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The Effect of Vocal Exploration Exercises on Pitch-Matching Skills in First and Fourth Grade Students

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Running head: THE EFFECT OF VOCAL EXPLORATION EXERCISES

**The Effect of Vocal Exploration Exercises on Pitch-Matching Skills in First and Fourth
Grade Students**

A Project Presented to the Graduate Faculty of Minnesota State University Moorhead

By

Katie Hillestad

In Partial Fulfillment of the Requirements for the Degree of Master of Science in Curriculum and

Instruction

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Abstract

The purpose of this study was to examine the effect of daily vocal exploration exercises on pitch matching skills of first and fourth grade students. Students were assessed on their ability to match pitch in echo patterns and short songs at the beginning and end of the study. The goal was to use vocal exploration to help students develop their head voice and potentially develop more accurate singing. The first grade experimental and control groups and fourth grade control group showed improvement in their echo patterns, but the fourth grade experimental group demonstrated a reduction in their echo abilities. Both first and fourth grade experimental and control groups showed improvement or maintained their scores in their short song singing excerpt. It was concluded that vocal exploration exercises are a contributing factor to the development of the singing voice, but regular singing instruction also contributes to increased pitch matching skills.

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CHAPTER ONE

INTRODUCTION

Much of the musical learning in an elementary general music classroom is accomplished through singing. Students learn how pitches relate to one another, discover long and short note values, and find similarities and differences in musical phrases. Singing is an integral part of a primary music student's learning that provides a source of expression and joy for many.

In my general music classroom, I notice a discrepancy in students' ability to match pitch while singing. Pitch matching, "the ability to vocally reproduce an acoustic model in a corresponding tone to the presented sound" (Fadel et al., 2018, para. 1), is a skill that some students seem to grasp naturally, while others seem to have little experience in singing outside the music classroom. This could be due to lack of exposure to music or singing in the home, lack of self-confidence, or pre-conceived notions about music class; however, the ability to match pitch is a skill that can be developed over time through multiple techniques.

One method of "exercising" the voice to develop pitch matching skills is vocal exploration. Vocal exploration can include making animal sounds, performing rising and falling pitches, and using various vowel sounds. The use of vocal exploration allows children to become more familiar with the sensation of different sounds the human voice can make and experiment with their own vocal qualities. One of these sensations is head voice, the light, flute-like sound produced when only the edges of the vocal folds touch while phonating (Goetze et al., 2016). When students are able to use their head voice, they are more likely to match pitch while singing.

The purpose of my action research was to determine the effectiveness of daily vocal exploration tools on pitch matching in elementary music students. Using vocal exploration exercises on a daily basis is a teaching technique that may increase students' ability to develop

their head voice, which could lead to more successful pitch matching when singing. During the study, students used vocal exercises, echo singing, and manipulatives as tools for vocal exploration.

The study examined the effect of daily vocal exploration on elementary students' ability to match pitch in independent vocal assessments. The findings are impacting the way that singing is taught in my classroom in an attempt to improve the skills of the young singers.

Setting and Subjects

This action research study was completed at an elementary school that consists of about 315 students. The elementary school is located in a city with a population of about 53,000 and is one of eleven elementary schools. Elementary schools in the district are comprised of kindergarten through fifth grade.

Research was conducted with first grade and fourth grade students. One first grade section and one fourth grade section were randomly chosen as the experimental group and completed vocal exploration activities on a daily basis along with regular music activities, while the other sections continued with only regular singing activities and games. There was no prescreening to determine whether a certain section of the grades was in more need of vocal training. Students who already had strong singing skills still participated in the study, with hopes that their abilities would improve further.

Research Ethics

Permission to conduct research was approved by the Institutional Review Board at Minnesota State University Moorhead. All human subjects were protected. Students and parents were informed of the purpose of the research and timeline of the study. Parental permission was granted through a consent form sent home with students, and they had the option to withdraw at

any time once committed to participating. Parents were informed that there were no negative risks expected from the study and that identifying information would be kept confidential in the presentation of data. Students were informed of the study through a statement that was read aloud during class and were assured that they could choose not to participate in the research. They were also told that there were no consequences if they decided to withdraw from the study.

Definition of Terms

Chest voice: The heavier, louder sound produced when the vocal folds completely come together while singing (Goetze et al., 2016).

Head voice: The light, flutelike sound produced when only the edges of the vocal folds touch while phonating (Goetze et al., 2016).

Pitch matching: Fadel et al. (2018) define pitch matching as “the ability to vocally reproduce an acoustic model in a corresponding tone to the presented sound.”

Vocal exploration: Activities that explore what the voice can do. Also known as *pitch exploration*.

CHAPTER TWO

LITERATURE REVIEW

Singing is a primary form of instruction in an elementary general music classroom. It is used to reinforce melodic concepts such as intervals and common musical patterns. Students directly interact with songs being studied to experience the concepts in their own vocal mechanism. A pleasant sound is achieved when children sing together, but not all students are able to easily match the pitch of their classmates and teacher. Pitch matching, “the ability to vocally reproduce an acoustic model in a corresponding tone to the presented sound,” (Fadel et al., 2018, para. 1) is a skill that primary music students practice during each music class. Researchers and educators have various perspectives about the best ways to help students achieve age-appropriate pitch matching abilities.

Potential to Develop Intonation Skills

Many researchers have studied the potential for children to develop intonation skills (Welch, 2006). Just as in other developmental factors, children’s singing voices may mature and increase in skill at different times compared to their peers. However, because of musical experiences in the home or in the classroom, with practice, singing ability and intonation skills can improve.

Child Development

Vocal capabilities are discovered in infancy. As children grow, they imitate sounds and repeat them in rising and falling passages, babble in small intervals of seconds and thirds, and eventually reproduce rhymes and chants (Campbell & Scott-Kassner, 2019). Following basic vocal development, it is important for children to understand the difference between their speaking and singing voices. The Kodály method of music education suggests the study of this

distinction during kindergarten music classes (Houlahan & Tacka, 2015a). As students explore their own singing voices, their ability to sing tunefully will hopefully improve. Houlahan & Tacka (2015a) state that the elementary music classroom should encourage singing for enjoyment and promote correct intonation with a good vocal model from the teacher.

Correct Singing Exercises

The development of the child singing voice is greatly influenced by the use of correct singing exercises, including posture, breathing, and pitch exploration. The potential for improvement in pitch matching increases when children are exposed to, and practice, these procedures.

Posture. Posture is of utmost importance when singing. Without proper stance, tension can occur and prevent the best and safest singing outcomes. Feet should be approximately shoulder-width apart with one foot slightly in front of the other and the knees relaxed. The head should be balanced and directly above the spine (Campbell & Scott-Kassner, 2019; Goetze et al., 2016; Houlahan & Tacka, 2015a). Campbell and Scott-Kassner (2019) suggest a marionette puppet imitation game to slowly rise into a relaxed position for singing in which students pretend that each part of their bodies is being lifted by strings.

Breathing. Campbell and Scott-Kassner (2019) compare breathing for singing to breathing for high-endurance sports. It is important for children to understand the expansion of the muscles in the abdomen when inhaling to prepare for singing. Goetze et al., (2016) suggest long, sustained exhalation exercises and shorter, pulsed exhalation exercises to train those muscles. An exercise from Telfer (2000) includes inhaling for four beats, maintaining pressure of the breath, inhaling again for four beats, and finally releasing the breath for eight beats to expand lung capacity.

Pitch exploration. The purpose of pitch exploration (also known as vocal exploration) activities is to promote healthy singing technique by finding head voice, the light, flutelike sound produced when only the edges of the vocal folds touch while phonating (Goetze et al., 2016). Goetze et al., (2016) point out that young children sometimes have difficulty singing in their head voice because of exposure to vocal models in popular music who favor their heavier chest voice, in which the vocal folds completely come together while singing. The switch between head and chest voice is difficult for children; therefore, pitch exploration activities are used to “help them experience the feeling of the head voice register” (Feierabend, 2004, p.7).

Pitch Exploration Examples. There are many types of pitch exploration, including visual, imitation, echo songs, and call and response songs. Visual pitch exploration activities involve following a line or shape with the voice on a neutral syllable such as “oo” (Campbell & Scott-Kassner, 2019; Feierabend, 2004; Houlahan & Tacka, 2015a). The line or shape can be drawn on a whiteboard, made from pipe cleaners or yarn, or created in the air with a prop. Making animal sounds or imitating a siren can extend the register of the voice (Campbell & Scott-Kassner, 2019). Creating these sounds is also an engaging way to explore vocally. Feierabend (2004) suggests the use of echo songs and call and response songs to enable children to feel the sensation of using their head voice. These types of songs allow students to catch on to the melody quickly and involve direct participation. Houlahan and Tacka (2015a) recommend using a greeting song or a song where children are asked to sing their names and the class sings the student’s name back to him or her. Teachers are encouraged to invite individual students to make the vocal exploration sounds on their own only when the whole group is comfortable singing together first.

Other Variables

Even when practicing correct singing exercises, there are other variables to consider when researching the potential for intonation in young singers.

Teacher influence. Although teachers must insist on the right type of sound from the head voice (Feierabend, 2004), they must do so kindly. Many adults remember being told that they “cannot sing” or that they are “tone deaf,” which discouraged their participation in arts activities and therefore decreased their potential for improvement in pitch matching (Demorest et al., 2017).

Teacher expectations. Welch (2006) describes teacher expectations as a major factor in differences between improved singing skills in various socio-economic environments, with the highest amount of progress shown in classes where the teacher “worked consistently for singing improvement with all their pupils over a sustained period.” Because of strong teacher influence, music educators should be gentle in their criticisms in a way that encourages opportunities for growth.

Stereotypes, peer pressure, and familiar influence. Stereotypes, peer pressure, and familial influence may also contribute to the ability to sing in tune. Singing is sometimes regarded as a “feminine” activity, and this attitude may result in a lack of motivation for young boys to work on their singing skills (Bassy, 2010). Bassy also considers the social pressure boys may feel to impress girls with their masculinity. Furthermore, individual singing development is variable due to differences in family background and attitudes toward singing (Demorest et al., 2017).

Types of Singing Assessments

In order to accurately assess students’ pitch matching skills, it is important to use various types of assessments to increase reliability. According to Nichols (2016b, p. 39), “the prevalence

of accurate singing depends on the difficulty of the test items, the type of measure used for evaluation, and the definition of accurate singing.” There are many types of singing assessments, including single pitch, interval, pattern, and entire song or a song phrase. Each of them differs in difficulty level, which should be considered when determining the best way to assess students on their pitch matching skills.

Single Pitch

A single pitch assessment would involve a student hearing a single pitch from an instrument or vocal model and attempting to match it with their own voice. It is the briefest type of pitch matching task (Nichols, 2016b), but may not be the best way to assess the topic. Children are most responsive to other children’s voices (Green, 1990), but in an assessment situation it is not always possible to have a child’s voice for the model. Because singing a single pitch in tune is not typically the goal of a music educator for students, this type of assessment is usually combined with another type of task.

Interval

An interval assessment directly correlates to melodic concepts taught in the general music classroom. An interval in music is the distance between two pitches; for example, a minor third (pitches *sol-mi*) is a common interval studied by first grade students in the Kodály music curriculum (Houlahan & Tacka, 2015b). Similar to a single pitch assessment, students would be asked to echo the interval heard from the model.

Pattern

A pattern assessment is similar to an interval assessment but would contain three or more notes and is the most complex of the echo pitch matching tasks (Nichols, 2016b). The complexity of this task is based on memory, because the longer the pattern, the more difficult it

is for children to remember and reproduce it. Nichols (2016b) found that using four unique notes in a pattern assessment was difficult for poor singers because they were overwhelmed by the complexity.

Songs or Song Phrases

A study by Nichols (2016a) showed that some students can sing individual pitches or interval patterns accurately but are unable to sing an entire song or song phrase in tune. Asking students to recall a phrase of a song or an entire song is theoretically more difficult than echoing a single pitch, interval, or pattern. Students' familiarity with a song may increase their pitch matching ability in song or song phrase assessments. Conversely, adding text (song lyrics) adds complexity and "may take priority over accurate singing" (Nichols, 2016b, p. 43). This conflicting evidence further verifies the need for multiple tasks during singing assessments.

Scoring considerations. Music educators should consider how assessments will be scored before administering them. Other factors besides the type of assessment could affect the data, including doubling with another student and the range of the pitches used in the assessment. In a study where students sang in partners instead of individually, Nichols (2016a) concluded that singing with another student affects pitch-matching ability, usually in a positive way. A student less successful at pitch matching may be able to rely on another student's intonation skills during an assessment, therefore affecting the validity of their score.

It is also important to consider students who may not yet have solidified the use of their head voice or students who have a limited range. Rutkowski (1990) developed a scale to measure voice development rather than pitch matching that could be used with students who have not yet discovered the difference between their speaking and singing voice (see Appendix A). This scale may be needed for students in place of a rubric that measures singing accuracy until the student

is capable of using the singing voice more consistently. For students who are more proficient in their singing voices, choosing a range that is developmentally appropriate is essential. Students will not be able to sing in tune if the range is too low or too high, therefore obscuring the data before the assessment begins.

The Need for Study

Research shows that there are many factors to consider in the process of improving pitch matching skills. As stated by Nichols (2016b, p. 39), “the development of children’s singing accuracy is a responsibility of music teachers.” This topic has been studied for several years and continues to be investigated by current music educators. Nichols (2016a, p. 310) also states, “the assessment of in-tune singing remains one of the biggest pedagogical challenges elementary music teachers face in the classroom.” A deeper study of children’s intonation skills would help researchers develop best practices for teaching general music students to sing healthily and in tune; specifically, the study of vocal exploration and its impact on the pitch matching skills.

CHAPTER THREE

METHODOLOGY

Research Question

Upon reflection of my teaching career thus far, I recognize the importance of students being able to sing healthily and in tune. Although my teaching includes singing in every lesson, it can be a struggle to get students to sing in a proper way, particularly in head voice. There are many factors that contribute to this problem, including a lack of exposure to music or familial influence, of which I have no control. However, on my part as an educator, this struggle could be lessened by spending more time on vocal exploration exercises that encourage the shift between chest and head voices. Therefore, the research question to be answered is: What effect does daily vocal exploration have on elementary music students' ability to match pitch? The goal of using these exercises is to help students develop the use of their head voice, which will lead to more accurate pitch matching while singing.

Data Collection Method

In the fall of the 2020-2021 school year, I completed an action research project using vocal exploration exercises at the start of every music class for chosen first and fourth grade classes. Although the specific exercises differed between grade levels, the main focus of the vocal exercises was to shift successfully between head and chest voices, and consequently match pitch while singing short phrases or songs. The exercises consisted of these two items:

1. Vocal sounds, to promote discovering head voice (i.e. siren noises, animal noises, following an ascending or descending line on whiteboard or with manipulatives)
2. Echo patterns or songs, to apply the sensation of head voice to longer passages (teacher sings, students sing the same pattern or song back)

Completing these two exercises daily took five or fewer minutes of each music lesson and were completed as a whole group activity. To monitor changes in pitch matching ability, students recorded their singing at the beginning and end of the study, approximately four weeks in length. The classes not selected to participate in the daily vocal exploration exercises also completed the recordings for comparison purposes.

Other methods of data collection included video and audio recordings to monitor both student and instructor feelings and accomplishments, a student semantic differential survey, and a parent questionnaire.

Pre and Posttests

After examining studies that use singing assessments, it has been concluded that it is important to use varying types of assessments (Demorest et al., 2017). This is because some students may be more successful singing short patterns on neutral syllables, while others may sing whole songs or song fragments more successfully, and because certain types of assessments are more complex than others. For this study, audio recordings were taken during a pre and posttest that include echoing a short pattern on a neutral syllable and singing a fragment of a familiar song. The echo pattern was recorded on Seesaw and scored out of 3 (1=used speaking voice, 2=used singing voice but was not in tune, 3=sang with correct intonation). The song was be taught as a game at the beginning of the school year and had an appropriate difficulty level. Students were scored using the singing accuracy scale from Wise and Sloboda (2017) (see Appendix B), when singing the fragment of the song.

Semantic Differential Survey

A student's attitudes toward music and their like or dislike of singing may impact their pitch matching skills. A semantic differential survey could expose a correlation between a

student's fondness for singing and their ability to match pitch. The survey asked students to rate their feelings about singing, listening to music, and music class on a continuum between the words "boring" and "exciting" (see Appendices C and D). In the same survey, students also rated their feelings toward the three items between the phrases "unimportant part of learning" and "important part of learning." The survey was given at the beginning and the end of the study, corresponding with the pre and posttests.

Questionnaire

The background of the family can play a role in the development of a child's singing voice (Demorest et al., 2017). Therefore, a digital questionnaire was sent to parents asking for information about the amount and type of music their child is exposed to in the home environment (see Appendix E). The questionnaire was multiple choice with an optional comment section. Investigating the musical background of students' families provided another perspective into their ability and willingness to improve in their pitch matching.

The use of pre and posttests, a student semantic differential survey, and parent questionnaire provided insight into the development of pitch matching skills of elementary music students with the use of daily vocal exploration exercises. The study of children's intonation skills will help teacher-researchers like myself develop best practices for teaching general music students to sing healthily and in tune.

Data Analysis

Data from this study was analyzed using the scale from Wise and Sloboda (see Appendix B). Individual scores from the pre and post tests were compared to see if the daily vocal exploration had any effect on the scores, and therefore the pitch matching skills of the students. Answers from the semantic differential survey and the parent questionnaire were examined

alongside the scores to determine if there is a correlation between pitch matching skills and personal or familial influence. Finally, data was compared between the experimental and control groups to see if the added vocal exploration instruction made an impact on an entire class. The biggest limitation for this study was the possibility of reduced, or the elimination of, singing allowed due to the COVID-19 pandemic. However, absent students were able to complete the assessments and surveys on the same platforms as used in class (Seesaw and Google Forms).

Ethical Issues

There were no ethical issues to be expected from this study. Students' participation in the study posed no greater risk than that of a normal music class. Vocal assessments were completed privately and were stored on a password-protected teacher account. Participation of families also posed minimal risk because their information was kept anonymous in the presentation of the data. Parental permission and child assent were required for participation in the study.

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION

Description of Data

The purpose of my action research was to determine if daily vocal exploration exercises would improve the pitch matching skills of first and fourth grade music students. Vocal exploration activities were completed during each music class with a selected first and fourth grade section. In total, thirty-one first graders and nineteen fourth graders participated in the study. A pre assessment was administered to study participants before the vocal exploration intervention began during music class time. After the initial data was collected, the vocal exploration activities were completed with the experimental sections of students for twelve music classes over approximately four weeks. A student survey was also administered during the first week of the intervention regarding the students' level of interest in singing. Parents were surveyed during the second week of the study, sharing the amount and type of music experienced in the home. At the conclusion of the four weeks, students completed a post assessment identical to the pre assessment and again took part in the survey about their interest in singing. Journal entries and video recordings were used to document my observations of student participation, understanding, and enthusiasm for the interventions. The journal entries facilitated reflection and aided in the selection of the types of activities that would encourage in-tune singing as the study progressed.

Results

First Grade Data

Singing assessments. The pre and post singing assessments for first grade consisted of three short echo patterns on the neutral syllable 'loo' and a fragment of a familiar game song

from music class. The echo patterns were scored out of three possible points, while the song fragment was scored out of eight points according to the Wise and Sloboda Singing Accuracy Scale (see Appendix B). The results from the experimental group are shown in Table 1.

Table 1

First Grade Experimental Group Pre and Post Singing Assessment Scores

Student	Preassessment Echo	Post Assessment Echo	Echo Score Change	Preassessment Song	Post Assessment Song	Song Score Change
A1	2	2	-	2	3	+1
B1	1	2	+1	1	2	+1
C1	3	2	-1	6	6	-
D1	3	3	-	6	7	+1
E1	3	3	-	6	6	-
F1	2	2	-	2	2	-
G1	3	3	-	5	5	-
H1	2	3	+1	3	3	-
I1	2	3	+1	4	6	+2
J1	2	3	+1	2	4	+2
K1	3	3	-	7	8	+1
L1	1	2	+1	1	6	+5
M1	2	2	-	6	5	-1
N1	1	2	+1	1	2	+1
Average	2.14	2.5	+0.36	3.71	4.64	+0.93

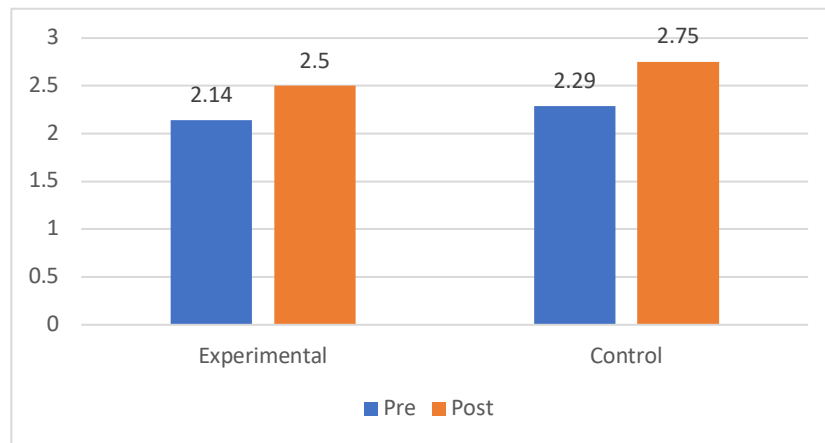
Note. This table shows the difference in student scores between the pre and post assessments in the echo and song portions as indicated in their respective “Score Change” column. The echo portion was scored out of three points, and the song portion was scored out of eight points.

Overall, the class average improved for both the echo pattern and song fragment. Notably, students I1 and J1 both improved their song fragment scores by two points, and L1's score improved by five points. In the pre assessment scoring, I noted that student L1 used a speaking voice rather than a singing voice. In a video recording from the third week of the study, I noticed L1 using their singing voice and matching pitch with the students around them.

The scores from the post assessments increased for both the experimental and control groups for both the echo and song portions as shown in Figures 1 and 2. For the echo portion, the experimental group average increased by 16.82% and the control group average increased by 20.09%. In the song portion, the experimental group average score increased by 25.07%, while the control group average only increased by 9.09%.

Figure 1

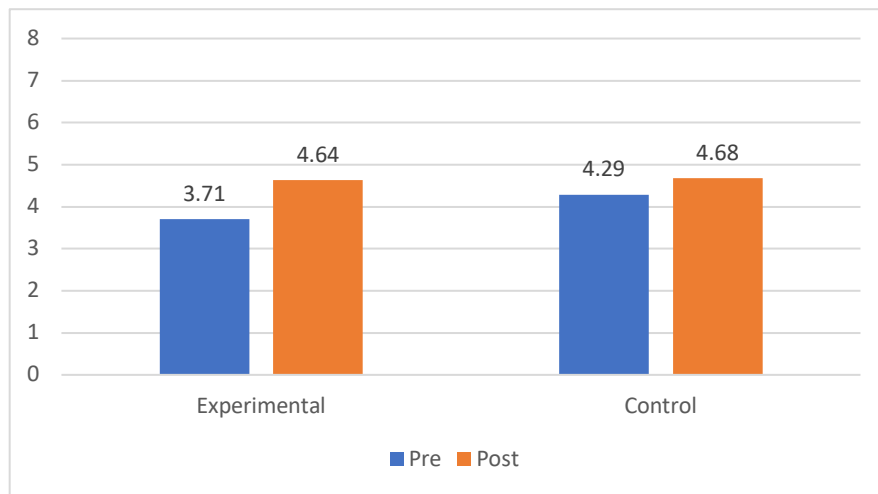
First Grade Pre and Post Echo Singing Assessment Averages



Note. This figure compares the echo portion of the pre and post test of the first grade experimental and control groups.

Figure 2

First Grade Pre and Post Song Fragment Singing Assessment Averages

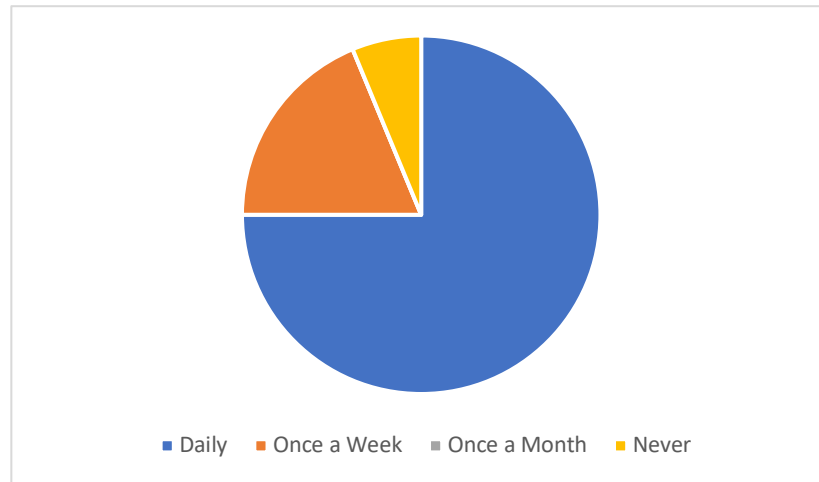


Note. This figure compares the song portion of the pre and post test of the first grade experimental and control groups.

Parent survey. Sixteen parents responded to the first grade student parent survey. All of the respondents noted that music in the home comes from recordings. 75% of the parents indicated that someone sings in their home on a daily basis as shown in Figure 3. Thirteen of the sixteen respondents indicated country and/or pop music are the genres most listened to in the home. Twelve of the sixteen parents denoted that singing is an activity that is encouraged in the home, and the remaining respondents selected “it is not discouraged but not obviously encouraged,” as shown in Figure 4. I did not find a correlation between the singing assessments and the amount of music, type of music, or singing encouragement received at home from the first grade data.

Figure 3

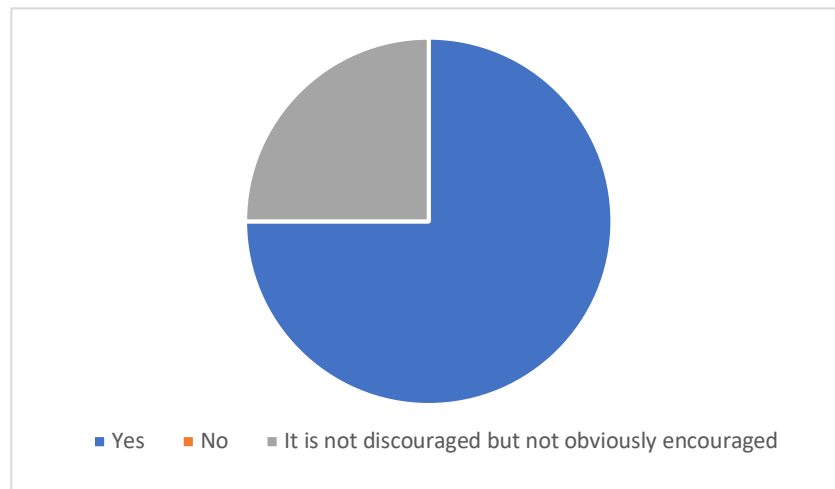
First Grade Singing Frequency in the Home



Note. Respondents were asked to indicate how often someone in the home sings.

Figure 4

First Grade Singing Encouragement in the Home

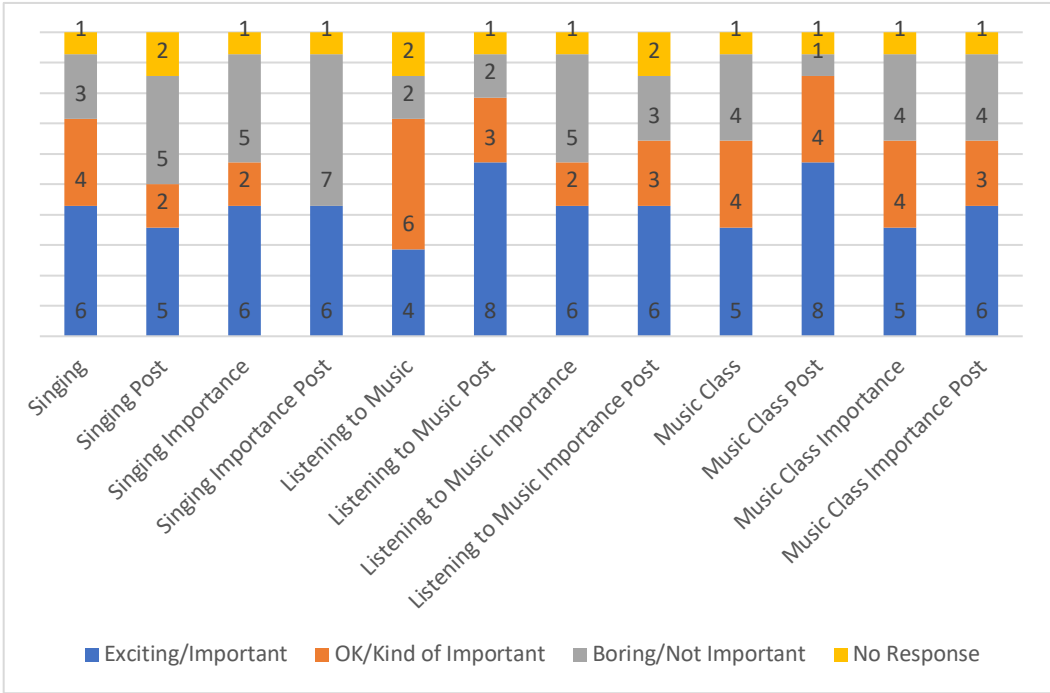


Note. Respondents were asked to indicate if singing is an activity encouraged in the home.

Semantic differential survey. All thirty-one first grade participants submitted answers to the semantic differential surveys. The results of the surveys from the experimental group showed a slight increase in the number of students rating singing and the importance of singing as “boring” and “not important” in their post survey. The most significant change between pre and post surveys was the number of students changing their opinion of music class, as seen in Figure 5. Only one student indicated that music class was “boring” on the post survey compared to four students in the pre survey.

Figure 5

First Grade Experimental Group Semantic Differential Survey Results



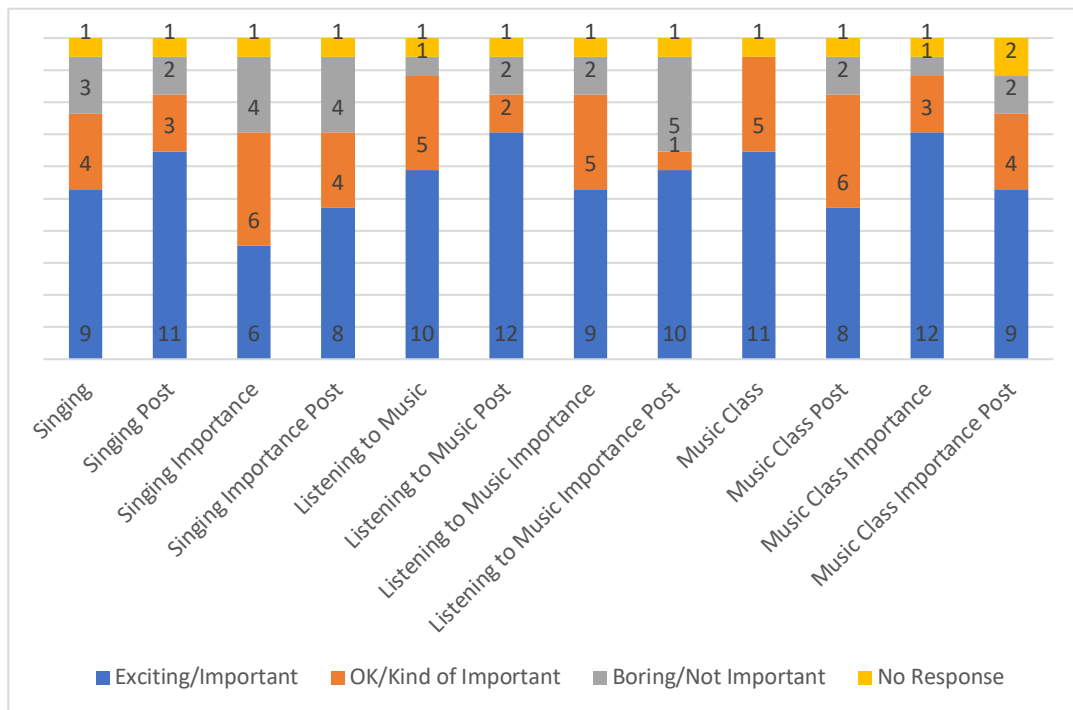
Note. This table compares the pre and post survey results side-by-side to show the change in responses. For example, “singing” and “singing post” are next to one another on the left side.

Notably, on an individual basis, students I1 and J1 from Figure 1 all increased the rating of their opinion of music class from “boring” to “OK.” Student L1 increased their rating of music class from “OK” to “exciting.” As previously stated, these three students raised their singing scores by two to five points. Student L1 also indicated singing as “exciting” on the post survey, which was an improved rating from “OK” on the pre survey.

Figure 6 shows the results of the semantic differential survey in the control group, where more children rated singing as “exciting” in the post survey, which is the opposite of what happened with the experimental group. This group also had lower ratings of music class in the post survey, which again is the opposite of what happened with the experimental group, perhaps indicating a liking for the added intervention activities.

Figure 6

First Grade Control Group Semantic Differential Survey Results



Note. This table compares the pre and post survey results side-by-side to show the change in responses. For example, “singing” and “singing post” are next to one another on the left side.

Fourth Grade Data

Singing assessments. The pre and post assessments for fourth grade students included four echo patterns on known solfège syllables and a short song learned in music class. The echo patterns were scored out of three possible points and the song was scored out of eight points from the Wise and Sloboda scale. Table 2 shows the results from the experimental group.

Table 2

Fourth Grade Experimental Group Pre and Post Singing Assessment Scores

Student	Preassessment Echo	Post Assessment Echo	Echo Score Change	Preassessment Song	Post Assessment Song	Song Score Change
A4	3	3	-	7	7	-
B4	3	3	-	4	6	+2
C4	3	2	-1	4	3	-1
D4	3	3	-	7	6	-1
E4	3	3	-	4	4	-
F4	3	3	-	5	5	-
G4	3	3	-	7	6	-1
H4	2	2	-	4	4	-
I4	3	3	-	2	7	+5
J4	3	3	-	7	8	+1

K4	3	3	-	6	7	+1
Average	2.9	2.81	-0.09	5.18	5.72	+0.58

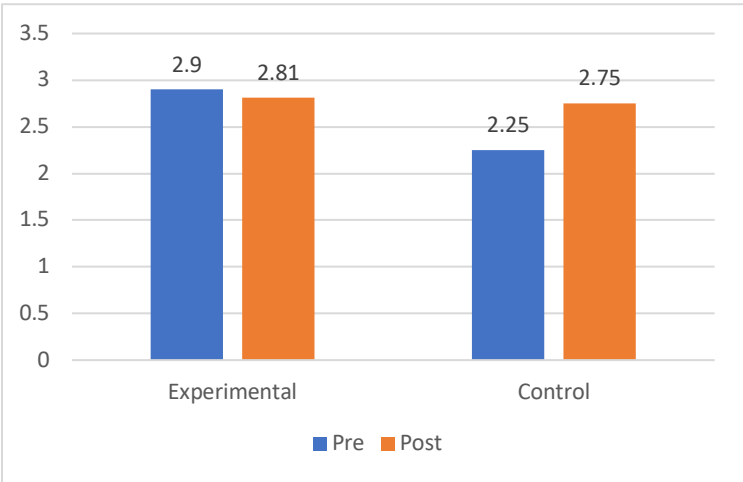
Note. This table shows the difference in student scores between the pre and post assessments in the echo and song portions as indicated in their respective “Score Change” column. The echo portion was scored out of three points, and the song portion was scored out of eight points.

There was a small decrease in the average for the echo portion of the assessment, which can be attributed to a single student scoring lower on the post assessment. The song portion of the assessment showed over half of a point increase in class average. Individually, student I4 made great gains, scoring five points higher on their post assessment than the pre assessment. Students D4 and G4 completed their post assessments online rather than in person due to absence, which may have affected their performance.

Figures 7 and 8 show the scores from the echo singing and song fragment portions of the assessments, respectfully. The control group improved their average in the echo portion by 22.22%, while the experimental group score decreased by 3.1%. In the song portion, the control group average stayed the same, while the experimental group average increased by 10.42%.

Figure 7

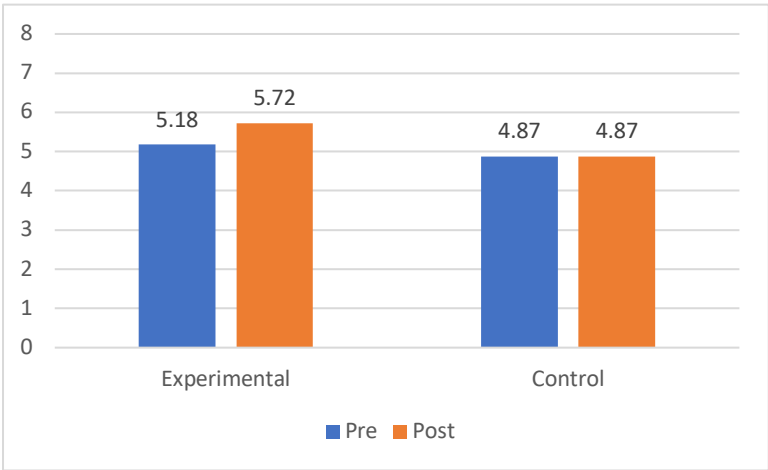
Fourth Grade Pre and Post Echo Singing Assessment Averages



Note. This figure compares the echo portion of the pre and post test of the fourth grade experimental and control groups.

Figure 8

Fourth Grade Pre and Post Song Fragment Singing Assessment Averages

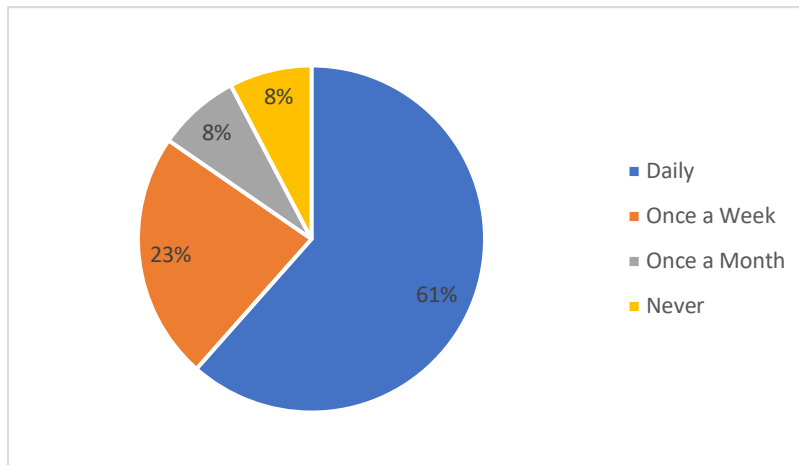


Note. This figure compares the song portion of the pre and post test of the first grade experimental and control groups.

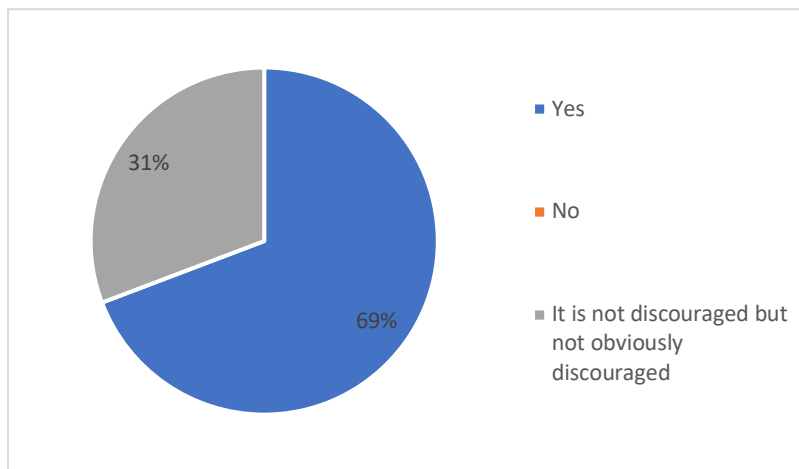
Parent survey. Thirteen fourth grade student parents responded to the parent survey. 61.53% of parents indicated that singing in the home happens on a daily basis, as shown in Figure 9. Only one respondent said that music most often comes from a live source, such as singing or instrument playing, while the rest said recordings are the main source of music in the home. Similar to the first grade student parents, pop and country were the genres most listened to in the home, with ten parents indicating those genres on their survey. Figure 10 shows that singing is encouraged in many fourth grade student homes, at 69%. There was no correlation between scores on the singing assessments and the amount of music, type of music, or singing encouragement received at home in the fourth grade data.

Figure 9

Fourth Grade Singing Frequency in the Home



Note. Respondents were asked to indicate how often someone in the home sings.

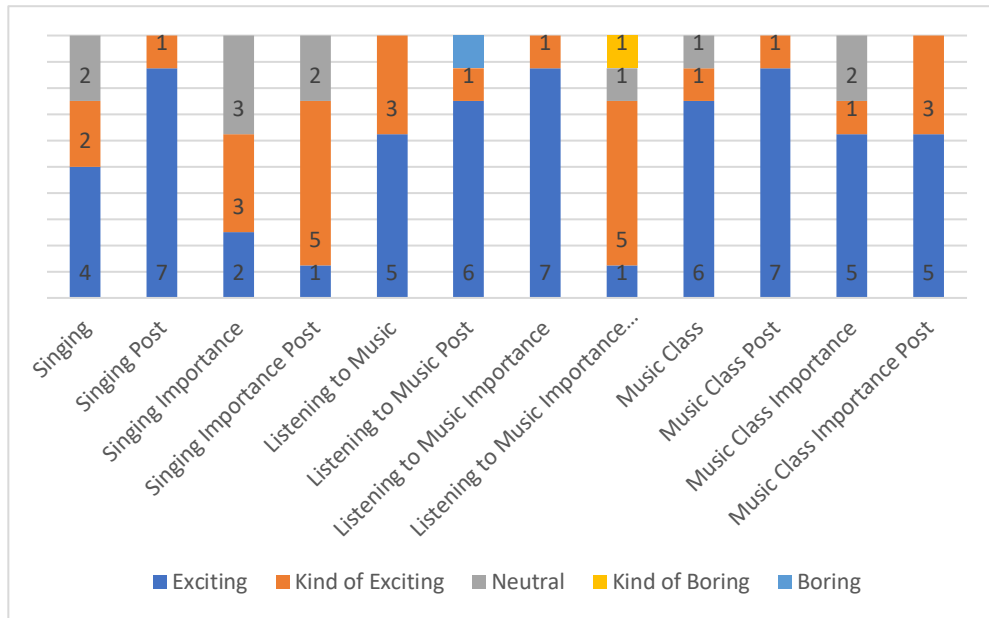
Figure 10*Fourth Grade Singing Encouragement in the Home*

Note. Respondents were asked to indicate if singing is an activity encouraged in the home.

Semantic differential survey. Only sixteen out of nineteen student participants submitted answers to the semantic differential survey. The results of the experimental group survey, shown in Figure 11, indicate a strong liking of singing and music class. The most significant change between pre and post data was an increased number students denoting singing as “exciting,” and a significant decrease of “important” scores in the “listening to music” section. Students indicating a more favorable attitude towards singing may have contributed to the increased song fragment score in the singing post assessments; however, individual data does not support this theory, as students whose singing scores improved did not consistently report higher ratings on the semantic differential survey. Similarly, students whose singing scores decreased did not report lower scores on their survey.

Figure 11

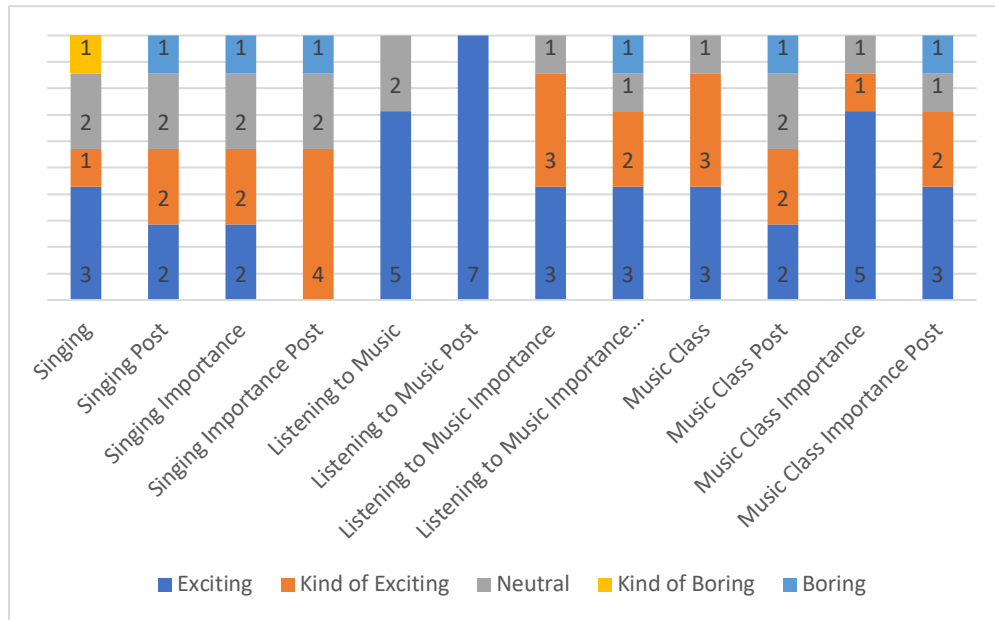
Fourth Grade Experimental Group Semantic Differential Survey Results



Note. This table compares the pre and post survey results side-by-side to show the change in responses. For example, “singing” and “singing post” are next to one another on the left side.

Figure 12

Fourth Grade Control Group Semantic Differential Survey Results



Note. This table compares the pre and post survey results side-by-side to show the change in responses. For example, “singing” and “singing post” are next to one another on the left side.

The control group scores trended slightly more unfavorably than the experimental group, with the exception of their rating of listening to music. Overall, the group attitude towards singing and singing importance became more neutral in the post assessment. Notably, one individual ranked every item except “listening to music” as “boring” in the post survey. The increase in echo assessment scores does not seem to correlate with the control group attitude toward singing.

Conclusions

The scores show that spending time on vocal exploration exercises can increase the pitch matching skills of first and fourth grade students. This is shown in the improved scores of the experimental group for the song portion of the assessments. However, the scores in the control

groups also increased in some areas, particularly in first grade, so it may not be the only determining factor. Although the control groups did not participate in the vocal exploration exercises, they were still singing during music class. Simply gaining experience using the singing voice could have also attributed to the change in scores.

Based on the data collected from the parent survey, it is inconclusive whether or not the genre of music listened to in the home affects the ability to match pitch. I was surprised to see that scores of students whose parents indicated that singing does not happen on a daily basis did not trend lower. This indicator reminded me that my encouragement as a music educator can affect the singing skills of my students. I was pleased to see that over 75% of parent respondents encourage singing in the home, meaning students have encouragement to sing both at home and at school.

I was expecting to see students that scored higher on the assessments would indicate singing as something they enjoy, and that proved to be generally true. Eighteen students across both grades that scored six or more points on the pre and post assessments indicated singing was “OK or “exciting,” and ten of these students gave singing the highest possible rating. On the other hand, only one fourth grader responded that they found singing on the less favorable side of the semantic differential survey on both the pre and post assessments. In first grade, there were eight students who indicated less favorable attitudes towards singing on the assessments. I have concluded that I need to continue to work on making singing more exciting in my teaching for the first graders. Although my survey did not ask students to explain why they rated singing the way they did, I am curious to explore why my younger students are less excited about singing than the older students.

Through my study of the child singing voice, I learned the importance of spending time teaching the difference between singing and speaking voices, modeling, and student choice. Some of the first graders made great gains in their ability to use a singing voice rather than a speaking voice. Once children can make that distinction, matching pitch becomes easier. I think the vocal exploration exercises and having high expectations from the instructor aided in this improvement. Modeling was useful from both the teacher and peers. When I heard students struggling to match pitch in our activities, I could model what I heard and then what I wanted to hear. Students also learned from peer leaders who were able to complete some of the exercises on their own. The fourth grade experimental group was very invested when I gave them the opportunity to create their own vocal exploration exercises and demonstrated more successful use of head voice. The older students also responded well when I discussed why good posture and the use of head voice was important for a healthy singing voice. I have concluded that the use of high expectations and clear explanation of activity goals helped students achieve a feeling of using a singing or head voice, thereby increasing assessment scores.

CHAPTER FIVE

ACTION PLAN AND PLAN FOR SHARING

Plan for Taking Action

After completing this study, I believe that daily vocal exploration is one method for improving the pitch matching ability of young singers. In addition to vocal exploration exercises, I think encouragement from the educator and repetitive practice are also key to improving pitch matching skills. I will continue to use vocal exploration exercises in my music classes and spend more time on it with my youngest students, as it is good to develop healthy singing habits at a young age. I will also use the vocal exploration exercises that I thought were most successful, including echoing patterns from a slide whistle, creating vocal pathways with lines and manipulatives, and call and response songs.

Because scores improved whether or not students were a part of the intervention, it can be inferred that as students practice this skill, they will improve. All first and fourth grade students participated in regular music activities during the course of this study, and singing was a large part of those activities.

I enjoyed spending time one-on-one with my students and hearing them sing as individuals, as much of my teaching time is spent on whole group activities. A four-week intervention is just a small amount of time during the school year. I think it would be significant to continue this research regarding vocal exploration over a longer period of time, such as the duration of a school year. More assessments could be completed at various points, perhaps monthly or at the end of quarters or trimesters. These assessments could help determine if progression in pitch accuracy continues over time or if scores eventually stop improving.

Throughout the study, I paid close attention to the students that indicated singing, listening to music, or music class was “boring” according to their initial survey. I plan to continue making connections with these students and offer a variety of activities that will be attractive to them in the future. For example, talking to them about what kind of music they enjoy or what types of activities they like in music class may help them be more invested in singing, listening to music, or music class.

Plan for Sharing

Now that I have spent time studying vocal exploration and completed action research, I plan to share my most successful vocal exploration exercises with my colleagues in the district. Hopefully it will inspire them to continue fostering healthy and in-tune singing with their students as I have. I will also be willing to share my findings and the process of action research with my colleagues looking to dig deeper into a problem or concern in their own classroom. Action research will continue to be a process I can use when difficulties arise in my classroom in the future.

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Appendix A

Rutkowski's Singing Voice Development Measure (1990)

1 **Pre-singer** does not sing but chants the song text

1.5 **Inconsistent Speaking Range Singers** sometimes chants, sometimes sustains tones and exhibits some sensitivity to pitch but remains in the speaking voice range (usually A2 to C3)

2 **Speaking Range Singer** sustains tones and exhibits some sensitivity to pitch but remains in the speaking voice range (usually A2 to C3)

2.5 **Inconsistent Limited Range Singer** waivers between speaking and singing voices and uses a limited range when in singing voice (usually up to F3)

3 **Limited Range Singer** exhibits consistent use of limited singing range (usually D3 to F3)

3.5 **Inconsistent Initial Range Singer** sometimes only exhibits use of limited singing range, but other times exhibits use of initial singing range (usually D3 to A3)

4 **Initial Range Singer** exhibits consistent use of initial singing range (usually D3 to A3)

4.5 **Inconsistent Singer** sometimes only exhibits use of initial singing range, but other times exhibits use of extended singing range (sings beyond the register lift: B3-flat and above)

5 **Singer** exhibits use of extended singing range (sings beyond the register lift: B3-flat and above)

Appendix B

Wise and Sloboda Singing Accuracy Scale (2007)

8	All melody is accurate and in tune, and key is maintained throughout.
7	Key is maintained throughout, and accurately represented, but some mistunings (though not enough to alter the pitch-class of the note).
6	Key is maintained throughout and melody mostly accurately represented, but some errors (notes mistuned sufficiently to be 'wrong').
5	Melody largely accurate, but singer's key drifts or wanders. This may be the result of a mistuned interval, from which the singer then continues with more accurate intervals but without returning to the original pitch.
4	Melody fairly accurate, or mostly accurate within individual phrases, but singer changes key abruptly, especially between phrases (e.g. adjusting higher-lying phrases down).
3	Singer accurately represents the contour of the melody but without consistent pitch accuracy or key stability.
2	Words are correct but there are contour errors. Pitches may sound almost random.
1	Singer sings with little variation in pitch, and may chant in speaking voice rather than singing.

Appendix C

Fourth Grade Semantic Differential Survey

Rate your feelings towards: Singing

Boring					Exciting
-2	-1	0	1	2	

Unimportant part of learning					Important part of learning
-2	-1	0	1	2	

Rate your feelings towards: Listening to music

Boring					Exciting
-2	-1	0	1	2	

Unimportant part of learning					Important part of learning
-2	-1	0	1	2	

Rate your feelings towards: Music class

Boring					Exciting
-2	-1	0	1	2	

Unimportant part of learning					Important part of learning
-2	-1	0	1	2	

Appendix D**First Grade Semantic Differential Survey**

Students were asked to circle their responses in each column regarding singing, listening to music, and music class.

**exciting****OK****boring****important****kind of important****not important**

Appendix E**Parent Questionnaire**Parent Questionnaire (completed by parent/guardian of participating subjects)

1. From what source does music come most often in your home?
 - a. Recordings (i.e. YouTube, Amazon Music, Spotify, CDs, etc.)
 - b. Live (someone playing an instrument or singing)
 - c. Movies
 - d. Music is not listened to in the home
 - e. Other (please specify)
2. What genre(s) of music is most often listened to or played in the home?
 - a. Pop
 - b. Classical
 - c. Hip Hop/Rap
 - d. Classic Rock
 - e. Country
 - f. Other (please specify)
3. How often does someone in the home play an instrument?
 - a. Daily
 - b. Weekly
 - c. Monthly
 - d. Never
4. How often does someone in the home sing (i.e. along with a recording, by themselves, for infants, etc.)?
 - a. Daily
 - b. Weekly
 - c. Monthly
 - d. Never
5. Is singing an activity that is encouraged in the home?
 - a. Yes
 - b. No
 - c. It is not discouraged but not obviously encouraged