

DEVELOPMENT OF MUSICAL ABILITY
IN SECONDARY SCHOOL STUDENTS
THROUGH A MUSICAL THEATRE PROGRAM

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David E. Michel

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APPROVAL

Name: David Michel
Degree: Master of Arts (Education)
Title of Thesis: Development of Musical Ability in Secondary
School Students Through a Musical
Theatre Program

Examining Committee

Chairman: Thomas J. O'Shea

R. Walker
Senior Supervisor

M. Manley-Casimir
Associate Professor

A. Clingman
Professor
Faculty of Education
University of British Columbia
External Examiner

Date approved November 15, 1982

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Development of Musical Ability in Secondary School Students

Through a Musical Theatre Program

Author .

(signature)

David E. Michel

(name)

Nov. 15/82

(date)

ABSTRACT

This study investigates the effect of participation in a secondary school musical theatre program and/or involvement in other musical activities upon the development of musical ability. Students attending the same school were divided into four groups and three of the groups comprised the experimental program. Students in group 1 (n = 42) participated in the production of the musical show, "The Wizard of Oz", and were simultaneously involved in other musical activities. Students in group 2 (n = 24) also participated in the musical production but were not involved in other musical activities. Students in group 3 (n = 14) did not participate in the musical theatre program but were involved in other musical activities. The control group was carried out with students in group 4 (n = 17) who did not participate in the musical theatre program nor in other musical activities.

The Wing Standardised Tests of Musical Intelligence were administered in a pretest-posttest format to all four groups before the rehearsals began and immediately following the production of the show. The experiment was concerned with the development of musical ability as it related to nine measures used in the Wing battery - Chord Analysis (detecting the number of notes played in a single chord); Pitch Change (detecting an alteration of single note in a short melody); Memory (detecting an alteration of a note in a short melody); Rhythmic Accent (choosing the better rhythmic accent in two performances); Harmony (judging the more appropriate of two harmonizations); Intensity (judging the more appropriate mode of varying loudness - crescendo, decrescendo, etc. - in two performances of the same melody); Phrasing (judging the more appropriate phrasing - grouping of notes by pauses, legato and staccato playing, etc. - in two performances); Total Scores; and Musical Quotients as defined by Wing.

The results of the experiment were determined by conducting analyses of variance across all four groups on mean scores of the experimental variables at pretest and posttest. The findings suggest that the groups involved in other musical activities attained significantly higher scores than the groups not involved in other musical activities. Further investigation, using a t-test, compared each individual group's pretest and posttest scores on each measure. The results indicated significant increases from pretest to posttest for each group in the experimental program on some measures, and no significant increases from pretest to posttest scores for the control group on any measure. Additional t-tests were performed comparing the differences in pretest and posttest means across the groups on each experimental variable. The most interesting of these comparisons was a significant increase by students involved in the musical theatre program exclusively as compared to students not involved in musical activities. These results provided empirical evidence to reject the null hypothesis and indicated measurable development of an overall ability to perceive and appreciate music in secondary school students as a result of their involvement in a musical theatre production.

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Chapter 1

INTRODUCTION

The Problem

Statement of the Problem. The aim of this investigation is to ascertain whether participation in a musical theatre program can contribute significantly to the development of musical ability in secondary school students as measured by the Wing Standardised Tests of Musical Intelligence. The study also seeks to compare the development of musical ability (as defined in this study on page 4) through participation in a musical theatre program with the development of musical ability through involvement in other musical activities such as school-based vocal and instrumental programs and extra-curricular vocal and instrumental classes.

The null hypothesis is that no difference in the development of musical ability (as defined on page 4) will be observed between students who participate in a musical theatre program and students involved in other music activities or no music activities at all.

Importance of the Study. Although there is an abundance of literature pertaining to American musical theatre, very little describes the educational significance of this activity to secondary school students. A few authors have warned of detrimental effects upon the young voice as a result of participation in musical theatre. Weiss (1978) states:

... Most of the songs written for musicals are fraught with problems for the average singer, and most students don't yet know how to deal with them. If the director does not take the time to help each student with the vocal aspect of his role and, in fact, has not even established correct vocal training as the basis of his music program, the student will have no choice but to perform the songs in whatever way he can manage. Frequently, a student will strain so as to be

heard, or to sing out of his range, that he becomes hoarse or even loses his voice.¹

Sample (1964) also cautions that "the adolescent voice should (not) be pushed to unrealistic extremes of range . . ." ², a situation which he believes may occur if students attempt to master too difficult selections contained in American musicals. Nevertheless, it is the contention of this author that these problems are less likely to occur when musicals produced at the secondary school level are not solely performance-oriented but, more importantly, are intended to enhance the educational experience of participating students. Although music educators tend to assume that involvement in a musical theatre program is a musically-enriching experience for secondary students, no specific outcomes from experience with this medium have been demonstrated empirically. It is the intention of this investigator to determine whether or not any development in musical ability can be attributed to participation in a musical theatre program. In addition, the author seeks to compare the effects of both musical theatre involvement and involvement in other musical activities upon the development of musical ability.

Limitations. It should be noted that the author of this study was the music director at the secondary school in which the study was conducted, and was therefore more highly involved with students in the musical theatre program and other school music activities than with students in the

¹Weiss, Carlyle E., "The Vocal Athlete", The American Music Teacher (Vol. 27, Apr./May, 1978), p. 32.

²Sample, Alonza D., "A Study of the Suitability of Selected Musical for Performance by the High School Student" (unpublished Doctoral Dissertation, Columbia University, 1964), p. 66.

control group (i.e. students not involved in any school music activity). Nevertheless, experimental bias on the part of the researcher was limited by the fact that he personally provided an identical testing format for all groups to be included in the study.

Definition of Terms

Musical Meaning. Although it is generally agreed that one characteristic of music is that it evokes an emotional response in the listener, the process through which this occurs has been explained in three different ways. A purist approach suggests that there are no intrinsic meanings to musical sounds other than those which relate to the style of the composer. Some human behavior tends to refute this, however, for experiences in music are usually not so emotionally neutral.

A second interpretation suggests that feelings are intrinsically associated with the music. This implies that there are specific qualities inherent in the music that automatically elicit specific emotions in the listener, irrespective of that individual's cultural and experiential background. An example of this is the feeling of sadness or melancholy which arises when one listens to a slow phrase in the minor mode. However, the association of a musical sound and a perceived emotion is not so closely related especially when it is compared to the other arts. Listening to music creates an immediate sensory effect whereas observing a work of visual art, for example, enables a more lasting and longer impression simply because of its more permanent nature. Pratt (1968) further explains:

It (music) does not express a particular and definite joy, sorrow, anguish, delight or mood of peace, but joy, sorrow, anguish, delight, peace of mind themselves, in the abstract, in their essential nature, without accessories

and therefore without their customary motives. Yet it enables us to grasp and share them in their full quintessence.³

A third interpretation of the manner in which music is understood suggests that factors such as cultural background, familiarity with different musical styles and prior life experiences are influential in determining the meaning of music. Walker states that "in order to perceive intended meanings, it is necessary to be familiar with the culture which produced them"⁴. A North American child is more likely to comprehend the intent of a North American folk tune than that of an oriental folk tune. Upon being exposed for the first time to oriental music, the North American child could conceivably misunderstand the intended meanings of that music. However, if the child has previous experience with a given culture, he is better prepared to respond in the intended manner.

For the purposes of this study, this investigator has adopted the third interpretation of musical meaning favouring the influence of previous experience. Subjects used in this experiment can understand the meaning of music as it is presented through musical theatre. They are familiar with musical theatre's cultural background and particular musical style because they are assimilated fully into North American culture. Our Musical Theatre is a typical and significant work of the American musical product.

Musical Ability. The term 'musical ability' is often used to describe an overall factor related to general musical ability, and a combination of

³Pratt, C.C., The Meaning of Music (New York: Johnson Publishers, 1968) preface.

⁴Walker, Robert, "Perception and Music Notation", Psychology of Music (Vol. 6, No. 2, 1978).

more specific group factors that could constitute a musical person. For the purposes of this study, musical ability is that ability which is measured by the various Wing Standardised Tests of Musical Intelligence. This study will concern itself with both an overall musical ability profile and specific group factors. This investigator accepts the premise that musical ability is influenced by a combination of nature and nurture, but this potential controversy is outside the scope of this study which is primarily concerned with the development of musical attainment induced by participating in musical theatre.

Musical Theatre. The separate worlds of music and drama have merged to form what we know as 'musical theatre'. While the origins of musical theatre are of European influence, the development of modern musical theatre is strictly a North American phenomenon. Participants in this study were involved in the production of a musical written by L. Frank Baum entitled, "The Wizard of Oz".

Organization of the Thesis

The remainder of the study includes three chapters. Chapter two presents a review of the literature on musical ability and musical theatre. Chapter three describes the design of the study, while chapter four includes the analysis of the data, a description of the results, and a section summarizing the results and conclusions of the study.

Chapter 2

REVIEW OF RELATED LITERATURE

Musical Ability

Definitions. Many researchers have attempted to describe the nature of musical ability; their efforts have failed, however, to result in a consensus regarding either the definition, etiology, or measurement of musical ability. Even the terminology used to denote musical ability varies amongst prominent theorists in this area.

What otherwise might be defined as musical ability has also been called musical talent (Seashore, 1938)⁵, musical aptitude (Davies, 1978)⁶, musical achievement (Sergeant and Thatcher, 1974)⁷, musicality (Revesz, 1954)⁸, and musical capacity (Wing, 1968⁹, Shuter, 1968)¹⁰. Study in this area is complicated not only by the variety of labels used to indicate musical ability, but is further confused by the variation among authors with respect to their individual conceptualizations of musical ability.

⁵Seashore, Carl E., Psychology of Music (New York: McGraw-Hill Inc., 1938) p. 302.

⁶Davies, John Booth, The Psychology of Music (Stanford: Stanford University Press, 1978) p. 107.

⁷Sergeant, Desmond and Thatcher, Gillian, "Intelligence, Social Status and Musical Abilities", Psychology of Music (Vol. 2, No. 2, 1974) p. 32.

⁸Revesz, G., Introduction to the Psychology of Music (Norman: University of Oklahoma Press, 1954) p. 131.

⁹Wing, Herbert, Tests of Musical Ability and Appreciation (Cambridge: University Press, 1968) p. 9.

¹⁰Shuter, Rosamund, The Psychology of Musical Ability (Methuen and Co. Ltd., 1968) p. 180.

Bentley (1966) has described limitations imposed upon efforts to enhance the understanding and measurement of musical ability, resulting from "the difficulty...that there is no generally agreed criterion or definition of musical ability."¹¹ Radocy and Boyle (1979) concur, stating that "studying musical ability is complicated by lack of definition, diverse criteria for musical success, and measurement of uncertainties."¹² Revesz also complains of the problems created by the absence of a "pertinent definition of the concept of musicality"¹³ and he further discusses the difficulties resulting when too general a definition of musical ability is made:

If we define musicality so as to take in all types and degrees of the musical sense, independent of time element and the grade of culture, then we must count on the definition lacking that concrete substance that furnishes criteria for diagnosing musicality.¹⁴

Some have defined musical ability as being the quality of an individual's approach and/or response to a musical situation. Davies¹⁵ and Bentley¹⁶ agree that musical ability is demonstrated through the media of musical performance, composition and appreciative listening.

All three, composer, performer, and attentive listener, are 'musical'; all three possess characteristics that

¹¹Bentley, Arnold, Musical Ability in Children and its Measurement (New York: October House Inc., 1966) p. 14

¹²Radocy, Rudolf E. and Boyle, J. David, Psychological Foundations of Musical Behavior (Springfield: Charles C. Thomas, 1979) p. 262

¹³Revesz, op. cit., p. 132

¹⁴Ibid., p. 132

¹⁵Davies, op. cit., p. 108

¹⁶Bentley, op. cit., p. 14

distinguish them from those who neither compose, nor perform, nor listen to music.¹⁷

Davies elaborates on his definition describing the ability which he considers to be unique to the "musical" person:

Logically, if a person can perform a certain feat at one particular point in time, and can repeat the performance again later, there must be some enduring state existing within that person, between the two points in time, which makes the repetition possible. It is this unseen but enduring state which we refer to as musical ability...¹⁸

Parker (1978) also believes that it is in the performance of various musical behaviours that musical ability is observed:

... It may be demonstrated by such overt acts as discriminating different pitches, intensities and intervals, or the harmonizing of melodies, singing at sight, or performing an instrument, to name a few.¹⁹

Revesz defines musical ability as simply a predisposition towards recognizing and evaluating the aesthetic quality characteristic of a musical work:

By musicality in general we are to understand the need and the capacity to understand and to experience the autonomous effects of music and to appraise musical utterances on the score of their objective quality.²⁰

Theories. Theorists have used two opposing views, the atomistic theory and the unitary theory, to describe the nature of musical ability (Davies²¹ and Wing²²). Bentley²³ differentiates between these two viewpoints,

¹⁷ Ibid., p. 14.

¹⁸ Davies, op. cit., p. 109.

¹⁹ Parker, Olin G., "The Relationship of Musical Ability, Intelligence and Socioeconomic Status to Aesthetic Sensitivity", (Vol. 2, No. 2, 1974) p. 31.

²⁰ Revesz, op. cit., p. 132.

²¹ Davies, op. cit., p. 116.

²² Wing, op. cit., p. 102.

²³ Bentley, op. cit., p. 15.

describing proponents of the atomistic theory as "those who would analyse music into its component parts" and supporters of the unitary theory as "those who maintain that music is a unity and musical ability is a single, albeit complex ability."

Mainwaring (1947), in support of the atomistic theory, has described musical ability as "a group of independently variable abilities, which may be regarded as specific manifestations in musical material of general aesthetic ability and of general intelligence."²⁴ The most prominent supporter of the atomistic theory is Carl Seashore who writes:

Musical talent is not one but a hierarchy of talents, branching out along certain trunk lines into the rich arborization²⁵ foliage and fruitage of the tree, which we call the musical mind.

Herbert Wing, considered to be the unitary counterpart to Carl Seashore, believes that there is a general ability to perceive and appreciate music. Wing argues with the atomistic theorist as follows:

It would therefore appear that at the present stage in music testing it is not possible to name a priori isolated factors which, when added together, make up general musical capacity, and which can be tested for in isolation from music as normally heard.²⁶

In support of their viewpoint, however, unitary theorists claim there are "strong correlations between tests designed to measure the different aspects of musical ability and an important general factor."²⁷

Measurement. Most existing tests of musical ability were developed by investigators concerned with the prediction of future musical success.

²⁴Mainwaring, James, "The Assessment of Musical Ability", British Journal of Educational Psychology (Vol. 17, 1947), p. 96.

²⁵Seashore, op. cit., p. 2.

²⁶Wing, op. cit., p. 13.

²⁷Shuter, op. cit., p. 180.

Music educators employ these tests in attempting to assess musical potential and to determine the course of musical training best suited to individual students. Davies describes what he considers to be the function of tests of musical ability:

... tests [of musical ability] are supposed to provide a guide to the natural ability of individuals, so that each and every one can receive the type of musical training that will best allow him or her to express fully whatever natural and creative gifts they may have.²⁸

Tests of musical ability can be categorized as instruments measuring either aptitude or attainment. Davies differentiates between these two kinds of tests:

The attainment tests are usually designed to answer questions about the extent to which individuals or groups have learned particular tasks, often from a syllabus. Aptitude tests on the other hand are supposed to measure what is sometimes referred to as natural ability.²⁹

The range of techniques used to assess musical ability is extensive and includes testing perceptual efficiency (with respect to identifying differences between two musical items), performance skills, creative talents, and musical appreciation skills. Mainwaring has provided a comprehensive list of the various kinds of tests which have been used to assess musical ability.³⁰ Radocy and Boyle have suggested that this wide variety of measurement methods is due, in part, to the fact that no singularly acceptable definition of musical ability exists.³¹ These authors state that in the absence of a conventional definition, musical ability is defined

²⁸ Davies, op. cit., p. 126.

²⁹ Davies, op. cit., p. 121.

³⁰ Mainwaring, op. cit., p. 89.

³¹ Radocy and Boyle, op. cit., p. 272.

operationally (i.e. according to the ways in which it can be observed) rather than absolutely (i.e. in terms of an as-yet-undefined essence).

Many investigators have neglected to consider the critical issues of validity and reliability of the instruments or methods which they have used in attempting to assess musical ability. Bentley, in general, has criticized investigators in this areas as "...[depending] more upon belief than scientifically proved conclusions" in their attempts to understand the nature of musical ability.³² Some theorists have discussed the importance of selecting only test instruments that possess satisfactory validity and reliability properties.³³

Two tests measuring musical ability stand out as being both comprehensive and statistically well-founded - the Seashore Measures of Musical Talents and the Wing Standardised Tests of Musical Intelligence. The former test is recognized as "the first systematic experimental measure of musical talent."³⁴ Seashore's instrument was designed to assess six basic capacities - pitch, loudness, rhythm, time, timbre and tonal memory - which he believes were independent and fundamental dimensions of musical ability. Although Wing, as a unitary theorist, did not agree with Seashore's theoretical conceptualization of musical ability, he has credited the Seashore Measures of Musical Talents as being "the first to be fully standardized."³⁵

In developing the Standardised Tests of Musical Intelligence, it was Wing's intention to measure a capacity which he construed as being "largely

³²Bentley, op. cit., p. 14.

³³Wing, op. cit., p. 8 and Radocy and Boyle, op. cit., p. 276.

³⁴Revesz, op. cit., p. 135.

³⁵Wing, op. cit., p. 10.

innate, not necessarily related to intelligence, and not influenced by environment."³⁶ Wing felt that in addition to measuring musical skills of a cognitive type, tests of musical appreciation, "the fundamental quality that all musicians would desire to find in any person who claims to have an interest in the art," should be included.³⁷ Wing's instrument consists of three tests measuring musical skill - chord analysis, pitch change and memory - and four tests assessing musical appreciation - rhythmic accent, harmony, intensity and phrasing. Scores attained on these tests are summated to derive a total score indicative of "general musical ability".

Influences. Whether the development of musical ability is predominantly a function of genetic or environmental influences has been the topic of considerable debate. Wing's position, that musical ability is genetically determined, is supported by Shuter's observation "that musical ability tends to run in families and appears early in life in individually varying degrees."³⁸ Seashore is also a proponent of this viewpoint and believed that the six sensory discrimination functions which he identified were innate.³⁹ Davies describes the necessity of specific inherited skills to the performance of musical tasks:

From a purely logical standpoint, it is impossible to conceive of an ability which has developed in the absence of those innate characteristics which make the task performance possible. There are no boxers without arms. Similarly, there is no pitch discrimination without the inheritance of a mechanism which permits it to develop.⁴⁰

³⁶Radocy and Boyle, op. cit., p. 275.

³⁷Shuter, op. cit., p. 34.

³⁸Ibid., p. 173.

³⁹Radocy and Boyle, op. cit., p. 264.

⁴⁰Davies, op. cit., p. 113.

Radocy and Boyle commented on how Scheid and Eccles (1975) have postulated that musical ability is genetically determined. The results of their research suggest that the physical size of one area of the brain's right hemisphere - the planum temporale - is indicative of genetically-coded musical ability.⁴¹

Musical ability has been described as a function of other human physiological and psychological characteristics. Sergeant and Thatcher stated that music teachers commonly observe "... that children with high intelligence generally tend to reach higher levels of musical achievement than do children with more modest intellectual ability."⁴² Radocy and Boyle explain that the more intelligent individual is more likely to cope effectively with musical problems.⁴³ Wing has cautioned, however, that "... high intelligence cannot induce musical aptitude if there is no musical sensitivity in the child."⁴⁴

Shuter has discussed the importance of memory to musical ability, stating, "an appreciation of form can hardly exist unless the listener can recognize themes when they return at a later point in a composition."⁴⁵ She had described the significance of an individual's attitude to his musical development:

... at any given level of musical talent, interest in music is likely to be an important determining factor in whether or not the child's potential capacity is fully realized.⁴⁶

⁴¹Radocy and Boyle, op. cit., p. 266.

⁴²Sergeant and Thatcher, op. cit., p. 32.

⁴³Radocy and Boyle, op. cit., p. 269.

⁴⁴Wing, op. cit., p. 85.

⁴⁵Shuter, op. cit. p. 188.

⁴⁶Ibid., p. 194.

Radocy and Boyle have discussed the relationship of certain physical features including teeth alignment, lip, hand and finger size to performing ability on different instruments.⁴⁷ These authors have also noted that since "music is an aural art form ... sufficient hearing is an essential part of musical ability."⁴⁸ The relationship between gender and the development of musical ability has been studied, however, no sex differences of significant proportion were found.⁴⁹

The impact of environmental factors upon the development of musical ability has been studied and acknowledged by investigators in this field. Radocy and Boyle have suggested that experiential factors have a more powerful influence upon musical ability than auditory, physical or intellectual characteristics.⁵⁰ Sergeant and Thatcher have demonstrated that "... the child from the favoured background (both socioeconomically and musically) is ... no more likely to develop high levels of musical ability."⁵¹ Although contending that genetically determined musical potential cannot be exceeded, Seashore states that "training ... can greatly increase the functional scope of these (musical) capacities."⁵²

Sergeant and Thatcher have described musical ability as, "... (the) result of interplay between an intelligently developing organism with appropriate environmental stimulation."⁵³ Most theorists agree that the

⁴⁷ Radocy and Boyle, op. cit., p. 267.

⁴⁸ Ibid., p. 265.

⁴⁹ Wing, op. cit., p. 85.

⁵⁰ Radocy and Boyle, op. cit., p. 282.

⁵¹ Sergeant and Thatcher, op. cit., p. 55.

⁵² Seashore, op. cit., p. 3.

⁵³ Sergeant and Thatcher, op. cit., p. 56

development of musical ability has both learning and aptitude components; however, the degree to which genetic and/or environmental factors determine musical ability is controversial. Nevertheless, Bentley has suggested that theorists assuming extreme positions in this debate acknowledge, at least minimally, the influence of other variables upon the development of musical ability:

Those who subscribe to the idea of inherited ability admit the importance of environmental for the development of what has been inherited; those who discount inherited abilities still admit different degrees of biological predisposition.⁵⁴

Musical Theatre

Description of American Musical Theatre. The origins of what is now known as American musical theatre was present before the 19th century in works patterned after European forms such as the English Ballad Opera and the French Extravaganza. Ewen (1970) describes the relationship between the ballad opera and musical comedy as follows:

Through its interpolation of popular songs (to which new lyrics were adapted) within the context of a spoken play, the ballad opera was the first suggestion, however faint, of musical comedy.⁵⁵

In describing the Extravaganza, Engel (1967) describes several characteristics found within this early form of musical theatre as follows:

The Extravaganza consisted largely of dance numbers featuring the female form, brilliantly costumed and surrounded by a sumptuous production, novel scenic devices, unusual lighting, rich costumes, and melodramatic musical scenes.⁵⁶

⁵⁴Bentley, op. cit., p. 15.

⁵⁵Ewen, David, New Complete Book of the American Musical Theatre (New York: Holt, Rinehart and Winston, 1970), p. xix.

⁵⁶Engel, Lehman, The American Musical Theatre/A Consideration by Lehman Engel (New York: CBS Records, 1967), p. 3

It is difficult to distinguish among the many early forms of American musical theatre as they contained many common characteristics. Engel describes the difficulty of differentiating between farce comedy, burlesque, musical comedy, and the extravaganza of the early 19th century.⁵⁷ According to Ewen, the burlesque form of the early 1800's was dissimilar to its later form in that its emphasis was not on sex but on "parody and caricature."⁵⁸

A later development leading to the present day American musical theatre was the late 19th century form called the musical revue. Ewen describes this form as follows:

In the revue one producer tried to outdo another in extravagance of sets and costumes, complexity of stage effect, and in the display of female pulchritude, while skits, sketches, blackouts, songs, dances, and production numbers followed a consistent program.⁵⁹

The form which developed from the revue is analogous to that found in contemporary American musical theatre.

Engel has identified several elements characteristic of American musical theatre.⁶⁰ The first element he has called "The Musical Opening", which he describes as the ensemble song-and-dance routine commonly found at the beginning of the production.⁶¹ A second element Engel has identified is "The Place of the Lyric". By this he refers to the rather unrealistic means of communication fundamental to musical theatre wherein the characters verbalize their sentiments to music.⁶² Through an introspective and poetic

⁵⁷ Ibid., p. 5.

⁵⁸ Ewen, op. cit., p. xx.

⁵⁹ Ibid., p. xxiv.

⁶⁰ Engel, op. cit., p. 101.

⁶¹ Ibid., p. 101.

⁶² Ibid., p. 104.

form, the lyrics combine with music to further the audiences' understanding of the plot and the characters. According to Engel, "Comedic Invention" is a third element of the musical show.⁶³ The use of comedy enhances the attractiveness of the production and its interest to the audience. A fourth element in which a variety of songs found within a musical theatre production are categorized and denoted as "The Musical Program".⁶⁴ Engel has distinguished the following types of songs commonly used in musicals:

- i. Song - This is simply identified as the musical setting of a lyric.
- ii. Ballad - A love song.
- iii. Rhythm Song - A song in which the musical beat is predominant.
- iv. Comedy Song - A song containing humor or "jokes".
- v. Charm Song - A song in which the music and lyrics are of equal importance.

Also integral to "The Musical Program" is the Musical Scene which he describes as "a theatrical sequence - dramatic, comedic, lyrical, narrative, or a combination of several of these set to music for one or any number of characters".⁶⁵ The final element identified by Engel is the "style" of the musical show. By this he refers to the individualized and distinctive influences of different composers of musical theatre.⁶⁶

It is important to differentiate among the present day forms of musical theatre. Within some of the literature, the terms musical theatre and

⁶³Ibid., p. 110.

⁶⁴Ibid., p. 118.

⁶⁵Ibid., p. 120.

⁶⁶Ibid., p. 127.

and musical comedy have been used synonymously. More thorough writers, however, have distinguished different types of musical theatre. Green (1968) has described the differences between musical comedy and the musical play as follows:

While these forms can and do overlap, musical comedy is lighter in content and looser in construction, with far more room for show-stopping numbers having only the slightest relationship to the story.⁶⁷

Lane (1974) describes the musical play as being

... a production with a continuous story line in which well developed characters further their actions with spoken dialogue. Songs and production numbers are introduced to help develop the plot and heighten the emotion of the play, not to serve as mere divertissement.⁶⁸

Lane also distinguishes another form of musical theatre called the folk opera. He states that "unlike the musical comedy or musical play, in folk opera the dialogue is completely - or almost completely - sung rather than spoken."⁶⁹

The libretto, or script, contained within the musical has undergone progressive changes which have influenced the form of the musical. The close integration of story and song, and the strengthening of the libretto through the addition of music, have always been fundamental to musical theatre.⁷⁰ As American musical theatre has developed, however, Engel feels that librettists have become "increasingly aware of the need for more

⁶⁷Green, Christopher, "Objectives in Music Education", Music in Education, Vol. 32, 1968, p. 7.

⁶⁸Lane, Richard Albert, "A Critical Analysis of the Treatment of Selected American Drama in Musical Adaptation" (unpublished Doctoral Dissertation, Washington State University, 1974), p. 11.

⁶⁹Ibid., p. 12.

⁷⁰Green, op. cit., p. 5.

plausible plots, identifiable characters and settings - in short, for something more nearly approaching the life around them."⁷¹

Musical Theatre and its Relationship to Music Education. Prior to discussing the relationship of musical theatre to music education, the philosophy and objectives of music education in the secondary school curriculum should be established.

Leonhard and House (1972) describe the values of music education as follows:

Through extensive experiences with music certain extrinsic values inevitably accrue. These include the development of resources for worthwhile use of leisure time, the opportunity to participate with peers in a worthwhile group endeavor, resources for enriched home and community life, and the opportunity to discover unusual talent. Results in these areas can occur, however, only when the primary emphasis is placed on providing musical experience that is worthwhile in itself.⁷²

The Province of British Columbia's Music Curriculum Guide/Resource Book states that "music is an essential aspect of human existence and that music education is a central part of the total education program."⁷³ This is, however, somewhat idealistic because at the secondary level music is an elective not a mandatory subject. Payne (1967) states that although many students would like to participate in curricular musical activities, when music is offered as an elective, they often have difficulty fitting it into their schedules.⁷⁴

⁷¹Engel, op. cit., p. 30.

⁷²Leonhard, Charles, and House, Robert W., Foundations and Principles of Music Education (New York: McGraw-Hill Inc., 1972), p. 117.

⁷³Curriculum Summaries 1980 (Province of British Columbia, Ministry of Education, 1979), p. 5.

⁷⁴Payne, J. Win., "Music in the School Curriculum", The School Musician (Vol. 39, Oct., 1967), p. 66.

As a result, many students find themselves involved in music only as an extra-curricular activity. Nevertheless, Barrows (1965) has argued that "nothing that has a legitimate place in the total school program is, in effect, extra-curricular."⁷⁵

Because school-based musical activities are designed to be educational, it is important that objectives for this subject area are formulated.

Popham and Baker (1970) have defined an "instructional objective" as follows:

... a future behavioral response in the learner's repertoire that the instructor plans to promote. Somewhat more loosely, an objective stated in these operational terms is merely a description of what the learner is to be like after instruction.⁷⁶

Leonhard and House have defined objectives "... as precise, clear statements of values, goals, or directions of education" and they have furthermore suggested that "objectives are best formulated by the people who must use them."⁷⁷ Barrows has agreed that "musical objectives need to be handmade and custom-built if they are to serve a useful purpose."⁷⁸ Instructional music objectives for participants in the secondary school musical, as identified by Barrows, include the development of musical appreciation or taste, musical understanding, musical skills, musical knowledge, musical attitudes and musical habits.⁷⁹ The educational value of musical theatre

⁷⁵Barrows, Richard Anthony, "Fostering Musical Growth Through the Production of Broadway Musicals in Senior High School: A Guide for Music Educators" (unpublished Doctoral Dissertation, Columbia University, 1965), p. 40.

⁷⁶Popham, W. James and Baker, Eva L., Systematic Instruction. (Englewood Cliffs, N.J., 1970), p. 21.

⁷⁷Leonhard and House, op. cit., p. 8.

⁷⁸Barrows, op. cit., p. 48.

⁷⁹Ibid., p. 104.

productions includes its effect upon the school and community, the music program, and individual students and teachers. Burnau (1966) has further described an educational objective of school musical theatre production as follows:

... teaching social acceptance patterns by means of the presentation of opportunities for group endeavor, is accentuated by the school production of a musical comedy.⁸⁰

Sample (1964) has shed light upon the relationship of musical theatre to the school as a whole and to the community:

When considering the role of a Broadway Musical in the program of the school, one must take cognizance of its unique function in the lives of certain talented students, its role in the educational development of the student body as a whole, and its contribution to the life of the community.⁸¹

Fields (1970) also states that few other educational experiences in the entire school would involve or reach a larger percentage of the student body.⁸²

Burnau has described the value of musical theatre to the school music program as follows:

The musical with its "knowledge in action" attributes, public relations values, socializing aspects, opportunity for creative expression by students, and verbal and non-verbal educational values seems to be assured of a place in the structure of many music programs.⁸³

⁸⁰Burnau, John M., "Factors Concerning the Production of the Musical in the High School", The School Musician. (Vol. 38, Dec., 1966), p. 50.

⁸¹Sample, Alonza D., "A Study of the Suitability of Selected Musicals for Performance by the High School Student" (unpublished Doctoral Dissertation, Columbia University, 1964), p. 31.

⁸²Fields, James Clinton, "The Musical Theatre Production: A Guide for the High School Director" (unpublished Doctoral Dissertation, University of Arkansas, 1970), p. 9.

⁸³Burnau, op. cit., p. 51.

Although the benefits of musical theatre to the school music program have been described extensively, Skaggs (1966) has expressed concerns regarding possible detrimental affects of secondary school musical theatre productions on the music program. She writes that with the range of activities expected of the total music program, musical theatre "takes up too much time."⁸⁴ She also states that "musicals are all right as school projects provided they aren't substitutes for serious music education."⁸⁵

Several authors have described the value of participation in school musicals upon the student's development of musical skills. Even if the student does not consciously seek or is not aware of the educational benefits of participating in musical theatre, through this activity he has the opportunity to experience music firsthand and to develop his musical skills. Swanwick (1976) describes this process:

Children can be helped, through movement, drama, verbal imagery, and so on, to group what is "going" on musically. Above all, they can get the sense of music by handling it for themselves.⁸⁶

Sample comments on the enhancement of the student's understanding of the performing arts as a result of his involvement in musical theatre:

Many Broadway musicals have a relevancy for adolescents. These shows can be made legitimate avenues for teaching music and the dramatic arts when the participants are at the same time aided in the formation of evaluative judgements regarding the place and relative worth of the Broadway musical in the field of the performing arts.⁸⁷

⁸⁴Skaggs, Hazel G., "Broadway Musicals in School Today", Music Educator's Journal, (Vol. 52, 1966), p. 148.

⁸⁵Ibid., p. 149.

⁸⁶Swanwick, Keith, "What is Music?", Music in Education, (Vol. 40, 1976), p. 77.

⁸⁷Sample, op. cit., p. 2.

Randall studied the effect of student participation in school musical theatre productions on their behavior in selecting different types of music. His study revealed that secondary students, classified as performing treatment groups, increased their desire to listen to show music and decreased their interest for rock music after being involved in the school's musical theatre production.⁸⁸ Randall (1975) summarized his report with the following statements:

1. There were differences between the leading players and the chorus members on the pretest in selection time for both rock and show music.
2. There were differences in show and rock music selection in the posttest when controlling for pretest differences between all the performing groups (leads, chorus, and orchestra) and the no-contact control group.
3. All production groups increased their show selection time.
4. Rock music selection decreased with the production groups except for the peripheral participants.
5. The leading players and orchestra members preferred show music on the pretest and increased their show music selection on the posttest.
6. From pretest to posttest, the chorus members changed from a preference for rock to a preference for show music.⁸⁹

Burnau concludes that

High school is the last opportunity that many of the students will have to become acquainted with higher levels of musical culture. Students need experience with musical productions of various types.⁹⁰

⁸⁸Randall, Charles Andrew, "The Effect of Participation in School Music - Theatre Productions on the Selection Behaviour of Elementary and Secondary School Students" (unpublished Doctoral Dissertation, Columbia University, 1975), p. 11.

⁸⁹Ibid., p. 40.

⁹⁰Burnau, op. cit., p. 79.

In addition to describing the benefits to students involved in musicals, some authors have specified the attractive elements of musical theatre to students. Engel (1957) suggests that one of the reasons for the students' enthusiasm is the increasing availability of musicals with indigenous American themes.⁹¹ Sample further explains that with containing American themes, "the student is now able to identify more readily with the principal characters and to feel himself an integral part of the development of the plot."⁹² Sample also comments upon the attractiveness of musical theatre to students who have interest in one aspect of musical theatre. He states that the "musico-dramatic production" can draw an adolescent with little musical interest but with a strong interest in drama, and at the same time attract the musically talented student with little dramatic aptitude because of its musical outlet.⁹³

Some of the literature on the music educator's role can be applied to the teacher's involvement in school musical theatre activities. Franklin's (1967) description of the music teacher's role in conditioning a positive response to musical experience within the student can be expanded to include the teacher's effect upon the students involved in musicals he directs.

It makes sense, though, in light of recent discoveries in behavioristic psychology, to assume that if the teacher can lead the student through emotional experiences with music which the student finds rewarding, some progress will have been made toward conditioning this type of response in him.⁹⁴

⁹¹Engel, Lehman, Planning and Producing the Musical Show, (New York: Crown Pub. Inc., 1957), p. 13.

⁹²Sample, op. cit., p. 6.

⁹³Ibid., p. 28.

⁹⁴Franklin, A. David, "Ends and Means in Music Education", Music Educator's Journal, (Vol. 53, Mar., 1967), p. 103.

The contention that the success or failure of the school musical is dependent upon the experience and skills of the music teacher has been supported by some writers. Sample has warned that "unskilled direction can often mean that the time spent to prepare a performance is excessive and out-of-proportion to the benefits gained."⁹⁵ Fields stresses that the productions must be properly supervised if they are to make valuable contributions to the total music education curriculum and to the total school curriculum.⁹⁶ It is unfortunate that there is insufficient material available to the teacher desiring to become involved in secondary school musical theatre productions.

Musical Theatre in the Secondary School. As previously mentioned, there is a lack of relevant literature available to guide the music educator in the production of secondary school musical theatre. Barrows writes:

The music educator is impeded in his attempts to utilize the Broadway musical as an instrument for the fostering of musical growth by the lack of published materials pertinent to his special needs and the inaccessibility of the few publications which might be of assistance to him.⁹⁷

Sample supports this sentiment:

Even a cursory glance at the latest significant books designed for the training and guidance of music educators would seem to suggest a need for a more comprehensive consideration of the current role the musical has come to play in secondary education and a careful scrutinizing of the ingredients and potential contributions a specific musical play can be expected to provide the high school student.⁹⁸

Sample suggests this lack of material is due to the fact that the performance of musical theatre productions by secondary school students is relatively

⁹⁵ Sample, op. cit., p. 50.

⁹⁶ Fields, op. cit., p. 21.

⁹⁷ Barrows, op. cit., p. 5.

⁹⁸ Sample, op. cit., p. 8.

new phenomenon.⁹⁹ Of the literature that is available, the major emphasis is placed on assisting the director in his selection of a musical. Sample has identified important factors to be considered in choosing a musical for the secondary students:

... the director must consider the level of musical taste in the school and community, the degree to which the property will develop musical competency in his students, and the suitability of the libretto for teen-age performance.¹⁰⁰

Burnau includes additional relevant considerations that have major importance to the success of the production of a high school musical. These include the availability of singing talent, the staging requirements, the suitability of text, the educational experience for students, and the financing.¹⁰¹

Barrows has described the most important consideration to be made in the selection of a musical as being the suitability of the music to the talents of the students.

The most important criterion in the selection of a musical intended to foster musical growth is the excellence of its music and the availability of students capable of performing it artistically.¹⁰²

Only two publications specifically deal with the organizational aspects of musical theatre in the secondary school. Both Fields (1970) and Barrows (1965) have designed guides detailing the organization of musical theatre for music educators. Of these two, Barrows' dissertation is more descriptive and useful. In his comprehensive review, he has included directives regarding the roles of the production staff; the choice and adaptation of a musical to the performing group; the assemblage and preparation of the cast, crew, and

⁹⁹Ibid., p. 12.

¹⁰⁰Ibid., p. 95.

¹⁰¹Burnau, op. cit., p. 78.

¹⁰²Barrows, op. cit., p. 126.

orchestra; as well as the description of objectives for the school musical and information on evaluating the finished product.

Summary

A review of the literature on musical ability reveals that there is a lack of consensus regarding the definition of musical ability. In addition, the nature of musical ability is described by two opposing theories, the atomistic theory, which suggests that musical ability is a composite of a number of component skills, and the unitary theory, which conceives of musical ability as being a singular overall ability. The literature on musical ability includes a description of the variety of techniques which are employed in assessing musical ability, and the importance of selecting a test instrument possessing suitable validity and reliability properties is addressed. Controversy regarding the relative influences of both genetic and environmental factors upon the development of musical ability is also discussed in literature pertaining to this area of study.

The literature on musical theatre describes American musical theatre as we now know it, as well as the European origins of this art form. Experience in musical theatre is described as within an educational setting being of educational value not only to the student, but to the school and community in general. Literature describing musical theatre in the secondary school is limited in scope and is mainly concerned with assisting the director in the selection and production of a musical.

The present study seeks to explore the relationship between musical ability and participation in musical theatre. Because at the present time, knowledge with respect to these two areas, musical ability and musical theatre, is limited, it is inappropriate to frame predictive hypotheses

regarding the relationship between musical ability and participation in musical theatre. Consequently, this study employs a null hypothesis to determine the effects of involvement in musical theatre upon the development of musical ability.

Chapter 3

METHODS

Design of the Study

The intention of this study is to determine if there are any effects of participation in a musical theatre program and/or involvement in other musical activities upon the development of musical ability. The four groups of subjects employed in this study could be described as follows:

Group 1 - This group participated in the musical theatre program and also were simultaneously involved in other musical activities. (n = 42)

Group 2 - This group participated only in the musical theatre program. (n = 24)

Group 3 - This group did not participate in the musical theatre program, however, were involved in other musical activities. (n = 14)

Group 4 - This group did not participate in the musical theatre program and was not involved in other musical activities. (n = 17)

Because of being obliged to work within the confines of a school timetable, there was some effect upon the experimental design. The number of subjects in each group were not equal and there was some difficulty in testing all the subjects at the same time.

The Sample of Students

Four groups of students were included in this study. Students involved in the musical theatre program were assigned to either Group 1 or Group 2, depending upon whether or not they were involved simultaneously in other musical activities, as indicated on the pretest. It was important to create two groups of musical theatre students, both those with and those without other musical activities, so that any interaction of involvement in both

musical theatre and other musical activities might be observed. Groups 3 and 4 were comprised of students enrolled in another class which met at the same time as the musical theatre class. Students who were not enrolled in the musical theatre class were also divided into two groups depending upon whether or not they were involved in other musical activities. The total number of students involved in the study was 97. All subjects were between the ages of 14 years and 17 years, enrolled in grades nine to twelve.

The School

Presenting a production of musical theatre as a performing arts activity is not supported by every school in the Province of British Columbia. Furthermore, the development of a program that deals specifically with this art form as a part of the curriculum is even more uncommon. As a result, the school selection was limited to a school where such an elective is made available at the secondary level. A secondary school located in northwest Langley was chosen, not only because it met the selection criterion, but also its musical theatre program had been functioning over the past four years.

Collection of Data

During the second week in September, 1981, each student was given the Wing Standardised Tests of Musical Intelligence which were individually administered during two separate meetings. Each student was also asked to provide information regarding involvement in other simultaneous musical activities. At the end of the experimental program in January, 1982, the Wing Standardised Tests of Musical Intelligence were administered to each student as a posttest.

Instrument

In choosing an evaluative instrument for this study, it was important to select a battery that measured a wide range of musical skills. The Wing Standardised Tests of Musical Intelligence were selected because they assessed not only technical skills, but also appreciation abilities. Wing has elaborated on the importance of evaluating musical appreciation skills in addition to technical skills:

Musical appreciation, which is distinguished from musical ability both by musicians and by psychologists, is the power to recognize or evaluate artistic merit in music; it involves the deliberate aesthetic judgement of music as it actually exists in compositions rather than ability to solve problems connected with the elementary materials of which music is composed.¹⁰³

Furthermore, Wing's tests were selected because of their 'musical' content. Many tests that claim to measure musical ability contain unmusical material (i.e. taps and buzzers) concentrating on memory and rhythmic abilities. Although, in comparison with more recent North American attainment tests, the musical content of Wing's tests are limited in musical vocabulary.

Included in the seven standardised tests are three tests measuring technical skills - Chord Analysis (detecting the number of notes played in a single chord), Pitch Change (detecting an alteration of a single note in a repeated chord) and Memory (detecting an alteration of a note in a short melody). The remaining four tests measure musical appreciation - Rhythmic Accent (choosing the better rhythmic accent in two performances), Harmony (judging the more appropriate of two harmonizations), Intensity (judging the more appropriate mode of varying loudness - crescendo, decrescendo, etc. - in two performances) and Phrasing (judging the more appropriate phrasing - grouping of notes by pauses, legato and staccato playing, etc. - in two

¹⁰³Wing, op. cit., p. 2.

performances). In addition to the seven individual tests, Wing made provision for a Total Score and a Musical Quotient. The Musical Quotient is obtained by dividing the subject's musical age by his actual age. The formula developed to achieve an approximate musical age is as follows:

$$\text{Approximate Musical Age} = \frac{\text{Total Score} - 25}{3}$$

Reliability and Validity of the Instrument

Because the Wing Standardised Tests of Musical Intelligence is a well established measuring instrument, its reliability and validity have been established. Wing reports that "the reliability and validity of the test results vary with the age and composition of the group." He suggests that older subjects will derive a higher reliability coefficient. In a similar age group of subjects compared to this study, the reliability coefficient of the seven tests was .91.

The Experiment

Groups 1 and 2 comprised the first part of the experiment by participating in the musical theatre program. Groups 1 and 3 were included in the second part of the experiment by their involvement in a musical activity in addition to or other than musical theatre. As Group 4 did not participate in the musical theatre program and was not involved in other musical activities, it was designated the control group. The results of the experiment will be determined by investigating the analysis of variance across all four groups; subjecting the pretest-posttest scores of each individual group to a t-test; and by comparing the means of the pretest-posttest differences of each group in order to assess the effect of the program. The criterion level of significance is designated at .05.

The Experimental Program

The first part of the experimental program focused on the participation of Groups 1 and 2 in the musical theatre program. These two groups were involved in the presentation of the musical theatre production entitled, "The Wizard of Oz". To ensure the maximum musical involvement in this activity, the participants were members of the cast. Musical responsibilities of the cast included singing in the chorus and/or singing as a lead character. The preparation included four and one half months of rehearsals followed by one week of presentations.

The second part of the experimental program was the involvement in musical activities, other than musical theatre, in Groups 1 and 3. These musical activities were classified as follows:

- (1) involvement in school instrumental training (e.g. Band, Stage Band, etc.)
- (2) involvement in outside school instrumental training (e.g. private piano lessons, etc.)
- (3) involvement in school choral training (e.g. Concert Choir, Jazz Choir, etc.)
- (4) involvement in outside school choral training (e.g. Church Choir, etc.)

Subjects in Group 2 were exposed to only the first part of the experiment and subjects in Group 3 were included in only the second part of the experiment. Those students that comprised Group 1 were involved in both parts of the experiment.

The Control Program

Subjects in Group 4 did not participate in the musical theatre program and were not involved in other musical activities. This group, however, was

given the Wing Standardised Tests of Musical Intelligence in a similar pretest-posttest format to the other groups. It was expected that there would be no significant difference between the pretest and posttest scores, indicating no development of musical ability. A factor in calculating the Musical Quotient is chronological age. Because there was an increase in age, but no musical experience, there should show an actual decrease in the Musical Quotient posttest scores.

Chapter 4

RESULTS

The results are presented by separating the nine measures of the Wing Standardised Tests of Musical Intelligence. A report is given from the statistical information provided by the experiment. Tables containing means and standard deviations; analysis of variance summaries; t-test comparisons between pretest and posttest means; and t-test comparisons between differences of the pretest-posttest means will follow the report on each group.

The results are presented in this way for the ease of reading and referral. Because the definition of musical ability used in this study is concerned with both an overall profile and specific group factors, it is hoped that presenting the results in this way will clarify the intended meaning of musical ability.

Measure 1: Chord Analysis

The results of the analysis of variance for Measure 1: Chord Analysis indicated that there was a significant difference across the four groups in the posttest ($p = .02$), but not in the pretest (Table 2). A t-test comparison between the pretest and posttest means also found significant differences for Group 1 ($p = .001$) and Group 3 ($p = .02$), but not for Groups 2 and 4 (Table 3). However, a further investigation comparing the differences of the mean scores among the four groups indicated no significant differences (Table 4).

TABLE 1
Means and Standard Deviations
for Measure 1: Chord Analysis

		Pretest	Posttest	Difference
Group 1	M	9.21	11.33	2.12
	SD	3.27	3.29	3.51
Group 2	M	8.96	9.54	0.58
	SD	2.20	2.86	3.34
Group 3	M	9.43	11.50	2.07
	SD	3.13	2.53	2.79
Group 4	M	8.18	9.18	0.94
	SD	2.67	2.91	3.09

TABLE 2
Analysis of Variance Summary
for Measure 1: Chord Analysis

	<u>df</u>	Mean Squares	<u>F</u>	<u>p</u>	
<u>Pretest:</u>					
Between Groups	3	5.36	0.63	0.60	non sig.
Within Groups	93	8.52			
<u>Posttest:</u>					
Between Groups	3	32.54	3.56	0.02	$p < 0.05$
Within Groups	93	9.15			

TABLE 3

Comparison Between Pretest and Posttest Means
for Measure 1: Chord Analysis

	<u>df</u>	<u>t-value</u>	<u>p</u>	
Group 1	41	-3.92	0.001	$p < 0.05$
Group 2	23	-0.86	0.40	non sig.
Group 3	13	-2.78	0.02	$p < 0.05$
Group 4	16	-1.26	0.28	non sig.

TABLE 4

Comparison Between Differences of the Means
for Measure 1: Chord Analysis

	<u>df</u>	<u>t-value</u>	<u>p</u>	
Between Groups 1 and 2	64	1.74	.09	non sig.
Between Groups 1 and 3	54	0.05	.96	non sig.
Between Groups 1 and 4	57	1.21	.23	non sig.
Between Groups 2 and 3	36	-1.41	.17	non sig.
Between Groups 2 and 4	39	-0.35	.73	non sig.
Between Groups 3 and 4	29	1.06	.30	non sig.

Measure 2: Pitch Change

The results of the analysis of variance for Measure 2: Pitch Change (Table 6) found significant differences across the four groups in the pretest ($p = .001$) and the posttest ($p = .001$). The t -test comparison between the pretest and posttest means, however, indicated no significant differences in any group (Table 7). Furthermore, there was no evidence of significant differences when comparing the differences of the means among the four groups (Table 8).

TABLE 5

Means and Standard Deviations
for Measure 2: Pitch Change

		Pretest	Posttest	Difference
Group 1	M	24.93	25.40	.47
	SD	4.99	3.76	3.58
Group 2	M	19.21	20.79	1.58
	SD	5.27	4.62	4.61
Group 3	M	24.29	25.79	1.50
	SD	3.73	2.52	3.01
Group 4	M	19.24	18.82	-0.41
	SD	4.37	5.83	3.22

TABLE 6

Analysis of Variance Summary
for Measure 2: Pitch Change

	<u>df</u>	Mean Squares	<u>F</u>	<u>p</u>	
<u>Pretest:</u>					
Between Groups	3	244.34	10.59	0.001	p < 0.05
Within Groups	93	23.08			
<u>Posttest:</u>					
Between Groups	3	254.15	13.93	0.001	p < 0.05
Within Groups	93	18.25			

TABLE 7

Comparison Between Pretest and Posttest Means
for Measure 2: Pitch Change

	<u>df</u>	<u>t-value</u>	<u>p</u>	
Group 1	41	-0.86	0.39	non sig.
Group 2	23	-1.68	0.11	non sig.
Group 3	13	-1.87	0.08	non sig.
Group 4	16	0.53	0.60	non sig.

TABLE 8

Comparison Between Differences of the Means
for Measure 2: Pitch Change

	<u>df</u>	<u>t-value</u>	<u>p</u>	
Between Groups 1 and 2	64	-1.09	0.28	non sig.
Between Groups 1 and 3	54	-0.96	0.34	non sig.
Between Groups 1 and 4	57	0.89	0.38	non sig.
Between Groups 2 and 3	36	0.06	0.95	non sig.
Between Groups 2 and 4	39	1.54	0.13	non sig.
Between Groups 3 and 4	29	1.69	0.10	non sig.

Measure 3: Memory

The results of the analysis of variance for Measure 3: Memory (Table 10) indicated significant differences across the four groups in the pretest ($p = .001$) and the posttest ($p = .001$). A t-test comparison between the pretest and posttest means also found significant differences for Group 1 ($p = .05$), Group 2 ($p = .05$) and Group 3 ($p = .04$), but not for Group 4 (Table 11). A further investigation comparing the differences of the mean scores among the groups indicated significant differences between Groups 1 and 3 ($p = .02$), Groups 1 and 4 ($p = .02$), Groups 2 and 3 ($p = .01$) and Groups 2 and 4 ($p = .01$), but not between Groups 1 and 2 nor Groups 3 and 4 (Table 12).

TABLE 9

Means and Standard Deviations
for Measure 3: Memory

		Pretest	Posttest	Difference
Group 1	M	18.88	19.98	1.10
	SD	4.20	2.99	3.46
Group 2	M	15.42	16.79	1.37
	SD	3.93	4.16	3.20
Group 3	M	19.36	18.07	-1.29
	SD	2.31	2.02	2.09
Group 4	M	18.35	17.06	-1.29
	SD	3.33	3.86	3.16

TABLE 10

Analysis of Variance Summary
for Measure 3: Memory

	<u>df</u>	Mean Squares	<u>F</u>	<u>p</u>	
<u>Pretest:</u>					
Between Groups	3	73.55	5.16	0.001	$p < 0.05$
Within Groups	93	14.25			
<u>Posttest:</u>					
Between Groups	3	66.17	5.82	0.001	$p < 0.05$
Within Groups	93	11.36			

TABLE 11
 Comparison Between Pretest and Posttest Means
 for Measure 3: Memory

	<u>df</u>	<u>t-value</u>	<u>p</u>	
Group 1	41	-2.05	0.05	$p < 0.05$
Group 2	23	-2.10	0.05	$p < 0.05$
Group 3	13	2.30	0.04	$p < 0.05$
Group 4	16	1.69	0.11	non sig.

TABLE 12
 Comparison Between Differences of the Means
 for Measure 3: Memory

	<u>df</u>	<u>t-value</u>	<u>p</u>	
Between Groups 1 and 2	64	-0.32	0.75	non sig.
Between Groups 1 and 3	54	2.43	0.02	$p < 0.05$
Between Groups 1 and 4	57	2.46	0.02	$p < 0.05$
Between Groups 2 and 3	36	2.78	0.01	$p < 0.05$
Between Groups 2 and 4	39	2.65	0.01	$p < 0.05$
Between Groups 3 and 4	29	0.01	0.99	non sig.

Measure 4: Rhythmic Accent

The results of the analysis of variance for Measure 4: Rhythmic Accent (Table 14) found significant differences across the four groups in the pretest ($p = .01$) and the posttest ($p = .001$). A t -test comparison between the pretest and the posttest means also indicated significant differences for Group 2 ($p = .01$) and Group 3 ($p = .001$), but not for Groups 1 and 4 (Table 15). A further investigation comparing the differences of the mean scores among the groups found significant differences between Groups 1 and 4 ($p = .05$), Groups 2 and 4 ($p = .01$) and Groups 3 and 4 ($p = .001$), but not between Groups 1 and 2, Groups 1 and 3 nor Groups 2 and 3 (Table 16).

TABLE 13

Means and Standard Deviations
for Measure 4: Rhythmic Accent

		Pretest	Posttest	Difference
Group 1	M	7.19	7.98	0.79
	SD	2.51	2.66	3.11
Group 2	M	6.08	7.46	1.38
	SD	2.24	2.30	2.50
Group 3	M	4.93	6.57	1.64
	SD	1.73	1.87	1.74
Group 4	M	6.18	5.24	-0.94
	SD	2.01	1.72	2.54

TABLE 14

Analysis of Variance Summary
for Measure 4: Rhythmic Accent

	<u>df</u>	Mean Squares	<u>F</u>	<u>p</u>	
<u>Pretest:</u>					
Between Groups	3	19.93	3.88	0.01	$p < 0.05$
Within Groups	93	5.14			
<u>Posttest:</u>					
Between Groups	3	32.65	6.01	0.001	$p < 0.05$
Within Groups	93	5.43			

TABLE 15

Comparison Between Pretest and Posttest Means
for Measure 4: Rhythmic Accent

	<u>df</u>	<u>t-value</u>	<u>p</u>	
Group 1	41	-1.64	0.11	non sig.
Group 2	23	-2.70	0.01	$p < 0.05$
Group 3	13	-3.54	0.001	$p < 0.05$
Group 4	16	1.53	0.15	non sig.

TABLE 16

Comparison Between Differences of the Means
for Measure 4: Rhythmic Accent

	<u>df</u>	<u>t</u> -value	<u>p</u>	
Between Groups 1 and 2	64	-0.79	0.43	non sig.
Between Groups 1 and 3	54	-0.98	0.33	non sig.
Between Groups 1 and 4	57	2.03	0.05	$p < 0.05$
Between Groups 2 and 3	36	-0.35	0.73	non sig.
Between Groups 2 and 4	39	2.91	0.01	$p < 0.05$
Between Groups 3 and 4	29	3.23	0.001	$p < 0.05$

Measure 5: Harmony

The results of the analysis of variance for Measure 5: Harmony (Table 18) indicated significant differences across the four groups in the pretest ($p = .001$) and the posttest ($p = .001$). There were no significant differences, however, in the t-test comparison between the pretest and posttest means (Table 19) with the exception of Group 3 ($p = .02$). Further investigation comparing the differences of the mean scores among the groups (Table 20) found significant difference between only Groups 1 and 3 ($p = .01$).

TABLE 17

Means and Standard Deviations
for Measure 5: Harmony

		Pretest	Posttest	Difference
Group 1	M	8.36	8.26	-0.10
	SD	2.54	2.73	2.71
Group 2	M	6.58	7.00	.42
	SD	2.83	3.09	3.48
Group 3	M	6.79	9.00	2.21
	SD	2.19	1.62	2.94
Group 4	M	5.06	6.06	1.00
	SD	1.30	1.56	2.18

TABLE 18

Analysis of Variance Summary
for Measure 5: Harmony

	<u>df</u>	Mean Squares	<u>F</u>	<u>p</u>	
<u>Pretest:</u>					
Between Groups	3	48.33	8.37	0.001	$p < 0.05$
Within Groups	93	5.77			
<u>Posttest:</u>					
Between Groups	3	31.46	4.88	0.001	$p < 0.05$
Within Groups	93	6.44			

TABLE 19
 Comparison Between Pretest and Posttest Means
 for Measure 5: Harmony

	<u>df</u>	<u>t-value</u>	<u>p</u>	
Group 1	41	.23	0.82	non sig.
Group 2	23	-0.59	0.56	non sig.
Group 3	13	-2.82	0.02	$p < 0.05$
Group 4	16	-1.89	0.08	non sig.

TABLE 20
 Comparison Between Differences of the Means
 for Measure 5: Harmony

	<u>df</u>	<u>t-value</u>	<u>p</u>	
Between Groups 1 and 2	64	-0.66	0.51	non sig.
Between Groups 1 and 3	54	-2.70	0.01	$p < 0.05$
Between Groups 1 and 4	57	-1.48	0.14	non sig.
Between Groups 2 and 3	36	-1.62	0.11	non sig.
Between Groups 2 and 4	39	-0.61	0.55	non sig.
Between Groups 3 and 4	29	1.32	0.20	non sig.

Measure 6: Intensity

The results of the analysis of variance for Measure 6: Intensity found no significant differences across the groups in the pretest not the posttest (Table 22). The t-test comparison between the pretest and the posttest means (Table 23) only indicated a significant difference for Group 1 ($p = .03$). Furthermore, the investigation comparing the differences of the mean scores found no evidence of significant differences among the four groups (Table 24).

TABLE 21
Means and Standard Deviations
for Measure 6: Intensity

		Pretest	Posttest	Difference
Group 1	M	5.76	6.74	0.98
	SD	2.03	2.36	2.75
Group 2	M	5.62	5.83	0.21
	SD	1.76	2.32	2.90
Group 3	M	6.29	5.79	-0.50
	SD	2.52	2.26	2.53
Group 4	M	5.47	5.24	-0.23
	SD	1.55	2.11	2.86

TABLE 22

Analysis of Variance Summary
for Measure 6: Intensity

	<u>df</u>	Mean Squares	<u>F</u>	<u>p</u>	
<u>Pretest:</u>					
Between Groups	3	1.91	.49	0.69	non sig.
Within Groups	93	3.90			
<u>Posttest:</u>					
Between Groups	3	10.96	2.09	0.11	non sig.
Within Groups	93	5.26			

TABLE 23

Comparison Between Pretest and Posttest Means
for Measure 6: Intensity

	<u>df</u>	<u>t-value</u>	<u>p</u>	
Group 1	41	-2.30	0.03	$p < 0.05$
Group 2	23	-0.35	0.73	non sig.
Group 3	13	0.74	0.47	non sig.
Group 4	16	.34	0.74	non sig.

TABLE 24

Comparison Between Differences of the Means
for Measure 6: Intensity

	<u>df</u>	<u>t</u> -value	<u>p</u>	
Between Groups 1 and 2	64	1.07	0.30	non sig.
Between Groups 1 and 3	54	1.77	0.08	non sig.
Between Groups 1 and 4	57	1.51	0.14	non sig.
Between Groups 2 and 3	36	0.76	0.45	non sig.
Between Groups 2 and 4	39	0.48	0.63	non sig.
Between Groups 3 and 4	29	-0.27	0.79	non sig.

Measure 7: Phrasing

The results of the analysis of variance for Measure 7: Phrasing indicated a significant difference across the four groups in the pretest ($p = .02$) but not in the posttest (Table 26). The t-test comparison between the pretest and posttest means found no significant differences in all four groups (Table 27). In addition, the t-test comparison between differences of the mean scores indicated no significant differences among the groups (Table 28).

TABLE 25
Means and Standard Deviations
for Measure 7: Phrasing

		Pretest	Posttest	Difference
Group 1	M	6.40	6.21	-0.19
	SD	2.00	2.25	2.79
Group 2	M	5.79	6.29	0.50
	SD	2.11	2.22	3.59
Group 3	M	6.79	5.43	-1.36
	SD	1.93	2.44	2.79
Group 4	M	4.82	5.24	0.42
	SD	1.51	1.60	2.48

TABLE 26
Analysis of Variance Summary
for Measure 7: Phrasing

	<u>df</u>	Mean Squares	<u>F</u>	<u>p</u>	
<u>Pretest:</u>					
Between Groups	3	13.33	3.53	0.02	$p < 0.05$
Within Groups	93	3.77			
<u>Posttest:</u>					
Between Groups	3	6.08	1.29	0.28	non sig.
Within Groups	93	4.72			

TABLE 27

Comparison Between Pretest and Posttest Means
for Measure 7: Phrasing

	<u>df</u>	<u>t-value</u>	<u>p</u>	
Group 1	41	0.44	0.66	non sig.
Group 2	23	-0.68	0.50	non sig.
Group 3	13	1.82	0.09	non sig.
Group 4	16	-0.69	0.50	non sig.

TABLE 28

Comparison Between Differences of the Means
for Measure 7: Phrasing

	<u>df</u>	<u>t-value</u>	<u>p</u>	
Between Groups 1 and 2	64	-0.87	0.39	non sig.
Between Groups 1 and 3	54	1.36	0.18	non sig.
Between Groups 1 and 4	57	-0.77	0.44	non sig.
Between Groups 2 and 3	36	1.66	0.11	non sig.
Between Groups 2 and 4	39	0.09	0.93	non sig.
Between Groups 3 and 4	29	-1.87	0.07	non sig.

Measure 8: Total Scores

The results of the analysis of variance for Measure 8: Total Scores (Table 30) found significant differences across the four groups in the pretest ($p = .001$) and the posttest ($p = .001$). The t -test comparison between the pretest and posttest means also indicated significant differences in Group 1 ($p = .01$), Group 2 ($p = .001$) and Group 3 ($p = .03$), but not in Group 4 (Table 31). A further investigation comparing the differences of the mean scores (Table 32), however, only found significant differences between Groups 2 and 4 ($p = .02$) and Groups 3 and 4 ($p = .05$).

TABLE 29

Means and Standard Deviations
for Measure 8: Total Scores

		Pretest	Posttest	Difference
Group 1	M	80.74	85.83	5.09
	SD	14.51	13.62	11.37
Group 2	M	67.67	73.71	6.04
	SD	11.85	14.24	9.20
Group 3	M	77.86	82.14	4.28
	SD	8.07	6.46	6.58
Group 4	M	67.29	66.76	-0.53
	SD	7.81	10.90	6.41

TABLE 30

Analysis of Variance Summary
for Measure 8: Total Scores

	<u>df</u>	Mean Squares	<u>F</u>	<u>p</u>	
<u>Pretest:</u>					
Between Groups	3	1263.44	8.59	0.001	$p < 0.05$
Within Groups	93	147.13			
<u>Posttest:</u>					
Between Groups	3	1772.09	11.20	0.001	$p < 0.05$
Within Groups	93	158.16			

TABLE 31

Comparison Between Pretest and Posttest Means
for Measure 8: Total Scores

	<u>df</u>	<u>t-value</u>	<u>p</u>	
Group 1	41	-2.90	0.01	$p < 0.05$
Group 2	23	-3.22	0.001	$p < 0.05$
Group 3	13	-2.44	0.03	$p < 0.05$
Group 4	16	.34	0.74	non sig.

TABLE 32

Comparison Between Differences of the Means
for Measure 8: Total Scores

	<u>df</u>	<u>t</u> -value	<u>p</u>	
Between Groups 1 and 2	64	-0.35	0.73	non sig.
Between Groups 1 and 3	54	0.25	0.80	non sig.
Between Groups 1 and 4	57	1.91	0.06	non sig.
Between Groups 2 and 3	36	0.63	0.54	non sig.
Between Groups 2 and 4	39	2.54	0.02	$p < 0.05$
Between Groups 3 and 4	29	2.06	0.05	$p < 0.05$

Measure 9: Musical Quotients

The result of the analysis of variance for Measure 9: Musical Quotients (Table 34) indicated significant differences across the four groups in the pretest ($p = .001$) and the posttest ($p = .001$). A t-test comparison between the pretest and the posttest means also found significant differences for Group 1 ($p = .04$) and Group 2 ($p = .02$) but not for Groups 3 and 4 (Table 35). When comparing the differences of the mean scores (Table 36), however, there was only a significant difference found between Groups 2 and 4 ($p = .02$).

TABLE 33
Means and Standard Deviations
for Measure 9: Musical Quotients

		Pretest	Posttest	Difference
Group 1	M	1.22	1.30	0.08
	SD	0.33	0.32	0.25
Group 2	M	0.91	1.01	0.10
	SD	0.25	0.29	0.21
Group 3	M	1.22	1.29	0.07
	SD	0.20	0.16	0.15
Group 4	M	0.93	0.90	-0.03
	SD	0.17	0.23	0.14

TABLE 34
Analysis of Variance Summary
for Measure 9: Musical Quotients

	<u>df</u>	Mean Squares	<u>F</u>	<u>p</u>	
<u>Pretest:</u>					
Between Groups	3	.72	9.83	0.001	$p < 0.05$
Within Groups	93	.07			
<u>Posttest:</u>					
Between Groups	3	.92	11.80	0.001	$p < 0.05$
Within Groups	93	.08			

TABLE 35

Comparison Between Pretest and Posttest Means
for Measure 9: Musical Quotients

	<u>df</u>	<u>t-value</u>	<u>p</u>	
Group 1	41	-2.13	0.04	$p < 0.05$
Group 2	23	-2.53	0.02	$p < 0.05$
Group 3	13	-1.70	0.11	non sig.
Group 4	16	.96	0.35	non sig.

TABLE 36

Comparison Between Differences of the Means
for Measure 9: Musical Quotients

	<u>df</u>	<u>t-value</u>	<u>p</u>	
Between Groups 1 and 2	64	-0.37	0.71	non sig.
Between Groups 1 and 3	54	0.18	0.85	non sig.
Between Groups 1 and 4	57	1.76	0.08	non sig.
Between Groups 2 and 3	36	0.57	0.58	non sig.
Between Groups 2 and 4	39	2.41	0.02	$p < 0.05$
Between Groups 3 and 4	29	1.95	0.06	non sig.

Description of Results and Commentaries

Pretest. The purpose of the analyses of variance was to determine whether significant differences showed up among the four groups by comparing the means of the pretest and posttest. Three of the seven measures that produced significant differences on the pretest, Pitch Change (2)*, Total Scores (8) and Musical Quotients (9), distinguished Groups 1 and 3 as attaining higher scores than Groups 2 and 4. The Rhythmic Accent (4) and Harmony (5) measures identified Group 1 as receiving higher scores than the other groups. Group 2 obtained a significantly lower score than the other groups on the Memory (3) measure, and Group 4 received a significantly lower score on the Phrasing (7) measure. These results clearly distinguished the groups involved in other musical activities as attaining higher scores than the groups not involved in other musical activities.

Posttest. The posttest results of the analyses of variance also yielded seven measures with significant differences. Four measures, Chord Analysis (1), Pitch Change (2), Total Scores (8) and Musical Quotients (9), identified Groups 1 and 3 as receiving higher scores than Groups 2 and 4. Group 1 obtained a significantly higher score than the other groups on the Memory (3) and Rhythmic Accent (4) measures, while Group 3 received a significantly higher score on the Harmony (5) measure. Based on these results, we can conclude that the significant difference indicated by the analyses of variance is related to the fact that Groups 1 and 3 were involved in other musical activities. Because these differences were also evident in the pretest scores, further analysis comparing differences between the pretest and posttest mean scores of each group became necessary.

*Note: Each measure will be identified by its number given in the results.

Comparison of t-tests. The t-test comparison of pretest and posttest mean scores revealed significant differences on certain measures for each group. These measures could be identified as specific group factors that constitute a musical person. Group 1 demonstrated significant increases in five measures - Chord Analysis (1), Memory (3), Intensity (6), Total Scores (8) and Musical Quotients (9). Significant increases were evident by Group 2 in four measures - Memory (3), Rhythmic Accent (4), Total Scores (8) and Musical Quotients (9). Group 3 also showed significant increases in four measures - Chord Analysis (1), Rhythmic Accent (4), Harmony (5) and Total Scores (8); but demonstrated a significant decrease in the Memory (3) measure. There were no significant differences between pretest and posttest mean scores in the control group, Group 4.

Further investigation concerning development of general musical ability were observed in some of the groups. If we consider only the Total Scores (8) measure, the three groups involved in musical theatre and other musical activities demonstrated significant increases in their posttest scores. The Musical Quotient (9) measure, which included the factor of maturing in actual age, however, showed significant increases in only the groups involved in the musical theatre program. This finding might suggest that there was measurable development of general musical ability (as defined on page 4) in secondary students as a result of their involvement in the musical theatre program.

Additional empirical evidence was found by comparing the differences of the mean scores in each measure among the groups. The t-test comparing the differences of the means between Groups 1 and 2 revealed no significant differences. Group 3 received a significantly higher score than Group 1

in the Harmony (5) measure, conversely, Group 1 received a significantly higher score than Group 3 in the Memory (3) measure. Group 1 also obtained significantly higher scores than Group 4 in the Memory (3) and Rhythmic Accent (4) measures. Group 2 received a significantly higher score than Group 3 in the Memory (3) measure and also received significantly higher scores than Group 4 in four measures - Memory (3), Rhythmic Accent (4), Total Scores (8) and Musical Quotients (9). There were also significant differences favouring Group 3 over Group 4 in the Rhythmic Accent (4) and Total Scores (8) measures.

Summary and Conclusions

In comparing the differences of the means, it was shown that the ability to choose the better rhythmic accent in two performances (Measure 4: Rhythmic Accent) is increased more substantially by students involved in musical activities than for students who are not involved in musical activities (Group 4). More significantly, the ability to detect an alteration of a note in a short melody (Measure 3: Memory) was enhanced in students involved in the musical theatre program (Groups 1 and 2) than students who did not participate in the program (Groups 3 and 4). Based on the changes made in the Total Scores (8) measure, there was a significant increase in the scores relating to musical ability by students only involved in the musical theatre program (Group 2) and only involved in other musical activities (Group 3) in comparison with students not involved in musical activities (Group 4). Even the difference between the group of students involved in both musical theatre and other musical activities (Group 1) approached a significant level ($p = .06$).

Only one comparison, however, demonstrated a statistically significant difference in scores of the Musical Quotients (9) measure. The group of

students involved in the musical theatre program exclusively (Group 2) showed a significant increase compared to students not involved in musical activities (Group 4). Because there was no empirical evidence that indicated an increase in the development of musical ability by students involved in the musical theatre program (Groups 1 and 2) compared with students involved in other musical activities (Group 3), there was evidence to accept the first part of the null hypothesis. Nevertheless, because of the observed differences in the scores of the students involved in only the musical theatre program (Group 2) and the control group (Group 4), there was evidence to reject the second part of the null hypothesis. Therefore, it can be claimed that there was measureable development of an overall ability to perceive and appreciate music in secondary school students as a result of their involvement in a musical theatre program.

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