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THE EFFECT OF RANGE TRAINING ON THE VOCAL ACCURACY OF
RESTRICTED AND COMPLETE RANGE K-3 SINGERS

by

Jane Mary Rooks

A Thesis
Submitted to the
Faculty of The Graduate College
in partial fulfillment of the
requirements for the
Degree of Master of Music
School of Music

Western Michigan University
Kalamazoo, Michigan
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THE EFFECT OF RANGE TRAINING ON THE VOCAL ACCURACY OF RESTRICTED AND COMPLETE RANGE K-3 SINGERS

Jane Mary Rooks, M.M.

Western Michigan University, 1987

The primary purpose of the study was to investigate the effects of remedial vocal training on inaccurate singers. Inaccurate singers in kindergarten through third grade were given a pretest to determine if they were inaccurate complete range singers or inaccurate restricted range singers. These singers were placed into three equivalent groups for vocal instruction by means of a Systematic Vocal Training in either their low range, high range, or high/low range. A posttest was administered to ascertain gain scores.

The results demonstrated a significant difference in the gain scores of restricted range singers as compared to complete range singers and in the gain scores resulting from the interaction between range training and the subjects' pretest vocal range. The gain scores of the restricted range singers were significantly greater than those of the complete range singers. The gain scores resulting from the interaction of the treatment and subjects' pretest range indicated a significant difference only in the subjects' low range. Restricted range singers trained in the high/low range established significantly greater gains in scores than restricted range singers trained in the high range or complete range singers trained in the low, high, or high/low ranges. Other relationships in the study did not reveal significant differences.

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Jane Mary Rooks

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CHAPTER I

INTRODUCTION

Background of the Problem

Music educators are in agreement that correct and accurate singing is a vital goal in music education programs. Not only is the joy of singing understood to be an experience that should be accessible to every child, but many educators also feel singing is the child's first step into the world of music. Jones (1979) argues this point saying "singing is the child's most natural access to music; without it he may experience increasing alienation from music as he grows older" (p. 183). Gould (1968) concurs stating, "Too often in the past children who have experienced difficulty in negotiating this initial step [matching pitches] have been increasingly excluded from learning experiences with music as they grow older" (p. 1).

Accurate singing, unfortunately, does not develop naturally in all children. Singing inaccuracy, in fact, is common in children of all ages. More than 600 music teachers reported that 10-34% of the students were singing inaccurately in the elementary grades (Gould, 1968). The prevalence of singing inaccuracy has led to many studies concerning the nature of the inaccuracy and the methods of remediation. Although gains are being made in the understanding of vocal inaccuracy and remediation techniques, continued research is needed to effectively assist inaccurate singers.

Statement of the Research Problem

In the early part of the twentieth century studies developed which examined accuracy in singing. These studies investigated the nature of inaccurate singing in children and remedial techniques. One area that had been explored is the effect of the singer's range on the ability to sing accurately. Many researchers found that young inaccurate singers needed to develop both their low range (middle C1 up to A1) and their high range (A1 up to E2) to sing with accuracy (Joyner, 1969; Rossell, 1983; Smith, 1961). It was also found that some inaccurate singers had a normal range for their age, while others had a restricted range (Joyner, 1969). It has not been fully investigated whether complete range singers would respond differently than restricted range singers to training in different vocal ranges.

The primary purpose of this study was to investigate the effects of a remedial vocal training program in the low, high, and high/low ranges on the ability of kindergarten through third grade students to sing accurately as measured by pretest and posttest gain scores. In addition, the effect of the subject's initial range classification of restricted range singer or complete range singer was noted. And, finally, the interaction between the initial range variable and the experimental treatment was also assessed.

The Subproblems

The following subproblems were examined in this study:

The first subproblem was to determine the effect of vocal

training in the low range, high range, and high/low range on overall vocal accuracy gain scores.

The second subproblem was to determine the effect of the subjects' pretest vocal range on overall vocal accuracy gain scores.

The third subproblem was to determine the interaction effect of vocal training and the subjects' initial range on overall vocal accuracy gain scores.

The fourth subproblem was to determine the effect of vocal training in the low range, high range, and high/low range on the gain scores for the low range section of the vocal accuracy test.

The fifth subproblem was to determine the effect of the subjects' pretest vocal range on the gain scores for the low range section of the vocal accuracy test.

The sixth subproblem was to determine the interaction effect of training and the subjects' initial range on the gain scores for the low range section of the vocal accuracy test.

The seventh subproblem was to determine the effect of vocal training in the low range, high range, and high/low range on gain scores for the high range section of the vocal accuracy test.

The eighth subproblem was to determine the effect of the subjects' pretest vocal range on the gain scores for the high range section of the vocal accuracy test.

The ninth subproblem was to determine the interaction effect of training and the subjects' initial range on the gain scores for the high range section of the vocal accuracy test.

Delimitations

Subjects in this study were limited to students at a Christian grade school. Application of the results beyond this population must be made with caution.

All extraneous influences could not be controlled. The subjects surely experienced differing amounts of singing or music activities outside of this study (e.g., extracurricular singing through choirs or Sunday School, studying the piano, and so on). The subjects were divided into the three training groups so that each group had an equivalent number of students from each grade and voice classification. Within that controlled structure random selection was implemented. It is hoped that the effect of the extraneous influences would be minimized by this group division. It is thought, therefore, that the results could be reasonably attributed to the interaction of the treatment and voice classification.

CHAPTER II

REVIEW OF RELATED LITERATURE

Theories Concerning Inaccurate Singing

A common view of singing, particularly among non-musicians, is that singing ability is completely innate. Unfortunately, this attitude tends to obviate the need for remediation for inaccurate singing since the deficiency is considered to be a natural and unchangeable character of the singer. From this view can come statements such as the following by Kalmus (cited in Kazez, 1985):

They [inaccurate singers] can sometimes, if pressed, achieve a reasonable proficiency on the piano. But probably no such person has ever learned to sing tolerably or to play the violin or flute without arousing violent reactions. In general, it is unprofitable to make a tone-deaf child take music lessons. (p. 46)

Even music textbooks have inadvertently supported this idea by not providing a structured approach in teaching children how to sing (Atterbury, 1984a).

Fortunately, most researcher and music educators consider inaccurate singing to be treatable through remedial programs. Many studies have pursued the problem of inaccurate singing and have suggested guidelines for assistance. Although these studies have greatly increased the understanding of inaccurate singing and remedial techniques, they have not come to conclusive agreement concerning the nature of the inaccuracy or the definitive means of eradicating the problem.

The earliest researchers working in the first half of the twentieth century, most notably Seashore, Drake, and Wing, developed tests which could objectively assess perceptual or aural skills. Building on this testing approach, Anderson and Fieldhouse in 1930 came to the conclusion that the inaccurate singer was deficient in the aural skills of pitch discrimination and in tonal memory (cited in Welch, 1979a).

The next major research studies on singing inaccuracy were conducted by Bentley, (1954, 1957, 1966, 1968) and Joyner (1969). Bentley attempted large-scale investigations and accumulated a great amount of useful data, thereby offering a basic understanding of the extent of the problem and its occurrence relative to age. Joyner continued Bentley's investigations and found there were differing degrees of singing inaccuracy. He differentiated between the "real monotone" who sings consistently out of tune, regardless of pitch level, and the "Grade A monotone" who can sing in tune if pitch level is low. His studies indicated the problem to be motor-based rather than the fault of auditory processing. Thus, he concluded that the low scores for tonal memory and pitch discrimination produced by inaccurate singers were a product of a motor dysfunction. This conclusion was a reversal of the early twentieth century assessment of inaccurate singing as resulting from, not leading to, poor pitch discrimination and tonal memory.

Other studies did not view singing inaccuracy as exclusively an aural or vocal deficiency. They showed that a strong interdependent correlation does exist between vocal ability, accurate pitch discrimination and tonal memory (Buckton, 1977; Pedersen & Pedersen, 1970)

but that vocal ability is the stronger variable (Roberts & Davies, 1976).

Prevalence of Inaccurate Singers

The proportion of school children classified as inaccurate singers has been studied in a variety of ways by different researchers. Gould (1968) tabulated information gleaned from more than 600 music teachers concerning their inaccurate singers. In the first grade, 34.6% of the students were reported to be inaccurate singers. In the second grade, 24.2% were deemed inaccurate in singing. In the third grade, 17.8% were reported inaccurate singers. In the fourth grade, 12.9% were considered inaccurate. In fifth grade, 11.8% sang inaccurately. In the sixth grade, 11.0% were inaccurate in singing. This made for an average of 18.7% inaccuracy in singing for elementary grades. Gould found his research statistics consistent with the research of Jersild and Beinstock (1934). Bentley (1968) found through his own testing that 12-25% of 7 and 8-year-olds (second graders) were inaccurate singers and that 2-7% still remained inaccurate singers by the age of 12 and 13.

Inaccuracy in singing is found in both male and female singers. Some researchers record a higher incidence of pitch problems with boys. Bentley (1968), for example, found 25% of boys and 12% of girls between the ages of seven and eight years were monotones and that 7% of boys and 1-2% of girls between the ages of 12 and 13 were monotones. After 8 years of age, 3 to 4 times as many boys as girls were monotone singers. Roberts and Davies (1975a) found similar ratios in their

research. Other researchers, however, argue that there is no sex difference in vocal ability (Jersild & Bienstock, 1934; Pedersen and Pedersen, 1970, Petzold, 1966; Wassum, 1979). Wilson (1970) suggested that the vocal mechanism is essentially the same for both genders until about age 11, but boys tend to feel more comfortable in a lower range possibly due to cultural pressures.

These findings imply that maturation alone will not necessarily remedy inaccurate singing in all students, and that the traditional music class instruction is not completely successful in remediating the vocally inaccurate singer.

Development of Vocal Skills

The development of vocal skills needed for accurate singing has been studied in a variety of ways by researchers. Moog (1976) suggested that children's development in singing from birth to 2 years begins initially with words, then rhythm, and finally pitch. At age 2½ to 3 years imitative singing becomes part of the child's singing experience. Winner (1982) sites a similar progression of words progressing into song as part of vocal development. She considers song learning as involving sequential mastery of the following: lyrics, rhythm, melodic contour, correct intervals and sense of tonality. More specifically and by age level, Winner has suggested that the following behavioral sequence occurs: from birth until age 1½ vocalization is evident on varied pitches, but usually with continuous, rather than discrete, pitches. From age 1½ to 2½ distinct pitches are sung often with intervals of a minor third or smaller. Age 2½ to

3½ most often includes the expansion of the interval size and an undulating contour of melody. This undulating melodic contour is similar to that produced by adults except that the child's songs lack rhythmic and tonal organization. By age 3½ tonal awareness becomes evident and continues to develop so that by age 6 most children can sing in one key. This tonal mastery demands first of all an ability to produce discrete rather than continuous pitches; next, the skill to sing wider intervals; and, finally, the ability to invent or copy tunes that possess a tonal organization.

Shuter-Dyson and Gabriel (1981) gave guidelines for typical musical development in a more general scope. From birth to age one children react to sounds until, by age 2, there is spontaneous music making. At age 2 to 3 children begin to reproduce phrases of songs heard. By age 3 to 4 children are conceiving a general plan of melodic contour and may even develop perfect pitch if given lessons on an instrument. From age 4 to 5 children can determine the register of pitches and can tap back simple rhythms. By age 5 to 6 there develops the ability to discriminate between loud/soft and same/different within simple tonal or rhythmic patterns. At age 6 to 7 a movement toward tuneful singing is evident and tonal music is perceived better than atonal. Age 7 to 8 sees a greater appreciation of consonance over dissonance and by age 8 to 9 rhythmic performance tasks have improved. Age 9 to 10 brings an improvement in rhythmic perception and melodic memory as well as an ability to perceive two-part melodies and feel a sense of cadence. By age 10 to 11 children are establishing a harmonic sense and appreciating the finer points of music. From age 12 to 17 there

is an increase in appreciation both cognitively and emotionally.

Myers (1961) did not link vocal development to specific ages but instead set out a sequence of necessary skills for accurate singing. She first identified the child's vocalizations as being in three categories: a speaking voice which is clear and high pitched, a play voice which is harsh and strident, and a singing voice which is again clear and high pitched. The necessary steps for accurate singing begin with the ability to differentiate between high and low sounds. This leads to the ability to differentiate between tones within an octave. Next, the ability to match specific tones develops, followed by the skill to match two or three successive tones. Finally, the ability to sing short phrases develops. Jones (1979), however, challenged Myers' sequential steps scheme by observing that some children she tested were able to match tones prior to being able to discriminate between high and low pitches. She also found that some children could match two or three successive pitches before they could accurately match a single pitch.

Bergethon and Boardman (1970) built on existing vocal development research by establishing an outline for musical growth through singing skills at different grade levels. Kindergarteners and first graders should display an improving ability to sing on pitch in a limited range and should understand melodic movement. Second graders should possess an expanding range and be able to associate melodic movement with numbers or syllables. Third graders should demonstrate an improvement in diction and tone in singing and be able to work with scale and chord patterns. Fourth graders ought to be able to sing

accurately from B (below middle C) to high F2. Fifth graders can be expected to sing more expressively and independently using numbers or syllables. Sixth graders may start experiencing their voice change and may be more limited in vocal range and control.

Remedial efforts for inaccurate singers may well be assisted by knowledge of the vocal development sequences; an inaccurate singer may be delayed in the sequential steps or may have skipped a necessary stage of development. However, another skill may be necessary for the development of accurate pitch matching: the ability to function accurately in a wide range. Wassum (1979) stated that "relationships between the ability to sing a wide range and the task of maintaining major tonality by singing scales or songs were not significantly correlated throughout a 5-year period" (p. 29). These two skills, correct intonation and a full range, may both be necessary for accurate singing and may not be interdependent. It appears that one skill could develop without the other, but the absence of either skill would result in inaccurate singing.

Research on Children's Voice Ranges

A frequent topic of research has been the "typical" range of children's voices at various ages. The research literature can be confusing, because some studies have tabulated the extreme ranges of individual subjects, while others indicated the mean ranges for groups of children, whereas still others presented only the range of pitches that were of good singing quality. Unfortunately, the studies did not always indicate which approach was taken in examining the vocal ranges

of children.

Jersild and Bienstock (1934) seem to have tabulated the extremes of children's ranges: kindergarteners had a range from low A up to high G2 (an interval of a fourteenth); first graders sang in a range from low A up to high F2 (an interval of a thirteenth); second graders demonstrated a range from low G to high G2 (an interval of a fifteenth, two octaves); third graders had a range from low F up to high G2 (an interval of a sixteenth); fourth graders exhibited a range from low F up to high G2 (an interval of a sixteenth); and sixth graders sang in a range from low F up to high G2 (an interval of a sixteenth).

More current research by Wilson (1970) found ranges to be somewhat more restricted: third graders used a range from low A up to C2 (an interval of a tenth); fourth graders sang in a range from low G up to F2 (an interval of a fourteenth); and fifth graders demonstrated a range from low F up to E2 (an interval of a fourteenth).

Wassum (1979) and Atterbury (1984b) also examined the ranges of children in different school grade levels, but presented their results only in intervals, not in actual pitches. Wassum's conclusions seemed to indicate the mean ranges of the group of singers, not the extreme ranges. First graders had a range of an interval of a ninth; second graders sang within an interval of a tenth; third graders demonstrated vocal control in an interval of a thirteenth; fourth graders also sang within an interval of a thirteenth; fifth graders expanded their singing range to an interval of a fourteenth. Atterbury's findings are more conservative: kindergarteners and first

graders were found to sing in a range of a perfect fifth to a major sixth with the vocal center being around middle C1 or D1.

Other researchers present more general estimates of primary children's ranges instead of grade specific ranges. Nye and Nye (1964) found primary children's ranges to be from middle C1 up to A1. Welch (1979) suggested the comfortable singing range to be from middle C1 up an octave to C2. Wilson (1970) found primary children using a range from middle C1 up to D2. Wassum (1979) found that 50% of the children at every grade level could sing in the range of at least an octave and that generally her research indicated children's ranges to be higher and wider than previously reported. Smith (1961) divided children's ranges into a low range and a high range, suggesting the low range to extend from middle C1 up to A1 and the high range to span from A1 up to high E2.

The average singing ranges of the research indicate that kindergarten and first grade children generally sing easily in an interval of a ninth; second or third grade children generally can expand their range to an interval of a tenth. Ranges usually widen as they mature until they are singing in a range from an octave and a half to two octaves by fifth grade. To achieve this full range by fifth grade they need to develop both their low and high ranges.

The results of range studies should offer guidelines in the choice of ranges and keys in children's song series. Oddly enough, most music textbooks in use today seem to disregard the more current research. Atterbury (1984b), Nye and Nye (1964), and Welch (1979) found that these textbooks usually pitch songs in the range indicated by the

studies of range extremes published in the early twentieth century. They felt that these songs are not only too extreme in their ranges, but are also in keys pitched too high to be a comfortable range for most singers in primary grades. They suggested a need for songbooks in lower and less extreme ranges. In contrast, however, other researchers were wary of a possible reverse trend in songbooks towards lower pitched and more restricted song ranges (Gould, 1968; Myers, 1961). These researchers felt that songs pitched too low could have a ruinous effect on the voices of young singers as it encouraged them to sing heavily and with a harsh tone quality. Wilson (1970) acknowledged this concern, but found it unjustified. Her studies indicated that children could be taught to sing in a lower range with an unforced, light quality.

In general, researchers agree that the extreme ranges cited in early twentieth century studies are not appropriate ranges for songbooks. However, agreement does not exist as to whether the placement of songs should be in children's high or low range.

Optimum Age for Remediation

Given the expected range of children at each grade level, it will be found that some are unable to reach that range while others, though able to sing the pitches, are unable to sing with vocal accuracy. Remediation (which will be discussed in detail later) is then recommended by researchers investigating vocal control in children. These researchers do not agree, however, about the optimum age for remediation.

Some researchers believed that remediation is most effective in preschool to kindergarten age singers. The strongest argument for remediation at this very early age is that the formation of bad singing habits can be avoided through early training. Smith (1961) found his research to indicate not only an improvement in vocal control, but also a more positive interest in all aspects of music among the preschool trainees. In 3 to 5 year old children the interest in music activities was directly proportional to the amount of vocal training received. Apfelstadt (1984) found remediation beneficial in the vocal development of kindergarten students. Petzold (1966) studied the result of vocal training in elementary students and found a steady improvement in the ability to sing back tunes at all age levels, but that the gains tended to level off among older elementary students. According to his study, the greatest improvement was evident at age 6 and 7.

Other research indicated an older age, grades 1 to 4, is the more effective age for vocal remediation. Gould (1968) surveyed more than 600 music educators who overwhelmingly recommended grades one, two and three, and if necessary grade four. Buckton (1977) supported this recommendation, suggesting that age 6.5 to 8.1 years old (grades one to three) is a time of considerable vocal growth and psychological openness. Jones (1979) chose grades two, three, and four as most suitable for training. Forucci (1975) settled on third grade as the best age to test training ideas.

Success of remediation cannot, however, be attributed unequivocally to vocal training. Maturation is an important factor in both

the improvement of skills and the responsiveness to remediation. Shuter-Dyson and Gabriel's studies (1981) of child development in musical ability indicated a notable improvement in singing in tune at age 6 and 7 even without remediation. Perhaps the improvement across grades observed by Petzold (1966) was to some degree an effect of maturation, not training. Shuter-Dyson also found that while early vocal training did promote better singing accuracy, it also only served to speed up the maturational process and did not effect the ultimate level of vocal development. Since maturation plays a part in vocal development and accuracy, it could be argued that a late elementary age would be most highly recommended for vocal training. Delaying remediation might be counter-productive, however, due to the possibility of establishing improper vocal habits, failing to exercise needed vocal muscles and muscular control, neglecting to develop a positive attitude toward music and singing, and the possibility of the student becoming overly self-conscious about singing.

Research indicates that vocal training is best presented from kindergarten through grade four, when some maturation has occurred, but before improper vocal habits have been established and incorrect vocalization has hampered needed development of muscular control, and while successful singing can still foster positive attitudes.

The long-term benefits of remedial training are encouraging. Jersild and Bienstock (1934) noted that remedial effects continued beyond the time of training. Smith (1961) found that even two years after training, remediation effects were still apparent.

Areas of Remediation

Pitch Discrimination

As outlined earlier, vocal ability seems to be related to pitch discrimination ability at least to some extent. Research results on pitch discrimination and vocal control vary when considering the strength of the relationship between the two skills and the effect of each on vocal remediation. Only a few researchers found that pitch discrimination and vocal ability had no significant relationship. Apfelstadt (1984) found no relationship between the ability of her kindergarten subjects to discriminate pitch patterns and to sing with accuracy. Pollock (1950) found that non-singers differentiated between pitches in a normal manner and concluded that the causes of singing inaccuracies needed to be sought elsewhere. Most researchers, however, do find an important relationship between pitch discrimination skills and vocal control. Bentley (1968) found that poor singers displayed a significantly lower ability level in pitch discrimination tests. Joyner (1969) used Bentley's test and found a relationship between inaccurate singing and poor pitch discrimination skills. Pedersen and Pedersen (1970) set up a study to investigate the relationship between pitch recognition and vocal pitch production in sixth grade students and found a significant relationship. The varying results from research may derive from testing different age levels, the make-up of the test, or confusion by the subject over test language (Kazez, 1985).

Some researchers not only find a relationship between pitch

discrimination and vocal ability, but suggest that the latter affects the former. Shuter-Dyson and Gabriel (1981) found that singing demands the ability to tune each tone so that improving the control of the voice in turn improved the ability to discriminate between pitches. Buckton (1977) found that either vocal or instrumental training could improve pitch discrimination, but that only vocal training could improve vocal ability. Porter (1977) came to the conclusion that skills in pitch discrimination could be improved quite easily through remediation, but that improvement in vocal control took a longer period of remediation and that faulty pitch perception did not seem to be the cause of vocal inaccuracy.

Tonal Memory

Tonal memory, like pitch discrimination, has been carefully examined as to its relationship with vocal ability. Researchers agree that the two skills interact with one another. They differ, however, as to whether tonal memory is the cause or the result of poor singing accuracy. Pollock (1950) simply states that poor memory for the rise and fall of notes correlates with poor singing. Bentley (1968) states the relationship more causally saying, "the ability to remember what has been heard does not necessarily imply the further ability to reproduce this vocally; on the other hand, it is impossible to reproduce vocally that which has not been accurately perceived and remembered" (p.9). Gould (1968) views vocal control as the dominant factor, finding that many problem singers scored low on tonal memory tests, but, as they gained facility in using their voices, their

memory for tones improved. Due to the acknowledgement of an inter-relationship between these two skills, remedial training for inaccurate singers often includes activities for developing tonal memory. Rhythmic memory does not need to be included in the remedial efforts (Bentley, 1968). Buckton (1977) found that both vocal and instrumental training improved tonal memory skills. He also suggested that "playing by ear" might improve the memory for pitches. Atterbury (1984a) also thought that playing melodies for identification and echoing phrases either vocally or instrumentally could benefit the inaccurate singer. Davies and Yellard (1977) found that silent rehearsal, thinking the pitches without actual phonation, helps to develop a mental idea of the sound which aids the strengthening of tonal memory.

Vocal Control

Vocal control cannot be achieved vicariously through the teaching of other music skills, but must be taught specifically (Buckton, 1977; Joyner, 1969). Apfelstadt (1984) found that the vocal abilities of young children improved significantly when either receiving vocal instruction through visual and kinesthetic means such as ikons, physical movement, and resonator bells, or through vocal imitation. Teaching in a traditional style of repetitive singing without use of a visual, kinesthetic, or imitative approach seemed to be the least effective for vocal development. Jarjisian (1983) investigated the effect of vocal training in pentatonic and diatonic modes on the singing accuracy of children. Her study indicated that neither mode was

superior to the other and that the most accurate vocal control developed when training included both modes. It was suggested that diatonic training may have aided a sense of tonality while pentatonic training may have encouraged more tuneful singing. Since the testing included diatonic and pentatonic scales for all groups in the study, that the superiority of the group trained in both modes is not surprising.

Three skills seem necessary for accurate singing: pitch discrimination, tonal memory, and vocal control. Each skill is related to the other and yet each one must be taught specifically to achieve the most accurate singing results.

Voice Classification

Many researchers had created voice classifications for inaccurate singers to be used in conjunction with remedial programs. These vocal classifications helped to define the specific vocal deficiencies, set up a hierarchy of singing abilities, and focus the remediation efforts. Roberts and Davies (1975) used the following categories:

1. Can sing correctly part but not all of the melodic line.
2. Can sing the melodic line correctly but at a lower pitch.
3. Can sing the melodic line correctly but at a higher pitch.
4. Does not follow the melodic line at all. Pitch is very erratic.
5. "Monotones" or "droners." Always completely untuneful with little variation in pitch.

Forucci (1975) divided his inaccurate singers not just according

to their vocal ability when singing independently, but also when singing in a group. He used the following system:

1. Independent singers--those who sing accurately alone and in a group.
2. Dependent singers--those who sing accurately only when following another voice.
3. Uncertain singers--those who sing out-of-tune both individually and in groups.
4. Restricted range singers--those who lack an ability to flex their vocal cords to produce or control any series of pitches.

Joyner (1969) employed three categories when classifying inaccurate singers:

1. The singer demonstrates no major pitch errors or departures from the melodic outline.
2. The singer is generally erratic in pitch, in spite of moments of tunefulness.
3. The singer demonstrates no hint whatsoever of melodic outline or pitch coincidence.

These three categorizations demonstrate the slightly different approach researchers can take in assessing vocal problems. These categories all use a hierarchy of progressively more severe pitch problems. The systems recognize gradations of the same problem while failing to deal with the possibility of distinctly different deficiencies.

Remediation Techniques

Non-Sequential Remedial Activities

Specific techniques for remediating inaccurate singing have been examined by many researchers. The voice was found to be the most effective teaching instrument (Shuter-Dyson & Gabriel, 1981) and both the male and female voices were found to be equally successful (Small & McCachern, 1983). Individualized practice was indicated to be necessary prior to synthesis into group singing for accurate singing achievement (Roberts & Davies, 1976). Breath-control training, in the form of posture development, breathing exercises, and breath management skills, was found to improve vocal range, vocal intensity, tonal duration, and pitch accuracy in singers (Phillips, 1985).

Some research included the use of mechanical aids. The tape recorder was employed by Klemish (1974) in a remediation study for inaccurate singers. Unfortunately, her study had some design flaws which made the results unreliable. The tape recorder, nonetheless, offers some effective possibilities in remediation programs. Another mechanical device was the vertical keyboard designed and tested by Jones (1979). The vertical keyboard offered visual and kinaesthetic reinforcement to the singers training in pitch levels and melodic contour. The gains in singing accuracy of subjects using the vertical keyboard were compared with subjects receiving traditional singing instruction. The study indicated that the vertical keyboard training produced superior results.

Speech to Song Activities

Many inaccurate singers seem to be attempting to sing with the same vocal mechanisms that are used in speaking because that is their most natural vocal mode. In response, some researchers suggest using speech as the entrance into singing. Atterbury (1984a) found the following speech/singing activities effective. She had the students use different speaking registers and then singing registers on rhymes, chants, and improvised sentences. Environmental sounds (wind, fire engine, puppy squeal) were used to explore the vocal registers. Rhythmic speaking on known nursery rhymes led into chanting, first on a single pitch and then with minor thirds and other intervals added. Gould (1969) found that the singer needed to develop the ability to sustain pitches for singing instead of using an unsustained speaking articulation. Roberts and Davies (1976) tested a program that first worked for an extension of range of the spoken pitch. Then, in order to make a transition from a speech mode to a singing mode, a tone was found in each child that could be sustained. This "personal note" was regarded as the base from which the singing voice could be extended. The next stage involved moving from spoken words in a subdued voice to words spoken in an excited, higher pitched voice, followed by a singing of the interval from the personal note to the new pitch. The sessions which followed guided children in producing short tunes. Gould emphasized the need, when progressing from speech to song, for the singer to experience unison in their singing. The singer needed to hear and feel the difference between unison and non-unison singing.

Intervallic Activities

After the initial control of vocalization is achieved, most remediation methods progress into intervallic work. Billingsley and Rotenberg (1982) found that children performed consistently better on three-note rather than two-note processing. Jones (1979) gained greater accuracy with subjects using intervals wider than a minor third. As proficiency in vocal ability developed, Jones had the subjects match simple intervallic patterns, first in their own range and then more extreme ranges (5-3, 3-2-1, 1-3-5, 1-5, 5-3-1). Myers (1961) suggested fixing certain combinations of tones, such as the third or the triad, in the singer's mind. Smith (1961) recommended interval training to be confined to repetitions in one key rather than utilizing a number of tonalities. He also found that descending intervals were easier to sing than ascending intervals and that the use of syllables rather than words encouraged more accurate intonation.

Development of Low and High Vocal Ranges

Some researchers encourage the use of both the low and the high vocal ranges or registers. Smith (1961) recommended first developing vocal accuracy in the lower register and then concentrating on upper range accuracy. Rossell (1983) supported this idea by encouraging the development of each of the two registers separately and then the two in combination. He felt that the needed coordination can be aided by the development of an awareness of the physical sensation of the tone. The head will have the sensation of vibrations in the forehead, mask, and cheekbones. The throat and mouth will have no

vibratory sensations as the back of the roof of the mouth lifts and the tongue lowers. The chest will experience the sensation of vibrations on low notes.

The development of both the lower and upper ranges of the voice, however, is not deemed necessary by all researchers. Some researchers stress the need for work only in the upper register (Gould, 1968; Joyner, 1969). They feel that this vocal area is usually the weakest and most challenging to the singer. The expectation is that remediation in the upper range would transfer automatically to the more easily controlled lower range.

Joyner (1969) found that inaccurate singers often could not shift into the upper register as needed for high range training or full range singing. He performed a battery of vocal tests on inaccurate singers and formulated an insightful observation. The poorly produced voice fails to reduce the vertical thickness of the vocal cords with rising pitch; an over-broad and foreshortened soundbeam is produced which fails to find the appropriate resonating areas, thus producing a tone which lacks proper harmonic reinforcement and pleasing quality. An attempt at higher pitches can cause a break in vocal quality due to excessive thickness of the cords when, instead, a gradual thinning process should have occurred. The strained chords suddenly shift causing the tone to jump into a different resonating zone without the necessary gradation in the process. These singers seem to lack the kinesthetic sensations needed both to aid them in employing different vocal registers as well as to recall the different pitches by sensation.

The research seemed to imply that the ability to sing in different vocal registers is a prerequisite to accurate singing and that the kinesthetic sensations associated with the registers must be recognized and remembered by the singer.

Sequential Systems of Remediation

Researchers have developed remedial techniques to aid inaccurate singers. Myers (1961) recommended the sequential system that follows: first, imitate sounds; next, extend words on a pitch a bit higher than a speaking tone; when the former stage is achieved, work for repetition of song phrases; then, associate pitch differences with definite objects such as a ladder, keyboard, steps, or types of movement; finally, fix certain combinations of tones in the singer's mind; for example, the triad.

Gould (1969) outlined a sequence that he found successful with inaccurate singers. Remediation began with speech activities such as chanting phrases and song texts. This led from speech to song activities by adding musical tones to speech at a pitch level the child could produce. Experiencing unison was considered a crucial step in Gould's remedial sequence. It was a skill that needed to be first attempted in the child's most comfortable range. To work into new registers, thereby finding the true singing voice, the singer began on an "oo" vowel with one or two tone responses and then expanded the number of pitches. For the final step of developing the singing vocabulary, the singer transferred from "oo" to songs with words.

Jones (1979) developed a remedial approach which began with

the repetition of simple song patterns since she found that pattern singing often develops prior to single pitch matching. She then encouraged pitch matching and aural discrimination skills to develop with singing skills. The first intervals of the recommended pitch matching skills were of a medium size, though no smaller than a minor third. As proficiency increased, the interval size widened to help extend the range. Echo clapping was recommended to improve listening skills.

Forucci (1975) set up his own remedial procedure. The inaccurate singer first began by matching pitches around middle C on the vowel "wa." If any inability to match the initial pitches was evident, humming was implemented until a pitch was matched and sustained. The hum was then opened to the "wa" vowel. The subject was questioned continually as to the accuracy of the sung pitch. Next, groups of pitches, beginning with three to five successive notes, were echoed by the subject. The child watched the piano-playing hands of the researcher thereby adding a visual element to the melodic contour. Simple songs were added. The range of the pitch groups and songs was extended until accuracy within an octave was achieved. To lessen the dependency of the subject on outside sources of tonal support, the researcher, using piano and voice to double the melody line, would leave out pitches at various times thereby encouraging vocal independence.

Joyner (1969) formulated a technique for establishing the first sung pitch in children who use only a speaking voice. The subject was asked to open his/her mouth as wide as possible and to rest the

tongue on the floor of the mouth to create resonating space. He/She was then told to utilize the lower part of the lungs to conserve breath, thus relaxing the throat muscles; then, the subject was told to direct the sound to the head resonators through the use of a sung, sharp "ee" while raising the upper lip. Through this method the reference note, middle C, was able to be found and the subject could be guided to use a glissando to expand the vocal range.

These remedial approaches had points of commonality and contrast. Most of the remediation programs began by establishing the singing voice in contrast to the speaking voice. Myers (1961) and Gould (1969) began with speech activities and then worked into singing activities. Forucci (1975) and Joyner (1969), however, directly introduced singing by achieving an initial pitch from which to begin singing. The exception was the approach advocated by Jones (1979) in which an assumption was made that an initial pitch was able to be achieved. After the initial pitch was established, the remedial systems either worked to develop accuracy in pitch within the subject's range or worked to extend the range itself. Tasks to improve accuracy included echoing song phrases, associating pitch differences with definite objects, and fixing intervals in the mind (Myers, 1961); experiencing unison, singing songs first on vowels and then on words (Gould, 1969); combining pitch matching and aural discrimination (Jones, 1979); singing groups of pitches by joining with the vocalization and piano playing of the researcher, watching the hands on the piano, and singing while the piano reinforcement is periodically left out (Forucci, 1975). Tasks to extend the range included singing one or two tones on "oo" while

expanding the range (Gould, 1969), stretching the range through the use of increasingly wide intervals (Forucci, 1975; Jones, 1979), and using the glissando (Joyner, 1969). The inaccurate singers were not categorized as having either the deficiency of using only a restricted portion of their range or of singing inaccurately throughout a full range. They, therefore, were not given special treatment for their particular needs.

The main purpose of the present study was to investigate further the recommendation of several researchers cited earlier (Forucci, 1975; Gould, 1969; Jones, 1979; Joyner, 1969) regarding the use of range training in remediation of inaccurate singers. Specifically, this study compared three types of remediation:

1. Remediation exclusively in the lower register of the singer's voice (middle C up to A) could be implemented. This training would utilize the child's most comfortable singing range in gaining intonation accuracy. Once the skills were accomplished they might automatically transfer into the upper vocal register of the singer (A above middle C up to E).

2. Remediation exclusively in the upper register could also be given to a parallel group of inaccurate singers. This training would develop the more difficult vocal register for the child singer. Skills mastered at this more challenging range might be assimilated into the full range without additional training.

3. Remediation in both the upper and lower registers could be tested. To achieve full vocal control with inaccurate singers, it might be necessary to train in both registers.

These remedial approaches may achieve different results with those inaccurate singers who have a full range in contrast to those who have a restricted range. The results would then indicate which training system was the most efficient and effective for each inaccurate singer.

Null Hypotheses

It was hypothesized that the interaction between type of remediation and children's voice classification of inaccurate singer in a restricted range and inaccurate singer in a full range would result in the following null hypotheses:

The first null hypothesis states that there will be no significant difference between the means of the overall pretest and posttest gain scores on a vocal accuracy test due to the training system being in either the low range, high range, or high/low range.

The second null hypothesis states that there will be no significant difference between the means of the overall pretest and posttest gain scores on a vocal accuracy test due to the subjects' pretest vocal range.

The third null hypothesis states that there will be no significant difference between the means of the overall pretest and posttest gain scores on a vocal accuracy test due to the interaction of the vocal training and the subjects' initial range.

The fourth null hypothesis states that there will be no significant difference between the means of the low range section of the pretest and posttest gain scores on a vocal accuracy test due to the training system being in either the low range, high range, or high/low range.

The fifth null hypothesis states that there will be no significant difference between the means of the low range section of the pretest and posttest gain scores on a vocal accuracy test due to the subjects' pretest vocal range.

The sixth null hypothesis states that there will be no significant difference between the means of the low range section of the pretest and posttest gain scores on a vocal accuracy test due to the interaction of the vocal training and the subjects' initial range.

The seventh null hypothesis states that there will be no significant difference between the means of the high range section of the pretest and posttest gain scores on a vocal accuracy test due to the training system being in either the low range, high range, or high/low range.

The eighth null hypothesis states that there will be no significant difference between the means of the high range section of the pretest and posttest gain scores on a vocal accuracy test due to the subjects' pretest vocal range.

The ninth null hypothesis states that there will be no significant difference between the means of the high range section of the pretest and posttest gain scores on a vocal accuracy test due to the interaction of the vocal training and the subjects' initial range.

CHAPTER III

DESIGN AND METHODOLOGY

Selection and Assignment of Subjects

The subjects for this study were students in a Christian grade school in Kalamazoo, Michigan. The school is comprised of primarily Caucasian, Protestant, middle class families. The class sizes in the school ranged from 17 to 27 students per class.

The subjects included in this study were drawn from kindergarten, first grade, second grade, and third grade. Initially, a total of 55 subjects were informally identified by the music teacher as inaccurate singers by means of singing games, small group and solo singing, and observation during singing time.

These subjects were individually given a pretest to assess their vocal deficiency and to establish a baseline singing proficiency. As a result of that test, 42 subjects were categorized as inaccurate singers with a complete range, 11 as inaccurate singers with a restricted range, and 2 as accurate singers. The accurate singers were not used for the study. All 11 of the restricted range singers were included in the study due to the need for as large a population as possible in that vocal category. Out of the group of 42 complete range singers, 34 were randomly selected with stratification according to grade level.

From the resultant group of 45 inaccurate singers, three

equivalent groups of 15 randomly-assigned subjects were formed. Each group included 5 kindergarteners, 4 or 5 first graders, 4 or 5 second graders, and 1 third grader. Each group was also balanced with 11 or 12 inaccurate singers with complete ranges and 3 or 4 inaccurate singers with restricted ranges. The division of subjects into training groups is shown in Table 1.

Table 1
Assignment of Students to Treatment Groups

Systematic Vocal Training	Students' Range		Totals
	Complete	Restricted	
Low	11	4	15
High	11	4	15
High/Low	12	3	15
Totals	34	11	45

Instruments

A test of singing accuracy was constructed and used as a pretest and a posttest (see Appendix A). The first section of both the pretest and posttest was comprised of eight one-note, two-note, three-note pitch matching tests and four seven-note matching tests. Half of the test pitches were in the subject's low range, while the other half were in the subject's high range using a retrograde sequence of the low range test. The second part of the test included the singing of

a song in both the low and high registers. There was one difference between the pretest and posttest; the pretest song was the familiar "Mary Had a Little Lamb," while the posttest song was a newly taught song learned during the training sessions.

The vocal range of the tests was designed to suit the average range for the different grade levels. The kindergarten and first grade test range was a ninth with the low range extending from middle C1 up to A1 and the high range from A1 up to D2. The second and third grade test range was a tenth with the low range extending from middle C1 up to A1 and the high range from A1 up to E2. The pretest and posttest sessions were tape recorded to assist scoring. Three adjudicators were selected to score the tapes independently. The adjudicators had earned at least a BA degree in music education. They scored the tapes by giving a number rating according to the accuracy of the subject's sung pitches.

The scoring of the pitch tests required the subject's sung pitch to match the test pitch for a minimum of one second to be considered valid. Each measure of the test was given a numerical score according to pitch accuracy. Four points were given if the sung pitch(es) matched the single pitch test or the multiple pitch test accurately, that is, having no departures from the melody or pitches. Three points were awarded if all sung pitches were within a whole step of the test pitch(es). Two points were given if the sung pitch of the single pitch test matched within a major third of the test pitch or all pitches of the multiple pitch test moved in the direction of the test pitch, but one or more pitches were greater than a whole step

from the test pitch. One point was granted if the sung pitch of the single pitch test was within a perfect fifth of the test pitch or if the pitches of the multiple pitch test moved from a static pitch level, but did not resemble the melodic contour of the test pitches. No points were awarded if the pitch matching the single pitch test was an interval of a perfect fifth or greater or if the pitches matching the multiple test did not move from a single, static pitch level (see Appendix B).

The singer's low range and high range scores were computed separately. The singer who achieved a score from 71-88 was considered an accurate singer in that voice range. The singer who scored between 38-70 was classified as an inaccurate singer in that voice range. The subject who scored from 0-37 was considered a non-functioning singer in that voice range.

The totaling of low range and high range points allowed for classification of subjects as inaccurate complete range singers or inaccurate restricted range singers. The Inaccurate Complete Range Singer achieved a score between 0-70 in the low range and 38-70 in the high range. The Inaccurate Restricted Range Singer earned a score between 0-70 in the low range and 0-37 in the high range. The total amount of points possible on the combined low and high range scores was 176, while the minimum possible was zero.

Procedure

The subjects had music class with a music specialist twice a week for one half hour, except the kindergarten students who had music

only once a week for one half hour. During each music period the students sang for approximately 10-15 minutes each period. In addition to singing that occurred in their music class, the students also sang occasionally in their regular academic classrooms. The classroom teachers varied in the amount of time they sang with their students: kindergarten students generally sang 15 minutes a week outside of the music time; first grade students sang 30-40 minutes a week; second grade students sang about 75 minutes a week, and third grade students sang 10 minutes a week.

The 45 subjects, randomly divided into three groups, were given remediation by means of a Systematic Vocal Training (SVT) method. Three types of SVT were used: SVT-low gave training only in the low vocal register (middle C1 up to A1). SVT-high gave training only in the high register (A1 above middle C to E2). SVT-high/low gave training in the complete range (middle C1 up to E2).

For each training session, the SVT concentrated in three areas: phonation readiness skills which included posture and breath control; vocal control skills which included speech activities, initial pitch control, single and multiple pitch matching, unison singing, kinesthetic reinforcement, melody matching, and new song learning; and, pitch and tonal memory skills which included high/low pitch discrimination, singing accuracy discrimination, silent tone imagery, tone bell usage, and tape recorder assistance in discrimination of accuracy (See Appendices A, D, and E for SVT Low, SVT High, and SVT High/Low respectively, and Appendix F for a Bibliography of References in the Development of Systematic Vocal Training Method).

The SVT training sessions took place outside of the regular music time. The time of day for each training session was consistently from 12:10 to 12:30 p.m. The 20 minute training sessions took place once a week for eight weeks. For the subjects, this time came directly after the recess and noon hour. For the experimenter, this time slot was during her noon hour.

Testing and training both took place in the music room. During the testing, only the experimenter and the subject were in the room. The subject and the experimenter sat by the piano with the subject on a chair and the experimenter on a piano bench. During the training, the groups met in the music room with the fifteen subjects sitting in a semicircle around the experimenter and the keyboard side of the piano.

CHAPTER IV

RESULTS

This section presents the descriptive and inferential statistical analysis of the gathered data. To determine the interjudge reliability. The judges' scores for the pretest and posttest were intercorrelated. All correlations were .90 or greater, indicating a very high degree of interjudge reliability. As a result, data from those tests were averaged across judges for further analysis.

Before investigating the subproblems of the effect of treatment and subjects' initial range, it was first necessary to determine whether students attained a significant increase in vocal accuracy from the pretest to the posttest. Table 2 shows the overall means and standard deviations of the pretest and posttest scores.

Table 2
Means and Standard Deviations of the Overall
Pretest and Posttest Scores

Test	Mean	Standard Deviation
Pretest	99.11	26.90
Posttest	113.76	22.58

It should be noted that the tests had a possible maximum score of 176 points and a minimum score of zero points, with a higher score indicating a greater singing accuracy. The difference between the pretest and posttest means, 14 points, was significant, $F(1, 44) = 27.36$, $p < .001$.

Table 3 shows the means and standard deviations for the low range section of the pretest and posttest scores.

Table 3
The Means and Standard Deviations of the Low Range
Section of the Pretest and Posttest Scores

Test	Mean	Standard Deviation
Pretest	52.56	13.50
Posttest	60.64	11.57

The maximum score possible on the low range section of the test was 88 points and the minimum was zero points. The difference between pretest and posttest means, 8 points, was significant, $F(1, 39) = 35.20$, $p < .001$.

Table 4 contains the means and standard deviations for the high range section of the pretest and posttest scores. The maximum score possible on the high range section was 88 points and the minimum score zero points. The difference between the pretest and posttest means, 6.5 points, was significant, $F(1, 39) = 13.39$, $p < .05$.

Table 4

The Means and Standard Deviations of the High Range
Section of the Pretest and Posttest Scores

Test	Mean	Standard Deviation
Pretest	46.55	14.61
Posttest	53.11	12.38

Next, the data pertaining to the study's major subproblems were examined to determine if:

1. There were significant effects on gain scores due to the type of training.
2. There were significant effects on gain scores due to the subject's pretested vocal range.
3. There was a significant interaction effect of training and subject's pretested range on gain scores.

Table 5 shows the overall gain scores for the three levels of training, the two levels of range, and the individual categories of each.

Table 6 contains the results of a two-way ANOVA on the means of Table 5. Table 6 shows that only the difference between the mean gains of students' range classification was significant, $F(1,39) = 13.45$, $p < .007$. The difference between the mean gain scores of the three treatments did not show a significant difference ($p = .19$), nor did the mean gain scores of the interaction between initial range

Table 5
Mean Gain Scores of the Overall
Pretest and Posttest Scores

SVT Training	Restricted Range	Complete Range	Totals
<u>Low</u>			
Number of Subjects	4	11	15
Gain Score	27.83	3.12	9.71
<u>High</u>			
Number of Subjects	4	11	15
Gain Score	21.25	13.42	15.51
<u>High/Low</u>			
Number of Subjects	3	12	15
Gain Score	43.44	12.53	18.71
<u>Totals</u>			
Number of Subjects	11	34	45
Gain Score	29.70	9.77	14.64

Table 6
ANOVA Table for a 2-Factor Analysis of
Variance on Overall Gain Scores

Source	df	SS	MS	F-test	P value
Treatment (A)	2	993.71	466.85	1.71	.19
Range (B)	1	3665.48	3665.48	13.45	<.007
AB	2	783.66	391.83	1.44	.25
Error	39	10629.12	272.54		

and type of treatment ($p = .25$).

Table 7 contains the low range section mean gain scores for the three levels of training, the two levels of initial range, and the individual categories of each.

Table 7
Mean Gain Scores in the Low Range Section
of the Pretest and Posttest Scores

SVT Training	Restricted Range	Complete Range	Totals
<u>Low</u>			
Number of Subjects	4	11	15
Gain Score	11.17	5.70	7.16
<u>High</u>			
Number of Subjects	4	11	15
Gain Score	5.75	8.94	8.09
<u>High/Low</u>			
Number of Subjects	3	12	15
Gain Score	22.78	5.56	9.00
<u>Totals</u>			
Number of Subjects	11	34	45
Gain Score	12.36	6.70	8.08

Table 8 contains the results of a two-way ANOVA on the means of Table 7. Table 8 shows that a significant difference was found between both the mean gains of students' initial range classification $F(1, 39) = 4.79$, $p < .04$ and the interaction of initial range and treatment,

Table 8

ANOVA Table for a 2-Factor Analysis of
Variance on Low Range Gain Scores

Source	df	SS	MS	F-test	P value
Treatment (A)	2	275.49	137.74	1.91	.16
Range (B)	1	346.25	346.25	4.79	.03
AB	2	550.48	275.24	3.81	.03
Error	39	2817.96	72.25		

$F(1, 39) = 3.81$, $p < .04$. The difference between the mean gain scores of the three treatments did not show a significant difference ($p = .16$).

The interaction of initial range and treatment was further explored to ascertain which type of treatment for what type of initial range classification was giving the significant difference. The LSD computation was used on the data to clarify the relationships. First, the effect of treatment was compared in each range category. The training for restricted range singers in the high/low range as compared with training in the high range was significant ($p < .05$). The other training comparisons for restricted range singers, low range with high range or low range with high/low range, were not significantly different. None of the training comparisons was significantly different for complete range singers.

Next, each of the training treatment of the restricted range singers was compared with the three treatments of the complete range

singers. The mean gain of restricted range singers who received high/low range training was significantly different when compared to the three training treatments of the complete range singers ($p < .05$). There was not a significant difference, however, between the mean gains of the restricted range singers who receive low or high range training when compared to the three training treatments of the complete range singers.

Table 9 contains the high range section mean gain scores for the three levels of training, the two levels of initial range, and the individual categories of each.

Table 9
Mean Gain Scores in the High Range Section
of the Pretest and Posttest Scores

SVT Training	Restricted Range	Complete Range	Totals
<u>Low</u>			
Number of Subjects	4	11	15
Gain Score	16.67	-2.58	2.56
<u>High</u>			
Number of Subjects	4	11	15
Gain Score	15.50	4.48	7.42
<u>High/Low</u>			
Number of Subjects	3	12	15
Gain Score	20.67	6.91	9.71
<u>Totals</u>			
Number of Subjects	11	34	45
Gain Score	17.33	3.08	6.56

Table 10 contains the results of a two-way ANOVA on the means of Table 9.

Table 10
ANOVA Table for a 2-Factor Analysis of Variance
on the High Range Section Gain Scores

Source	df	SS	MS	F-test	P value
Treatment (A)	2	242.36	121.18	1.15	.33
Range (B)	1	1758.59	1758.59	16.66	.002
AB	2	102.78	51.39	.49	.62
Error	39	4116.54	105.55		

Table 10 shows that only the difference between the mean gains of students' range classification was significant, $F(1, 39) = 16.66$, $p < .002$. The difference between the mean gain scores of the three treatments did not show a significant difference ($p = .33$), nor did the mean gain scores of the interaction between initial range and type of treatment ($p = .62$).

Summary

The results show the following effects on the study's original null hypotheses:

1. There was no significant difference between the means of the overall pretest to posttest gain scores on a vocal accuracy test due to the training system being either in the low range, high range, or high/low range.

2. There was a significant difference between the means of the overall pretest to posttest gain scores on a vocal accuracy test due to the subjects' pretest vocal range.

3. There was no significant difference between the means of the overall pretest to posttest gain scores on a vocal accuracy test due to the interaction of the vocal training and the subjects' initial range.

4. There was no significant difference between the means of the low range section of the pretest to posttest gain scores on a vocal accuracy test due to the training system being in either the low range, high range, or high/low range.

5. There was a significant difference between the means of the low range section of the pretest to posttest gain scores on a vocal accuracy test due to the subjects' pretest vocal range.

6. There was a significant difference between the means of the low range section of the pretest to posttest gain scores on a vocal accuracy test due to the interaction of the vocal training and the subjects' initial range.

7. There was no significant difference between the means of the high range section of the pretest to posttest gain scores on a vocal accuracy test due to the training system being in either the low range, high range, or high/low range.

8. There was a significant difference between the means of the high range section of the pretest to posttest gain scores on a vocal accuracy test due to the subjects' pretest vocal range.

9. There was no significant difference between the means of the

high range section of the pretest to posttest gain scores on a vocal accuracy test due to the interaction of the vocal training and the subjects' initial range.

CHAPTER V

DISCUSSION

The primary purpose of this study was threefold: first, to analyze the effect of training in different vocal ranges on vocal accuracy; second, to determine the effect of the subjects' initial range on vocal accuracy; and third, to observe the interaction of those two variables on the vocal accuracy of young inaccurate singers.

Prior to investigating the main purposes of the study, it was necessary to ascertain whether the posttest scores were significantly higher than the pretest scores. It was found that the posttest means were significantly greater than the pretest means. Whereas this information was necessary for the successive investigations of the present study, it did not establish that the posttest gains specifically resulted from the training. It should be noted that when the three treatments were implemented, a control group was not established for comparison with the treatment group. Since other studies have suggested that the subjects receiving vocal training show a greater improvement than those not receiving treatment, this consideration was not the purpose of the present study. It can be reasonably assumed from the other studies, therefore, that at least some of the gains in scores from pretest to posttest in the present study are due to the training method, and not merely maturation. From this assumption, the study proceeded to investigate the forementioned purposes.

The three treatments given to the subjects were vocal training

methods utilizing the low range, the high range, or the high/low range. The treatments, when considered irrespective of the students' initial range, appear to be equally effective in promoting vocal accuracy. A number of reasons for these comparatively equal gains could be sighted. It may be that the training concepts themselves were more important than the range in which they were implemented. The concepts were drawn from past studies by researchers who had observed gains in singing accuracy as a result of their use, so that their implementation in this study may have worked effectively. However, other explanations must be considered also. It could be that the comparatively equal gains associated with the three types of treatment were due more to the design of the study than to the effect of the training concepts. The short time duration of the study and the relatively large size of the remedial groups may have affected the results. It may be that 20 minutes per week for eight weeks was too brief a time to allow significant differences in the three types of treatment to emerge. The size of the training groups may have been too large for a remedial method which required each child to sing and to analyze pitches individually. A smaller group would have allowed for more individualized attention. It cannot be known at this time whether or not longer treatment time or smaller remedial groups would still have resulted in a comparable overall gain response to the three types of training.

The next main area of investigation focused on the effect of the subjects' initial range on vocal accuracy in the low range, the high range, and the overall vocal range. The comparison of gain scores

between restricted range singer and complete range singers indicated a significant difference with the restricted range singers demonstrating a larger gain in their vocal accuracy scores than the complete range singers. One factor influencing the restricted range singers' gain may have been regression, the tendency of extreme scores to move toward a median score upon retest. Another factor may have been that the basic singing skill of utilizing both the high and low ranges is a more easily learned skill than full-range accuracy. If so, the implication for the field of music education is that restricted range singers will respond quickly to basic remedial training and must not be considered beyond vocal assistance.

The final area of investigation examined the interaction effect of subjects' initial range and the treatment type on vocal accuracy. Analysis showed a significant interaction between the three treatment types and the subjects' pretest vocal range only for the low range section of the test, not for either the high range section of the test or the complete test. Thus, only data from the low range section of the test was submitted to the next levels of examination.

Comparison tests revealed that only the gain scores of the restricted range singers showed significant differences due to treatment. In contrast, the gain scores of the complete range singers were not significant when given the three different types of treatment. Looking more closely at the restricted range singers, it was found from the comparison tests that the singers trained in high/low ranges gained significantly more accuracy than the restricted range singers trained in only the high range. The other comparisons were not

significant for singers of a restricted range.

These results may have implications for the training situation and the music classroom. Since complete range singers did not show significant differences on the comparison tests, it could be again suggested either that the study was too short and the group size too large to produce significant differences or that the training concepts can be implemented with comparable effectiveness regardless of range. The implication for music education is that training is beneficial for complete range inaccurate singers. The study also seems to suggest that since complete range singers can function in both the high and low ranges, songs used for singing can be in either or both ranges as long as proper singing is emphasized.

Since this analysis also revealed that restricted range singers trained in both the high and low range gained significantly more accuracy than those trained in only the high range, a discussion of implications concerning restricted range singers is possible. It may be that restricted range singers need to control both their low and high range in order to function accurately in their low range. To promote accurate low range singing, training exclusively in the high range is less effective than full range training. In the field of music education, this implies that for restricted range singers, accuracy in the lower range can be better gained by singing songs pitched in both their high and low ranges than exclusively in their high range.

Further comparison tests, still dealing only with the gain scores of the low range section of the test, examined the interaction

effect of treatment on restricted range singers as compared to the effect of treatment on complete range singers. These comparison tests revealed that only restricted range singers trained in both their high and low ranges achieved greater gain scores than complete range singers trained in any of the three vocal methods. A significant difference was not revealed between restricted range singers and complete range singers when the former were trained exclusively in either their high range or low range.

Again, implications can be drawn from this analysis. It seems that to encourage accurate singing in the low range of restricted range singers, training is most beneficial in the full range. If so, then music educators should include both high and low range songs in their students' repertoire to accommodate the needs of restricted range singers.

Beyond the primary purposes of the study, a few informal observations can be mentioned. The attitude of the subjects was very positive. Many of the subjects increased their participation in the music class setting. This was evidenced by the frequency of their offering answers to questions, selecting songs, and having direct eye contact with the music teacher/experimenter. A number of the subjects gave the music teacher/experimenter notes expressing their enjoyment of music and the teacher.

Another informal observation worth mentioning relates to the posttest. It was observed by the experimenter that some of the subjects demonstrated a greater level of ability during the training sessions than on the posttest. In the training sessions the

experimenter could correct the singer or guide the singer in self-correction. Once a singer was made aware of the correct pitch range and sensation, many were able to maintain an accuracy of pitch for a time. In the testing situation, however, this corrective assistance could not be given due to the need for identical testing procedures for all subjects. Thus, for some of the subjects, the post-test scores did not accurately reflect the level of their newly-found vocal ability.


In conclusion, it is suggested that future studies explore further the use of range training with the inaccurate singers of different vocal deficiencies. The present study offers initial range categories and training systems which could be utilized in the further examination of vocal inaccuracy. It is recommended, however, that a larger group of subjects be included in the study to promote more reliable and more revealing comparisons. A longer duration of training time is also recommended to make the newly acquired skills more habitual. Studies following these recommendations may well indicate stronger interactions between range training and initial vocal range than could be revealed in the present study. Future researchers are challenged to clearly define the inaccurate singers' deficiency and then to develop specific remedial techniques so that the joy of singing accurately will be a part of every child's musical experience.

APPENDICES

APPENDIX A
Pretests and Posttests

Pretest for Kindergarten and First Grade Singers

PITCH TEST

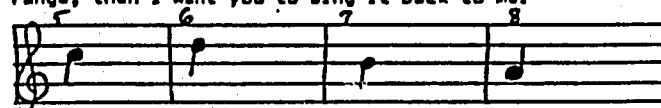
1. Warm-up the student's voices by having them sing a glissando down their range on "ah"  and then by having them sing the song "Kookaburra". Do not correct any errors.
2. Play the test pitch or pitches on the piano one numbered measure at a time. Use a tempo of ♩60.
3. Sing the pitch(es) on "doo" for the subject.
4. Have the subject sing test pitch(es) unaccompanied. Subject must respond after each numbered measure except in free song which must be played and sung in entirety.
5. Respond by saying "good" while having eye contact with the subject to help the subject relax.
6. Say introductory sentences as indicated below and then verbally cue each test measure. The subject's pitch must match the test pitch for a minimum of one second.
7. Tape record testing for scoring.
8. Alternate subjects should be given the high range test first and low range second in each category.

I. SINGLE PITCH TEST

"I will play and sing one note for you, then I want you to sing it back to me."

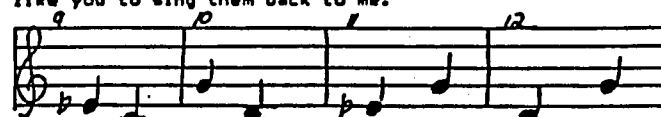


"I will play and sing one note for you in your high voice range, then I want you to sing it back to me."

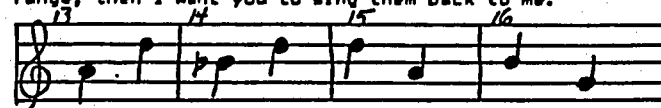


II. TWO-NOTE PITCH TEST

"I will play and sing two notes for you, then I would like you to sing them back to me."



"I will sing and play two pitches in the high voice range, then I want you to sing them back to me."

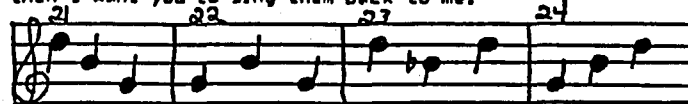


III. THREE-NOTE PITCH TEST

"I will play and sing three notes for you, then I want you to sing it back to me."

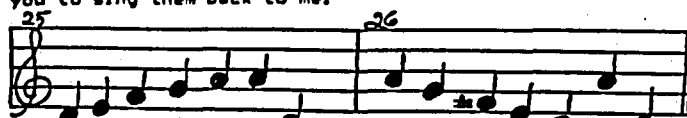


"I will play and sing three notes in the high voice range, then I want you to sing them back to me."

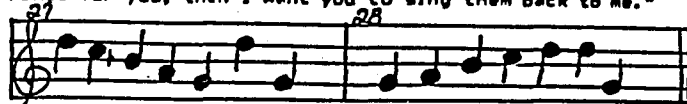


IV. MELODIC PHRASE RECALL

"I will play and sing a group of notes for you, then I want you to sing them back to me."



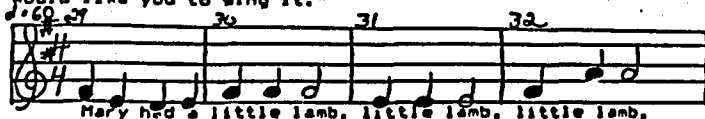
"I will play and sing a group of notes in the high voice range for you, then I want you to sing them back to me."



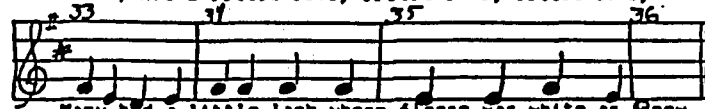
V. FREE SONG FOR PRETEST ONLY

Use song in entirety.

"Now I will sing 'Mary had a Little Lamb' and then I would like you to sing it."

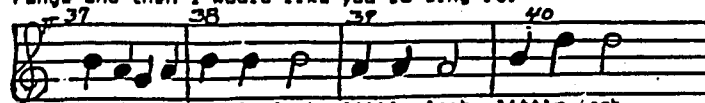


Mary had a little lamb, little lamb, little lamb,

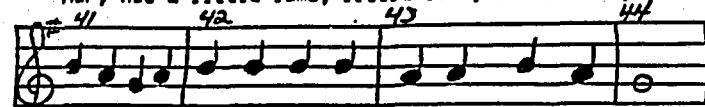


Mary had a little lamb whose fleese was white as snow.

"Now I will sing 'Mary had a Little Lamb' in the high voice range and then I would like you to sing it."




Mary had a little lamb, little lamb, little lamb,



Mary had a little lamb whose fleese was white as snow.

Pretest for Second and Third Grade Singers

PITCH TEST

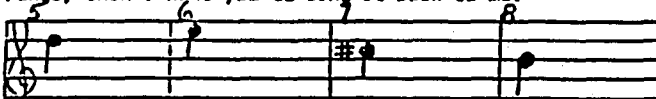
1. Warm-up the student's voices by having them sing a glissando down their range on "ah"  and then by having them sing the song "Kookaburra". Do not correct any errors.
2. Play the test pitch or pitches on the piano one numbered measure at a time. Use a tempo of ♩=60.
3. Sing the pitch(es) on "doo" for the subject.
4. Have the subject sing test pitch(es) unaccompanied. Subject must respond after each numbered measure except in free song which must be played and sung in entirety.
5. Respond by saying "good" while having eye contact with the subject to help the subject relax.
6. Say introductory sentences as indicated below and then verbally cue each test measure. The subject's pitch must match the test pitch for a minimum of one second.
7. Tape record testing for scoring.
8. Alternate subjects should be given the high range test first and low range second in each category.

I. SINGLE PITCH TEST

"I will play and sing one note for you, then I want you to sing it back to me."

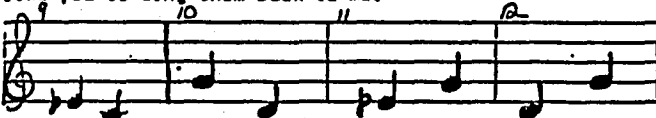


"I will play and sing one note for you in your high voice range, then I want you to sing it back to me."

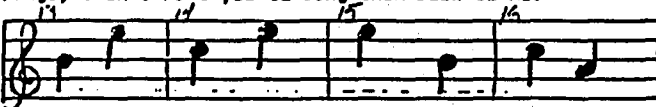


II. TWO-NOTE PITCH TEST

"I will play and sing two notes for you, then I would like you to sing them back to me."



"I will sing and play two pitches in the high voice range, then I want you to sing them back to me."

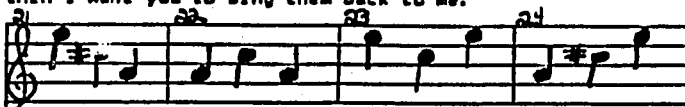


III. THREE-NOTE PITCH TEST

"I will play and sing three notes for you, then I want you to sing it back to me."



"I will play and sing three notes in the high voice range, then I want you to sing them back to me."



IV. MELODIC PHRASE RECALL

"I will play and sing a group of notes for you, then I want you to sing them back to me."



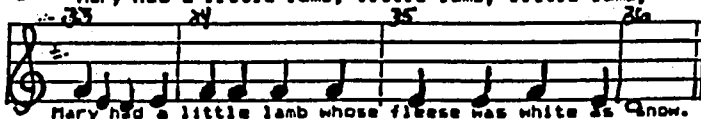
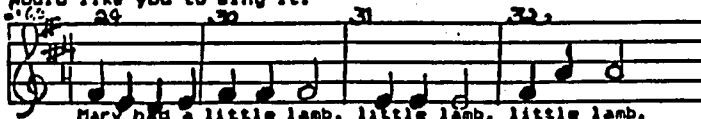
"I will play and sing a group of notes in the high voice range for you, then I want you to sing them back to me."



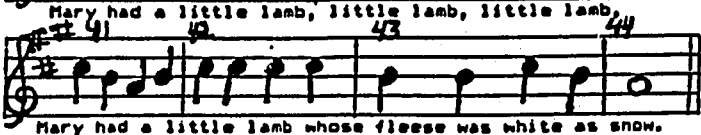
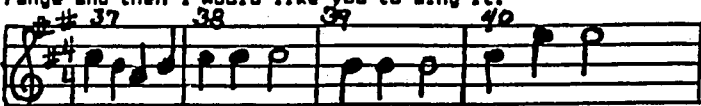
V. FREE SONG FOR PRETEST ONLY

Use song in entirety.

"Now I will sing 'Mary had a Little Lamb' and then I would like you to sing it."



"Now I will sing 'Mary had a Little Lamb' in the high voice range and then I would like you to sing it."



Posttest for Kindergarten and First Grade Singers

PITCH TEST

1. Warm-up the student's voices by having them sing a glissando down their range on "ah" and then by having them sing the song "Koolaburra". Do not correct any errors.
2. Play the test pitch or pitches on the piano one numbered measure at a time. Use a tempo of -60.
3. Sing the pitch(es) on "doo" for the subject.
4. Have the subject sing test pitch(es) unaccompanied. Subject must respond after each numbered measure except in free song which must be played and sung in entirety.
5. Respond by saying "good" while having eye contact with the subject to help the subject relax.
6. Say introductory sentences as indicated below and then verbally cue each test measure. The subject's pitch must match the test pitch for a minimum of one second.
7. Tape record testing for scoring.
8. Alternate subjects should be given the high range test first and low range second in each category.

I. SINGLE PITCH TEST

"I will play and sing one note for you, then I want you to sing it back to me."

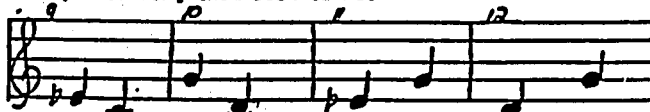


"I will play and sing one note for you in your high voice range, then I want you to sing it back to me."

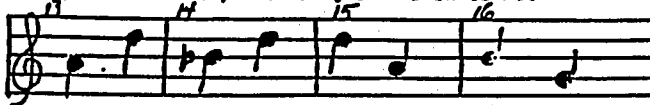


II. TWO-NOTE PITCH TEST

"I will play and sing two notes for you, then I would like you to sing them back to me."



"I will sing and play two pitches in the high voice range, then I want you to sing them back to me."



III. THREE-NOTE PITCH TEST

"I will play and sing three notes for you, then I want you to sing it back to me."

IV. MELODIC PHRASE RECALL

"I will play and sing a group of notes for you, then I want you to sing them back to me."

V. FREE SONG FOR PRETEST ONLY


Use song in entirety.

"Now I will sing 'Mary had a Little Lamb' and then I would like you to sing it."

"Now I will sing 'Mary had a Little Lamb' in the high voice range and then I would like you to sing it."

Posttest for Second and Third Grade Singers

PITCH TEST

1. Warm-up the student's voices by having them sing a glissando down their range on "ah"  and then by having them sing the song "Kookaburra". Do not correct any errors.
2. Play the test pitch or pitches on the piano one numbered measure at a time. Use a tempo of =60.
3. Sing the pitch(es) on "doo" for the subject.
4. Have the subject sing test pitch(es) unaccompanied. Subject must respond after each numbered measure except in free song which must be played and sung in entirety.
5. Respond by saying "good" while having eye contact with the subject to help the subject relax.
6. Say introductory sentences as indicated below and then verbally cue each test measure. The subject's pitch must match the test pitch for a minimum of one second.
7. Tape record testing for scoring.
8. Alternate subjects should be given the high range test first and low range second in each category.

I. SINGLE PITCH TEST

"I will play and sing one note for you, then I want you to sing it back to me."



"I will play and sing one note for you in your high voice range, then I want you to sing it back to me."



II. TWO-NOTE PITCH TEST

"I will play and sing two notes for you, then I would like you to sing them back to me."

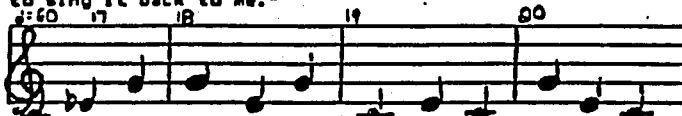


"I will sing and play two pitches in the high voice range, then I want you to sing them back to me."



III. THREE-NOTE PITCH TEST

"I will play and sing three notes for you, then I want you to sing it back to me."

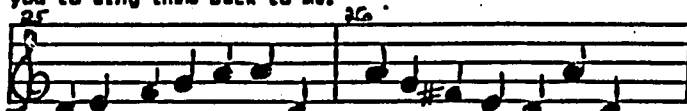


"I will play and sing three notes in the high voice range, then I want you to sing them back to me."

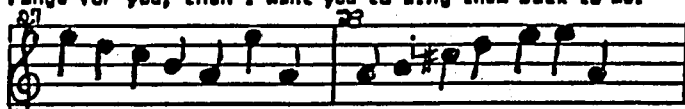


IV. MELODIC PHRASE RECALL

"I will play and sing a group of notes for you, then I want you to sing them back to me."



"I will play and sing a group of notes in the high voice range for you, then I want you to sing them back to me."



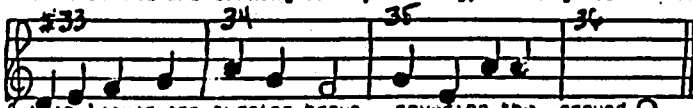
V. FREE SONG FOR PRETEST ONLY

Use song in entirety.

"Now I will sing 'Mary had a Little Lamb' and then I would like you to sing it."

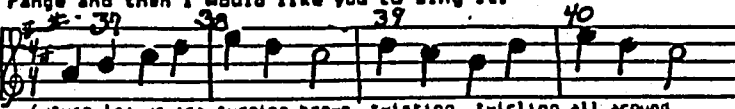


Autumn leaves are turning brown, twisting, twirling all around

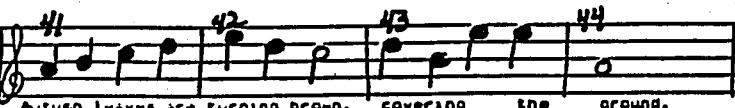


Autumn leaves are turning brown, covering the ground. O

"Now I will sing 'Mary had a Little Lamb' in the high voice range and then I would like you to sing it."



Autumn leaves are turning brown, twisting, twirling all around



Autumn leaves are turning brown, covering the ground.

APPENDIX B
Pitch Test Scoring

PITCH TEST SCORING

<u>Score</u>	<u>Single Pitch Tests</u>	<u>Multiple Pitch Tests</u>
4 points	Sung pitch was within a whole step of test pitch.	All sung pitches were within a whole step of test pitch.
3 points	Sung pitch was within a whole step of test pitch.	All sung pitches were within a whole step of test pitch.
2 points	Sung pitch was within a major third of test pitch.	Sung pitches moved in same direction as test pitches, but one or more pitch was greater than a whole step from test pitch.
1 points	Sung pitch was within a perfect fifth of test pitch.	Sung pitches did not resemble the melodic contour of test pitches, but did move from a single pitch level.
0 point	Sung pitch was an interval of a perfect fifth or greater from test pitch.	Sung pitch maintained a single, static pitch level.

APPENDIX C
Systematic Vocal Training--Low

SYSTEMATIC VOCAL TRAINING--LOW

WEEK ONE

A. Phonation Readiness Skills

1. Exercises: children stretch hands above head, bend to either side at waist, stretch up again, slowly bring arms down keeping arms straight and out from sides of the body. Note and maintain resulting straight and erect posture.
2. Standing posture: subjects stand tall, chest high, shoulders back.
3. Sitting posture: singers sit tall, legs uncrossed, shoulders back.
4. Instructor refers to correct posture three times during the entire training session.

B. Vocal Control Skills (Implement skills first as a group and then individually)

1. Speech activities: child imitates environmental sounds (wind, fire engine, puppy squeal).
2. Speech to song activities: subject speaks first phrase of the nursery rhyme, "Mary Had a Little Lamb", in a normal speaking voice and then in an excited speaking voice. Since the excitement in the voice raises the pitch, more excitement is encouraged until the pitch level is distinctly higher than a speaking tone. Next, the child repeats the higher pitched, excited phrase of the rhyme, this time sustaining the last word. Discuss this new sensation of the higher pitch level while adding in minor thirds.
3. Initial pitch: child matches middle C with a "hum" and then opens to "wah". If this is not possible, the child opens mouth as wide as possible, rests tongue on the floor of the mouth for resonating space. Then they use lower part of the lungs to control breath thus relaxing the throat muscles. Finally, the child directs the sound to the head resonators using a sing "ee" while raising the upperlip.
4. Single pitch matching: child sings back single pitches in the range of middle C1 up to A1 sometimes with the instructor's voice and the piano doubling the pitch, other times with the subjects singing a capella (see Figure C-1).

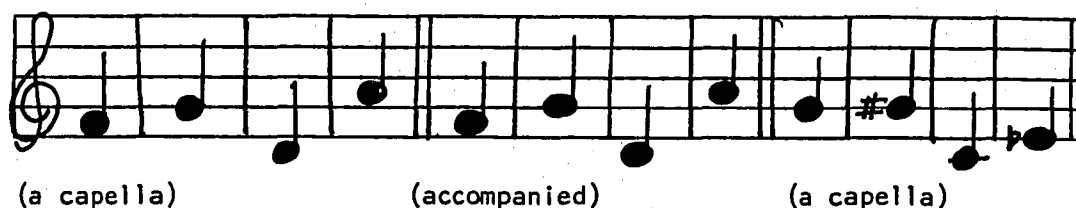


Figure C-1. Single Pitch Matching.

5. Multiple pitch matching: child sings back three descending pitches in range of middle C1 up to A1, in the key of C, sometimes with the instructor's voice, other times a capella (see Figure C-2).

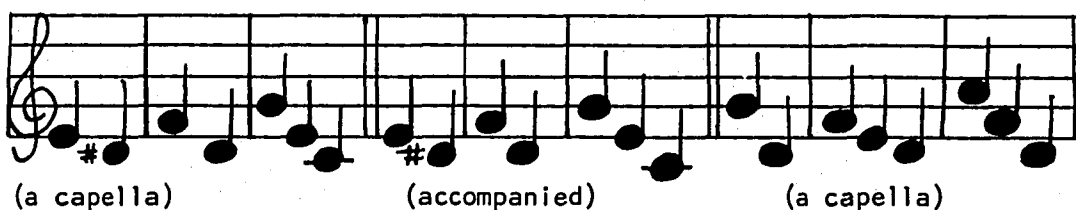


Figure C-2. Multiple Pitch Matching.

C. Pitch Discrimination and Tonal Memory Skills (Implement in conjunction with the Vocal Control Skills)

1. High and low discrimination: the instructor sings high and low pitches and child identifies them as high or low.
2. Pitch discrimination: as child sings pitches, child is asked whether or not the echoed response was accurate. Instructor will tell child if the answer was correct.
3. Pitch accuracy: subject sings pitch; instructor echoes back accurately or inaccurately. Subject identifies correctness of instructor's pitch.

WEEK TWO

A. Phonation Readiness Skills

1. Posture: review correct posture (week 1)
2. Standing posture: children imagine that they are suspended from the ceiling by a hook positioned in the back of the top part of the head on a line the spine would make if extended up through the head.
3. Sitting posture: children seek to maintain same suspended sensation when seated with legs and feet giving balance, but not tension.
4. Reinforcement: instructor will mention correct posture three times during the session.
5. Breathing exercises: children bend over at the waist exhaling air. As the children slowly stand, they inhale air. When a standing position is reached, the hands are raised high above the head as the air is held in the lungs. The children bend over to exhale the air. The process is repeated three times.
6. Breath management: the children slowly inhale air on a slow count of 12 and then exhale quickly, but maintain correct posture. Next, the children inhale quickly and then slowly exhale on a slow count of 20.

B. Vocal Control Skills (Implement skills #4 and 4 first as a group and then individually)

1. Speech to song: child reviews the skills of week one.
2. Initial pitch: child re-establishes an initial pitch using techniques of week one if necessary.
3. Single and multiple pitch matching: child echoes pitches as he/she did in week one, but also watches the instructor's hands playing pitches on the piano (see Figure C-3).

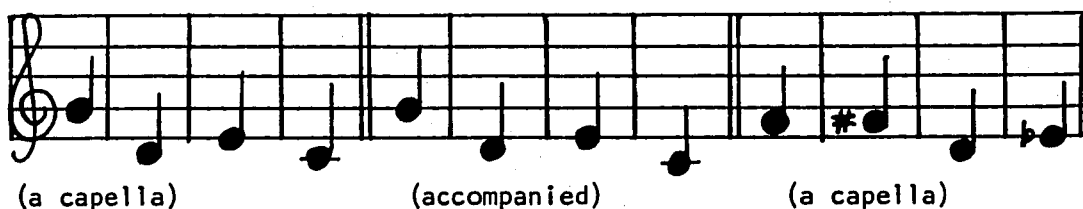


Figure C-3. Single and Multiple Pitch Matching.

4. Unison: the awareness and sensation of unison singing will be discussed and emphasized by having the child sing any sustained pitch. First, the instructor will join the child's pitch in unison. Next, the instructor will join the child's pitch not in unison and discuss the sensation of the non-unison pitches. The child will then match the instructor's unison and then intentionally not sing in unison. The contrasting sensations will be discussed (see Figure C-4).

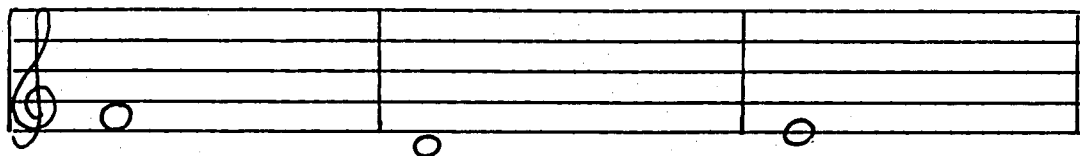


Figure C-4. Unison Pitch Matching.

C. Pitch Discrimination and Tonal Memory Skills (Implement in conjunction with the Vocal Control Skills)

1. Pitch accuracy: throughout the pitch matching the child will be asked if his/her pitch is accurate.
2. Tonal memory: child will be asked to think pitch momentarily prior to matching tones.

WEEK THREE

A. Phonation Readiness Skills

1. Posture: review the concepts of week one and two.
2. Breathing: children take breaths opening resonating cavities by breathing through the eyes, back of teeth, throat, and nose. (It is physically impossible to breathe through the eyes and back of teeth, but the sensation of doing so helps open the resonating cavities.)

B. Vocal Control Skills (Implement skill #2 first as a group and then individually)

1. Initial pitch: the initial pitch is again established using the technique described in week one.
2. Single and multiple pitch matching: child echoes pitches as described in week one with the addition of ascending intervals (see Figure C-5).

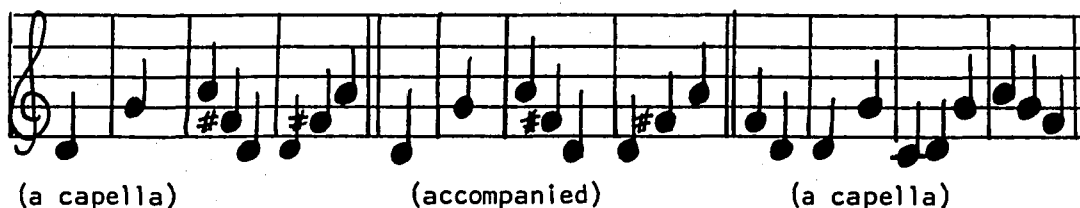


Figure C-5. Single and Multiple Pitch Matching.

3. Unison: the sensation and sound of unison is re-emphasized.
 4. Kinaesthetic reinforcement: the child places a hand at his/her throat to feel the sensation of vibrations. Low tones give a sensation of vibrations in the chest and collarbone area. Middle range tones give a sensation of vibrations in the throat area. High tones give a sensation of vibrations leaving the throat areas and giving a very subtle sense of vibrations in the nose, cheekbone area.
- C. Pitch Discrimination and Tonal Memory Skills (Implement in conjunction with Vocal Control Skills)

1. Tape recorder: tape the child's attempts at matching pitches. Play back and discuss.
2. Tonal memory: child thinks pitch prior to vocalization of the pitch.
3. Tone bells: arrange tone bells middle C1, D1, E1, F1, G1, A1 vertically with the highest pitch on top and the lowest pitch at the bottom. Child plays one, two, then three pitches. Next, the child replays his/her pattern and sings with it.

WEEK FOUR

A. Phonation Readiness Skills

1. Posture: review posture. Compare need for good singing posture with the athlete's need for proper body positioning and control.
2. Diaphragmatic-costal breathing: experience the diaphragm between and below the rib cage by feeling the diaphragm action by panting, coughing, laughing, staccato singing, and supported legato singing.

B. Vocal Control Skills (Implement skills #3 and 4 first as a group and then individually)

1. Kinesthetic review: review the vibratory sensations explored in week three.
2. Unison: have one child sustain a pitch and then add in more children in unison until a non-unison pitch occurs.
3. Single and multiple pitch matching: child echoes descending, ascending, and mixed direction patterns (see Figure C-6).

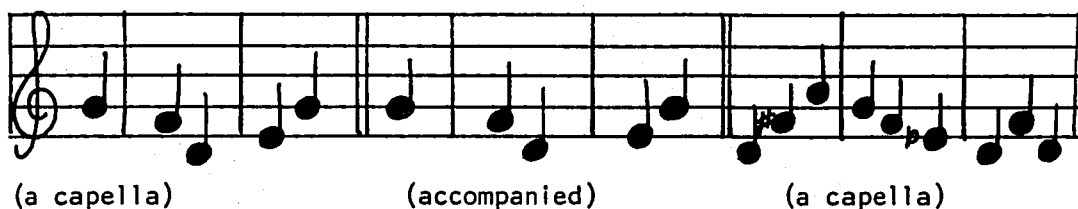


Figure C-6. Single and Multiple Pitch Matching.

4. Melody matching: child echoes a short melody. Instructor varies giving melodic and harmonic support with voice and the piano, and having the subject sing a capella (see Figure C-7).



Figure C-7. Short Melody Matching.

C. Pitch Discrimination and Tonal Memory Skills (Implement in conjunction with Vocal Control Skills)

1. Kinesthetic reinforcement: instructor and child point up and down to match singing pitch contours.
2. High/low, ascending/descending identification; instructor plays high or low pitches and then ascending or descending patterns so that child can identify which was sounded (see Figure C-8).



Figure C-8. High/Low and Ascending/Descending Pitches.

3. Tone bells: the tone bells are arranged vertically as described in week three. The child plays simple tunes by ear (Mary Had a Little Lamb, Hot Cross Buns, or Twinkle Twinkle Little Star).

WEEK FIVE

A. Phonation Readiness Skills

1. Posture: correct singing posture will be reviewed.
2. Breathing: breathing concepts examined in weeks three and four will be reviewed.

B. Vocal Control Skills (Implement skills #3 and 4 first as a group and then individually)

1. Kinesthetic reinforcement: the child will recall the sensations in the chest, throat, and face as discussed in week three.
2. Vocal range analogy: changing vocal ranges will be compared to shifting a standard shift car. The car functions best when the driver shifts to higher gears as speed increases and lower gears as the speed decreases. The voice functions best when the singers shift to a higher register as the pitch ascends and to a low register as the pitch descends.
3. Scales: the child will sing ascending and descending half scales (pitch 1-5) in the keys of C, C#, and D, pointing in the direction of the melodic contour.
4. Melodic echo: the two children will echo short melodies in the range of middle C up to A attempting a unison (see Figure C-9).



Figure C-9. Short Melody Matching.

C. Pitch Discrimination and Tonal Memory (Implement in conjunction with Vocal Control Skills)

1. Pitch discrimination: the child will identify if the melodies were sung accurately.
2. Tone bells: the child will play and then sing half (1-5) scales in the keys of C, C#, and D.

3. "Telephone" vocal self analysis: the child will place one hand by his/her ear and the other hand by his/her mouth to amplify the sound by directing a greater number of vibrations to the eardrum.

WEEK SIX

A. Phonation Readiness Skills

1. Posture: the children will recall proper posture for singing as discussed in weeks one and two.
2. Breathing: the children will recall proper breathing techniques for singing as discussed in weeks three and four.

B. Vocal Control Skills (Implement skills #3 and 4 first as a group, then individually)

1. Soft palate: the children will raise the soft palate by acting as if surprised or smelling a rose and by opening the eyes. This aids the upward arching of the soft palate. Draw Figure C-10 as shown.



no raise in soft palate



raised soft palate

Figure C-10. Position of the Soft Palate.

2. Larynx: to maintain a low position of the larynx without an unnatural raising of the larynx, the children will be asked to put his/her finger gently in the v-shaped notch on the tip of the larynx. The children will try to keep the larynx in its original position as he/she sings half scales in the keys of C, C#, and D.
3. Melodic echoing: the child will echo short melodies in the range of middle C up to A (see Figure C-11).
4. New song: the child will taught a new song on the vowel "oo". Children will be encouraged to sing with more air and less sound. References will be made to the vocal skills learned throughout the teaching of the new song (see Figure C-12).



Figure C-11. Short Melody Matching.



Figure C-12. The New Song.

C. Pitch Discrimination and Tonal Memory Skills (Implement skill in conjunction with Vocal Control Skills)

1. Tape recorder: the tape recorder will record the melody echoing. The child will listen to the recording after each melody is sung and will analyze its accuracy.

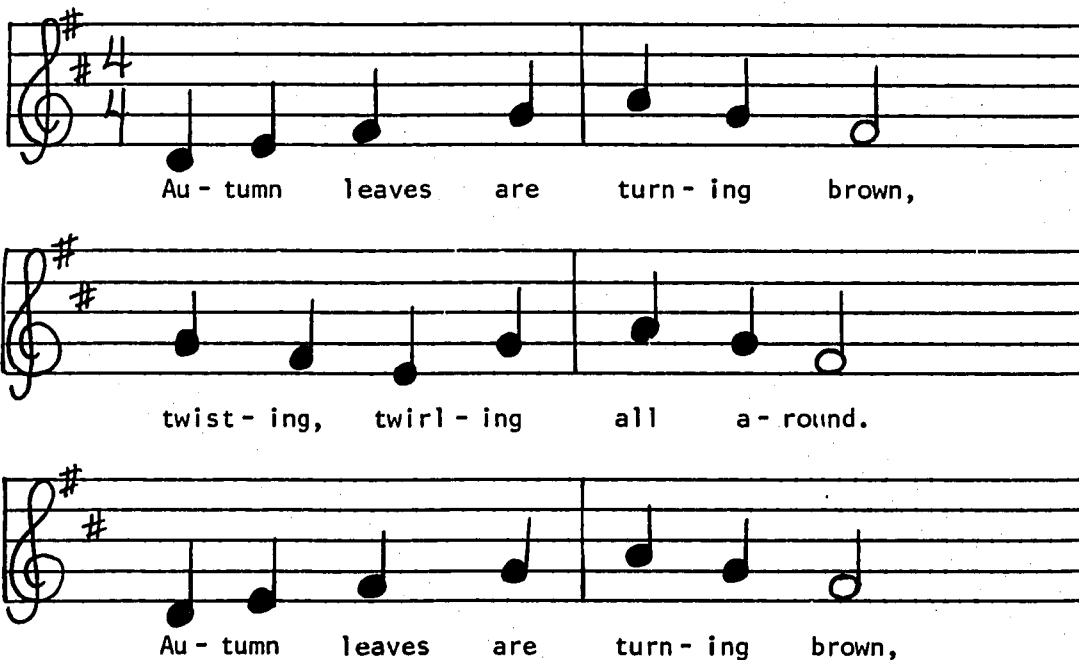
WEEK SEVEN

A. Phonation Readiness Skills

1. Posture: the children will review correct singing posture.
2. Breathing: the children will review correct breathing for accurate singing.

B. Vocal Control Skills (Implement skill #4 first as a group and then individually)

1. Soft palate: the children review the concepts about the raising of the soft palate as discussed in week six.
2. Jaw position: the children will be instructed to maintain a feeling of about one-half inch between the back teeth while singing.
3. Initial pitch: for initial pitch accuracy, the children will be encouraged to imagine the initial pitch as they breathe.
4. New song: the child will be taught the new song on words. References would be made to the vocal skills learned throughout the teaching of the new song (see Figure C-13).



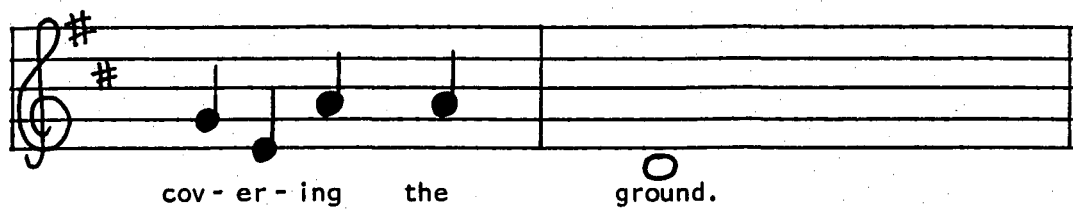


Figure C-13. The New Song.

C. Pitch Discrimination and Memory Skills (Implement in conjunction with Voice Control Skills)

1. Tape recorder: the tape recorder will assist the child's analysis of his/her pitch accuracy and tone quality on the new song.
2. Melodic contour: the child will identify the high and low pitches of the new song and the melodic contour while listening to the tape.

WEEK EIGHT

A. Phonation Readiness Skills

1. Posture: the children will briefly review the correct singing posture.
2. Breathing: the children will briefly review the correct breathing for accurate singing.

B. Vocal Control Skills (Skill #1 will be implemented first as a group and then individually)

1. New song: the child will review the new song on the words. References would be made to the vocal skills learned throughout the teaching of the new song.
2. Kinesthetic reinforcement: children will move hands in the direction of the song's melodic contour.
3. Expressive singing: the children will be encouraged to sing with sensitivity to phrase direction, text expression, and clear articulation.
4. Group singing: have the most accurate singing child sing the new song, gradually add more children, finally add a simple chordal piano accompaniment.

C. Pitch Discrimination and Tonal Memory (Implement with Vocal Control Skills)

1. Pitch discrimination: the child will identify which pitches were sung accurately or inaccurately.

APPENDIX D

Systematic Vocal Training--High

SYSTEMATIC VOCAL TRAINING--HIGH

WEEK ONE

A. Phonation Readiness Skills

1. Exercises: children stretch hands above head, bend to either side at waist, stretch up again, slowly bring arms down keeping arms straight and out from sides of the body. Note and maintain resulting straight and erect posture.
2. Standing posture: subjects stand tall, chest high, shoulders back.
3. Sitting posture: singers sit tall, legs uncrossed, shoulders back.
4. Instructor refers to correct posture three times during the entire training session.

B. Vocal Control Skills (Implement skills first as a group and then individually)

1. Speech activities: child imitates environmental sounds (wind, fire engine, puppy squeal).
2. Speech to song activities: subject speaks first phrase of the nursery rhyme, "Mary Had a Little Lamb", in a normal speaking voice and then in an excited speaking voice. Since the excitement in the voice raises the pitch, more excitement is encouraged until the pitch level is distinctly higher than a speaking tone. Next, the child repeats the higher pitched, excited phrase of the rhyme, this time sustaining the last word. Discuss this new sensation of the higher pitch level. Finally, the child chants the rhyme on the higher pitch level while adding in minor thirds.
3. Initial pitch: child matches A1 (A above middle C) with a "hum" and then opens to "wah". If this is not possible, the child opens mouth as wide as possible, rests tongue on the floor of the mouth for resonating space. Then they use lower part of the lungs to control breath thus relaxing the throat muscles. Finally, the child directs the sound to the head resonators using a sung "ee" while raising the upperlip.
4. Single pitch matching: child sings back single pitches in the range of A1 up to E2 sometimes with the instructor's voice and the piano doubling the pitch, other times with the subjects singing a capella (see Figure D-1).



Figure D-1. Single Pitch Matching.

5. Multiple pitch matching: child sings back three descending pitches in range of A1 up to E2 in the key of A, sometimes with the instructor's voice, other times a capella (see Figure D-2).



Figure D-2. Multiple Pitch Matching.

C. Pitch Discrimination and Tonal Memory Skills (Implement in conjunction with the Vocal Control Skills)

1. High and low discrimination: the instructor sings high and low pitches and child identifies them as high or low.
2. Pitch discrimination: as child sings pitches, child is asked whether or not the echoed response was accurate. Instructor will tell child if the answer was correct.
3. Pitch accuracy: subject sings pitch; instructor echoes back accurately or inaccurately. Subject identifies correctness of instructor's pitch.

WEEK TWO

A. Phonation Readiness Skills

1. Posture: review correct posture (week 1).
2. Standing posture: children imagine that they are suspended from the ceiling by a hook positioned in the back of the top part of the head on a line the spine would make if extended up through the head.
3. Sitting posture: children seek to maintain same suspended sensation when seated with legs and feet giving balance, but not tension.
4. Reinforcement: instructor will mention correct posture three times during the session.
5. Breathing exercises: children bend over at the waist exhaling air. As the children slowly stand, they inhale air. When a standing position is reached, the hands are raised high above the head as the air is held in the lungs. The children bend over to exhale the air. The process is repeated three times.
6. Breath management: the children slowly inhale air on a slow count of 12 and then exhale quickly, but maintain correct posture. Next, the children inhale quickly and then slowly exhale on a slow count of 20.

B. Vocal Control Skills (Implement skills #3 and 4 first as a group and then individually)

1. Speech to song: child reviews the skills of week one.
2. Initial pitch: child re-establishes an initial pitch using techniques of week one if necessary.
3. Single and multiple pitch matching: child echoes pitches as he/she did in week one, but also watches the instructor's hands playing pitches on the piano (see Figure D-3).



Figure D-3. Single and Multiple Pitch Matching.

4. Unison: the awareness and sensation of unison singing will be discussed and emphasized by having the child sing any sustained pitch. First, the instructor will join the child's pitch. First, the instructor will join the child's pitch in unison and discuss with the child the sensation of that unison. Next, the instructor will join the child's pitch not in unison and discuss the sensation of the non-unison pitches. The child will then match the instructor's unison and then intentionally not sing in unison. The contrasting sensations will be discussed (see Figure D-4).

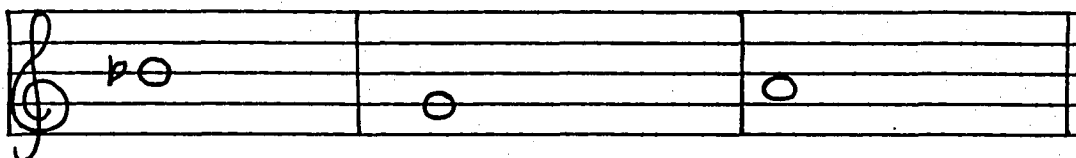


Figure D-4. Unison Matching.

C. Pitch Discrimination and Tonal Memory Skills (Implement in conjunction with the Vocal Control Skills)

1. Pitch accuracy: throughout the pitch matching the child will be asked if his/her pitch is accurate.
2. Tonal memory: child will be asked to think pitch momentarily prior to matching tones.

WEEK THREE

A. Phonation Readiness Skills

1. Posture: review the concepts of week one and two.
2. Breathing: children take breaths opening resonating cavities by breathing through the eyes, back of teeth, throat, and nose. (It is physically impossible to breathe through the eyes and back of teeth, but the sensation of doing so helps open the resonating cavities).

B. Vocal Control Skills (Implement skill #2 first as a group and then individually)

1. Initial pitch: the initial pitch is again established using the technique described in week one.
2. Single and multiple pitch matching: child echoes pitches as described in week one with the addition of ascending intervals (see Figure D-5).

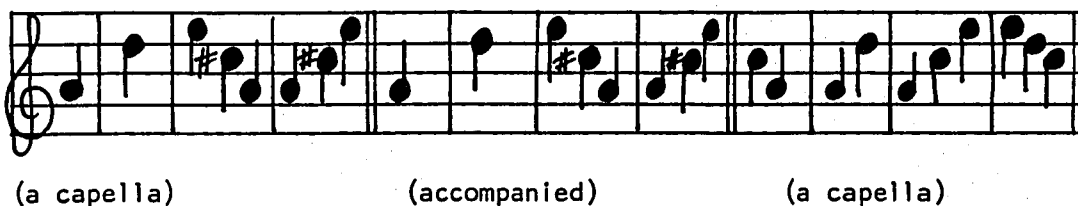


Figure D-5. Single and Multiple Pitch Matching.

3. Unison: the sensation and sound of unison is re-emphasized.
4. Kinaesthetic reinforcement: the child places a hand at his/her throat to feel the sensation of vibrations. Low tones give a sensation of vibrations in the chest and collarbone area. Middle range tones give a sensation of vibrations in the throat area. High tones give a sensation of vibrations leaving the throat areas and giving a very subtle sense of vibrations in the nose, cheekbone area.

C. Pitch Discrimination and Tonal Memory Skills (Implement in conjunction with Vocal Control Skills)

1. Tape recorder: tape the child's attempts at matching pitches. Play back and discuss.

2. Tonal memory: child thinks pitch prior to vocalization of the pitch.

3. Tone bells: arrange tone bells A1, B1, C2, D2, E2 vertically with the highest pitch on top and the lowest pitch at the bottom. Child plays one, two, then three pitches. Next, the child replays his/her pattern and sings with it.

WEEK FOUR

A. Phonation Readiness Skills

1. Posture: review posture. Compare need for good singing posture with the athlete's need for proper body positioning and control.
2. Diaphragmatic-costal breathing: experience the diaphragm between and below the rib cage by feeling the diaphragm action by panting, coughing, laughing, staccato singing, and supported legato singing.

B. Vocal Control Skills (Implement skills #3 and 4 first as a group and then individually)

1. Kinesthetic review: review the vibratory sensations explored in week three.
2. Unison: have one child sustain a pitch and then add in more children in unison until a non-unison pitch occurs.
3. Single and multiple pitch matching: child echoes descending, ascending, and mixed direction patterns (see Figure D-6).



Figure D-6. Single and Multiple Pitch Matching.

4. Melody matching: child echoes a short melody. Instructor varies giving melodic and harmonic support with voice and the piano, and having the subject sing a capella (see Figure D-7).



C. Pitch Discrimination and Tonal Memory Skills (Implement in conjunction with Vocal Control Skills)

1. Kinesthetic reinforcement: instructor and child point up and down to match singing pitch contours.
2. High/low, ascending/descending identification instructor plays high or low pitches and then ascending or descending patterns so that child can identify which was sounded (See Figure D-8).



Figure D-8. High/Low, Ascending/Descending Pitches.

3. Tone bells: the tone bells are arranged vertically as described in week three. The child plays simple tunes by ear (Mary Had a Little Lamb, Hot Cross Buns, or Twinkle Twinkle Little Star).

WEEK FIVE

A. Phonation Readiness Skills

1. Posture: correct singing posture will be reviewed.
2. Breathing: breathing concepts examined in weeks three and four will be reviewed.

B. Vocal Control Skills (Implement skills #3 and 4 first as a group and then individually)

1. Kinesthetic reinforcement: the child will recall the sensations in the chest, throat, and face as discussed in week three.
2. Vocal range analogy: changing vocal ranges will be compared to shifting a standard shift car. The car functions best when the driver shifts to higher gears as speed increases and lower gears as the speed decreases. The voice functions best when the singers shift to a higher register as the pitch ascends and to a low register as the pitch descends.
3. Scales: the child will sing ascending and descending half scales (pitches 1-5) in the keys of G, G#, and A, pointing in the direction of the melodic contour.
4. Melodic echo: the two children will echo short melodies in the range of A1 up to E2 attempting a unison (see Figure D-9).



Figure D-9. Short Melody Matching.

C. Pitch Discrimination and Tonal Memory (Implement in conjunction with Vocal Control Skills)

1. Pitch discrimination: the child will identify if the melodies were sung accurately.
2. Tone bells: the child will play and then sing half (1-5) scales in the keys of G, G#, and A.

3. "Telephone" vocal self analysis: the child will place one hand by his/her ear and the other hand by his/her mouth to amplify the sound by directing a greater number of vibrations to the eardrum.

WEEK SIX

A. Phonation Readiness Skills

1. Posture: the children will recall proper posture for singing as discussed in weeks one and two.
2. Breathing: the children will recall proper breathing techniques for singing as discussed in weeks three and four.

B. Vocal Control Skills (Implement skills #3 and 4 first as a group, then individually)

1. Soft palate: the children will raise the soft palate by acting as if surprised or smelling a rose and by opening the eyes. This aids the upward arching of the soft palate. Draw Figure D-10 as shown.



no raise in soft palate



raised soft palate

Figure D-10. Position of the Soft Palate.

2. Larynx: to maintain a low position of the larynx without an unnatural raising of the larynx, the children will be asked to put his/her finger gently in the v-shaped notch on the tip of the larynx. The children will try to keep the larynx in its original position as he/she sings half scales in the keys of G, G#, and A.
3. Melodic echoing: the child will echo short melodies in the range of A1 up to E2 (see Figure D-11).
4. New song: The child will be taught a new song on the vowel "oo". Children will be encouraged to sing with more air and less sound. References will be made to the vocal skills learned through the teaching of the new song (see Figure D-12).



Figure D-11. Short Melody Matching.



Figure D-12. The New Song.

C. Pitch Discrimination and Tonal Memory Skills (Implement skill in conjunction with Vocal Control Skills)

1. Tape recorder: the tape recorder will record the melody echoing. The child will listen to the recording after each melody is sung and will analyze its accuracy.

WEEK SEVEN

A. Phonation Readiness Skills

1. Posture: the children will review correct singing posture.
2. Breathing: the children will review correct breathing for accurate singing.

B. Vocal Control Skills (Implement skill #4 first as a group and then individually)

1. Soft palate: the children review the concepts about the raising of the soft palate as discussed in week six.
2. Jaw position: the children will be instructed to maintain a feeling of about one-half inch between the back teeth while singing.
3. Initial pitch: for initial pitch accuracy, the children will be encouraged to imagine the initial pitch as they breathe.
4. New song: the child will be taught the new song on words. References would be made to the vocal skills learned throughout the teaching of the new song (see Figure D-13).

The image shows three staves of handwritten musical notation in treble clef, key of D major (two sharps), and 4/4 time. The melody is simple, using quarter and half notes. The lyrics are written below each staff.

Au - tumn leaves are turn - ing brown,

twist - ing, twirl - ing all a - round.

Au - tumn leaves are turn - ing brown,

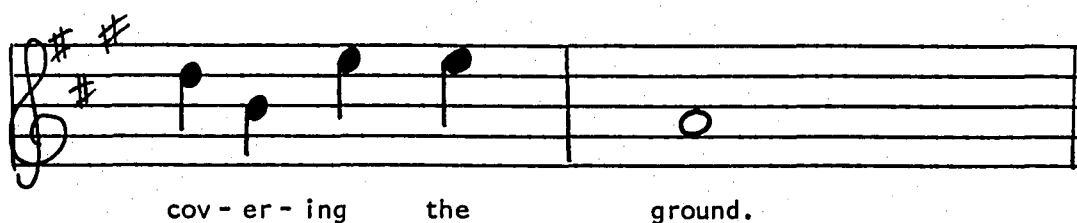


Figure D-13. The New Song.

C. Pitch Discrimination and Memory Skills (Implement in conjunction with Voice Control Skills)

1. Tape recorder: the tape recorder will assist the child's analysis of his/her pitch accuracy and tone quality on the new song.
2. Melodic contour: the child will identify the high and low pitches of the new song and the melodic contour while listening to the tape.

WEEK EIGHT

A. Phonation Readiness Skills

1. Posture: the children will briefly review the correct singing posture.
2. Breathing: the children will briefly review the correct breathing for accurate singing.

B. Vocal Control Skills (Skill #1 will be implemented first as a group and then individually)

1. New song: the child will review the new song on the words. References would be made to the vocal skills learned throughout the teaching of the new song.
2. Kinesthetic reinforcement: children will move hands in the direction of the song's melodic contour.
3. Expressive singing: the children will be encouraged to sing with sensitivity to phrase direction, text expression, and clear articulation.
4. Group singing: have the most accurate singing child sing the new song, gradually add more children; finally add a simple chordal piano accompaniment.

C. Pitch Discrimination and Tonal Memory (Implement with Vocal Control Skills)

1. Pitch discrimination: the child will identify which pitches were sung accurately or inaccurately.

APPENDIX E**Systematic Vocal Training--High/Low**

SYSTEMATIC VOCAL TRAINING--HIGH/LOW

WEEK ONE

A. Phonation Readiness Skills

1. Exercises: children stretch hands above head, bend to either side at waist, stretch up again, slowly bring arms down keeping arms straight and out from sides of the body. Note and maintain resulting straight and erect posture.
2. Standing posture: subjects stand tall, chest high, shoulders back.
3. Sitting posture: singers sit tall, legs uncrossed, shoulders back.
4. Instructor refers to correct posture three times during the entire training session.

B. Vocal Control Skills (Implement skills first as a group and then individually)

1. Speech activities: child imitates environmental sounds (wind, fire engine, puppy squeal)
2. Speech to song activities: subject speaks first phrase of the nursery rhyme, "Mary Had a Little Lamb", in a normal speaking voice and then in an excited speaking voice. Since the excitement in the voice raises the pitch, more excitement is encouraged until the pitch level is distinctly higher than a speaking tone. Next, the child repeats the higher pitched, excited phrase of the rhyme, this time sustaining the last word. Discuss this new sensation of the higher pitch level. Finally, the child chants the rhyme on the higher pitch level while adding in minor thirds.
3. Initial pitch: child matches middle C with a "hum" and then opens to "wah". If this is not possible, the child opens mouth as wide as possible, rests tongue on the floor of the mouth for resonating space. Then they use lower part of the lungs to control breath thus relaxing the throat muscles. Finally, the child directs the sound to the head resonators using a sung "ee" while raising the upperlip.
4. Single pitch matching: child sings back single pitches in the range of middle C1 up to E2 sometimes with the instructor's voice and the piano doubling the pitch, other times with the subjects singing a capella (see Figure E-1).

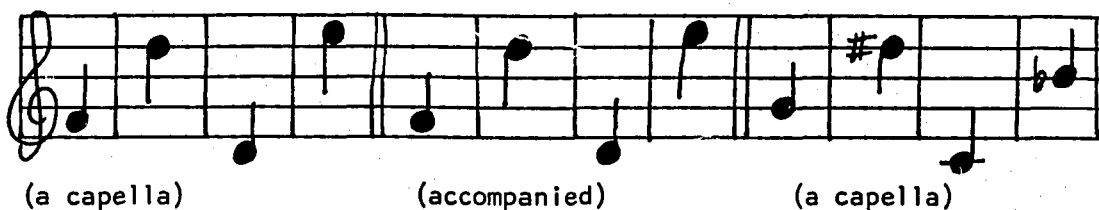


Figure E-1. Single Pitch Matching.

5. Multiple pitch matching: child sings back three descending pitches in range of middle C up to E2, in the key of C, sometimes with the instructor's voice, other times a capella (see Figure E-2).

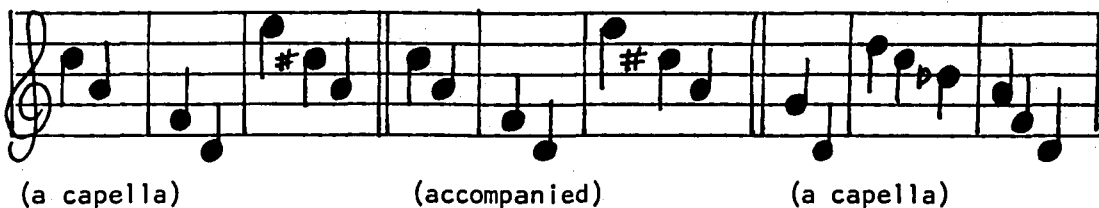


Figure E-2. Multiple Pitch Matching.

C. Pitch Discrimination and Tonal Memory Skills (Implement in conjunction with the Vocal Control Skills)

1. High and low discrimination: the instructor sings high and low pitches and child identifies them as high or low.
2. Pitch discrimination: as child sings pitches, child is asked whether or not the echoed response was accurate. Instructor will tell child if the answer was correct.
3. Pitch accuracy: subject sings pitch, instructor echoes back accurately or inaccurately. Subject identifies correctness of instructor's pitch.

WEEK TWO

A. Phonation Readiness Skills

1. Posture: review correct posture (week 1).
2. Standing posture: children imagine that they are suspended from the ceiling by a hook positioned in the back of the top part of the head on a line the spine would make if extended up through the head.
3. Sitting posture: children seek to maintain same suspended sensation when seated with legs and feet giving balance, but not tension.
4. Reinforcement: instructor will mention correct posture three times during the session.
5. Breathing exercises: children bend over at the waist exhaling air. As the children slowly stand, they inhale air. When a standing position is reached, the hands are raised high above the head as the air is held in the lungs. The children bend over to exhale the air. The process is repeated three times.
6. Breath management: the children slowly inhale air on a slow count of 12 and then exhale quickly, but maintain correct posture. Next, the children inhale quickly and then slowly exhale on a slow count of 20.

B. Vocal Control Skills (Implement skills #3 and 4 first as a group and then individually)

1. Speech to song: child reviews the skills of week one.
2. Initial pitch: child re-establishes an initial pitch using techniques of week one if necessary.
3. Single and multiple pitch matching: child echoes pitches as he/she did in week one, but also watches the instructor's hands playing pitches on the piano (see Figure E-3).



Figure E-3. Single and Multiple Pitch Matching.

4. Unison: the awareness and sensation of unison singing will be discussed and emphasized by having the child sing any sustained pitch. First, the instructor will join the child's pitch in unison and discuss with the child the sensation of that unison. Next, the instructor will join the child's pitch not in unison and discuss the sensation of the non-unison pitches. The child will then match the instructor's unison and then intentionally not sing in unison. The contrasting sensations will be discussed (see Figure E-4).

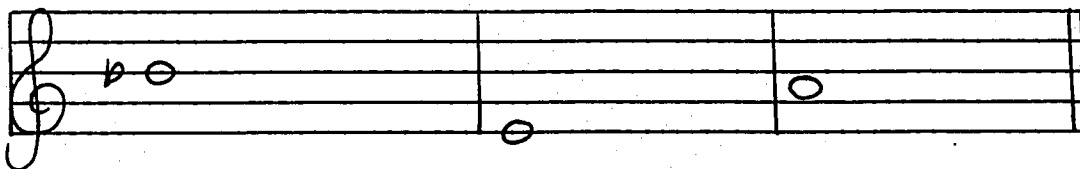


Figure E-4. Unison Matching.

C. Pitch Discrimination and Tonal Memory Skills (Implement in conjunction with the Vocal Control Skills)

1. Pitch accuracy: throughout the pitch matching the child will be asked if his/her pitch is accurate.
2. Tonal memory: child will be asked to think pitch momentarily prior to matching tones.

WEEK THREE

A. Phonation Readiness Skills

1. Posture: review the concepts of week one and two.
2. Breathing: children take breaths opening resonating cavities by breathing through the eyes, back of teeth, throat, and nose. (It is physically impossible to breathe through the eyes and back of teeth, but the sensation of doing so helps open the resonating cavities).

B. Vocal Control Skills (Implement skill #2 first as a group and then individually)

1. Initial pitch: the initial pitch is again established using the technique described in week one.
2. Single and multiple pitch matching: child echoes pitches as described in week one with the addition of ascending intervals (see Figure E-5).



Figure E-5. Single and Multiple Pitch Matching.

3. Unison: the sensation and sound of unison is re-emphasized.
4. Kinaesthetic reinforcement: the child places a hand at his/her throat to feel the sensation of vibrations. Low tones give a sensation of vibrations in the chest and collarbone area. Middle range tones give a sensation of vibrations in the throat area. High tones give a sensation of vibrations leaving the throat areas and giving a very subtle sense of vibrations in the nose, cheekbone area.

C. Pitch Discrimination and Tonal Memory Skills (Implement in conjunction with Vocal Control Skills)

1. Tape recorder: tape the child's attempts at matching pitches. Play back and discuss.
2. Tonal memory: child thinks pitch prior to vocalization of the pitch.
3. Tone Bells: arrange tone bells F1, G1, A1, B1, C2, vertically with the highest pitch on top and the lowest pitch at the bottom. Child plays one, two, then three pitches. Next, the child replays his/her pattern and sings with it.

WEEK FOUR

A. Phonation Readiness Skills

1. Posture: review posture. Compare need for good singing posture with the athlete's need for proper body positioning and control.
2. Diaphragmatic-costal breathing: experience the diaphragm between and below the rib cage by feeling the diaphragm action by panting, coughing, laughing, staccato singing, and supported legato singing.

B. Vocal Control Skills (Implement skills #3 and 4 first as a group and then individually).

1. Kinesthetic review: review the vibratory sensations explored in week three.
2. Unison: have one child sustain a pitch and then add in more children in unison until a non-unison pitch occurs.
3. Single and multiple pitch matching: child echoes descending, ascending, and mixed direction patterns (see Figure E-6).

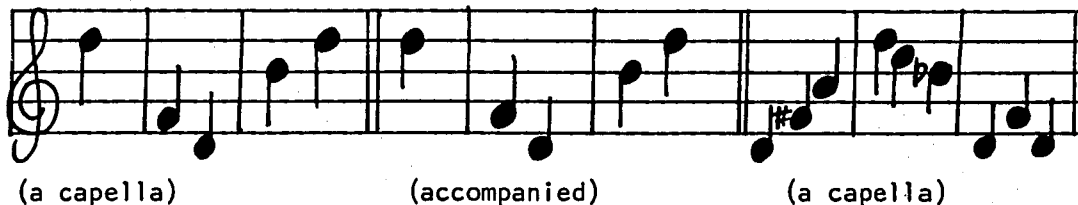


Figure E-6. Single and Multiple Pitch Matching.

4. Melody matching: child echoes a short melody. Instructor varies giving melodic and harmonic support with voice and the piano, and having the subject sing a capella (see Figure E-7).



Figure E-7. Short Melody Matching.

WEEK FIVE

A. Phonation Readiness Skills

1. Posture: correct singing posture will be reviewed.
2. Breathing: breathing concepts examined in weeks three and four will be reviewed.

B. Vocal Control Skills (Implement skills #3 and 4 first as a group and then individually)

1. Kinesthetic reinforcement: the child will recall the sensations in the chest, throat, and face as discussed in week three.
2. Vocal range analogy: changing vocal ranges will be compared to shifting a standard shift car. The car functions best when the driver shifts to higher gears as speed increases and lower gears as the speed decreases. The voice functions best when the singers shift to a higher register as the pitch ascends and to a low register as the pitch descends.
3. Scales: the child will sing ascending and descending half scales (pitches 1-5) in the keys of C, E, and A, pointing in the direction of the melodic contour.
4. Melodic echo: the two children will echo short melodies in the range of middle C1 up to E2 attempting a unison (see Figure E-9).



Figure E-9. Short Melody Matching.

C. Pitch Discrimination and Tonal Memory (Implement in conjunction with Vocal Control Skills)

1. Pitch discrimination: the child will identify if the melodies were sung accurately.
2. Tone bells: the child will play and then sing half (1-5) scales in the keys of C, E, and A.

3. "Telephone" vocal self analysis: the child will place one hand by his/her ear and the other hand by his/her mouth to amplify the sound by directing a greater number of vibrations to the eardrum.

WEEK SIX

A. Phonation Readiness Skills

1. Posture: the children will recall proper posture for singing as discussed in weeks one and two.
2. Breathing: the children will recall proper breathing techniques for singing as discussed in weeks three and four.

B. Vocal Control Skills (Implement skills #3 and 4 first as a group, then individually)

1. Soft palate: the children will raise the soft palate by acting as if surprised or smelling a rose and by opening the eyes. This aids the upward arching of the soft palate. Draw Figure E-10 as shown.



no raise in soft palate



raised soft palate

Figure E-10. Position of the Soft Palate.

2. Larynx: to maintain a low position of the larynx without an unnatural raising of the larynx, the children will be asked to put his/her finger gently in the v-shaped notch on the tip of the larynx. The children will try to keep the larynx in its original position as he/she sings half scales in the keys of C, C#, and D.
3. Melodic echoing: the child will echo short melodies in the range of middle C1 up to E2 (see Figure E-11).



Figure E-11. Short Melody Matching.

4. New song: the child will be taught a new song on the vowel "oo". Children will be encouraged to sing with more air and less sound. References will be made to the vocal skills learned throughout the teaching of the new song (see Figure E-12).



Figure E-12. The New Song.

C. Pitch Discrimination and Tonal Memory Skills (Implement skill in conjunction with Vocal Control Skills)

1. Tape recorder: the tape recorder will record the melody echoing. The child will listen to the recording after each melody is sung and will analyze its accuracy.

WEEK SEVEN

A. Phonation Readiness Skills

1. Posture: the children will review correct singing posture.
2. Breathing: the children will review correct breathing for accurate singing.

B. Vocal Control Skills (Implement skill #4 first as a group and then individually)

1. Soft Palate: the children review the concepts about the raising of the soft palate as discussed in week six.
2. Jaw position: the children will be instructed to maintain a feeling of about one-half inch between the back teeth while singing.
3. Initial pitch: for initial pitch accuracy, the children will be encouraged to imagine the initial pitch as they breathe.
4. New song: the child will be taught the new song on words. References would be made to the vocal skills learned throughout the teaching of the new song (see Figure E-13).

Au - tumn leaves are turn - ing brown

twist - ing, twirl - ing all a - round.

Au - tumn leaves are turn - ing brown,

Handwritten musical notation for "The New Song" in G major (one sharp) and 4/4 time. The melody consists of five lines of music. The lyrics are: "cov - er - ing the ground. Au - tumn leaves are turn - ing brown, twist - ing, twirl - ing all a - round. Au - tumn leaves are turn - ing brown, cov - er - ing the ground."

Figure E-13. The New Song.

C. Pitch Discrimination and Memory Skills (Implement in conjunction with Voice Control Skills)

1. Tape recorder: the tape recorder will assist the child's analysis of his/her pitch accuracy and tone quality on the new song.
2. Melodic contour: the child will identify the high and low pitches of the new song and the melodic contour while listening to the tape.

WEEK EIGHT

A. Phonation Readiness Skills

1. Posture: the children will briefly review the correct singing posture.
2. Breathing: the children will briefly review the correct breathing for accurate singing.

B. Vocal Control Skills (Skill #1 will be implemented first as a group and then individually)

1. New song: the child will review the new song on the words. References would be made to the vocal skills learned throughout the teaching of the new song.
2. Kinesthetic reinforcement: children will move hands in the direction of the song's melodic contour.
3. Expressive singing: the children will be encouraged to sing with sensitivity to phrase direction, text expression, and clear articulation.
4. Group singing: have the most accurate singing child sing the new song, gradually add more children, finally add a simple chordal piano accompaniment.

C. Pitch Discrimination and Tonal Memory (Implement with Vocal Control Skills)

1. Pitch discrimination: the child will identify which pitches were sung accurately or inaccurately.

APPENDIX F

Bibliography of References Used in the Development of the Systematic Vocal Training Method

BIBLIOGRAPHY OF REFERENCES USED IN THE DEVELOPMENT
OF THE SYSTEMATIC VOCAL TRAINING METHOD

A. References Used in the Development of Phonation Readiness Skills

- Christy, V. A. (1979). Foundations in singing (4th ed.). Dubuque, IA: Wm. Brown.
- Hammar, R. A. (1978). Singing--An extension of speech. Metuchen, NJ: Scarecrow.
- Phillips, K. (1985). The effects of group breath-control training on the singing ability of elementary students. Journal of Research in Music Education, 33(3), 179-192.
- Stanton, R. (1971). Steps to singing for voice classes. Belmont, CA: Wadsworth.
- Vennard, W. (1967). Singing, the mechanism and the technique. New York: Carl Fischer.

B. References Used in the Development of Vocal Control Skills

- Apfelstadt, H. (1984). The effect of melodic perception on pitch discrimination and vocal accuracy of kindergarten children. Journal of Research in Music Education, 32(1), 15-24.
- Atterbury, B. W. (1984). Are you really teaching children how to sing? Music Educators Journal, 70(8), 43-45.
- Billingsley, R., & Rotenberg, K. (1982). Children's interval processing in music. Psychomusicology, 2(1), 38-44.
- Forucci, S. L. (1975). Help for the inaccurate singer. Music Educators Journal, 62(2), 57-61.
- Gould, A. O. (1969). Developing specialized programs for singing in the elementary school. Council for Research in Music Education, 17, 9-22.
- Hammar, R. A. (1978). Singing--An extension of speech. Metuchen, NJ: Scarecrow.
- Jarjisian, C. S. (1983). Pitch pattern instruction and singing achievement of young children. Psychology of Music, 11(1), 19-25.
- Jones, M. (1979). Using a vertical-keyboard instrument with the uncertain singer. Journal of Research in Music Education, 27(3), 173-184.

Joyner, D. R. (1969). The monotone problem. Journal of Research in Music Education, 17(1), 115-124.

Myers, L. K. (1961). Teaching children music in the elementary school. Englewood Cliffs, NJ: Prentice-Hall.

Roberts, E., & Davies, A. (1976). A method of extending the vocal range of 'monotone' school children. Psychology of Music, 4(1), 29-43.

Rossell, D. (1983). Voice--A dramatic new concept. Seattle, WA: Magnolia House.

Smith, R. B. (1961). The effect of group training on the singing ability of nursery school children. Journal of Research in Music Education, 11, 137-141.

Stanton, R. (1971). Steps to singing for voice classes. Belmont, CA: Wadsworth.

Vennard, W. (1967). Singing, the mechanism and the technique. New York: Carl Fischer.

C. Research Used in the Development of Pitch Discrimination and Tonal Memory Skills

Apfelstadt, H. (1984). The effect of melodic perception on pitch discrimination and vocal accuracy of kindergarten children. Journal of Research in Music Education, 32(1), 15-24.

Atterbury, B. W. (1984). Are you really teaching children how to sing? Music Educators Journal, 70(8), 43-45.

Bentley, A. (1968). "Monotones" a comparison with "normal" singers in terms of incidence and musical abilities. London: Novello.

Buckton, R. (1977). A comparison of the effects of vocal and instrumental instruction on the development of melodic and vocal abilities in young children. Psychology of Music, 5(1), 36-47.

Davies, J. B., & Yellard, A. (1977). Effects of training on the production of melodic contour in memory for tonal sequences. Psychology of Music, 5(2), 3-9.

Forucci, S. L. (1975). Help for the inaccurate singer. Music Educators Journal, 62(2), 57-61.

- Jones, M. (1979). Using a vertical-keyboard instrument with the uncertain singer. Journal of Research in Music Education, 27(3), 173-184.
- Klemish, J. (1974). Treating the uncertain singer through the use of the tape recorder. Council for Research in Music Education, 37, 36-45.
- Porter, S. Y. (1977). The effect of multiple discrimination training on pitch-matching behavior of uncertain singers. Journal of Research in Music Education, 25(1), 68-81.
- Rossell, D. (1983). Voice--A dramatic new concept. Seattle, WA: Magnolia House.
- Stanton, R. (1971). Steps to singing for voice classes. Belmont, CA: Wadsworth.

BIBLIOGRAPHY

- Apfelstadt, H. (1984). The effect of melodic perception on pitch discrimination and vocal accuracy of kindergarten children. Journal of Research in Music Education, 32(1), 15-24.
- Atterbury, B. W. (1984a). Are you really teaching children how to sing? Music Educators Journal, 70(8), 43-45.
- Atterbury, B. W. (1984b). Children's singing voice: A review of selected research. Council for Research in Music Education, 80, 51-62.
- Bentley, A. (1954). Children who sing out of tune. London: Novello.
- Bentley, A. (1957). Children who sing out of tune (2nd ed.). London: Novello.
- Bentley, A. (1966). Musical ability in children and its measurement. London: Harrap.
- Bentley, A. (1968). "Monotones" a comparison with "normal" singers in terms of incidence and musical abilities. London: Novello.
- Bergethon, B., & Boardman, E. (1970). Musical growth in the elementary school. New York: Holt, Rinehart & Winston.
- Billingsley, R., & Rotenberg, K. (1982). Children's interval processing in music. Psychomusicology, 2(1), 38-44.
- Buckton, R. (1977). A comparison of the effects of vocal and instrumental instruction on the development of melodic and vocal abilities in young children. Psychology of Music, 5(1), 36-47.
- Christy, V. A. (1979). Foundations in singing (4th ed.). Dubuque, IA: Wm. Brown.
- Davies, J. B., & Yellard, A. (1977). Effects of training on the production of melodic contour in memory for tonal sequences. Psychology of Music, 5(2), 3-9.
- Forucci, S. L. (1975). Help for the inaccurate singer. Music Educators Journal, 62(2), 57-61.
- Gould, A. O. (1968). Developing specialized programs for singing in the elementary school (Project No. 5-0241). Washington, DC: United States Office of Education.

- Gould, A. O. (1969). Developing specialized programs for singing in the elementary school. Council for Research in Music Education, 17, 9-22.
- Hammar, R. A. (1978). Singing--An extension of speech. Metuchen, NJ: Scarecrow.
- Jarjisian, C. S. (1983). Pitch pattern instruction and singing achievement of young children. Psychology of Music, 11(1), 19-25.
- Jersild, A., & Bienstock, S. (1934). A study of the development of children's ability to sing. Journal of Educational Psychology, 25, 481-503.
- Jones, M. (1979). Using a vertical-keyboard instrument with the uncertain singer. Journal of Research in Music Education, 27(3), 173-184.
- Joyner, D. R. (1969). The monotone problem. Journal of Research in Music Education, 17(1), 115-124.
- Kazez, D. (1985). The myth of tonedeafness. Music Educators Journal, 71, 46-47.
- Klemish, J. (1974). Treating the uncertain singer through the use of the tape recorder. Council for Research in Music Education, 37, 36-45.
- Moog, H. (1976). The development of musical experience in children of pre-school age. Psychology of Music, 4(2), 38-45.
- Myers, L. K. (1961). Teaching children music in the elementary school. Englewood Cliffs, NJ: Prentice-Hall.
- Nye, R., & Nye, V. (1964). Music in elementary school (2nd ed.). Englewood Cliffs, NJ: Prentice-Hall.
- Pedersen, D., & Pedersen, N. (1970). The relationship between pitch recognition and vocal pitch production in sixth grade students. Journal of Research in Music Education, 18, 265-272.
- Petzold, R. (1966). Auditory perception by children. Journal of Research in Music Education, 17(1), 83-87.
- Phillips, K. (1985). The effects of group breath-control training on the singing ability of elementary students. Journal of Research in Music Education, 33(3), 179-192.
- Pollock, T. (1950). Singing disability in school children (Doctoral Dissertation, University of Illinois, 1950). Dissertation Abstracts International, 25, 1245. (University Microfilms No. 64-8354)

- Porter, S. Y. (1977). The effect of multiple discrimination training on pitch-matching behavior of uncertain singers. Journal of Research in Music Education, 25(1), 68-81.
- Roberts, E., & Davies, A. (1975). Poor pitch singing: A survey of its incidence in school children. Psychology of Music, 3(2), 24-36.
- Roberts, E., & Davies, A. (1976). A method of extending the vocal range of "monotone" school children. Psychology of Music, 4(1), 29-43.
- Rossell, D. (1983). Voice--A dramatic new concept. Seattle, WA: Magnolia House.
- Shuter-Dyson, R., & Gabriel, C. (1981). The psychology of musical ability. New York: Methuen.
- Small, A., & McCachern, F. (1983). The effect of male and female vocal modeling on pitch-matching accuracy of first-grade children. Journal of Research in Music Education, 31(3), 227-233.
- Smith, R. B. (1961). The effect of group training on the singing ability of nursery school children. Journal of Research in Music Education, 11, 137-141.
- Stanton, R. (1971). Steps to singing for voice classes. Belmont, CA: Wadsworth.
- Vennard, W. (1967). Singing, the mechanism and the technique. New York: Carl Fischer.
- Wassum, S. (1979). Elementary school children's vocal range. Journal of Research in Music Education, 27, 214-226.
- Welch, G. F. (1979). Vocal range and poor pitch singing. Psychology of Music, 7(2), 13-31.
- Wilson, D. S. (1970). A study of the child voice 6-12 (Doctoral dissertation, University of Oregon, 1970). Dissertation Abstracts International, 31, 5453A-4A. (University Microfilms No. 71-10, 796)
- Winner, E. (1982). Invented worlds: The psychology of the arts. Cambridge, MA: Harvard University Press.