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An investigation into the effects of band participation on academic achievement.

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AN INVESTIGATION INTO THE EFFECTS OF BAND PARTICIPATION ON ACADEMIC ACHIEVEMENT

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THESIS ACCEPTANCE

Acceptance for the faculty of the Graduate College University of Nebraska, in partial fulfillment of the requirements for the degree Master of Music, University of Nebraska at Omaha.

Committee

Name	Department/School
	Teacher Education
	Music
	Music

Chairperson

Date July 8, 1997

Abstract

The purpose of this study was to examine the relationship between high school band participation and academic achievement as measured in terms of cumulative grade point average (GPA) and grades in math and English. Based on the results of a short survey, students (N = 105) from four different Nebraska high schools served as subjects. T-test analysis signified that band students' scores in math and cumulative grade point average may decline in high school while non-band students' scores in English scores may increase. Non-band students' math and cumulative grade point averages may also decrease at times in high school. When utilizing ANCOVA data, however, it appears that there may be a relationship between band participation and academic achievement. Upon review of high school transcripts, mean scores indicated that band students (N = 53) scored higher than non-band students (N = 52) in every subject during every semester studied. Using analysis of variance, this relationship was found to be significant during every semester of high school for cumulative grade point average, during the first five semesters for math, and during the first six semesters for English. Gender and number of semesters participation, however, may have some effect on this relationship.

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Chapter 1

INTRODUCTION

While recent property tax reform may reduce school budgets in Nebraska by millions of dollars, the value of music education is possibly being questioned like never before. When more programs are offered by a school system than money to fund those programs, school administrators are forced to make curricula choices. Traditionally, the public has placed a greater emphasis upon the conventional basics of math, science, English, and history. The last quarter of the twentieth century has also brought computer competency and multiculturalism to the forefront of American education today. With so many subjects competing for the same money, music education is often one of the first areas reduced or eliminated when budgets are diminished.

While most people seem to agree that music education is a good idea, few want to extend the school day or pay the taxes necessary to increase teacher salaries and provide "extra-curricular" activities. This is evidenced by the passage of LB1114 (Nebraska Legislature, 1996). This bill limits the property tax levy in Nebraska to $1.10 which may force many administrators to drastically reduce curricular offerings. The question often asked is why should music education be part of a basic education? Why should music be academically equal to English, math and science?

Howard Gardner (1993) stated there are seven forms of intelligence: linguistic, logical-mathematical, spatial, musical, bodily kinesthetic, interpersonal, and intrapersonal. According to Gardner, every individual has abilities in each of the seven intelligences. Gardner stated that all seven intelligences are equally important. Also, no single intelligence has priority

over the others.

Without the arts, schools risk graduating individuals who are "right brain damaged" (Harvey, 1991). Harvey stated that while music may be viewed as one of seven forms of human intelligence, all equal in stature and potential, education in the U.S. is almost totally geared to nurturing linguistic and mathematical abilities alone, leaving the other five forms, including music, neglected. According to Harvey, while the "back-to-basics curricula" has merit, it ignores the most urgent void in our present system-absence of self-discipline. In his opinion, the arts inspire and require self-discipline making them more "basic" to our national survival than traditional coursework. "Presently we are spending 29 times more on science than on the arts, and the result so far is worldwide intellectual embarrassment" (Harvey, 1991).

Due to the concern for the role of aesthetic education in America, Curtis and Spiker (1977) made several recommendations on behalf of the Association for Supervision and Curriculum Development (ASCD). Chief among those proposals was that "aesthetics, including music, should be accorded a significant place in basic education at all levels of learning for all individuals in the nation" (p. 144). According to the ASCD, the rationale for aesthetic education included: quality of life, humanity, cultural pluralism, citizenship, general education, and personal satisfaction. If these purposes for aesthetic education are to be effectively met, the education process must be viewed as a lifelong endeavor.

Relating the benefits of music education to the rest of the curriculum, however, is difficult to state. A good music education program can make growth in music appreciation and skill possible, and even more likely (Wolff, 1978). Many music educators agree that participation in music will contribute

to the quality of a person's life through their heightened ability to share more of the affective power of the art of music (Fowler, 1994). Fowler went on to state that "the arts humanize the curriculum while affirming the interconnectedness of all forms of knowing. They are a powerful means to improve general education" (p. 4).

Several reports on the status of American education have targeted music education as important to a basic education. A Nation at Risk: The Imperative for Educational Reform (1983) by the National Commissioner on Excellence in Education, recommended that high schools provide vigorous programs in the fine and performing arts. The College Board Report Academic Preparation for College (1983) included the arts as one of the six basic subjects in the school curriculum. John Goodland (1984) viewed the arts as one of the "five fingers" (p. 28) of human knowledge along with mathematics and science, literature and language, society and societal studies, and vocations. Ernest Boyer's High School: A Report On Secondary Education in America (1983) listed the arts as second in curriculum priority after language, in the proposed core of common learning. He also stated that music is ranked first among subjects most liked by students and received high rankings in the areas of importance and difficulty.

Despite these reports, administrators still seem to question the value of music. Perhaps the best way to justify music education is by precisely stating the benefits of music experiences. Bruner (1960) stated that "the first object of any act of learning is that it should serve individuals in the future. Learning should not only take us somewhere; it should allow us to go further more easily" (p. 17). Wolff (1978) added that "the habits of mind which are developed when a person concentrates on a matter, when he attends to a

problem, when he perseveres in solving it, are thought to be skills which can be transferred to learning situations in other fields of academic endeavor" (p. 3). Wolff suggested that the study of music serves as a mental discipline which expedites the learning of other subjects. Proving these theories to be true, however, has been elusive to many researchers.

While many researchers (Groff, 1963; Kelley, 1981; McDonald, 1975; Movesian, 1967; Nicholson, 1972) have found a positive correlation between music participation and reading achievement, other researchers (Blickinstaff, 1963; Pelletier, 1963) have concluded that no definitive relationship between music and reading achievement could be established. The same trend can be seen when defining the relationship between math achievement and music participation. Some studies found that music participation does benefit a student's mathematical achievement (Ciepluch, 1988; College Board Service, 1995) and another (Friedman, 1959) denied any such relationship exists.

Anello (1972) compared the academic achievement in mathematics, English, and social science between high school instrumental music participants and nonparticipants by comparing grade point averages and IQ's. He found that while instrumental music participation did not cause higher grades, the activity itself did attract higher IQ students. Anello stated that further research was needed on this subject. In a review of the literature on the use of music and its effects on the behavior and academic performance of special students, McIntyre and Cowell (1984) also concluded that findings regarding the effect of music on studying, math and reading performance, activity rates, and social behavior are unclear and often contradictory.

It therefore appears that more research is needed regarding the relationship of music and academic studies. The primary purpose of this study

was to examine the relationship between high school band participation and overall academic achievement as measured by cumulative grade point averages. The secondary purposes were to measure the relationship between high school band participation and academic achievement in the individual subjects of math and English, and the effect that gender and years of musical study had on these relationships. Specific research questions addressed were:

1) Is there a difference in academic achievement between students who participate in high school band and those who do not?
    a) Is there a difference in cumulative grade point average between students who participate in high school band and those who do not?
    b) Is there a difference in math grades between students who participate in high school band and those who do not?
    c) Is there a difference in English grades between student who participate in high school band and those who do not?
2) Does gender have any effect on the relationship between high school band participation and academic achievement in cumulative grade point average, math, and English?
3) Does the number of semesters of participation in high school band have any effect on the relationship between high school band participation and academic achievement?

For the purposes of this research, grade point average was defined by all grade points received (where an A=4 points, B=3, C=2 , D=1, and F=0) divided by the total number of credit hours taken. High school was defined by grades

9 - 12, and academic achievement was defined by teacher-reported grades in math and English as well as cumulative grade point averages. Since the focal point of most music programs in Nebraska is the secondary performing groups, high school students was the focus of this investigation. Band was the performing group used due to the researcher's background in instrumental education.

Chapter 2

RELATED LITERATURE

Though the College Board (1995) cited the arts as one of six basic subjects for an effective school curriculum, many administrators appear willing to cut music programs which, in their opinion, will not cause a significant loss in the overall quality of education (Manthei & Smith, 1993). In addition to the importance of studying music for its intrinsic value, perhaps music needs to be further justified in terms of the non-musical benefits that it provides. Numerous studies have investigated the relationship between music and academics. For the purposes of this study, all research has been divided into three categories: the effect of music on English, the effect of music on math, and the effect of music on overall academic achievement.

The Effects of Music on English Ability (Reading and Language)

This section presents various studies concerning the effects of music on English ability, specifically in the areas of reading and language. Many studies show a correlation between music participation and higher achievement in English. However, the results are often disputed making it difficult to define the relationship between music and English.

Zinar (1976) stated that attempts to correlate reading language and reading music have been directed toward answering two basic questions: (1) What, if any, is the relationship between children's language reading ability or intelligence and their music reading ability or musicality? (2) What effect, if any, does instruction in reading music have upon the ability to read language?

Dalton (as cited in Zinar, 1976) conducted a study using 1,175 children in grades three through six from twenty-nine schools. Using the top and bottom

twenty-five percent in music reading ability, Dalton compared the language reading ability scores obtained from previous tests to the Kwalwasser Experimental Music Talent Test and found that the reading scores of the 278 most talented children were superior to lower music readers reading scores.

Nicholson (1972) studied the effect of music on the ability of the "slow learner" in the development of certain reading readiness skills. Using fifty 6-8 year old students with I.Q.'s of 80-95 (as determined by the Stanford-Binet Intelligence Tests), Nicholson divided the subjects into two groups matched for gender, reading achievement, age, and socioeconomic status. The control group received no music instruction while the experimental group was instructed in the concepts of melody, rhythm, and meter. Results indicated that the experimental group received significantly higher scores on the Metropolitan Readiness Test and the Botel Test of Reading Achievement. Nicholson concluded that music instruction can improve the ability of the "slow learner" in the recognition of alphabet letters and reading readiness skills.

In a similar study, first-, second-, and third-graders were tested to determine if music had an effect on basic reading skills (Movsesian, 1967). The control group received their regular reading instruction while the experimental group was instructed in music reading skills along with the regular reading instruction. Results indicated that, overall, students who studied music while learning to read scored significantly higher on the California Achievement Tests (Reading Section), the Gray Oral Reading Test, and the Survey of Primary Music Reading Development. Differences were noted among grade levels as well. First-graders who were instructed in music and reading at the same time had higher scores in reading comprehension

only. Second-graders in the experimental group had significantly higher scores in both reading vocabulary and reading comprehension. Third-graders receiving music instruction scored higher in oral reading but not in any other categories. Movsesian concluded that learning to read music while learning to read has a significant positive impact upon the reading achievement of these students.

Groff (1977) criticized the research of Movsesian (1968) and Nicholson (1972) for weaknesses in their research designs. According to Groff, the control group teachers were not given the same amounts of quality constructive help as the experimental teachers. Without this condition, Groff maintained the two groups of contending teachers were not matched. Unless teachers in educational experiments are provided equal chances to improve the learning variable in children under study, these experiments must be seen as biased according to Groff.

Using the Knuth Achievement Test, Wheeler and Wheeler (1952) researched the possible correlations between language reading ability, intelligence, music reading, and music abilities. Although language reading ability and intelligence showed the closest relationship, there was a low correlation between language and music reading abilities. They concluded that the relationship between music reading and language reading abilities as measured by tests is too low to warrant an assumption that the skills involved in music reading are closely related to the language reading skills.

King (1954), on the other hand, found a relationship between intelligence and the ability to learn to read music. When comparing the results of intelligence and music reading tests taken by fifth- and sixth- grade students with two years of music instruction, King found that poor music

readers seemed to test lower on the scale of intelligence than good music readers.

Kelley (1981) found that "music shows a demonstrated potential for enhancing reading and language development in the first grade" (p. 1076-A). Kelley divided 62 first-graders into three groups. One group received music instruction based on the Orff Schuhlwerk method three time per week for six months. The second group received the same amount of visual art instruction and the third group received no instruction of any kind. Pre- and post-measures included psychometric and edumetric tests. Results revealed that the music group began at a statistically significantly lower level than the other two groups, but improved to the level of the other groups in reading and related areas by the end of the study. Individual analysis of initially poor performers in all three groups suggested that this improvement was not attributable to maturation, but rather the effect of the music treatment.

Blanton (1962) explored the complexity of language and its close relationship between music, spoken language, and the nature of man. Subjects for the experiment were twenty first-grade and twenty second-grade children with functional articulation defects. Subjects at each grade level were divided into four groups, designed to test speech therapy with: applied and passive music, applied music, passive music, and no music. Pre- and post-tests were given to determine articulation achievement and personality adjustment. Analyses of variance on the articulation achievement and personality adjustment indicated that music improved both speech and personality. The fact that children modified their speech behavior and showed substantial improvement in emotional adjustment suggested that what was effective in this therapeutic endeavor is significant and available as a

constructive force in the development of adequate language behavior.

In 1975, McDonald stated "one of the curricular areas where music seems particularly useful is the development of language and reading readiness skills" (p. 872). She further stated that development of auditory discrimination, expansion of oral skills, acquisition of visual skills and refined listening skills seemed particularly compatible with classroom music experiences. According to McDonald, in the early years of school, learning to listen to language, to use language, and to recognize the symbols which represent language are vitally important skills. If a child does not develop these skills, this failure may have a significant effect on ability to use language as a communicative tool throughout school years. McDonald concluded that if music can help in the development of language skills, its use should be explored and purposefully developed.

Music and the reading of language appear related (Groff, 1977). Groff listed seven reasons as to how and why this happens. Music (1) creates a positive attitude, which in turn improves approaching the task of learning to read words, (2) can increase children's willingness to listen, (3) develops auditory perception or acuity, (4) helps acquire the ability to read words, (5) contributes to beginning reading achievement, (6) correlates to the similar visual functions found in reading, and (7) involves a "language" like word reading. Groff cautioned, however, that many of the testimonials that music will help children read lack sufficient research evidence to substantiate these claims.

Lamar (1989) conducted a study to determine how the music training of the teacher responsible for instruction in music affected developmental music aptitude in first- and fourth-grade students. Subjects included randomly

selected students from two Alabama school systems, one employing music specialists, and the other using classroom teachers for the instruction of music. Dependent variables considered were students' scores on the Intermediate Measures of Music Audiation test and reading and mathematic section of the Stanford Achievement Test. Results indicated no difference in correlations at the first-grade level. However, the fourth-grade students who were taught music by a music specialist had significantly higher correlations between music and reading scores than did the control group who did not have a music specialist. The mathematics correlations at the fourth-grade level, while higher, did not reach a level of significance.

In a study involving 72 four- and five-year olds, the comparative effects in both the affective and cognitive domains of the Creative Action Reading Program (CAR) with music and CAR without music in two daycare centers were investigated (Wagley, 1978). Learning of sound-symbol relationships in the cognitive domain was measured by pretest and post-test scores on the phonics sub-tests of the Spache Diagnostic Reading Scales. Affective assessment of enjoyment was measured utilizing the Kuhn Response Figures (KRF). CAR with music appearing to make a difference, and in the affective CAR combined with music instruction appeared to make a marked difference in the cognitive and affective areas. Music specifically aided the enjoyment that the children felt about themselves as they learned the sound-symbol relationship.

Pelletier (1963), however, found no significant difference in reading vocabulary or spelling with music as an independent variable. Pelletier used equivalent experimental and control groups of fifty-five students each from the third-grade classes of two elementary schools. The groups were matched on the basis of reading and spelling achievement, but no significant

difference appeared in IQ or auditory discrimination between the two groups. Members of one group were subjected to a 25-week course in music utilizing a prepatory string instrument. The second group received no music training. Both groups were retested in reading, spelling and auditory discrimination. At the conclusion of the study, the experimental group's reading gain was 1.9 months higher than the control group, a difference significant only at the .10 level.

One study suggested a strong relationship between spoken and melodic development (Hoskins, 1988). Sixteen developmentally delayed and mentally retarded preschoolers, ages 2 to 5, served as subjects. The procedure included administration of the Peabody Picture Vocabulary Test (PPVT), given in the usual manner and in a melodic version, and the Expressive One-Word Picture Vocabulary Test (EOWPVT) as both pre- and post-tests. Following the pretest, students were divided into three groups which all participated in group music activities with emphasis on increasing expressive language skills, including antiphonal singing using picture cards. After the experimental period of ten weeks, the same speech and music tests were re-administered. Hoskins noted a significant improvement in PPVT-melodic test scores from pre- to post-test suggesting that antiphonal singing with picture cards was beneficial.

A 1975 study examined the effect of the Kodaly methodology on sequencing skills, spacial abilities, and academic achievement patterns (Hurwitz, Wolff, Bortnick, & Kokas, 1975). Forty first-graders from a middle class, suburban school system were divided into two groups. The experimental group received Kodaly instruction for seven months, five days a week for forty minutes a session, while the control group which was matched for age, IQ, social class, and for ordinal position in the family received no Kodaly

instruction. All participants were tested to determine sequencing skills and spatial abilities regarding sensorimotor sequencing and verbal perception sequencing. There were no significant differences between the two groups in grade point average. However, the experimental group showed a significant difference in improvement in reading ability during the course of the study.

In 1992, 270 fifth-grade students located in a southwestern Kansas school district participated in a study investigating the influence of instrumental music instruction on academic achievement (Dreyden, 1992). The independent variables considered were: instrumental music status, gender, race, socioeconomic status, family structure, mother's level of formal education, and length of time in the district. Specific scores from the Comprehensive Test of Basic Skills, Fourth Edition, Level 15 were used as the dependent variables. Among the significant findings were that band participants had statistically higher reading vocabulary and reading total achievement; males receiving instrumental instruction scored higher statistically in reading vocabulary; and instrumental students whose mothers had a post-high school education showed statistically higher achievement in the total score.

The Effects Of Music On Math

High school students who participate in music classes receive SAT scores higher than the national average of students who take no music coursework (College Board, 1995). From 1988 to 1993, scores of nearly ninety-five percent of the students who took the SAT were compared. The groups compared included (1) students who took music appreciation, (2) students who participated in music performance, (3) students who participated in no arts education, and (4) the average of all students nationally. Results indicated that

students who took music appreciation or participated in a musical performance group had math scores which were consistently fourteen to twenty-three points above the national average and nineteen to thirty-seven points above students with no arts experience. Students who participated in music or other art courses four or more years scored on average 18 points better on the math section of the SAT than did students with less than one year and approximately 14 points better than students with only one year of high school music participation.

According to College Bound Seniors (1995), there is a direct relationship between SAT scores and the length of time studying six subjects, one of which is "Arts and Music." High school students who have completed twenty units of study in the six areas scored 118 points higher on the math section of the SAT than did students with only fifteen units.

In contrast, Friedman (1959) found no significant difference in math achievement on the SAT between students who studied instrumental music and those who did not. Subjects included fourth-grade pupils from four different schools. Every child in music was matched with a non-music student of comparable sex, intelligence, and age. The test used to measure achievement was the Stanford Achievement Test. Results indicated no significant difference in initial status in intelligence, in age, in reading, or arithmetic.

The Effects of Music on Overall Academic Achievement

While the preceding studies have focused on overall academic achievement, many studies have examined the relationship between music participation and individual academic areas. One study showed a significant relationship between sight-reading achievement in instrumental music performance and grade point average, math achievement and reading

achievement (Ciepluch, 1988). One hundred fifty-seven subjects from one high school band program were screened for several independent variables using these standardized tests: Group Embedded Figures Test, Edmonds Learning Style Identification Exercise, Watkins-Farnum Performance Scale, Musical Aptitude Profile, and the Comprehensive Test of Basic Skills. Hypothesis testing was accomplished by using a Chi-square test of association to determine if each variable was significantly related to sight-reading achievement in instrumental music. Results indicated a significant relationship between sight-reading achievement and field-dependence/field-independence, musical aptitude, written word sensory mode preference, grade point average, math achievement, and reading achievement.

The Comprehensive Test of Basic Skills (CTBS) scores of all fifth-graders (N=5,154) in the entire district of Albuquerque, New Mexico were examined to compare basic skills scores of all students who took instrumental music to those who didn't (Robitaille & O'Neil, 1981). In all areas including reading, language, social science, and history, students in the instrumental program scored higher on the CTBS than the total fifth-grade group. Additionally, the longer pupils were in instrumental music programs, the more they achieved in comparison with other fifth-grade pupils. Students with two or more years in band scored ten percentile points higher on the CTBS than the total group of fifth-graders in reading and twelve percentile points higher in language. Students with two or more years in orchestra scored sixteen points higher than the total fifth-grade group in reading and twenty percentile points in language. The study was duplicated a year later with a new group of 5,299 fifth-graders with similar results. (Robitaille & O,Neil)

As a follow up to the preceding study, students from a group of 129

randomly selected music students were paired with non-music students from the same schools who had matching scores on the Short Form Test of Academic Aptitude (Robitaille & O'Neill). The Comprehensive Test of Basic Skills (CTBS) scores of all the music participants were then compared with CTBS scores of nonparticipants. The music students showed an average raw score one point higher than that of the academically matched non-music students. While the findings were not significant, they were consistent for schools with test scores ranging from significantly below to substantially above the national norms and with student populations of varying ethnic mix.

These trends are echoed in results from the 1993 Standardized Achievement Test (SAT) which may show that music training prepares students to handle a wide variety of tasks outside of music itself. Students with experience in music performance scored an average of twenty-two points above the mean on the verbal portion of the exam, and an average of eighteen points above the mean on the mathematical portion of the test. These SAT results also fulfilled a pattern of an increasing gap between the scores achieved by musicians over the scores of their non-musical peers. Students who had participated in music performance groups had higher verbal and mathematical scores than the typical test taker in comparison to scores from 1990 (Martin 1995). Martin (1995) asserted that these test scores "raise serious questions for educators and administrators who may have been tempted to view music training as peripheral to their main objectives when designing elementary or secondary school curricula" (p. 16).

When comparing state pupil-to-music teacher ratios with state averages on nationally standardized scholastic achievement tests including the American College Testing Program (ACT) and the Scholastic Aptitude Test

(SAT), a trend was revealed (Asmus, 1991). As the student-music teacher ratios increased, scholastic achievement scores decreased. While this was true for the pupil-to-instructor ratios in all other disciplines as well, the scholastic achievement correlated better with the pupil-to-music teacher ratio in music. Asmus concluded that music does contribute positively to the school environment in producing strong scholastic achievement scores, and music teacher staffing is a better indicator of overall educational quality than is the overall ratio of pupils to teachers.

The transcripts of 7,499 college students from eight major student groups at a midwestern state university were examined to determine if Nelson Denny Reading Test (NDRT) scores, high school or college grades, high school rank or ACT Composite scores differed (Wood, 1990). His comparison of student scores from different majors revealed that music and music education students tended to produce the highest scores for the five academic indicators. These measures included scores on the Nelson Denny Reading Test, high school rank, ACT composite score, and high school GPA. Music student scores were higher than their counterparts majoring in biology, history, mathematics, and English.

Steven J. Morrison (1994) looked at the "First Follow-Up to the National Education Longitudinal Study of 1988" to ascertain the relationship between music students and academic growth. Of the 18,221 sophomores who participated, 13,327 gave a response to each of the following questions considered in this research: Were they elected to be an officer of their school class? Did they receive an academic honor? Did they receive special recognition for good grades or placement on the honor roll? Another measure of achievement was the actual grades the students received. Morrison found

that music participants received "more than their fare share of recognition" in each of the three questions above. Music students demonstrated an even stronger showing in grades received. The percentage of music students reporting A's and B's was compared with the percentage of nonparticipants who reported similar grades. The largest difference of 10.9% was in English, followed by history at 8.9%, science with 8.5%, and math with 6.1%. Morrison concluded that although it can not be said that the music programs are responsible for helping students meet their potential, it does appear that the best and brightest students participate in music.

With all other things being equal, if you look at two students, one who studies music and one who doesn't, the child who studies music will have enhanced spatial reasoning (Rauscher, 1995). Preschool aged children were provided with keyboard lessons twice a week, singing lessons daily, and supervised practice periods. Spatial reasoning was also tested at regular four-month intervals. The lessons lasted fifteen minutes due to the children's small attention spans. With only fifteen minutes of music treatment, the children showed an increase in spatial reasoning.

Summary of Related Literature

Many studies have attempted to measure the relationship or effect that music participation has on test scores, academic achievement in the classroom, and in specific individual subjects. Many of these studies show a possible link between music participation and higher achievement in academic areas, while others find no connection between music and academic achievement. The primary purpose of this study was to investigate the effect that high school band has on academic achievement as measured by grade point averages and teacher-reported grades in math and English.

Chapter 3

METHODOLOGY

Subject Selection

The subjects (N = 105) were randomly-selected seniors from four different freshmen (9) through senior (12) high schools. Based on the results of a short survey administered by homeroom teachers in each school to all senior students, the subjects were divided into five groups. One group was excluded from the study due to factors which could skew the results. Students were randomly selected from each of the remaining four groups: male band students (n=24), female band students (n=29), male non-band students (n=24), and female non-band students (n=28). Each school contributed up to 8 students to each subgroup.

Participating schools were selected by a panel of professionals deemed by their peers as experts in the music education field. This peer endorsement was evidenced by their election to office in either the Nebraska State Bandmasters Association or the Nebraska Music Educator's Association at some time during their career. The selection of schools was based on the following factors: 1) the student body characteristics regarding socio-economic status and racial make-up was deemed consistent by the panel of experts; 2) the level of musicianship of band students from the three schools selected was deemed consistent by the panel of experts; and 3) all three of the selected programs were designated as class "A" bands by the Nebraska Schools Activities Association (Activities Bulletin, 1997). NSAA classification for class "A" music includes any school with a total enrollment of 301 to 600 in grades 10-12. (This investigation used grades 9-12 because although only grades 10-12 are used in classification procedures, all Class A high school music programs in Nebraska

encompass freshmen as well.) Class A schools were used due to the researcher's background of teaching in this size school. In analyzing the schools musicianship, experts were asked to consider district music contest ratings as well as the comprehensive scope of the instrumental music departments in question.

Procedures

Prior to beginning the study, permission was obtained from the University of Nebraska Internal Review Board to proceed. A panel of experts was assembled to assist in confirming that the schools selected to participate (see Appendix E) in this study met the criteria for inclusion listed above. The panel consisted of five people who, by their profession and years of experience, had expert knowledge pertaining to high school bands in Nebraska (see appendix A).

The principals of the eligible schools were contacted to secure cooperation in the study. If needed, superintendents and/or school boards were contacted as well. Once four schools were identified, a short survey was administered to all senior students during their home room period by home room teachers at each school (see appendix B). The purpose of the survey was to aid in dividing the subjects into the four equal sub-groups. The survey asked six questions: 1) have you been enrolled in your high school band every semester of your high school career, 2) have you ever been in your school band program (elementary, junior high, or high school), 3) have you ever been in your school choir program (junior high or high school), 4) have you ever taken piano lessons, 5) have you ever taken voice lessons, and 6) have you ever taken private lessons from a professional musician or private teacher on any instrument? The survey helped provide a control for non-

band students who may have had a significant background in music which could have skewed the results of this study.

At each school, completed surveys were placed into five piles: 1) male students who answered "no" to all five survey questions, 2) female students who answered "no" to all five survey questions, 3) male students who answered "yes" to question number one, 4) female students who answered "yes" to question number one, and 5) all other questionnaires. Up to eight students were randomly drawn from each of the first four piles as participating subjects. The fifth pile was discarded as no student in this group was eligible to participate in either the band or non-band group. Therefore, each school contributed up to 8 students to each of the four groups (male band, female band, male non-band, and female non-band. Total subjects selected numbered 105 students.

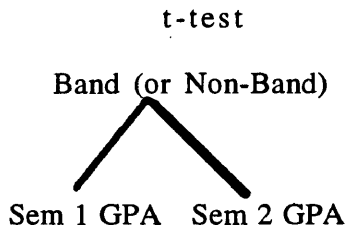
The principals at each high school were then be asked to photocopy the academic records for the 105 participants (see Appendix D). Confidentiality was guaranteed by deleting student names and biographical information from the transcripts. The principals at each school identified each student's gender on the transcripts by writing "male" or "female" in the top right hand corner. Since high schools often differ in how they compute student grade point averages, all subjects' GPA's from every semester in high school were refigured by the researcher according to the following scale: A=4 points, B=3 points, C=2 points, D=1 point, and F=0 points. No difference was made in points received for "+" or "-" signs attached to grades, and no class was emphasized over another when figuring the GPA.

Data Analysis

After collecting the participants' academic records, data analysis began

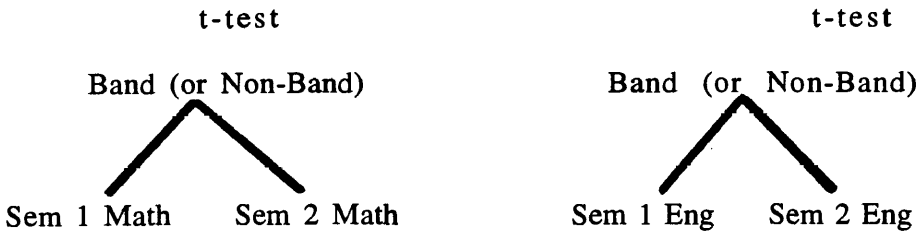
with assistance from the Computing and Data Communications Department at the University of Nebraska at Omaha. Computer data analysis was via the Statistical Package for the Social Sciences. Parametric procedures at the interval level were utilized. Measures of central tendency regarding cumulative grade point averages as well as math and English grades were also reported.

Using a t-test to test an independent two-sample design, the cumulative GPA's of each band student were compared to those of non-band students after the eighth-grade year and each subsequent year by semester (see figure 1). By comparing the semester-by-semester progress, the researcher



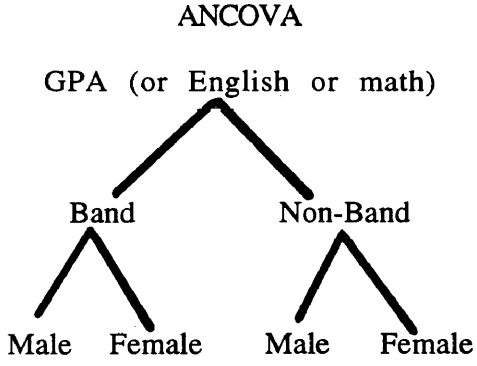
(figure 1)

determined how the number of semesters in high school band may have had an effect of overall academic achievement. This process was repeated for the individual subjects of English and math (see figure 2). Analysis of Covariance (ANCOVA) was then used to compare the GPA's, math grades, and English



(figure 2)

grades of the subjects by band/non-band classifications and to control for gender(see figure 3).



(figure 3)

Chapter 4

RESULTS

This chapter will present the results of T-test and ANCOVA procedures used to analyze the English and math grades, and cumulative grade point averages for all subjects. Ninth-grade first semester grades (English, math, cumulative GPA) served as the pre-test. Each subsequent semester grade served as a post-test score. Descriptive information will be presented first followed by quantitative data. Table 1 presents central measures of tendency in English, math, and cumulative grade point averages for all 105 subjects. English grades had a tendency to increase throughout the seven semesters while math and cumulative grade point averages tended to decrease.

Table 1

English/Math/Cumulative GPA for all Subjects (N=105)

Sem/Area	Mean	SD	SE	Median	Mode
Sem 1 Eng	2.781	1.193	.116	3.000	4.000
Sem 1 Math	2.543	1.217	.119	3.000	3.000
Sem 1 Cum	2.957	.851	.083	3.140	4.000
Sem 2 Eng	2.790	1.166	.114	3.000	4.000
Sem 2 Math	2.279	1.311	.129	2.500	3.000
Sem 2 Cum	2.941	.857	.084	3.070	4.000
Sem 3 Eng	2.781	1.256	.123	3.000	4.000
Sem 3 Math	2.524	1.179	.116	3.000	3.000
Sem 3 Cum	2.906	.865	.084	2.950	4.000
Sem 4 Eng	2.829	1.172	.114	3.000	4.000
Sem 4 Math	2.434	1.295	.130	3.000	3.000
Sem 4 Cum	2.887	.870	.085	2.900	3.930
Sem 5 Eng	2.790	1.207	.118	3.000	4.000
Sem 5 Math	2.408	1.283	.130	3.000	3.000
Sem 5 Cum	2.878	.837	.082	2.890	3.94

Table 1

English/Math/Cumulative GPA for all Subjects (N=105) (continued)

Sem 6 Eng	2.952	1.212	.118	3.000	4.000
Sem 6 Math	2.456	1.334	.141	3.000	4.000
Sem 6 Cum	2.908	.815	.080	2.950	3.900
Sem 7 Eng	2.941	1.070	.106	3.000	4.000
Sem 7 Math	2.477	1.335	.144	3.000	3.000
Sem 7 Cum	2.918	.794	.078	2.980	3.920

Table 2 presents the T-test comparison of band students' scores by semester in English. Scores ranged from 3.0755 in semester 3 to 3.2453 in semester 6. Overall, the mean scores decreased from semester 1 to semester 7. Based on the mean scores, English grades for band students tended to increase in even numbered semesters and decrease in odd semesters. Although the final English score was actually lower than the first semster English score, T-test data indicated no significant difference in English scores occurred during any semester among band participants. Therefore, the number of semesters of participation in high school band may not have an effect on English grades.

Table 2

T-Tests Comparing English Grades for Band Students (N=53)

Sem/Area	Mean	SD	SE	t-Value	DF	Probability
Sem 1 Eng	3.1887	.982	.135	-----	-----	-----
Sem 2 Eng	3.2264	.974	.134	-.36	52	.719
Sem 3 Eng	3.0755	1.158	.159	.88	52	.381
Sem 4 Eng	3.2075	1.063	.146	-.14	52	.892
Sem 5 Eng	3.1132	1.068	.147	.54	52	.591
Sem 6 Eng	3.2453	1.054	.145	-.44	52	.659
Sem 7 Eng	3.0962	.955	.132	.88	51	.382

Table 3 presents the T-test comparison of band students' scores by semester in Math. Scores ranged from 2.6327 in semester 6 to 2.9245 in semester 1. Overall, band students math scores tended to decrease. The data indicated a significant difference in math scores occured among band participants in semesters 2 ($p < .051$), 5 ($p < .050$), 6 ($p < .036$), and 7 ($p < .021$). Comparing the mean scores suggests that the number of semesters participation in high school band may have a negative effect on math grades. When comparing the mean scores of these four semesters to semester 1, it appears that in semesters 2, 4, 5, and 6, band students' scores in math may decrease.

Table 3

T-Tests Comparing Math Grades for Band Students (N=53)

Sem/Area	Mean	SD	SE	t-Value	DF	Probability
Sem 1 Math	2.9245	1.035	.142	-----	-----	-----
Sem 2 Math	2.6981	1.170	.161	2.00	52	.051
Sem 3 Math	2.8302	1.139	.156	.84	52	.403
Sem 4 Math	2.7358	1.227	.169	1.60	52	.115
Sem 5 Math	2.6346	1.189	.165	2.01	51	.050
Sem 6 Math	2.6327	1.270	.181	2.15	48	.036
Sem 7 Math	2.6957	1.190	.175	2.40	45	.021

Table 4 presents the T-test comparison of band students' scores by semester in Cumulative GPA. Scores ranged from 3.2562 in semester 7 to 3.3423 in semester 2. Overall, band students cumulative grade point averages tended to decrease. The data indicated a significant difference in cummulative GPA among band participants in semester 5 ($p < .048$). When examining mean scores, this suggests that the number of semesters participation in high school band may have a negative effect on grade point average in the fifth semester of high school. When comparing the mean score of this semester back to semester 1, it appears that in semester 5, band students' scores in cumulative GPA may decrease.

Table 4

T-Tests Comparing Cumulative GPA's for Band Students (N=53)

Sem/Area	Mean	SD	SE	t-Value	DF	Probability
Sem 1 Cum	3.3240	.614	.084	-----	-----	-----
Sem 2 Cum	3.3423	.580	.080	-1.04	52	.302
Sem 3 Cum	3.3151	.598	.082	.33	52	.745
Sem 4 Cum	3.2977	.601	.083	.77	52	.444
Sem 5 Cum	3.2491	.602	.083	2.03	52	.048
Sem 6 Cum	3.2692	.571	.078	1.51	52	.137
Sem 7 Cum	3.2562	.558	.077	1.65	52	.106

Table 5 presents the T-test comparison of non-band students' scores by semester in English. Scores ranged from 2.3462 in semester 2 to 2.7800 in semester 7. Overall, non-band students' English grades tended to increase. The data indicated a significant difference in English scores among non-band participants in semester 7 ($p < .008$) suggesting that the number of semesters of non-participation in high school band may have a positive effect on English scores in the seventh semester of high school. When comparing the mean score of this semester back to semester 1, it appears that in semester 7, non-band students' scores in English may increase. By comparing the mean scores of non-band students to band students (see table 2) in English, it appears that non-band students tend to improve on their English scores in high school while band students' scores tend to decrease.

Table 5

T-Tests Comparing English Grades for Non-Band Students (N=52)

Sem/Area	Mean	SD	SE	t-Value	DF	Probability
Sem 1 Eng	2.3654	1.253	.174	-----	-----	-----
Sem 2 Eng	2.3462	1.186	.165	.16	51	.875
Sem 3 Eng	2.4808	1.291	.179	-.77	51	.444
Sem 4 Eng	2.4423	1.162	.161	-.57	51	.569
Sem 5 Eng	2.4615	1.260	.175	-.68	51	.498
Sem 6 Eng	2.6538	1.297	.180	-1.82	51	.075
Sem 7 Eng	2.7800	1.166	.165	-2.77	49	.008

Table 6 presents the T-test comparison of non-band students' scores by semester in math. Scores ranged from 1.8431 in semester 2 to 2.2439 in semester 6. Overall, non-band students' math grades fluxuated. Grades increased in semesters 3, 6, and 7 and decreased in semesters 2, 4, and 5. The data indicated a significant difference in math scores among non-band participants in semester 2 ($p < .011$). Examination of the mean scores suggests that the number of semesters non-participation in high school band may have a negative effect on math scores in the second semester of high school. When comparing the mean score of this semester back to semester 1, it appears than in semester 2, non-band students' scores in math may decrease. While band students scores (see table 3) tended to decrease in math, non-band students scores appear to improve slightly over the semester timeframe.

Table 6

T-Tests Comparing Math Grades for Non-Band Students (N=52)

Sem/Area	Mean	SD	SE	t-Value	DF	Probability
Sem 1 Math	2.1961	1.249	.175	-----	-----	-----
Sem 2 Math	1.8431	1.317	.184	2.64	50	.011
Sem 3 Math	2.2000	1.143	.162	-.12	49	.907
Sem 4 Math	2.0870	1.297	.191	.96	45	.342
Sem 5 Math	2.1522	1.349	.199	.50	45	.617
Sem 6 Math	2.2439	1.392	.217	.85	40	.399
Sem 7 Math	2.2250	1.459	.231	.12	39	.903

Table 7 presents the T-test comparison of non-band students scores by semester in Cummulative GPA. Scores ranged from 2.4681 in semester 4 to 2.587 in semester 1. Overall, non-band students' cumulative grade point averages tended to decline in the first four semesters and then rise slightly during the last three semesters. The data indicated a significant difference in cumulative GPA's among non-band participants during semesters 3 ($p < .017$) and 4 ($p < .006$). Examining mean scores suggested that the number of semesters of non-participation in high school band may have a negative effect on cumulative GPA's in the third and fourth semesters of high school. When comparing these semesters mean scores back to semester 1, it appears that in semesters 3 and 4, non band students' scores in cumulative GPA may decrease. It appears, then, that both the band students (see table 4) and non-band students cumulative grade point averages tended to decrease in high school.

Table 7

T-Tests Comparing Cummulative GPA's for Non-Band Students (N=52)

Sem/Area	Mean	SD	SE	t-Value	DF	Probability
Sem 1 Cum	2.5827	.899	.125	-----	-----	-----
Sem 2 Cum	2.5313	.903	.125	1.63	51	.110
Sem 3 Cum	2.4900	.901	.125	2.47	51	.017
Sem 4 Cum	2.4681	.905	.126	2.86	51	.006
Sem 5 Cum	2.5002	.878	.122	1.85	51	.070
Sem 6 Cum	2.5388	.864	.120	.88	51	.384
Sem 7 Cum	2.5742	.855	.118	.17	51	.869

Table 8 presents the ANCOVA analysis of band to non-band students for semester 1 in English with a covariate of gender. The results indicate a significant difference ($p < .000$) between band and non-band students. Mean scores indicate that band students' English grades (3.1887) were higher than non-band students (2.3654) for this semester (see tables 2 and 5). In addition, gender was found to be a significant factor ($p < .004$). Based on the mean scores, regardless of gender, band students may score higher in English than non-band students during the first semester of high school.

Table 8

ANCOVA Comparing Band to Non-Band Students in Semester 1 English (N = 105)

Source of Variation	SS	DF	MS	F	SigF
Covariates (Gender)	10.430	1	10.430	8.867	.004
Main Effects (Band)	17.555	1	17.555	14.925	.000
Explained	27.985	2	13.993	11.896	.000
Residual	119.977	102	13.993		
Total	147.962	104	1.423		

Table 9 presents the ANCOVA analysis of band to non-band students for semester 2 in English with a covariate of gender. The results indicate a significant difference ($p < .000$) between band and non-band students. Mean scores indicate band students' English grades (3.2264) were higher than non-band students (2.3462) for this semester (see tables 2 and 5). In addition, gender was found to be a significant factor ($p < .053$). Based on mean scores, regardless of gender, band students may score higher in English than non-band students during the second semester of high school.

Table 9

ANCOVA Comparing Band to Non-Band Students in Semester 2 English (N = 105)

Source of Variation	SS	DF	MS	F	SigF
Covariates (Gender)	4.210	1	4.210	3.824	.053
Main Effects (Band)	18.121	1	18.121	16.460	.000
Explained	22.331	2	11.166	10.142	.000
Residual	111.198	101	1.101		
Total	133.529	103	1.296		

Table 10 presents the ANCOVA analysis of band to non-band students for semester 3 in English with a covariate of gender. The results indicate a significant difference ($p < .027$) between band and non-band students. Mean scores indicate that band students' English grades (3.0755) were higher than non-band students (2.4808) for this semester (see tables 2 and 5). In addition, gender was found to be a significant factor ($p < .002$). Based on the mean scores, regardless of gender, band students may score higher in English than non-band students during the third semester of high school.

Table 10

ANCOVA Comparing Band to Non-Band Students in Semester 3 English (N = 105)

Source of Variation	SS	DF	MS	F	SigF
Covariates (Gender)	14.301	1	14.301	10.488	.002
Main Effects (Band)	6.833	1	6.833	5.011	.027
Explained	21.135	2	10.567	7.750	.001
Residual	136.360	100	1.364		
Total	157.495	102	1.544		

Table 11 presents the ANCOVA analysis of band to non-band students for semester 4 in English with a covariate of gender. The results indicate a significant difference ($p < .003$) between band and non-band students. Mean scores indicate that band students' English grades (3.2075) were higher than non-band students (2.4423) for this semester (see tables 2 and 5). In addition, gender was found to be a significant factor ($p < .000$). Based on the mean scores, regardless of gender, band students may score higher in English than non-band students during the fourth semester of high school.

Table 11

ANCOVA Comparing Band to Non-Band Students in Semester 4 English (N = 105)

Source of Variation	SS	DF	MS	F	SigF
Covariates (Gender)	19.330	1	19.330	18.672	.000
Main Effects (Band)	9.466	1	9.466	9.144	.003
Explained	28.797	2	14.398	13.908	.000
Residual	99.385	96	1.035		
Total	128.182	98	1.308		

Table 12 presents the ANCOVA analysis of band to non-band students for semester 5 in English with a covariate of gender. The results indicate a significant difference ($p < .005$) between band and non-band students. Mean scores indicate that band students' English grades (3.1132) were higher than non-band students (2.4615) for this semester (see tables 2 and 5). In addition, gender was found to be a significant factor ($p < .000$). Based on the mean scores, regardless of gender, band students may score higher in English than non-band students during the fifth semester of high school.

Table 12

ANCOVA Comparing Band to Non-Band Students in Semester 5 English (N = 105)

Source of Variation	SS	DF	MS	F	SigF
Covariates (Gender)	19.411	1	19.411	16.285	.000
Main Effects (Band)	10.048	1	10.048	8.430	.005
Explained	29.459	2	14.729	12.357	.000
Residual	113.235	95	1.192		
Total	142.694	97	1.471		

Table 13 presents the ANCOVA analysis of band to non-band students for semester 6 in English with a covariate of gender. The results indicate a significant difference ($p < .021$) between band and non-band students. Mean scores indicate that band students' English grades (3.2453) were higher than non-band students (2.6538) for this semester (see tables 2 and 5). In addition, gender was found to be a significant factor ($p < .011$). Based on the mean scores, regardless of gender, band students may score higher in English than non-band students during the sixth semester of high school.

Table 13

ANCOVA Comparing Band to Non-Band Students in Semester 6 English (N = 105)

Source of Variation	SS	DF	MS	F	SigF
Covariates (Gender)	8.044	1	8.044	6.837	.011
Main Effects (Band)	6.478	1	6.478	5.506	.021
Explained	14.522	2	7.261	6.171	.003
Residual	102.366	87	1.177		
Total	116.889	89	1.313		

Table 14 presents the ANCOVA analysis of band to non-band students for semester 7 in English with a covariate of gender. No significant difference ($p < .404$) between band and non-band students was found. In addition, gender was found to be a significant factor ($p < .013$). Therefore, regardless of gender, band may not have an effect on English grades during the seventh semester of high school.

Table 14

ANCOVA Comparing Band to Non-Band Students in Semester 7 English (N = 105)

Source of Variation	SS	DF	MS	F	SigF
Covariates (Gender)	7.166	1	7.166	6.339	.013
Main Effects (Band)	.788	1	.788	.704	.404
Explained	7.954	2	3.977	3.552	.033
Residual	92.941	83	1.120		
Total	100.895	85	1.187		

Table 15 presents the ANCOVA analysis of band to non-band students for semester 1 in math with a covariate of gender. The results indicate a significant difference ($p < .001$) between band and non-band students. Mean scores indicate that band students' math grades (2.9245) were higher than non-band students (2.1961) for this semester (see tables 3 amd 6). Gender, however, was not found to be a significant factor ($p < .127$). Based on the mean scores, band students may score higher than non-band students in math in the first semester of high school although gender may have some effect on this relationship.

Table 15

ANCOVA Comparing Band to Non-Band Students in Semester 1 Math (N = 105)

Source of Variation	SS	DF	MS	F	SigF
Covariates (Gender)	3.148	1	3.148	2.371	.127
Main Effects (Band)	15.469	1	15.469	11.650	.001
Explained	18.617	2	9.308	7.010	.001
Residual	135.440	102	1.328		
Total	154.057	104	1.481		

Table 16 presents the ANCOVA analysis of band to non-band students for semester 2 in math with a covariate of gender. The results indicate a significant difference ($p < .001$) between band and non-band students. Mean scores indicate that band students' math grades (2.6981) were higher than non-band students (1.8431) for this semester (see tables 3 and 6). Gender, however, was not found to be a significant factor ($p < .625$). Based on the mean scores, band students may score higher than non-band students in math during the second semester of high school although gender may have some effect on this relationship.

Table 16

ANCOVA Comparing Band to Non-Band Students in Semester 2 Math (N = 105)

Source of Variation	SS	DF	MS	F	SigF
Covariates (Gender)	.374	1	.374	.240	.625
Main Effects (Band)	19.009	1	19.009	12.187	.001
Explained	19.383	2	9.691	6.214	.003
Residual	157.530	101	1.560		
Total	176.913	103	1.718		

Table 17 presents the ANCOVA analysis of band to non-band students for semester 3 in math with a covariate of gender. The results indicate a significant difference ($p < .006$) between band and non-band students. Mean scores indicate that band students math grades (2.8302) were higher than non-band students (2.2000) for this semester (see tables 3 and 6). In addition, gender was found to be a significant factor ($p < .035$). Based on the mean scores, regardless of gender, band students may score higher in math than non-band students during the third semester of high school.

Table 17

ANCOVA Comparing Band to Non-Band Students in Semester 3 Math (N = 105)

Source of Variation	SS	DF	MS	F	SigF
Covariates (Gender)	5.774	1	5.774	4.579	.035
Main Effects (Band)	9.811	1	9.811	7.780	.006
Explained	15.585	2	7.792	6.179	.003
Residual	126.105	100	1.261		
Total	141.689	102	1.389		

Table 18 presents the ANCOVA analysis of band to non-band students for semester 4 in math with a covariate of gender. The results indicate a significant difference ($p < .012$) between band and non-band students. Mean scores indicate that band students math grades (2.7358) were higher than non-band students (2.0870) for this semester (see tables 3 and 6). In addition, gender was found to be a significant factor ($p < .025$). Based on the mean scores, regardless of gender, band students may score higher in math than non-band students during the fourth semester of high school.

Table 18

ANCOVA Comparing Band to Non-Band Students in Semester 4 Math (N = 105)

Source of Variation	SS	DF	MS	F	SigF
Covariates (Gender)	7.936	1	7.936	5.202	.025
Main Effects (Band)	9.919	1	9.919	6.501	.012
Explained	17.855	2	8.928	5.852	.004
Residual	146.468	96	1.526		
Total	164.323	98	1.677		

Table 19 presents the ANCOVA analysis of band to non-band students for semester 5 in math with a covariate of gender. The results indicate a significant difference ($p < .59$) between band and non-band students. Gender, however, was not found to be a significant factor ($p < .097$). Therefore, band students may score higher in math than non-band students in semester 5. Gender, however, may affect the results of such a comparison.

Table 19

ANCOVA Comparing Band to Non-Band Students in Semester 5 Math (N = 105)

Source of Variation	SS	DF	MS	F	SigF
Covariates (Gender)	4.416	1	4.416	2.806	.097
Main Effects (Band)	5.732	1	5.732	3.642	.059
Explained	17.855	2	8.928	5.852	.004
Residual	149.525	95	1.574		
Total	159.673	97	1.646		

Table 20 presents the ANCOVA analysis of band to non-band students for semester 6 in math with a covariate of gender. The results indicate a no significant difference ($p < .163$) between band and non-band students. Additionally, gender was not found to be a significant factor ($p < .448$). Therefore, band may not be related to math grades in the sixth semester. Gender, however, may affect the results of such a comparison.

Table 20

ANCOVA Comparing Band to Non-Band Students in Semester 6 Math (N = 105)

Source of Variation	SS	DF	MS	F	SigF
Covariates (Gender)	1.028	1	1.028	.582	.448
Main Effects (Band)	3.507	1	3.507	1.984	.163
Explained	4.536	2	2.268	1.283	.282
Residual	153.787	87	1.768		
Total	158.322	89	1.779		

Table 21 presents the ANCOVA analysis of band to non-band students for semester 7 in math with a covariate of gender. The results indicate a no significant difference ($p < .095$) between band and non-band students. Gender was also not found to be a significant factor ($p < .447$). Therefore, band may not be related to math grades in the seventh semester. Gender, however, may affect the results of such a comparison.

Table 21

ANCOVA Comparing Band to Non-Band Students in Semester 7 Math (N = 105)

Source of Variation	SS	DF	MS	F	SigF
Covariates (Gender)	1.021	1	1.021	.583	.447
Main Effects (Band)	5.009	1	5.009	2.859	.095
Explained	6.030	2	3.015	1.721	.185
Residual	145.423	83	1.752		
Total	151.453	85	1.782		

Table 22 presents the ANCOVA analysis of band to non-band students for semester 1 in cumulative grade point average with a covariate of gender. The results indicate a significant difference ($p < .000$) between band and non-band students. Mean scores indicate that band students' cumulative GPA's (3.3240) were higher than non-band students (2.5827) for this semester (see tables 4 and 7). Gender, however, was not found to be a significant factor ($p < .092$). Based on the mean scores, band students may score higher than non-band students on cumulative GPA in the first semester of high school although gender may have some effect on this relationship.

Table 22

ANCOVA Comparing Band to Non-Band Students in Semester 1 Cumulative GPA (N = 105)

Source of Variation	SS	DF	MS	F	SigF
Covariates (Gender)	1.681	1	1.681	2.896	.092
Main Effects (Band)	14.338	1	14.338	24.694	.000
Explained	16.019	2	8.010	13.795	.000
Residual	59.222	102	.581		
Total	75.241	104	.723		

Table 23 presents the ANCOVA analysis of band to non-band students for semester 2 in cumulative grade point average with a covariate of gender. The results indicate a significant difference ($p < .000$) between band and non-band students. Mean scores indicate that band students' cumulative GPA's (3.3423) were higher than non-band students (2.5313) for this semester (see tables 4 and 7). Gender, however, was not found to be a significant factor ($p < .229$). Based on the mean scores, band students may score higher than non-band students on cumulative GPA during the second semester of high school although gender may have some effect on this relationship.

Table 23

ANCOVA Comparing Band to Non-Band Students in Semester 2 Cumulative GPA (N = 105)

Source of Variation	SS	DF	MS	F	SigF
Covariates (Gender)	.807	1	.807	1.467	.229
Main Effects (Band)	15.790	1	15.790	28.709	.000
Explained	16.597	2	8.299	15.088	.000
Residual	55.552	101	.550		
Total	72.150	103	.700		

Table 24 presents the ANCOVA analysis of band to non-band students for semester 3 in cumulative grade point averages with a covariate of gender. The results indicate a significant difference between ($p < .000$) band and non-band students. Mean scores indicate that band students cumulative GPA's (3.3151) were higher than non-band students (2.4900) for this semester (see tables 4 and 7). In addition, gender was found to be a significant factor ($p < .030$). Based on the mean scores, regardless of gender, band students may score higher in cumulative GPA's than non-band students during the third semester of high school.

Table 24

ANCOVA Comparing Band to Non-Band Students in Semester 3 Cumulative GPA (N = 105)

Source of Variation	SS	DF	MS	F	SigF
Covariates (Gender)	2.641	1	2.641	4.858	.030
Main Effects (Band)	15.098	1	15.098	27.766	.000
Explained	17.739	2	8.870	16.312	.000
Residual	54.377	100	.544		
Total	72.117	102	.707		

Table 25 presents the ANCOVA analysis of band to non-band students for semester 4 in cumulative grade point averages with a covariate of gender. The results indicate a significant difference ($p < .000$) between band and non-band students. Mean scores indicate that band students cumulative GPA's (3.2977) were higher than non-band students (2.4681) for this semester (see tables 4 and 7). In addition, gender was found to be a significant factor ($p < .019$). Based on the mean scores, regardless of gender, band students may score higher in cumulative GPA's than non-band students during the fourth semester of high school.

Table 25

ANCOVA Comparing Band to Non-Band Students in Semester 4 Cumulative GPA (N = 105)

Source of Variation	SS	DF	MS	F	SigF
Covariates (Gender)	2.896	1	2.896	5.664	.019
Main Effects (Band)	11.224	1	11.224	21.953	.000
Explained	14.120	2	7.060	13.809	.000
Residual	49.081	96	.511		
Total	63.200	98	.645		

Table 26 presents the ANCOVA analysis of band to non-band students for semester 5 in cumulative grade point averages with a covariate of gender. The results indicate a significant difference ($p < .000$) between band and non-band students. Mean scores indicate that band students cumulative GPA's (3.2491) were higher than non-band students (2.5002) for this semester (see tables 4 and 7). In addition, gender was found to be a significant factor ($p < .019$). Based on the mean scores, regardless of gender, band students may score higher in cumulative GPA's than non-band students during the fifth semester of high school.

Table 26

ANCOVA Comparing Band to Non-Band Students in Semester 5 Cumulative GPA (N = 105)

Source of Variation	SS	DF	MS	F	SigF
Covariates (Gender)	3.024	1	3.024	5.738	.019
Main Effects (Band)	10.866	1	10.866	20.623	.000
Explained	13.890	2	6.945	13.180	.000
Residual	50.057	95	.527		
Total	63.947	97	.659		

Table 27 presents the ANCOVA analysis of band to non-band students for semester 6 in cumulative grade point average with a covariate of gender. The results indicate a significant difference ($p < .000$) between band and non-band students. Mean scores indicate that band students' cumulative GPA's (3.2692) were higher than non-band students (2.5388) for this semester. Gender, however, was not found to be a significant factor ($p < .179$). Based on the mean scores, band students may score higher in cumulative GPA than non-band students during the sixth semester of high school although gender may have some effect on this relationship.

Table 27

ANCOVA Comparing Band to Non-Band Students in Semester 6 Cumulative GPA (N = 105)

Source of Variation	SS	DF	MS	F	SigF
Covariates (Gender)	.884	1	.884	1.839	.179
Main Effects (Band)	7.416	1	7.416	15.428	.000
Explained	8.300	2	4.150	8.634	.000
Residual	41.818	87	.481		
Total	50.118	89	.563		

Table 28 presents the ANCOVA analysis of band to non-band students for semester 7 in cumulative grade point average with a covariate of gender. The results indicate a significant difference ($p < .000$) between band and non-band students. Mean scores indicate that band students' cumulative GPA's (3.2562) were higher than non-band students (2.5742) for this semester. Gender, however, was not found to be a significant factor ($p < .349$). Based on the mean scores, band students may score higher in cumulative GPA than non-band students during the seventh semester of high school although gender may have some effect on this relationship.

Table 28

ANCOVA Comparing Band to Non-Band Students in Semester 7 Cumulative GPA (N = 105)

Source of Variation	SS	DF	MS	F	SigF
Covariates (Gender)	.458	1	.458	.886	.349
Main Effects (Band)	9.623	1	9.623	18.588	.000
Explained	10.081	2	5.041	9.737	.000
Residual	42.968	83	.518		
Total	53.049	85	.624		

Chapter 5

CONCLUSIONS

The primary purpose of this study was to examine the relationship between high school band participation and academic achievement including cumulative grade point average, English, and math. The results were derived from an analysis and comparison of high school transcripts for 105 randomly selected band (n = 53) and non-band students (n = 52) in four high schools. This chapter will present discussion and conclusions to the specific research questions addressed in Chapter I.

Researchers in the areas of instrumental music and academic achievement have reached contrasting conclusions. Many researchers (Asmus, 1991; Blanton, 1962; Cielpuch, 1988; Dreyden, 1992; Groff, 1977; Hoskins, Hurwitz, Wolff, Bortnick, & Kokas, 1975; 1988; Kelley, 1981; Lamar, 1989; Martin, 1995; McDonald, 1975; Morrison, 1994; Movesian, 1967; Nicholson, 1972; Rauscher, 1995; Robitaille & O'Neil, 1981; Wagley, 1978;. 1972; Zinar, 1976) have found a significant relationship between music instruction and heightened academic achievement. Other studies, however, have concluded that no significant relationship exists between band and academic achievement (Friedman, 1959; Groff, 1977; Pelletier, 1963; Wheeler & Wheeler, 1952).

The first research question addressed was: Is there a difference in academic achievement between students who participate in high school band and those who do not? Specifically, this study asked: Is there a difference in cumulative grade point average between students who participate in high school band and those who do not? Is there a difference in math grades between students who participate in high school band and those who do not? Is there a difference in English grades between students who participate in

high school band and those who do not? An examination of mean scores signified instrumental music students grades were higher than non-band students in all three subject areas for all seven semesters. Additionally, ANCOVA data showed a significant difference between band and non-band students regarding cumulative grade point averages during every semester of high school. ANCOVA analysis further showed a significant difference between band and non-band students' math scores during the first five semesters of high school. Although mean math scores of band students were higher during semesters 6 and 7, this relationship was not found significant using an ANCOVA procedure. This may indicate that non-band students might begin to close the academic gap in math during semesters 6 and 7 of high school. Examination of ANCOVA data also indicated a significant difference between band and non-band students' English grades during the first six semesters of high school. Again, although the mean English score was higher for the band group than the non-band group in semester 7, this relationship was not found to be significant when using an ANCOVA. It appears, then, that there may be a difference in academic achievement between students who participate in high school band and those who do not. This difference appears greater at the beginning of the high school years than at the end.

Examination of T-test data, however, revealed that band students English scores tend to decrease while the non-band students' scores tend to increase. The same relationship is seen in math where band students' scores appear to decrease while non-band students scores tended to increase slightly. Additionally, both the band and non-band students cumulative grade point averages tended to decline. Interestingly, while the band students score higher that the non-band students in every subject in every semester, the

non-band students appear to close the gap in math and English during the final semesters of high school.

Research question number two asked: Does gender have any effect on the relationship between high school band participation and academic achievement in cumulative grade point average, math, and English? When studying cumulative grade point average, ANCOVA analysis showed that gender had no significant effect on the relationship between high school band participation and cumulative grade point average in semesters 3, 4, and 5. Data showed, however, that gender may have an effect on this relationship in semester 1, 2, 6, and 7 of high school. When studying math grades, ANCOVA analysis showed that gender did not have a significant effect on the relationship between high school band participation and math grades in semesters 3 and 4. In semesters 1, 2, 5, 6, and 7, however, data indicated that gender may have some effect on this relationship. When studying English grades, ANCOVA analysis showed that gender did not have a significant effect on the relationship between high school band participation and English grades in semesters 1, 3, 4, 5, 6, and 7. During semester 2, however, data indicated that gender may have some effect on this relationship. Therefore, it appears that at times, gender may affect the relationship between band participation and academic achievement. This affect appears greater at the beginning and end of the high school years.

The third question asked was: Does the number of semesters of participation in high school band have any effect on the relationship between high school band participation and academic achievement? When using T-tests to compare achievement from semester to semester among band students, data indicated that years of participation had no significant impact on

cumulative grade point average in semesters 2, 3, 4, 6, and 7. In semester 5, however, cumulative grade point averages decreased significantly in comparison with semester 1. T-test analysis of band students' English grades showed no significant difference between any semester of English study. T-test analysis of band students math grades showed no significant difference in semesters 3 or 4. Semesters 2, 5, 6, and 7, however, showed that band math grades dropped significantly each semester. When using T-tests to compare achievement from semester-to-semester among non-band students, the data indicated that cumulative grade point averages dropped significantly in semesters 3 and 4. There was no significant change in semesters 2, 5, 6, and 7. T-test analysis of English grades showed no significant change in semesters 2, 3, 4, 5, or 6. In semester 7, however, data indicated a significant increase in English grades among non-band students. T-test analysis of math grades indicated a significant decrease in math grades among non-band students in semester 2. In semesters 3, 4, 5, 6, and 7, no significant change was indicated. It therefore appears that the number of semesters participation in band may have some effect on the relationship between band participation and academic achievement at varying times.

Summary and Discussion

In review, this investigation found that it appears there may be a relationship between band participation and academic achivement. This study indicates that band students score higher academically than their non-band counterparts. Using analysis of variance, this relationship was found to be significant during every semester of high school for cumulative grade point average, during the first four semesters for math, and during the first six semesters for English. It must be noted, however, that gender and number of

semesters of participation may have some effect on this relationship. Specifically, gender may effect math scores in semesters 1, 2, 5, 6, and 7 and gender may effect cumulative grade point average in semesters 1, 2, 6, and 7. Gender appears to be more of a factor at the beginning and end of the high school years.

T-test data indicated that band students English and math scores tend to decrease while the non-band students' scores in these areas tend to increase. This may suggest that non-band students narrow the gap in academic scores as the semesters progress.

There may be many factors affecting the final results of this investigation. In the first semester of high school, band students outscored the non-band students by .7413 in cumulative grade point average, .8233 in English, and .7294 in math. This may indicate that students who pursue instrumental music may be more academically inclined. According to Anello (1972) and McIntyre & Cowell (1984), findings regarding the effect of music on math and reading performance are unclear and often contradictory. Anello (1972) stated that higher academic students appear to be attracted to music classes. This is an area which may need to be further addressed in the future.

When administering the surveys to each school, the return rate varied greatly. Although Blair High School had a 100% return, Waverly had a 77% return, Grand Island Northwest had a 74% return, and Plattsmouth had a 59% return. Since the overall return rate was only 79%, the randomization process may have been slightly tainted and the best possible cross section of the student population may not have been achieved.

Additionally, not every school could meet the desired quota for each group. Blair and Waverly both contributed 8 students to each of the four

groups (male band, female band, male non-band, and female non-band) but after examining the results of the survey, Plattsmouth could only contribute 5 male band students and 5 female band students as well as 8 male non-band students and 8 female non-band students. Survey results limited Grand Island Northwest to only 3 male band students, 3 female band students, 5 male non-band students and 5 female non-band students. Once all transcripts were received, one female non-band student's transcript had to be excluded because this student had dropped out of school during the sophomore year. Total battery, then, included 24 male band students, 29 female band students, 24 female band students, and 28 female non-band students. Gender was distributed with 57 females and 48 males, and the band/non-band was distributed with 53 band students and 52 non-band students. The fact that all four subject groups were not equally represented may have had some bearing on the outcome of this investigation. Also, the lower number of subjects may have had some effect on this investigation.

Since only four schools were used, varying academic and instrumental music setting may have effected this investigation. Although an attempt was made to find subjects representing the ethnic, gender and socioeconomic diversity common to Class A instrumental music programs in Nebraska, individual teacher attitudes and instruction within these four schools may have varied. Variances in instruction coupled with the low number of subjects may have skewed the results of this investigation. In future research, a larger sampling of schools and students might help control for some of the inconsistencies encountered in this investigation.

Finally, when analyzing transcripts, no difference was made for weighted classes. Therefore, identical scores were entered for two students if

one took Calculus and received a "B" and the other took Senior General Math and received a "B". Although the content and difficulty of these two classes presumably differ substantially, these students were perceived in this study as achieving at an equal level to each other. Perhaps another means of examining the relationship of high school band participation and academic achievement would be to analyze standardized test scores and/or IQ's in addition to teacher reported grades. This could help to ensure all students achievement is being measured in a consistent manner. Future research in this area might consider using a matched pair design to help control for differing class schedules.

In conclusion, this research was initiated due to the concern over the criticism music education has come under in this country. Although much research has indicated that instrumental music participation has a positive effect on academic achievement, much research also exists denying any such relationship exists. The purpose of this paper was to examine this area for a possible relationship between high school band participation and academic achievement.

Indeed, mean scores in cumulative grade point average, English, and math indicated that band students score higher in each of these areas every semester of high school. Additionally, ANCOVA analysis showed that these relationships were often significant. There was a significant difference between band and non-band students cumulative grade point average scores during every semester of high school. A significant difference was also found during the first six semesters of English and during the first four semesters of math. However, T-test data indicated that while the band students score higher in every subject, their scores tend to decrease in English, math and cumulative

grade point average while non-band students' scores tend to increase in math and English. More research may need to be done to discriminate between these contradictory findings.

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APPENDIX A

PANEL OF EXPERTS

Dr. James R. Saker

University of Nebraska at Omaha

Director of Bands

Past President of Nebraska Music Educators Association

Ms. Linda Donohue

Blair Junior High School

Past President of Nebraska State Bandmasters Association

Mr. Joe Chapman

Retired

Past President of Nebraska State Bandmasters Association

Mr. Matt Shepherd

Grand Island Northwest High School

President of Nebraska State Bandmasters Association

Ms. Barb Mock

Plattsmouth High School

Chair of Band Affairs, Nebraska Music Educators Association

APPENDIX B

Survey of musical background/Survey administration instructions

Name _____

Please complete the following survey by circling "yes" or "no" for the following six questions.

YES NO 1) Have you been enrolled in your high school band every semester of your high school career?

YES NO 2) Have you ever been in your school band program (elementary, junior high, or high school)?

YES NO 3) Have you ever been in your school choir program (elementary, junior high, or high school)?

YES NO 4) Have you ever taken piano lessons?

YES NO 5) Have you ever taken voice lessons?

YES NO 6) Have you ever taken private lessons from a professional musician or private instructor on any instrument?

TO: Plattsmouth High School Faculty

FROM: Andy Sorensen, Blair High School Band Director

DATE: April 7, 1997

RE: Survey of Musical Background

In partial fulfillment for my Masters Degree at UNO, I am writing a thesis on "The Effect that Band Participation has on Academic Achievement". I have selected Plattsmouth High School due to the outstanding instrumental music program at your school. Please have all seniors complete the enclosed, very short survey.

Please make sure that the students:

1. Print their name on the survey legibly.
2. Circle "yes" or "no" for each of the six questions.

Once the surveys are completed, please return them to Mr. Johnston as soon as possible. Thank you for your cooperation and assistance.

APPENDIX C

Letter to Principal

March 3, 1997

Dear Mr. Shanahan,

Thank you for agreeing to participate in my investigation into the effect that instrumental music has on academic achievement. Enclosed, please find 200 surveys to be administered to all seniors at Blair High School. Distribute them at your earliest convenience but not later than Friday, March 24th. Please call me at work (402) 426-4941 or at home (402) 533-2084 as soon as you have gathered all completed surveys. I will then meet with you at Blair High School at a mutually agreeable time to randomly select the participants for the study and to obtain photocopies of the transcripts of those students selected. Please feel free to call me if you have any questions.

Sincerely,

Andrew R. Sorensen, Band Director

Blair High School

APPENDIX D

Thesis Participants Memo

TO: Mr. Maher

FROM: Andy Sorensen

RE: Thesis Project

DATE: May 16, 1997

The seniors of WHS have been divided into groups based on the answers they gave on the survey administered last week. From these groups, students have been randomly selected to participate in my investigation into the effects that band participation has on academic achievement. The following transcripts, then, need to be photocopied and returned to me at your earliest convenience. If you are more comfortable releasing these transcripts without any names attached, please identify each transcript by gender and band/non-band as outlined below (see enclosed example). The photocopied transcripts may be sent to: Andy Sorensen, Blair High School, 440 N. 10th Street, Blair NE 68008.

8 Male Band Students
John Doe
etc.

8 Female Band Students
Jane Doe
etc.

8 Male Non-Band Students
John Doe
etc.

8 Female Non-Band Students
Jane Doe
etc.

Please know that no student names will ever be mentioned at any time in my thesis project to protect the privacy of your students. Thank you very much for your assistance in my thesis project. I greatly appreciate Waverly High School's participation. I will send you a copy of the results of my investigation once it is completed.

APPENDIX E

Participating Schools

Blair High School

Grand Island Northwest High School

Plattsmouth High School

Waverly High School