask you. Ok here we go. Would you say the feedback that your teacher gave when you had trouble with something helped you get better at singing? Umhmm. Yes. Uuhhh.

Can you give me an example of maybe when that happened? Well, the trilling, whenever we vibrate our lips and stuff, warms up my lips to help me play. (Repeats herself because she was interrupted with an announcement).

Well, cool. The first thing we are going to do in the next part is lip trilling.
**A Zu, then Zi**  
Male

Do you like to sing?  
(Nods)

Tell me about the places you like to sing.  
*What do you mean?*

Besides in band and in your choir, where else do you sing?  
*I don’t sing in public much.*

No? Why not?  
*I don’t like the sound of my voice. It might just be me.*

Do you like to sing in your room, at home, or in the shower or in the car  
(Smiles and nods) *Yea, in the car.*

If you had to pick one word to describe what it feels like to sing in the places where you like to sing, how would you describe it?  
*Fun*

Fun? That’s a good answer. If you had to pick one word to describe what you were thinking the first day your teacher asked you to sing in band class this way what would you say?  
*I was a bit nervous because I didn’t want to sing in public and get made fun of, like, I just don’t think I can sing that well.* (Repeats himself.) *No, I don’t think I can sing that well.*

So, it has been 6 weeks of singing in band class. The first day you described as nervous. If you had to describe it now, what word would you use?  
*Fun*
Can you tell me more about why it is fun?

You get to sing and it helps you play. (Coughs and researcher offers water. He declines.) It helps you play and, uh, you get a better pitch, you know, you get it in your ear better so you can put it into your instrument.

Do you feel like the training you’ve received has made you a better musician?

Yes

Do you think you listen differently now?

Yes

Can you tell me a little bit about how you listen differently?

Like, what you mean about how I listen differently, what you do mean, like, do I concentrate more or something?

Um, yea, along those lines. Now that you sing in class you’ve told me that you hear things differently and that you can make better pitch happen on your instrument. So, I just want you to tell me a little bit about how that works.

Like when I hear it in my ear when I sing it I try to when I hear it on the instrument and I hear that I might not be playing it right, I try to adjust.

Would you say that the training you received in class from your teacher, like the hints and tips that she gave you in class, did they help you to sing better?

Like, open your teeth more? Yes.

She gave you some tools to work on skills, she gave you some lip trills, etc.

Oh yea, yea.

She gave you feedback when you would wing, gave you tips. Do you think it helped you?

(Nods)

Can you give me an example of how it helped you?

Uhhh, I’m trying to remember what tip she told me. She told me to sit up straight to help me breath better and it helps your back too.

Anything else?

Um no.

Okay, well we are going to move onto to the next thing. Can you give me some lip trills.
**A, Zi, then Zu

Male

Do you like to sing?
Um, well, in band class?

Well, in life in general?
Well, not really.

Where are some places that you sing?
(Laughs) In my house.

In your room or in your car. Maybe when nobody else is around?
Yea.

If you had one word to use to describe singing when nobody else is around and you’re just having a good time, what word would you use? Remember, there is no right or wrong answer.
Um, interesting.

Okay. Now think to the very first day that your teacher had you sing this new way in band class. If you had to pick one word to describe that day, what would it be?
Well, it was strange.

Can you tell me a little bit about why it was strange?
Well, we had to do the buzzing thing, like the lip trill, it was really strange.

Now 6 weeks later if you had to pick one word to describe it, what word would you use?
Like, um, well, helpful.
Tell me a little bit about that. Why is it helpful?
*It’s been helping me get in pitch better.*

How do you think?
*Well, uh (pauses).*

There is no right or wrong answer so you can tell me how you think it is helping you.
*Well, we sing and play the thing. We get double the experience.*

Has it changed the way you listen at all?
*Well, uh, Not really.*

And over the 6 weeks of training, the feedback that your teacher gave you, the tips that she would give you and the exercises did they help you to sing better?
*Huh. (pauses)*

Can you give me an example of how?
*Well, we had to breathe and the breathing helped.*

What did the breathing help you with?
*It helped us, like, it helped us warm up our lungs.*

Well cool. Those are all nice answers. Let me make sure I’ve asked everything I need to ask you. Okay. Is there anything else you’d like to add? Do you have any other thoughts?
*No.*

Okay, well we are going to move onto the next thing.
**D Zi, then Zu
Female

Do you like to sing?
Yes

Tell me, where do you sing? What are your favorite places to sing?
*I like singing in performances.*

Do you sing at home ever? Or with your friends?
*(Nods)*

If you had to pick one word to describe singing outside of school or outside of a performance, what would that word be?
*Fun*

Ok, so the very first day that your teacher had you sing here in class, if you had to pick one word to describe it, what would it be?
*(smiles) chaotic*

Tell me a little bit more about that. Why would say chaotic?
*Well, not a lot of people in the band like to sing, so many of them were silly with it and many of them just didn’t like to. But I did, so it was okay for me. But for other people (pauses)*

It was a little weird for them?
*Yes ma’am.*

Well if you had to pick one word to describe singing now 6 weeks later, what word would you use?
*Improving*
Well, cool. Can you tell me a little bit about that? What changes have you noticed? Well, a lot of people, instead of being so silly, they’ve matured and a lot of people have improved a lot and their confidence level has raised, too. So, you know.

Would you say that the band sings better now?
(Nods) I would.

I would agree! Have you noticed that singing has changed the way that you play at all?
Yes ma’am.

Can you tell me a little bit about that?
It helps me hear the pitch easier. And it helps me know if I’m on the right note more, faster than I would be able to than if I didn’t sing.

Do you feel like the feedback that your teacher gave you, the exercises she gave you and the tips that she gave the band, do you feel like they helped the band get better at singing?
(Nods head)

Do you have any examples of how?
Well the breathing really helped us and it helped us sing clearer. And I think that helped a lot.

Well let me make sure I’ve asked you all the questions I want to ask you. Is there anything else you would like to add?
Not really.
Instrument ID: Trumpet 3
Grade: 7th
Years Playing Current School Instrument: 2
Other School Instruments: N/A
Years Playing Other School Instrument: N/A
All School Band Experience at Glasgow? Yes
Private Lessons on School Instrument? No
Years of Private Instruction: 0
Outside Instruments: Piano, guitar, bass, drums
Outside Instrument Private Lessons: Yes, piano
Years of Private Lesson Instruction: N/A
Choir Experience: Yes
Where: Community Choir
Choir Experience in Years: 3

**D Zu, then Zi
Male

Do you like to sing?
*Well, I was in choir for 1 or 2 or 3 years.*

Do you sing at home or in the car or in your home or with your friends?
*Shakes head 'no’ and says no*

Why not, do you think?
*Uh, because I just don’t really do singing. Because it doesn’t really come into the topic of conversation.*

So you don’t really hang out with people that sing?
*No*

So when you are at home listening to your ipod, or whatever you listen to, and a song comes on that you like. You never sing along with it?
*No, because I’d probably be playing along with it on guitar, like practicing.*

Gotcha. So if you had to pick one word to describe what you were thinking when your teacher started the singing training 8 weeks ago what word would that be?
*Um, well, expected. Because eventually I knew something like that would happen because everyone is always on me about singing. I mean, well, generally, I’m around that idea because my parents teach piano and they always want their students to sing their parts.*

Now, 6 weeks later, compared to the first day, what word would you use to describe it?
*Um, I don’t know, it’s kind of, well, I’m used to it now.*

Yea? Tell me a little bit about that.
Well it was kind of strange at first doing all the lip trills and all that stuff but then eventually it's just kind of routine to do it in the band rehearsal.

Would you say that singing has changed the way you listen to music or the way you play your trumpet?
Um, kind of. I'm more breath oriented. Well, not breath oriented but more like, more conscious about the breaths that I take.

Yea? Good. Do you think it has helped your pitch at all?
Um, I don't know. I've always had pretty good pitch. (Smiles)

Well cool. Let me make sure I've asked you all the questions I want to ask you. Okay. The feedback that your teacher gave you and the exercises she had you do, do you think they helped you to sing better?
Uh, I guess, I mean well I think it helps other people but I've felt pretty confident.

Is there anything else you'd like to add or share with me about singing?
Not really

Okay, well we are going to move on.
Instrument ID: Trumpet 4
Grade: 7th
Years Playing Current School Instrument: 2
Other School Instruments: N/A
Years Playing Other School Instrument: N/A
All School Band Experience at Glasgow? Yes
Private Lessons on School Instrument? No
Years of Private Instruction: 0
Outside Instruments: Violin
Outside Instrument Private Lessons: No
Years of Private Lesson Instruction: 0
Choir Experience: No
Where: N/A
Choir Experience in Years: 0

A, Zu, then Zi
Male

If you had to describe singing outside of school, how would you describe it? Where do you sing?
I don’t really like singing.

Do you ever sing when you are in the car or with your friends or in the bedroom when nobody is around?
Not really

So when your teacher first started singing in band class, on the very first day if you had to pick one word to describe it what word would you use?
(Long pause)

There’s no right or wrong answer. I’m just looking for your honest opinion. How would you describe it?
(Long pause) I didn’t really want to do it.

Can you tell me a little bit about why?
I just don’t like singing.

Ok. Now, 6 weeks later, if you had to describe it how would you describe it?
It’s helpful.

Tell me a little bit about that. How is it helpful?
(Long pause) It makes you have the right pitch.

Can you hear a difference in your playing now that you have been singing in band class?
Yes.
Can you tell me a little bit about what you hear or how it helps you?
(Long Pause)

And again there is no right or wrong answer. I’m not looking for anything specific here. I just want to know your opinion.
I’m not sure.

Do you think it helps you because you feel like it helps you or because your teacher tells you it helps you?
I feel like it helps.

Very cool. (Student’s eyes begin to water.) Let’s see if I’ve asked you everything I’ve wanted to ask you. I’ve asked everybody the same questions, just so you know. What else do I need to ask you? Ok. The training that your teacher gave you, the exercises and the feedback that she gave you do you feel like that helped you to sing better?
Yes

Can you give me an example?
(Silence)

Was there something that you were struggling with or that somebody else was struggling with and she said or did something and it got better?
(Long pause) I think so.

Do you have any examples of when that happened?
(Long pause) no.

No? Do you just think it probably did?
(Nods)

Is there anything else you would like to add?
(Long pause and wipes tears) No.

Okay well we are going to move onto the next thing and do some lip trills.
**A Zi, then Zu**
Female

**Do you like to sing?**
*Yes ma’am.*

**Tell me about where you like to sing?**
*Like, what kind of music?*

**Sure. Anything that you like to do with singing tell me about it.**
*It’s not like a specific genre I like to sing. It doesn’t matter what genre because I just like to sing in general.*

**Nice. Where do you like to sing?**
*Um. More of a hip hop, kind of, or sometimes country.*

**So, with your friends or at home?**
*Yea.*

**So just anywhere, basically?**
*Yea*

Okay. On the very first day that your teacher asked you to sing in band class, if you had to pick one word to describe what you were thinking what would that word be? *Um, nervous.*

**Nervous? Can you tell me a little bit about that?**
*I was nervous because I thought we would have to sing individually and I thought that somebody was going to make fun of me maybe (laughs) if I messed up.*
Well, 6 weeks later, thankfully that never happened, and now 8 weeks later if you had to pick one word what would you say?
Um. I feel more advanced at it.

Yea? Tell me a little bit more about that.
Um, it’s easier for me and I can match pitch easier than I could before. Because at first I couldn’t really match pitch but I can do it better now.

Do you feel like you play differently now?
Yes

Can you tell me a little bit about how.
Um. Like, if I start playing now without singing, it’s going to sound good but if I sing first I’ll be able to get the pitch in my head and I’ll be able to play better.

Do you think that the band has benefitted from singing?
Yes ma’am.

Do you hear a difference?
Yes ma’am.

Ok. Do you feel like you listen differently now?
Yes

Can you tell me a little bit about it?
Um, well, I can adjust more since I know how to match pitch with like my partners and colleagues.

Okay. Great. Well I have my list of questions that I have to ask everyone. Let me make sure I’m asking all the right questions. Okay. Do you feel like the training your teacher gave you helped? The tips that she gave you guys, the feedback, the exercises, do you feel like it helped you to sing better?
Yes ma’am.

Okay. Can you give me any examples of how? Or specific things that might have helped you?
Um, like when we are singing Zi down the scale we can start to match pitch and, um, learn how to go down a scale (Long pause). And we can learn how to go down a scale without messing up. And we can go by do re mi fa sol. And it is much easier for us now that we have been doing it we sound better. We’ve progressed.

Is there anything else you would like to add about the experience?
No.

Okay, well we are going to move on to the next part.
Instrument ID: Trumpet 5
Grade: 7th
Years Playing Current School Instrument: 2
Other School Instruments: N/A
Years Playing Other School Instrument: N/A
All School Band Experience at Glasgow? Yes
Private Lessons on School Instrument? No
Years of Private Instruction: 0
Outside Instruments: Piano, drum
Outside Instrument Private Lessons: Yes
Years of Private Lesson Instruction: Piano: 6, Drums: 3-4
Choir Experience: No
Where: N/A
Choir Experience in Years: 0

**D Zu, then Zi
Male

Do you like to sing?
(Laughs and shrugs shoulders) Um. (Pauses) sure.

Where are the places in your life that you like to sing? Like at home or with your friends?
Yea. At home and with friends. That’s it.

Do you sing when you play drum set?
I count.

Do you sing when you play piano?
No.

Okay. The very first day that your teacher started the singing program in band class, if you had to pick one word to describe that day or your thoughts on that day what would it be?
It was fun, like, yea.

Fun? Tell me a little bit more about that.
Yea, well it really helps, I mean, it helps me play trumpet better.

So, just on that very first day, you thought it was fun on that very first day? Yea.

Why did you think it was fun?
Cuz I never did that before.

So it was something new? Yea
Okay. And now 6 weeks later if you had to describe it what would you use to describe it? What word?
(Long Pause) It helped me, just like, play better.

Ok. Can you tell me a little bit about how it helped you play better?
Like, I get the tune in my head. Like the zi’s and zu’s before I play.

So you hear it better before you play it? You get the tune in your head before you play it?
(Nods)

Do you feel like you listen differently now that you sing a little bit?
Yea, kind of.

How so? How do you think?
(Smiles and pauses)

Remember there is no right or wrong answer at all. I’m totally just looking for your opinion.
Alright um, you mean like how did it help me?

Yes, how did it help you do you think?
Um, it helped me get the levels of the, for like the warm up (moves hand up and down at different heights.) Just like the, levels.

It helped you understand the pitch? Is that what you mean by doing this with your hand?
Yea, the pitch!

Okay. Alright let me make sure I’ve asked you all the questions I want to ask you. Oh. Last question: The training that your teacher gave you, the tips that she gave you, the exercises and the feedback, would you say they helped you to sing better and hear better?
Yes

Do you have any specific examples of a time that you were struggling with something and she something or did something that made it click for you?
Just like, trying to like match others people’s pitch, that like, helped.

So just trying to listen to other people better helped you to match their pitch?
Yea.

Is there anything you’d like to add?
No.
Okay, well we are going to move onto the next part.
Instrument ID: Flute 4
Grade: 8th
Years Playing Current School Instrument: 3
Other School Instruments: N/A
Years Playing Other School Instrument: N/A
All School Band Experience at Glasgow? Yes
Private Lessons on School Instrument? No
Years of Private Instruction: 0
Outside Instruments: N/A
Outside Instrument Private Lessons: N/A
Years of Private Lesson Instruction: N/A
Choir Experience: Yes
Where: Church Choir
Choir Experience in Years: 6 years

D Zi, then Zu
Male

Do you like to sing?
Ehhh

Tell me why you answered ‘ehhh’.
Because I can’t.

So you don’t think you are very good at singing?
Nah

And what makes you think that?
I have no idea. I just don’t do it. Like, it’s (makes an unpleasant face).

Okay. Um. Do you like to sing in places outside of school? Like, if you are at home
alone and nobody is around or if you are in the car with your friends?
(Laughs and shakes head ‘no’) 

Nope? Don’t sing there?
Nope.

On the very first day that your teacher started this singing program in band class if
you had to describe that day, or the first time you sang, using one word, what word
would you use?
Hmmm (pauses) Awkward.

Awkward? A few people have said awkward.
(Laughs)

Now, 6 weeks later what word would you use to describe it?
Routine? Okay. Now tell me a little bit about how it went from awkward to becoming a routine. 
Well, I got used to it so it wasn’t really a big deal or whatever.

Do you think it has changed the way you listen?
Yea

Can you tell me a little bit about how?
Well I could sorta, like, have a feel of whether someone was flat or sharp but only if it was like outlandishly sharp or flat. But now I can tell if it is just a little.

Good. Okay. Do you think it has changed the way you play?
Yea. I know how to adjust better and I know when I am in tune and when I’m not.

Very cool. Um. Let me see, ugh, I’m asking everybody the same questions so let me make sure I ask all the right ones. Do you feel like the exercises your teacher gave you, and the feedback she gave you and the tips she gave you, did they help you and the band sing better?
Yea

Can you give me examples of a time where is seemed to click?
Well I mean, we were all just kind of slouching and its not really, the sound, the quality of the same is not really good but if you we all, you know, if we are all with our backs straight and our hands right then we sound better.

Well cool. Is there anything else you would like to add? Anything else you’d want to tell me about?
(Pauses) Nah. That’s it. (Smiles)

Okay, well we are going to move onto the next portion.
Instrument ID: Alto Sax 2
Grade: 8th
Years Playing Current School Instrument: 2.5
Other School Instruments: N/A
Years Playing Other School Instrument: N/A
All School Band Experience at Glasgow? Yes
Private Lessons on School Instrument? Yes
Years of Private Instruction: -1
Outside Instruments: N/A
Outside Instrument Private Lessons: N/A
Years of Private Lesson Instruction: N/A
Choir Experience: Yes
Where: Glasgow
Choir Experience in Years: 2

A Zu, then Zi
Female

Do you like to sing?
Yes

Tell me about what you like about singing.
Um I think it helps me when I play because I can hear better and I can get things, I can tune better and my tone is better.

Okay. If you had to pick one word for the first day of band class when your teacher had you sing with the rest of the band, how would you describe that day?
Quiet

Quiet? What do you mean by that?
Because no one was really singing

Okay. Then 9 weeks later, you guys have done this for about 8 weeks now, how would you describe it now?
(Long pause) Enthusiastic

Can you tell me a little bit about why you chose that word?
Because I think the people in the band they started singing louder and stronger and we all started singing better and more confident. And I think it is fun to be confident.

Well good. Um, can you tell me did the exercises that your teacher gave you and the feedback that she gave you did they help you and the rest of the band?
Yes

Do you have examples of a specific thing that she did that helped you?
I think us singing was the most helpful.
Well, in the singing process, anything in that entire process that was helpful. I think just trying to match the pitches with how we were playing. We would sing and then play and then sing.

Could you hear a difference?
Yea.

Is there anything else you’d like to add?
Nope
Instrument ID: Trumpet 6
Grade: 8th
Years Playing Current School Instrument: 3
Other School Instruments:
Years Playing Other School Instrument:
All School Band Experience at Glasgow? Yes
Private Lessons on School Instrument?
Years of Private Instruction: 0
Outside Instruments: Self taught piano and drums (Plays by ear)
Outside Instrument Private Lessons:
Years of Private Lesson Instruction:
Choir Experience: Yes
Where: Glasgow
Choir Experience in Years: 1 semester in 6th grade and 1 semester 8th grade

** A Zi, Zu
Male

Do you like to sing?
_Ugh. Sometimes_

Where do you like to sing?
_Ughh_

Ugh, like with your friends or when you are at home or something like that?
_At home_

Are you usually with people or by yourself when you sing?
_Sometimes with people but usually by myself._

I want you to think back to a few months ago to the first day your teacher had you sing in band class. Can you tell me what it was like? If you had to use one word to describe it, what would that word be?
(Long pause) _Ughhh. Different_

Can you tell me a little bit about why you chose that word?
_Um because before we sung some but not as much._

And how do you feel like you and the band did on the very first day?
_Um. (Long pause)_

There is no right or wrong answer. How do YOU feel like the band did?
_Ugh okay, but we got better as we progressed._
Okay, so over the course of the training you got better. So if you had to pick one word to describe it now, how would you describe it?

(Long pause) Ugh normal, a daily routine.

So it has just become something that you do?

Yes

Do you feel like you have gotten better at singing?

Yes

Do you feel like the singing in class has changed the way you listen in band class or the way you play in band class?

Yes

You do? Well cool. Can you tell me a little bit about that?

Ugh like when you are singing and playing you can like test yourself to see how close to the note you are.

Very cool. Do you feel like the training helped you to sing better? The exercises your teacher gave you, did it help you?

Yes

Can you give me an example of how it helped you?

Ughh. Like . (Long pause)

And again there is no right or wrong answer. I just want to know your thoughts.

Um like uh hearing the pitches in your head.

That helped you? Good. Okay we are going to move onto the next portion.
Instrument ID: Bass Clarinet 1
Grade: 8th
Years Playing Current School Instrument: 1
Other School Instruments: Clarinet, violin, viola
Years Playing Other School Instrument: Clarinet: 1, Violin and Viola: 1
All School Band Experience at Glasgow? Yes
Private Lessons on School Instrument? No
Years of Private Instruction: 0
Outside Instruments: N/A
Outside Instrument Private Lessons: N/A
Years of Private Lesson Instruction: N/A
Choir Experience: No
Where: N/A
Choir Experience in Years: 0

D Zu, then Zi
Male

Do you like to sing?
Not really

Do you sing anywhere outside of school just for fun? Like when you are with your friends or are by yourself?
Sometimes

Where are you when that ‘sometimes’ happens?
At home

Are you usually by yourself or with other people?
Most of the time I’m by myself

Do you have fun when you are singing by yourself?
Yes ma’am.

When you think back to the very first day that your teacher had you sing in band class, think about what it felt like and what it sounded like, and if you had to pick one word to describe it, what word would you pick?
Awkward

A few people have said awkward. Tell me a little bit about why you chose that word.
Because I don’t usually sing in front of other people. (Pauses)

So it was strange to sing that way?
Yea
Okay, well now a few months down the road after doing it in band class every day would you change that word? Would you pick a different word to describe it?
Normal

Tell me a little bit about that. Did you just get used to it?
Yes ma’am.

Do you feel like you got better at singing?
A little

Can you tell me a little bit about how you think you got better or why you think you got better?
Um, I don’t go off pitch as much when I sing. (Pauses)

Very cool. Very cool. Um, would you say that singing has changed the way you listen when you are playing your instrument?
Yes ma’am.

Can you tell me a little bit about it?
I can just sing before we start to play and just keep that in my head so that I can keep the pitch.

Do you feel like the training that your teacher gave to you, like the exercises and the feedback she gave you, do you feel like that helped you to be a better singer?
Yes ma’am.

Do you have any specific examples that you’d like to share?
(Long pause) I’m not sure

Okay. Ughh Let me make sure I’ve asked you all the questions I wanted to ask you because I’m asking everybody the same thing. I don’t want to skip anything.

Is there anything you’d like to add about the whole experience?
No

Okay well we are going to move onto to the next thing.
**D Zi, then Zu
Female

Do you like to sing?
No?

Why don’t you think you like to sing?
Ooh, it’s not something I like to do I guess.

Do you ever sing at home or in the car or when nobody is around?
No.

No, not even then?
No.

Okay. So on the very first day of class when your teacher started asking you guys to sing, if you had to pick one word to describe that day what word would you pick?
Um. Normal, I guess.

Normal? Why would you choose that word? Tell me a little bit about that.
I didn’t really. It’s like, hmmm. (Long pause)

There is no right or wrong answer, so just tell me whatever you think.
It was like any other day. Hmmm. Like. I didn’t really feel affected by it?

After 6 or so weeks of training, if you had to pick one word to describe the singing, what word would you pick?
Fun, I guess.

Well cool. Can you tell me a little bit about why you find it fun?
Because um the lip trills and things I couldn’t do it at first but now I can but its fun watching the other people.

So it’s fun in a silly sense?
Yea

Do you think singing has changed the way that you listen?
Yea

Can you tell me a little bit about that?
Like, um, I can actually feel when there’s a wrong note. And it’s like, really easy now to tell if I’m sharp or flat.

Nice. Very cool. Do you think it has changed the way you play?
Um yea.

How so?
Like, well, I like it’s like easier to play like high notes now.

Is there anything else you would like to tell me about the singing process?
No that’s about it.

Okay well we are going to move onto the next portion.
Instrument ID: Flute 6
Grade: 7th
Years Playing Current School Instrument: 2
Other School Instruments: Trumpet
Years Playing Other School Instrument: -1
All School Band Experience at Glasgow? Yes
Private Lessons on School Instrument? No
Years of Private Instruction: 0
Outside Instruments: N/A
Outside Instrument Private Lessons: N/A
Years of Private Lesson Instruction: N/A
Choir Experience: No
Where: N/A
Choir Experience in Years: 0

**A Zu, then Zi
Female

Do you like to sing?
No answer

Like, when you are at home or with friends or by yourself?
Yea

What kind of stuff do you sing?
Um (Long pause) I don’t know. I guess just whatever is on the radio.

If you had to pick one word to describe the very first day that your teacher started singing in band class, what word would you use to describe that day?
(Long pause) weird.

Tell me a little bit about that. Why weird?
I dunno, cuz, we were supposed to be playing our instruments and not really singing.

Because you were supposed to be playing your instrument and not singing? Is that because it is band class and not choir class?
(Nods)

And then 6 weeks later after 6 weeks of training and doing it every day in band, would you use a different word to describe the singing?
(Long pause) Um. (pause)

There is no right or wrong answer. I totally just want to know what you are thinking.
Okay. I guess it’s like normal because it kinda makes sense as to why we sing in class.
Why do you think you do it? Why do you think you sing in class?
So that we get like. She makes us sing so that we get the notes in our head so that we can like play in tune?

Do you find that it has changed the way you listen and the way you play?
Yea

Can you tell me a little bit about that?
Um, like whenever you sing the right and you play your instrument you can see what it actually sounds like to know if you are like high a little.

Very cool. Let me check my questions. I’m asking everybody the same stuff so let me make sure I’m asking you everything I’ve asked them. Do you feel like the training helped you to be a better singer? The exercises and the feedback.
Yea.

Can you tell me a little bit about it?
Um, I guess a little easier to count and know the note sounds like, to be able to sing it and play it?

Would you say you feel more confident?
Yes

Is there anything you would like to add about the whole singing experience in band class?
No.

Okay well we are going to go ahead and get started with the next portion.
Instrument ID: Contra Alto 1
Grade: 8th
Years Playing Current School Instrument: 1
Other School Instruments: Soprano clarinet, Bass clarinet,
Years Playing Other School Instrument: Soprano clarinet: 1; Bass clarinet: 1
All School Band Experience at Glasgow? Yes
Private Lessons on School Instrument? No
Years of Private Instruction: 0
Outside Instruments: N/A
Outside Instrument Private Lessons: N/A
Years of Private Lesson Instruction: N/A
Choir Experience: No
Where: N/A
Choir Experience in Years: 0

A Zi, then Zu
Male

Do you like to sing?
Not really

Do you sing anywhere? Like at home by yourself or in the car or with your friends?
No ma’am. Not really.

Why don’t you like to sing?
I don’t think I have a good singing voice.

Really? Okay. Um, so on the very first day when your teacher asked you to come in and sing in band class if you had to pick one word to describe that day ho would you describe it?
(Laughs) Um, it was shocking.

Tell me a little bit about that. Why shocking?
Because I was, whenever we were going up the scale and down the scale, it was kinda hard for me to switch notes because my voice kept cracking and it just sounded horrible for me.

To you it sounded horrible, but I bet it didn’t sound as bad as you thought it did!
(Smiles)

But shocking, huh? Ok. Well after 6 weeks of training and singing every day in band class if you had to describe it now in one word how would you describe it?
Uhh, improved.

Okay. Tell me a little bit about that
Well as we uh practiced the singing going uh with the oo and ahh, um it has improved my singing, with um, tremendously.

So you would say the training you got from your teacher and the feedback you got helped out a whole bunch?
Yes ma’am

Do you feel more confident?
Yes ma’am

Good! I’m so glad to hear that. Um can you tell me has it changed the way that you listen when you play your instrument? And do you think the singing has helped you play better?
Yes ma’am

Can you tell me a little bit about that? How do you think it has helped you?
Well, um, um, I don’t know how to put it, uh, but it has helped me um,

Remember there is no right or wrong answer so whatever you say is just fine. I just want to know what is going on up here (points to head).
Um, it has helped me try to get more in tune wit the rest of the people around me. To try to blend in with the tubas and the bass clarinet beside me. And that’s basically it.

Well cool. Do you have anything else you’d like to add?
No

Okay well we are going to move onto the next part of this.
Instrument ID: Alto 3
Grade: 8th
Years Playing Current School Instrument: 2
Other School Instruments: N/A
Years Playing Other School Instrument: N/A
All School Band Experience at Glasgow? Yes
Private Lessons on School Instrument? No
Years of Private Instruction: 0
Outside Instruments: N/A
Outside Instrument Private Lessons: N/A
Years of Private Lesson Instruction: N/A
Choir Experience: Yes
Where: N/A
Choir Experience in Years: -1

D Zu, then Zi
Female

Do you like to sing?
Uh no.

Even when you are at home by yourself or with your friends?
Yeaa. At home by myself.

Tell me when you like to sing.
At home by myself

And what kind of stuff do you sing?
Um, like pop.

Songs you like from the radio?
Yeaa

If you had to describe the very first day that your teacher had you sing in band class
what word would you use to describe it?
Um, Awkward.

A lot of your peers said awkward. Tell me a little bit more about that. Why would you say awkward?
Because it’s like you had to sing in front of a whole bunch of people that you don’t really know.

So, when I asked you if you liked to sing or not and you said no, is it because you don’t like to sing in front of other people?
Yeaa
And why do you think that’s the case?
Um. I dunno. It’s just like, I just don’t like singing in front of people.

Yea? Ok. After 6 weeks of training with your teacher if you had to pick a word to describe it would still be awkward or would that word change?
No, it would be comfortable.

Tell me a little bit more about that.
Um, because like you know like you are more used to singing in front of your classmates so it’s just more comfortable.

Do you think that the training helped you, the feedback and the exercises?
Oh yea.

How so? How do you think it helped you?
Um, I think it helped me, like, with the tuning the notes. Because you have to sing it and then you have to play it so you have to kind of hear.

So it changed the way you hear
Yea

Do you feel like you hear differently now?
Yea

How would you say you hear differently?
Uh, like, I think I hear the notes more, like, better.

Yea? Very cool. Well let me check my list of questions and make sure that I have asked you everything I need to ask you. And I think so. Is there anything else you would like to add?
No.

Okay, well let’s move onto the next portion.
Instrument ID: Trumpet 7
Grade: 6th
Years Playing Current School Instrument: 1
Other School Instruments: N/A
Years Playing Other School Instrument: N/A
All School Band Experience at Glasgow? Yes
Private Lessons on School Instrument? No
Years of Private Instruction: 0
Outside Instruments: Violin, Harp
Outside Instrument Private Lessons: Yes
Years of Private Lesson Instruction: Violin: 10
Choir Experience: Yes
Where: School choir
Choir Experience in Years: 2

D Zi, then Zu
Female

Do you like to sing?
No

Tell me a little bit about why you don’t like to sing?
Um, I don’t really like my voice a lot so I don’t like to sing.

If you had to pick one word to describe the very first day that your teacher had you sing in band class with the rest of the band, think back to that day. If you had to pick one word to describe what it felt like or sounded like what would that word be?
(Long pause) Different

Tell me a little bit about that.
Um it was just it was kind of weird for her to ask us to sing and I was kind of hesitant at first to sing in band. It just seemed (shrugged shoulders).

Why was it weird do you think?
Um I, I don’t think I would ever connect band and singing. Yea.

And why were you hesitant do you think?
Um, I don’t really like singing and I was wondering why she was making us sing.

Ok, well after 6 weeks of training would it be the same word or would that word change to something else?
(pauses)

And again there are no right or wrong answers. I just want to know what you think.
Um, helpful. It helped me match pitch and get a better sound.
Ok. So do you think it has maybe changed the way you listen?
(Nods)

Can you tell me a little bit about how you noticed that or what makes you think that?
Uh, I just noticed whenever I sing a note and then I play it I hear the note in my ear and I can adjust better and it helps me make a better sound.

Alright, that is good! Do you think that the training exercises your teacher gave you and the feedback she gave you helped you to be a better singer?
(Pauses) Um, not really.

Tell me a little bit about that.
Uh, I just don’t, I think the same of my voice. I don’t really like it and I don’t really like singing.

Ok. Do you think it helped the band sing better? Do you notice a difference in the band? Or do you feel the same about everybody as you do yourself?
In the beginning we were, um, kind of soft and we weren’t that great. But as it went on we got more confident and we learned how to sing better.

Well, cool. Is there anything else you would like to add?
Shakes head ‘no’

Okay. We will move onto the next portion.
Instrument ID: Clarinet 6
Grade: 8th
Years Playing Current School Instrument: 3
Other School Instruments: N/A
Years Playing Other School Instrument: N/A
All School Band Experience at Glasgow? Yes
Private Lessons on School Instrument? No
Years of Private Instruction: 0
Outside Instruments: Piano
Outside Instrument Private Lessons: Yes
Years of Private Lesson Instruction: 8
Choir Experience: No
Where: N/A
Choir Experience in Years: 0

**A Zu, then Zi
Male

Do you like to sing?
(pauses) hmm, when I’m by myself

So at home? So what types of things do you sing when you are by myself?
Like songs?

(Researcher nods)
Oh, like popular stuff that is on the radio

Ok. Think back to the very first day that your teacher had you sing with the band in class. If you had to pick one word to describe what it felt like and how it sounded, what would that word be?
Uh, shy.

Tell me a little bit about that.
Uh, I guess prior to this I hadn’t really sung in front of people that much. So, I’ll admit I probably didn’t sing as loud as I probably should have.

Ok. 6 weeks later, after doing it in band class every day for 8 plus weeks would you use the same word or would you use a different word to describe it?
Different word

What would you choose?
Forte

Tell me a little bit about that.
I guess the more we did it, the more comfortable I got and it became more natural to sing louder.
Ok. And do you think that the exercises that your teacher used with you and the feedback she gave you, did that make you more comfortable with it?
Yes.

Can you give me examples of that?
Whenever we were singing?

Uhmhm. Just something that made you feel more comfortable or feel better about singing. Anything in particular or doing it over and over again helped. Yea, repetition and I guess singing like on notes that we played in our songs helped us to play more in tune on all the notes.

Okay. So you can see a relationship between the singing and the playing?
Yes

Do you feel like it has changed the way you listen?
Yea. It's helped my ears listen more and find notes.

Is there anything else you would like to add?
Uh that's about it.

Okay, well we are going to move onto the next part of this.
**Instrument ID:** Clarinet 7  
**Grade:** 6th  
**Years Playing Current School Instrument:** 3  
**Other School Instruments:** N/A  
**Years Playing Other School Instrument:** N/A  
**All School Band Experience at Glasgow?** No  
**Private Lessons on School Instrument?** No  
**Years of Private Instruction:** 0  
**Outside Instruments:** N/A  
**Outside Instrument Private Lessons:** N/A  
**Years of Private Lesson Instruction:** N/A  
**Choir Experience:** No  
**Where:** N/A  
**Choir Experience in Years:** 0

**A Zi, then Zu**  
Female

**Do you like to sing?**  
*No*

**Tell me a little bit about that. Why don’t you think you like to sing?**  
*Whenever I sing I feel like I’m like really out of tune and it doesn’t sound good.*

**Well, let me ask you this. Outside of school, when you are by yourself or with your friends, do you like to sing in those situations?**  
*Well I might sing if my friends are singing loud and I’m singing quietly. But if I’m by myself I won’t sing.*

**So you don’t like to sing when you are alone no matter what.**  
*No*

**Let’s go back to the very first day of band class when your teacher had you sing in class for the first time. If you had to pick one word to describe when that happened about 8 weeks ago, the way it felt, the way it sounded, if you had to describe that day with one word what word would you pick?**  
*It was really different.*

**Different? Tell me a little bit about that.**  
*Well, like, I’ve never really done anything like that before and I didn’t sing in band at my other school. We sorta just like played it and got in tune and that’s really. Its just sort of new.*

**After 6 weeks of the training would you still use the word ‘different’ or would you choose a different word to describe it?**  
*Well, I don’t really know. I’d say it’s like (long pause) uh, I don’t know.*
Well if you can’t pick one word can you tell me a little bit about how it has maybe changed?
I think I’m a little used to singing a little more than I was before we started.

Do you feel like the feedback that you got from your teacher and the exercises that your teacher had you do, did they help you and the band sing better?
Oh, well, like the first time everyone sort of, well we weren’t really together and it didn’t really sound that good. But whenever we started doing it more it started to sound better.

Ok. Let me look at my list of questions. I’m asking everybody the same thing and I want to make sure I ask you all the same questions. Would you say that the singing has changed the way you listen or maybe the way you play your instrument?
Um, not really. Not yet. If I keep doing it, it might.

If you keep doing it what do you think might happen?
I think I’ll realize the more I’m out of tune. Because, like, I can’t really hear right now if I’m out of tune. So, I think it will help me with that.

Ok. Well that’s all of the questions I have for you. Is there anything you would like to add?
No.

Ok. We are going to move onto the next portion.
**Instrument ID:** Clarinet 8

**Grade:** 8th

**Years Playing Current School Instrument:** 3

**Other School Instruments:** N/A

**Years Playing Other School Instrument:** N/A

**All School Band Experience at Glasgow?** Yes

**Private Lessons on School Instrument?** No

**Years of Private Instruction:** 0

**Outside Instruments:** Piano, Guitar

**Outside Instrument Private Lessons:** Yes

**Years of Private Lesson Instruction:** Piano: -1; Guitar: 1

**Choir Experience:** Yes

**Where:** Church Choir

**Choir Experience in Years:** 1

**D Zu, then Zi**

Female

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**Do you like to sing?**

*Uh, yea.*

**Where do you like to sing?**

*I don’t know.*

**Like at home or with friends?**

*By myself*

**If you had to choose between singing with your friends or singing by yourself, would you choose by yourself?**

*Yes, because it is awkward with friends.*

**So, you like it more when there is nobody around?**

*(laughs) yea*

**Okay. Think back to the very first day that your teacher had you sing in class. If you had to pick one word to describe that day, what it felt like and what it sounded like and what you were thinking, what word would you use to describe it?**

*Um. (Long pause) UH. I don’t know. I’m not sure. Musical?*

**Can you give me another adjective?**

*Um.*

**Was it positive? Was it negative?**

*It was positive.*
Can you tell me a little bit about why it was positive?
It was fun, I guess, a little. (laughs)

Has it changed in the 6 weeks that you’ve done the singing in band class with your teacher?
Has what changed?

The way you feel about it or the way you think about it?
Um. I don’t think so.

Do you feel like you have gotten better at singing?
Uhh, maybe, uhh, I dunno, I can’t (laughs)

Tell me a little bit about that?
Um, my lip trills got better. Because before I couldn’t do them at all.

Do you feel like the band has gotten better?
Uh yea.

Tell me a little bit about that. What do you hear?
Well we played stronger and louder.

So you think you have played better since you have been singing?
Yes.

Do you think the singing has gotten better, too?
I can’t really tell but I guess.

Okay. Do you think that the singing has changed the way you listen when you play your instrument?
Yes

How so do you think?
Umm, I can tell more when I’m sticking out. Yea. When my pitch is weird and stuff.

Has the training helped you? The feedback that your teacher gave you and the exercises, have they helped you to sing?
Um. I think so.

You think so? Ok. Is there anything you would like to add?
No.

Okay, well we are going to move onto the next portion of this.
Instrument ID: Clarinet 9
Grade: 7th
Years Playing Current School Instrument: 2
Other School Instruments: N/A
Years Playing Other School Instrument: N/A
All School Band Experience at Glasgow? Yes
Private Lessons on School Instrument? No
Years of Private Instruction: 0
Outside Instruments: Piano
Outside Instrument Private Lessons: Yes
Years of Private Lesson Instruction: 3
Choir Experience: Yes
Where: Columbia
Choir Experience in Years: 5

**D Zi, then Zu
Female

Do you like to sing?
Sometimes

When do you like to sing?
In the shower (laughs)

Is it fun to sing?
Yes.

Did you enjoy singing in choir when you were in choir?
Yea

Think back to the very first day that your teacher had you sing in band class. If you had to pick one word to describe that day, the way it sounded and the way it felt, what would that word be?
Embarrassing

Tell me a little bit about that. Why embarrassing?
Because we were out of tune and were singing different pitches.

Well 6 weeks of training has passed. If you had to pick a word to describe it now would you pick the same word or would it change?
Change

What word would you use now?
Um, improved.

Tell me a little bit about that.
I think we sound way better. Because we are using more air and everyone is singing the same notes.

Do you feel like the training you received from your teacher, the feedback she gave you and the exercises she used, do you feel like that helped everybody to do better? Yea

Can you give me a specific example? Um, the breathing exercises help us to start together and take bigger breaths so we don’t stop like every measure.

Do you feel like singing in band class has changed the way you listen in band class and the way you play? Yea

Can you tell me a little bit about it? Well when you sing its like you want to match that pitch on your instrument. Before we didn’t really tune everyday, but now we do so I think it has helped us.

I want to make sure I understand what you are saying. The tuning every day: is that you didn’t really tune every day as led by your teacher or as led by the students? Both. We didn’t really do much tuning.

But you feel like the singing has helped you with the tuning? Yep.

Okay. Is there anything else you would like to add? Nope.

Okay. Well we will move onto the next part.
Can you describe your vocal experiences as a student and a teacher? Have you studied voice or sung in a choir?

I never had formal vocal training as far as lessons are concerned. I sang in an SATB mixed choir during my senior year of high school (though I wish I had done it longer – I loved it, even if I wasn’t great at it). I took one semester of vocal techniques during my undergrad at LSU. I also sang in the SAI chapter choir every year of college. I taught a four and five year old choir for three years (while teaching at Glasgow) at First United Methodist church downtown, as well.

I know you were a general music teacher. Tell me about your comfort level with singing in the classroom?

I am very comfortable with singing in the classroom. I know that my vocal quality is not superb as far as fullness or richness of tone, but I am comfortable with my abilities to hear well, match pitch and sing a clear, straight tone that the students can match. I often use singing to model more than modeling on an instrument during class because of its precision and convenience.

Can you describe how you used singing in your band teaching prior to the study?

All of my students sing and hum the melody of the pieces we play, so they know how to identify if they have the melody or not. I will have brass players buzz and sing to get pitches in their ears. I have done a piece or two with vocalizations, so we practice matching specific pitches. I have timpani players hum their pitches to learn to tune the timpani. None of this was formal as far as how they actually sang vocal technique-wise.

What was your initial reaction to the designed training?

I found the training well thought out and easy to follow, though I was nervous about getting things done in the wrong order or skipping a step. Everything seemed so important to do in a very specific way.

Tell me how you incorporated the training into your already established daily habits in rehearsal.

We did the training primarily based off of their most comfortable exercise in the book – lip slurs. They are confident with the pitches and know what the progression sounds like. We tied that in with scales they know for the descending steps.
What were your students’ reactions?

At first they were very silly and hesitant, as was expected. After awhile, for most, it became part of their normal routine. They did better when they began to hear their own improvement.

With what part of the training did the students struggle?

Surprisingly so, the students struggled the most with the lip trill portion of the training. After it was all done, I still had a few that could not do it. Also, they struggled a little bit with matching pitch in their head voices – especially the boys.

With what part of the training did you struggle?

I struggled with troubleshooting the boys with changing voices. I also struggled to keep the exercises moving – they often took longer than intended. I did not want to move on before the goal was achieved.

Were there specific tools you found to be beneficial in teaching the technique? If so, what were they?

I think the breathing exercises (and doing them more consistently than I had been) were extremely beneficial. The vocal warm ups to stretch the range, though the students found them silly, were helpful to ease them into singing – the same holds true for humming. It felt safer to them and they were a little less shy because of it.

Did you see any changes in your students’ attitudes about singing over the course of training? In their singing ability? Performance of intonation when playing?

Yes, I saw tremendous changes in their attitudes. By the end, there were very few who were still refusing to take it seriously, though these were the same students who did not take very much in band seriously. Most began to treat singing as a regular part of their routine. I felt that the classes sang much better at the end of the semester than in the beginning – their confidence was up and their confident singing led to more confident playing. Though they still had intonation problems to battle (of course!) – especially during performances/when nervous – their ability to hear and adjust on their own increased tremendously.

What was your overall impression of the training on your students?

They were much more independent and active in tuning themselves, which led to better rehearsals and better performances. It took a lot of the burden of tuning off the director (and the tuner) and put the weight onto the students. This was fantastic. It simulated real life far more than what goes on in the typical middle school band room as far as tuning is concerned. This is the approach I take with other aspects of their playing, so it fell nicely in line with my goals for the students.
Do you feel more comfortable with singing in your classes following this training?

Due to my general music and choir directing experiences, I was pretty comfortable singing in the classroom before the study. I wouldn’t say that I am any less comfortable!

Will you continue to use the vocal training in your band classes?

Yes, I will continue to use the vocal training in my band classes.

What changes would you make in the future?

I plan to start the vocal training on day one of the upcoming school year, so I imagine I won’t spend quite as long each day on the exercises. I plan to expand on the exercises into more scale singing. I also hope to get to the point where we can sing chorales and excerpts from their pieces in parts and on pitch.

Do you think this experience will change the manner in which you approach singing in your band classes in the future?

It absolutely will. I did not have a clear rhyme or reason to the student’s vocal techniques before this experience. I now feel that a light has been turned on and the “how to” and motivation for singing is clearer to me, which will lead me to more focused teaching (and hopefully learning!).

Is there anything you learned during this process that you would like to share?

Is there anything else you would like to add?

This study has been (and continues to be) extremely interesting to me. It stimulated my mind and pushed me into something new that – I enjoy the learning process and found your side of things (the why, how, what, etc.) fascinating. I truly believe that being a part of the entire scientific process was absolutely invaluable for the students and for me. I hope to share the results with them next school year. It was good for me to video my teaching and allow another person who I consider to be extremely knowledgeable into my classroom on such an intimate level. It was a bit nerve wracking at first, but I know I am much stronger because of it and my teaching has been impacted in a very positive way because of the entire process. It has been a true pleasure and a very unique and fun experience that I will value for some time. Thank you very much for trusting us at Glasgow with your precious study. Putting a major portion of your degree in the hands of middle schoolers and a teacher that you don’t know takes some guts. Please do not hesitate to let me know if I can be of further help to you!
Follow Up Questions

So can you tell me a little bit more about how the boys with changing voices were challenging for you to work with? You mentioned it in your response but, um, there wasn’t a whole lot of detail. So just, just elaborate on that a little bit for me, please.

Um, the boys, had trouble singing in their head voice. Which was something that we talked about, making sure that they were singing in their head voice because that’s the right way for them to be doing this. I could hear that they were having a lot of trouble and I wasn’t sure if singing an octave down was appropriate or really trying to force them to sing it in their head voice and try to get it into falsetto. Some of them could not get into, like a falsetto range for them. They could not, um, they couldn’t do it and I wasn’t sure what would be an appropriate alternative for them. I was really sure if an octave too low would be okay or if that would defeat your purpose, or, that was kind of hard. I wasn’t sure if (Fuzzy sound on microphone unclear) . . . I tried to keep those kids matching pitch in some sort of an octave situation or if, you know, they could match pitch in the octave everyone else was singing but that was gonna be impossible for about a handful. That was tricky there. I didn’t know what to tell them.

Did you notice if any of them were actually able to match at the octave?
Some were.

Some were? Ok.
Some were definitely able to match at the octave. I mean, they’ve got good ears as far as, you know, like, most of ‘em, a lot of ‘em were the percussion section, which is sort of strange, but they can tune the timpani. You know, they can tune things like that so I know they can hear it and I know they can internalize pitch. Actually, one of ‘em that was really having trouble can tune the timpani, changing pitches in the middle of a piece. So, he knows his (Not sure of what was said here. The phone cracked.), which is hard anyway. Hold on one second. Sorry. Hold on, Abby. Sorry

Interruption

Sorry. (Mumbles) Um, but, so I know he’s got the ability to hear pitch. But he, uh, he could not sing it and match it. You know, which was so strange for him.

Um, I’ve read a couple of articles about the difference between pitch production and pitch perception and it, they, they deal a little bit with that. So that probably ties into that idea, especially at the changing voice stage. I’ll share them with you. So, okay. Um. Next question. You also mentioned that you noticed the students were more proactive about tuning themselves. Can you give me details about how that happened?

They would do it in class without being told to. They would hear that they were out of tune with each other and start tuning themselves before I could get to them or by the time
I did they were already tuning it, which was really cool. I know the clarinets did it. The flutes did it all the time. Um, and they were one of the more out of tune sections anyway but they were constantly adjusting without me telling them to. So, they could hear that they were out of tune. They would tune to each other. They would adjust. And then they would try to tune to all of them at the same time. They were doing things on their own that I had never noticed them doing or more of them were doing them on their own. You know, so it may just be that they're just better leaders but I'm sure that they just are more aware of pitch and how important it is. Because of the study we talked about pitch so, I mean, we talked about pitch a lot before, but we talked pitch so intensely, like, this whole time so they were aware of it more. And they would just tune on their own. Which was pretty cool. Trumpets did it. That was great. That was awesome.

A couple of students mentioned that in their interviews as well. When I asked them about it they couldn’t, you know, they just said “Um, we just do it.” They couldn’t’ quite verbalize it. (Both laugh) Next question: Can you tell me a little bit about how the breathing exercises may have had a positive impact on the overall performance achievement. Quite a few of the students mentioned the fact that the breathing helped them, that their breath was better. They kept alluding to the breathing being a positive thing. So, in your perspective of how things went, where do you see breathing having played a role? How did the breathing exercises positively impact their performance?

I think it just, I mean we always do a lot of breathing at the beginning of the year because they are so rusty. And, we do a lot of it, and maybe it was just my fault that we stopped doing as much of it later on in the year. And I think this was a really good refresher of what they are supposed to be doing. They had kind of forgotten, you know, and gotten lazy. And they did really get a refresher that they need to be sitting up straight. That kind of ties in with the breathing. They need to be taking in a deep breath. They forgot what a deep breath feels like. And the fact that they could hold their breath for longer because we went on I had them hold their breath for longer and longer to the point where sometimes it was, it really was too long to ask them to hold their breath. They really strived to get to that, whatever number that was, whether it was 24 or 30 or whatever number we asked them for. And they were thinking about it more. And we focused on breathing together and starting together. They made the connection about taking (PHONE CUTS OUT) . . . to take an actual breath. We used it to work on our ‘starting together’ problem and things like that. Its been really helpful. It’s been a really good refresher. So when we talk about starting together and breathing together they know what we mean.

Do you think it had any impact at all on their phrasing? Oh, totally. Totally! We wouldn’t be able to be as musical if they had to take breaths so much more often. We were able to make long phrases and they understood that you have to have a certain amount of breath because musically it demands that you hold your breath for this long. And if you can’t hold it for this long you have to figure out a way to make it sound like you are holding this long. So that really helped and they understood that breathing connects to playing much better than they had before. Which was, you
know, one of my more positive consistent comments (at festival) was about musicality and good phrasing and things like that. So this played a huge role in that, clearly.

That brings me to my next question. After one of your festival performances, I think it was district, you mentioned to me comments about the judges about that and about intonation, positive comments about intonation. And uh, you mentioned that there may have been a correlation, possibly, Can you elaborate on that for me if you think there was a correlation there. If you don’t, after looking back at this and thinking about it for longer and you don’t think there is a correlation that is fine. Just let me know your thoughts about that at this point in time.

Well you know, I think, there definitely was a correlation. There has to be, because, especially at district. At state intonation was not good but we still got compliments, which was weird for me and for the students. So, I guess at district worked pretty well. It was one of those, like, everything lines up kind of moments. But they were able to adjust as they went in performance and the judges were positive about the intonation. Lots of plusses. They went out of their way to comment positively as opposed to making any mention of it, um, negatively. And when they did mention it negatively it was very isolated moments and it was “This band is in tune most of the time, we need to make sure that we are in tune all of the time” kind of thing. On the other side, we still got a lot of positives at state festival but our intonation was not nearly as good and I knew it and the kids knew it. That’s how I knew it(instruction) had to have had some sort of effect on them because they did not think that they played that well. They weren’t happened. I mean, it was good. It was very good. But they knew they could have played better and they knew they were out of tune in certain places. And I don’t think they would have known that previously. They now know what it is like to play more in tune. We’ve had some really special in tune in class, especially. Performances are still a whole different being with the nerves and with the everything, and they focus. You know, they hyperfocus so hard that they hurt themselves. But, um, they knew they had problems. Coming off stage they said “Aww, we got 2s. I know we got 2s. Our pitch was wrong.” And all these things and there weren’t even possibly thinking that they could have a different, you know, than the judge’s perception. They weren’t even close. They were scowling. So, for them to being attention to details and thinking that critically about themselves just shows that their expectations have changed, they are really high. They know more. So I think it definitely helped.

Very cool. Is there anything else you would like to add? I thought it was great. I had a good time!
Appendix G

Louisiana State University IRB Exemption Approval and Forms

Application for Exemption from Institutional Oversight

Unless qualified as meeting the specific criteria for exemption from Institutional Review Board (IRB) oversight, ALL LSU research/ projects using living humans as subjects, or samples, or data obtained from humans, directly or indirectly, with or without their consent, must be approved or exempted in advance by the LSU IRB. This Form helps the PI determine if a project may be exempted, and is used to request an exemption.

- Applicant, Please fill out the application in its entirety and include the completed application as well as Parts A-F, listed below, when submitting to the IRB. Once the application is completed, please submit two copies of the completed application to the IRB Office or to a member of the Human Subjects Screening Committee. Members of this committee can be found at https://research.lsu.edu/Compliance/Policies/Procedures/InstitutionalReviewBoard/38996;#ion item2785.html

- A Complete Application Includes All of the Following:
  (A) Two copies of this completed form and two copies of parts A thru F.
  (B) A brief project description (adequate to evaluate risks to subjects and to explain your responses to Parts 1 & 2)
  (C) Copies of all Instruments to be used.
  (D) If this proposal is part of a grant proposal, include a copy of the proposal and all recruitment material.
  (E) The consent form that you will use in the study (see Part 3 for more information.)
  (F) Certificate of Completion of Human Subjects Protection Training for all personnel involved in the project, including students who are involved with testing or handling data, unless already on file with the IRB.

1) Principal Investigator: Abby Lyons
   Dept: Music education
   Ph: 985-655-2653
   E-mail: allyons9@lsu.edu

2) Co Investigator(s): please include department, rank, phone and e-mail for each if student, please identify and name supervising professor in this space

3) Project Title:
   An Examination of Middle School Band Students’ Ability to Match Pitch Vocally and Instrumentally Following Short-term Vocal Technique Training

4) Proposal? (yes or no)  If Yes, LSU Proposal Number
   □ Yes, LSU Proposal Number
   □ No

   Also, if YES, either
   ○ This application completely matches the scope of work in the grant
   OR
   ○ More IRB Applications will be filed later

5) Subject pool (e.g. Psychology students):
   Glasgow Middle School advanced band students

   *Circle any “vulnerable populations” to be used: children < 18; the mentally impaired, pregnant women, the ages, other; Projects with incarcerated persons cannot be exempted.

6) PI Signature [Abby Lyons]
   Date [8/4/13] (no per signatures)

   "I certify my responses are accurate and complete. If the project scope or design is later changed, I will resubmit for review. I will obtain written approval from the Authorized Representative of all non-LSU Institutions in which the study is conducted. I also understand that it is my responsibility to maintain copies of all consent forms at LSU for three years after completion of the study. If I leave LSU before that time the consent forms should be preserved in the Departmental Office.

   Screening Committee Action: Exempted
   Signed Consent Waived? Yes
   Category/Paragraph
   Reviewer [Mathews] Signature [Mathews]
   Date [2/7/13]
1. Study Title: An Examination of Middle School Band Students' Ability to Match Pitch Vocally and Instrumentally Following Short-term Vocal Technique Training

2. Performance Site: Glasgow Middle School Band Room

3. Investigators: Abby Lyons, LSU graduate student
alyons9@lsu.edu

4. Purpose of the Study: The purpose of this study is to examine middle school musicians' pitch matching ability under three performance conditions: singing on the syllables OO and EE and performing on their individual instruments.

5. Subject inclusion: Members of the Glasgow Middle School Advanced Band

6. Number of subjects: 50

7. Study procedures: The study will occur in two phases. The first will involve vocal technique training integrated into the normal rehearsal routine and led by Nicole Mlynczak, the participants' regular band teacher. The second phase will involve individual student “testing” sessions with the investigator. Participants will attempt to match pitch with an in-tune stimulus by singing on OO and EE and by playing their instrument. Additionally, participants will consider questions about previous vocal experience, attitude about and perception of singing in the band setting, and overall reaction to the training experience. The exit interview with Nicole Mlynczak will give insight into the teaching of a vocal technique designed specifically for instrumentalists.

8. Benefits: Subjects will be exposed to a vocal training technique that may have positive impact their ability to match pitch. The study may yield valuable information about beneficial vocal techniques to be used in the instrumental music rehearsal settings.

9. Risks: There are no risks associated with this study.

10. Right to Refuse: Subjects may choose not to participate or to withdraw from the study at any time without penalty or loss of any benefit to which they might otherwise be entitled.

11. Privacy: Results of the study may be published, but no names or identifying information will be included in the publication. Subject identity will remain confidential.
12. Signatures:

The study had been discussed with me and all my questions have been answered. I may direct additional questions regarding study specifics to the investigators. If I have questions about subjects' rights or other concerns, I can contact Robert C. Mathews, Institutional Review Board, (225)-578-8692, irb@lsu.edu. www.lsu.edu/irb. I agree to allow my child to participate in the study described above and acknowledge the investigator's obligation to provide me with a signed copy of this consent form.

Parent Signature: ____________________________________________

Date: ____________

Study Exempted By:
Dr. Robert C. Mathews, Chairman
Institutional Review Board
Louisiana State University
203 B-1 David Boyd Hall
225-578-8692 / www.lsu.edu/irb
Exemption Expires: 2/1/2018
Child Assent Form

I, _______________________, agree to be in a study to help determine if a certain way of singing in rehearsal will help me to play better in tune. I understand that this study will require no extra time outside of class, but that I will be asked to sing and play my instrument by myself in a separate room during band rehearsal one time. During this time the person in charge of the study will use a computer program to determine if I am singing and playing in tune. I can decide to stop being in the study at any time without getting in trouble.

Child's Signature: ___________________________ Age: ______

Date: __________________

Witness*: __________________________

Date: __________________

* (N.B. Witness must be present for the assent process, not just the signature by the minor.)

Study Exempted By:
Dr. Robert C. Matthews, Chairman
Institutional Review Board
Louisiana State University
203 B-1 David Boyd Hall
225-578-8682 | www.lsu.edu/irb
Exemption Expires: 9/6/2018
E-mail Re: Principal Approval

To: Abby Lyons <alyons9@tigers.lsu.edu>  
Content-Type: multipart/alternative; boundary=14dae9d719a2a0aa5704d732395e --14dae9d719a2a0aa5704d732395e
Content-Type: text/plain; charset=ISO-8859-1

Abby,

My principal just returned today and I met with her. She is on board and happy we are doing this as long as the parents consent. No extra paperwork necessary. I will keep her in the loop with everything being sent home and post-test dates, etc. She was even curious about about what exactly we are doing and what we hope to find. She walked in on us doing the exercise last week, so she saw first-hand what we are doing. Anything coming up in the videos that I need to think about?

Thanks, Nicole
The Vita

Abby Lyons South earned a bachelor’s degree in music education from Loyola University New Orleans in and a master of music from Louisiana State University. Ms. South has 7 years of full time teaching experience, mostly in the area of beginning and intermediate band. Ensembles under her direction have consistently earned superior ratings at district and regional festivals. She was named band director of the year in her district in 2010. Ms. South is a frequently called upon guest conductor and clinician in South Louisiana, and will begin working Juban Parc Junior High School in the fall of 2013 as Director of Bands.