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Evaluating the Relationship Between Musical Aptitude and Standardized Achievement Test Scores of Beginner Instrumental Music Students

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The decade of the 1990s for public education in our nation could be characterized as a decade of increased emphasis upon school accountability. The accountability standard has been results that individual school districts achieve with regard to progress made on mandated standardized tests. Although internal pressure for increased student achievement as measured by these tests are evident in our schools, external pressure from the business community and the public at large have played a major role in the school accountability movement throughout the nation during the decade of the 1990s.

For example, Gerstner, et al., (1994) asserted that our true economic vitality was the product of unending change, product cycles and manufacturing transformations. Gerstner further stated that mass education and the commitment to educate all our citizens at public expenses has constituted the secret to American economic and political vitality, especially during the decade of the 1990s and public education has been our greatest social invention.

In their efforts to meet the challenges of the emphasis upon standardized testing, music educators have been asking themselves: What knowledge is worth knowing in music and what role will music play in the context of a diverse society in the twenty-first century? What should music programs look like with regard to organization for learning? What benchmarks should be used in predicting student success in instrumental music programs? Before music educators can answer these questions, students must be placed into the instrumental program. Frequently, one of the benchmarks used for placement has been a musical aptitude assessment. Two early benchmark studies surfaced in the early literature with regard to musical aptitude and student achievement.

Froseth (1971) used the Musical Aptitude Profile of Gordon (1965) to determine if elementary instrumental music students who were instructed by teachers using Musical_Aptitude Profile scores demonstrated a significantly higher level of musical achievement than did students who were instructed by teachers having no knowledge of these test results. Froseth concluded that

prior teacher knowledge of Musical Aptitude Scores was no more beneficial than no prior knowledge of such scores. However, Froseth (1971) also concluded that such scores could serve as a practical, objective, diagnostic tool for adapting instruction to meet the individual needs and abilities of elementary instrumental students.

Young (1971) also used the Musical Aptitude Profile of Gordon (1965), the Lorge-Thorndike Intelligence Test (Lorge and Thorndike, 1962) and the Iowa Test of Basic Skills (1962) to predict success in an elementary school instrumental program in suburban Chicago. Young concluded that student success in instrumental music was best predicted by the use of the Musical Aptitude Profile, the intelligence test and the student achievement test. The IQ test did not appear to contribute to prediction of musical success as did the musical aptitude test and the achievement test. In addition, students that scored higher than average on the musical aptitude test were more likely to remain in the instrumental music program. Young also asserted that the relationship of musical aptitude to musical attainment increased with years of study, while the relationship of intelligence and academic achievement to musical attainment, while initially higher, became noticeably less with additional years of instrumental music study.

More recent research reflected less emphasis upon musical aptitude and took on a more qualitative approach. Straub (1994) concluded that student participation in school music programs gained a sense of discipline, self-esteem and pride in accomplishment. In addition, music students developed teamwork, problem solving abilities, leadership characteristics and creative thinking skills. Likewise, Morrison (1994) concluded that musical activity had a positive effect on self-discipline and those music participants received more academic honors and achieved higher grades than did non-participating students in musical activities.

Three recent quantitative studies surfaced with regard to music and academic achievement. Corral (1998) examined the effects of an instrumental music pullout program on student achievement and concluded that no significant difference existed between the scores of instrumental music participants and non-participants on academic achievement as measured by the California Test of Basic Skills. Students were examined in the areas of reading, language comprehension, mathematics comprehension, science and social studies. These results mirrored the results found by Kvet (1985) in an earlier study. Kvet concluded that no significant difference was found in sixth grade reading, language and mathematics achievement between students who were excused from regular classroom activities for the study of instrumental music and students not studying instrumental music.

Dryden (1992) reached very different conclusions. Her study investigated the influence of instrumental music instruction on the academic achievement of fifth grade students in a southwestern Kansas school district in a city of approximately 20,000 people. Dryden used the Kansas Comprehensive Tests of Basic Skills as the dependent variable. Dryden concluded that band participants had statistically higher reading vocabulary and reading total achievement scores. In addition, males receiving instrumental music instruction scored higher statistically in reading vocabulary and instrumental music students whose mother had a post high school education showed statistically higher achievement in the total reading score as measured by the Kansas Comprehensive Tests of Basic Skills. Therefore, there was a difference in those receiving instrumental music instruction with regard to their reading vocabulary, but the connection was only with reading vocabulary and no other areas on that particular standardized test.

Method

The purpose of this study was to test the relationship between musical aptitude and various academic achievement measures of beginner instrumental music students. The standardized academic achievement tests used in this study were the Iowa Test of Basic Skills Test (ITBS), the Otis-Lemon School Abilities Test (OLSAT), the Metropolitan Achievement Test (MAT) and the Texas Assessment of Academic Skills Test (TAAS). The following question was addressed descriptively and analytically: Did a relationship exist between musical aptitude and the Iowa Test of Basic Skills, the Otis-Lemon School Abilities Test, the Metropolitan Achievement Test, or the Texas Assessment of Academic Skills Test? Likewise, the hypothesis stated: No relationship existed between musical aptitude and the Iowa Test of Basic Skills, the Otis-Lemon School Abilities Test, the Metropolitan Achievement Test, or the Texas Assessment of Academic Skills Test.

For this study it was assumed that comparable data were available on the number of pupils in the district under study and that data on the variables, as defined in this study, were available for all students being studied in a standardized format. Limitations of this study included:

1. This study was limited to one East Texas independent school district and the study was limited to one academic year and beginner band students.
2. A longitudinal study may have revealed different or similar relationship patterns, but this study was limited to the 1999-2000 school year.
3. All data were ascertained through data sent to the school district by the Iowa Test of Basic Skills, the Metropolitan Achievement Test, the Otis-Lemon School Abilities Test, and the Texas Assessment of Academic Skills, developed by the Texas Education Agency. Definitions of the variables, especially the variables that defined student achievement, were important because other variables and school site data could yield very different results.

This basic design was a correlation study used to determine the relationship between musical aptitude and academic achievement of beginner band students as measured by standardized tests used in this particular study. Student academic achievement was defined as scores on the Iowa Test of Basic Skills (composite math and composite reading grade equivalence and national percentile ranks). Academic achievement was also defined as scores on the Otis-Lemon School Abilities tests (composite verbal and non-verbal, verbal alone, and non-verbal alone), and scores on the Metropolitan Achievement Test (composite math and composite reading grade equivalence and national percentile ranks). In addition, scores on the Texas Assessment of Academic Skills Test (reading and math composite scores) were also used to define academic achievement for the beginner instrumental music students sample in this study.

The sampling technique was a purposive technique. The sample consisted of 104 sixth grade band students in an East Texas school district. According to Gay (1981) 30 subjects are considered to be a minimally acceptable sample size for a correlation study. This sample met and exceeded that particular benchmark in the literature. Since no research was found in the literature with regard to the Selmer Music Guidance Survey, the reliability coefficient was established for the composite scores. The Spearman-Brown prophecy formula was the reliability

method used for this study. Likewise, the standard error of measure was computed for the Selmer Music Guidance survey, since no literature existed for that musical aptitude test.

Students were given the Selmer Music Guidance Survey to serve as a guide to instrument assignment and general assessment of the individual needs of the selected band students at the beginning of the school year. Students are then interviewed for physical characteristics to match those characteristics for instrument placement in the sixth grade year, the year in which these students began their instrumental music training. Therefore, the sample was an intact group for research.

The Iowa Test of Basic Skills (math and reading) was given to students in the first semester in late November 1999. In addition, all students in the sixth grade were given these standardized tests as a part of the testing program for the entire school district as well as the band students sampled in this study. Scores for the Otis-Lemon School Abilities Test and the Metropolitan Achievement Test were ascertained from the fourth grade testing series and all were given these assessments as a part of the regular testing program for the school district. The Texas Assessment of Academic Skills Test was given to the students in April 2000. Similarly, all students were given these tests as part of the regular testing program for the entire school district as well as the band students sampled in this study.

Using Liebetrau (1983) as a guide, the Pearson product-moment correlation was computed, examining the relationship between the Selmer Music Guidance Survey and the Iowa Test of Basic Skills, the Otis-Lemon School Abilities Test, the Metropolitan Achievement Test and the Texas Assessment of Academic Skills Test. The significance level was set at the .01 level ($p < .01$). If the correlation result met or exceeded the critical value of the correlation coefficient, the hypothesis was rejected and the research question was answered for each standardized assessment used in the study.

Results

The descriptive analysis yielded a mean on the Selmer composite scores of 85.038 and a standard deviation of 9.038. The high score in the distribution of the Selmer composite scores was 100 and low score was 57. That set the range at 43. The coefficient of variation across the entire distribution was .10 or a 10% variation of the Selmer Music Guidance survey employed in this study.

Reliability coefficient analysis was performed on the Selmer Music Guidance Survey for the composite scores. The split-half method was chosen to determine reliability. The entire Selmer Music Guidance Survey was administered to the entire sample of students used in this study. The 60 items for the composite test were divided into odd and even sets of data. The Spearman-Brown prophecy formula was then used to obtain the reliability coefficient for the Selmer Music Guidance Survey composite scores. The formula yielded a reliability coefficient of .85 for the Selmer composite scores. The standard error of measurement was 4.459.

Once the descriptive statistics and the reliability coefficient had been established, the Pearson Product Moment correlation was computed for the Selmer Music Guidance Survey composite against the Iowa Test of Basic Skills (reading and math) and the Otis-Lemon School Abilities Test (verbal, non-verbal, and verbal, non-verbal composite scores). In addition, the correlation was tested for the metropolitan Achievement Test (reading and math) and the Texas Assessment of Academic Skills Test (reading and math) against the Selmer composite scores.

The correlation for the Iowa Test of Basic Skills (ITBS) reading grade equivalence and the Selmer Music Guidance Survey composite was .472 for the 104-student sample. The ITBS

reading percentile rank and the Selmer Music Guidance Survey composite was .455. The correlation for the math grade equivalence and the Selmer composite was .437 and for the math percentile rank, the correlation was .435. All correlation coefficients between the Selmer Music Guidance Survey composite scores and the ITBS reading and math scores (grade equivalence and percentile rank) were significant at the .01 level ($p < .01$). The results are displayed in Table 1 for the ITBS and the Selmer composite scores.

Table 1
Product Moment Correlation Coefficients for the standardized tests used in the study and the Selmer Music Guidance Survey Composite Scores

	Selmer Composite
Iowa Test of Basic Skills Test	
Composite Reading Grade Equivalence	.472*
Composite Reading Percentile Rank	.455*
Composite Math Grade Equivalence	.437*
Composite Math Percentile Rank	.435*
Otis-Lemon School Abilities Test	
Composite Verbal and Non-Verbal	.393*
Verbal	.377*
Non-Verbal	.371*
Metropolitan Achievement Test	
Composite Reading Grade Equivalence	.433*
Composite Reading Percentile Rank	.450*
Composite Math Grade Equivalence	.409*
Composite Math Percentile Rank	.369*
Texas Assessment of Academic Skills Test	
Reading Composite Scores	.502*
Math Composite Scores	.424*

Source: Iowa Test of Basic Skills, Otis-Lemon School Abilities Test, Metropolitan Achievement Test, Texas Assessment of Academic Skills Test, Selmer Music Guidance Survey Composite Scores
* $p < .01$

The correlation between the Otis-Lemon School Abilities Test and the Selmer Music Guidance Survey composite was .393 for composite verbal and non-verbal scores, .377 for the verbal scores alone and .371 for the non-verbal scores alone and the Selmer Music Guidance Survey composite musical aptitude scores for the sample. All correlation coefficients between the Selmer Music Guidance Survey composite scores and the Otis-Lemon School Abilities Tests were significant at the .01 level ($p < .01$). These results are displayed in Table 1.

The correlation for the Metropolitan Achievement Test (MAT) reading grade equivalence and the Selmer Music Guidance Survey composite was .433 for the 104-student sample. The MAT reading percentile rank and the Selmer Music Guidance Survey composite was .450. The correlation for the math grade equivalence and the Selmer composites were .409 and for the math percentile rank, the correlation was .369. All correlation coefficients between the Selmer Music Guidance Survey composite scores and the Metropolitan Achievement Test reading and math scores (grade equivalence and percentile rank) were significant at the .01 level ($p < .01$). These results are displayed in Table 1.

The correlation coefficient between the Texas Assessment of Academic Skills reading composite scores and the Selmer Music Guidance Survey composite scores was .502. It was noted that this finding was the highest correlation coefficient. Likewise, the Texas Assessment of Academic Skills math composite scores and Selmer composite scores yielded a correlation coefficient of .424. All correlation coefficients between the Selmer Music Guidance Survey composite scores and the Texas Assessment of Academic Skills Test (TAAS) (reading composite and math composite) were significant at the .01 level ($p < .01$). These results are also displayed in Table 1.

Conclusion

The purpose of this study was to test the relationship between musical aptitude and various academic achievement measures of beginner instrumental music students. The standardized academic achievement tests used in this study were the Iowa Test of Basic Skills Test (ITBS), the Otis-Lemon School Abilities Test (OLSAT), the Metropolitan Achievement Test (MAT) and the Texas Assessment of Academic Skills Test (TAAS). The following question was addressed descriptively and analytically: Did a relationship exist between musical aptitude and the Iowa Test of Basic Skills, the Otis-Lemon School Abilities Test, the Metropolitan Achievement Test, or the Texas Assessment of Academic Skills Test? Likewise, the hypothesis stated: No relationship existed between musical aptitude and the Iowa Test of Basic Skills, the Otis-Lemon School Abilities Test, the Metropolitan Achievement Test, or the Texas Assessment of Academic Skills Test.

In addressing the research question, it can be concluded that a relationship existed between musical aptitude, as measured by composite scores of the Selmer Music Guidance Survey, and the ITBS, Otis-Lemon, MAT, and the TAAS scores in the sample used in this study. Likewise, since the critical values of the correlation coefficients met or exceeded the critical value set in the study, the null hypothesis can be rejected, since all correlation coefficients were positive and significant at the .01 level ($p < .01$).

Discussion

Although it can be stated that no causal relationship existed between the musical aptitude scores and the achievement measured employed in the study, a positive and significant relationship does exist between these variables. The music educator is then faced with exactly how they are to use such data to bridge the gap between research and practice. First and foremost, music educators need to use their common sense in using any test data in their classroom practice. Although such data is useful in classroom practice, caution should be taken in using musical aptitude and standardized achievement scores of beginner music students. Such scores are only a guideline in assessing student differences and possible weaknesses among such students.

The ultimate task for music educators is using such data to adapt their curricula and their instructional strategies to reach all students in their classrooms. Aptitude scores and achievement scores can help music educators form realistic expectations of students. Further research could also give answers to exactly where such relationships between musical aptitude and forming context clues or other reading skills tested on a state assessment test such as the TAAS? Such a question is interesting and may be useful in ultimately designing curriculum and instructional strategies to meet the needs of all students.

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A New Approach to Teaching Music Appreciation

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Music appreciation courses are distinct in academy. Music appreciation students study approaches rather than perform the subject. Other academic disciplines incorporate inherent experiences allowing the general student population to actually manipulate the subject matter. Regardless of their respective majors, students in a math class do calculations, English classes write, and science classes perform experiments. Music appreciation classes most frequently explore elements of history, theory, and critical listening for appreciation. While these are an accepted method for teaching music appreciation, they are analogous to teaching acting through history and theory. Albert Einstein aptly summarized this scenario as "a perfection of means and a confusion of aims." Since appreciation is recognizing worth, quality or importance, teaching methods should be amended to facilitate such an appreciation.[1]

Methods of teaching music appreciation are the subject of a number of scholarly studies.[2] These studies have clearly identified the need for remediation, justified the need for music, endorsed traditional teaching strategies, and compared various music texts. Studies by Lewis Gordon, John Fuller, Jessica Halpern, Glen Hosterman, and William Doyle all examine the refinement of current methods or comparing approaches. Although a few studies were dedicated to analyzing traditional teaching strategies, none recommended research into developing new

[1] David Guralnik, ed. "Appreciation," Webster's New World Dictionary (Cleveland: New World Publishing Co., 1987), 22.

[2] Studies include Leon Doyle, "Relationships Between Prior Musical Experiences and Success in a College Music Appreciation Course," (DMA diss., University of Southern California, 1988), Abstract in Dissertation Abstracts International 49 (1993), 365A.; Edwin Gordon, Learning Sequences in Music, (Chicago, IL: GIA Publications, 1988); Jessica Halpern, "Effects of Historical and Analytical Teaching Approaches on Music Appreciation," Journal of Research in Music Education 40:1 (1992), 39-46.; Glen L. Hosterman, "Cooperative Learning and Traditional Lecture/demonstration in an Undergraduate Music Appreciation Course," (D. Ed. Diss., Pennsylvania State University, 1992), Abstract in Dissertation Abstracts International 53, (1993), 1440A.; Estelle R. Jorgensen, "The Curriculum Design Process in Music," College Music Symposium 28 (1988), 99; Edward Rothstein, "The ABC's of Music – and How!," The New York Times, 16 August 1993, 27; Camille M. Smith, "The Effects of Listening Perception Skills of Two Approaches to Teaching Music Appreciation to Non-Music Majors at the College Level" (Ph.D. diss., Indiana University, 1980), abstract in Dissertation Abstracts International 41 (1993), 978A.

methods of teaching the non-major appreciation course. In addition, no study attempted to examine the presentation of personal experiences for enhancing the appreciation of music.

One particular study, however, examined the relationship between meaningful learning and appreciation. This study incorporate Gagné's teaching strategies and theories that illustrate the need for a variety of stimuli on a single subject to facilitate meaningful education.[3] Edwin Gordon applied Robert Gagné's principals to music. Gordon defined the approaches to teaching music and established the need for activity.[4] In addition, Gordon presented invaluable information on course structure and methodology.[5] The gestalt effect of this study supports the need to have hands on experiences to facilitate true appreciation. Therefore, a variety of meaningful learning techniques must be the basis for appreciation.

The Status of Music Appreciation

Students with little or no formal musical experiences are typical in music appreciation classes. Students enrolling in math, English, science and most other academic disciplines are expected to have previously completed the most basic of training. Music appreciation classes typically treat those with a musical education as an exception. As a result, music teachers have a tremendous challenged to not only present the complete musical spectrum from expression to serialized sound, but must also spend considerable time in presenting rudimentary material. With the demands on memory and recall, it is difficult to understand how true appreciation is achieved under these conditions.

Students are continually surprised with the requirements of a music appreciation course. Many students elect the class for the proverbial "easy A." Other students are relegated to the class as a result of a scheduling conflict or a lesser choice of many work-intensive choices. The surprise unfolds when students are subjected to the overwhelming flood of theoretical and historical information. There is a degree of surprise still for having to learn nomenclature, review, and actually study for the perceived trivial nature of the class.

Those few students having a music background had gained experiences through high school performance groups, but had little or no knowledge of music theory or history. Edward Rothstein made a similar observation in the *New York Times*:

> Whatever minimal infrastructure once coexisted for the teaching of music in the public schools has been dismantled during the last 20 years with almost horrific nonchalance. And, without music education, the art music traditions of the world come to seem merely sonic entertainment competing in a crowded aural marketplace for the right to provide pleasure.[6]

According to the study administered by Rothstein, students with experience in music maintained a higher appreciation than those without any background.

The duality of teaching elements of music and appreciation is the subject of an on-going debate among educators. The questions of this compound approach must be solved in order to determine whether the orientation of the novice actually enhances appreciation. Gordon

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[3] Robert Gagné, Conditions of Learning, 2nd ed. (NY: Holt, Reinhart & Winston, 1970).
[4] Edwin Gordon, Learning Sequences and Patterns in Music (Chicago, IL: GIA Publications, 1977)
[5] J. David Boyle, ed., Instructional Objectives in Music (Vienna, VA: Music Educators National Conference, 1974).
[6] Edward Rothstein, "The ABC's of Music–And How!" The New York Times, 16 August 1993, 27.

champions the need for remedial classes by examining the pedagogical approaches of music appreciation.[7]

Another perhaps more pragmatic solution is to emphasize remediation. By devoting an entire semester to understanding and perceiving musical elements, students can begin to respond more directly to music's aesthetic qualities. This relationship has been articulated by proponents of the aesthetic education movement and confirmed in at least one study at the higher education level.[8]

Although studies do confirm an increase of appreciation through remedial music, the studies tended to favor knowledge as appreciation rather than quality or importance. Therefore, it is unclear whether remediation produces appreciation or simply will increase a working knowledge of music. A rudimentary knowledge of composers, works, and an increase of aural skills are a means for developing appreciation, but remains the only practiced methodology for achieving appreciation.

The Need for New Approaches

The majority of music appreciation classes emphasize critical listening. While listening is an accepted method for dealing with music, listening alone is not comprehensive enough to develop appreciation. Students are relegated into a passive audience doing what they have done their whole life – listening without hearing. Listening is only a part of appreciating the music spectrum from wordless expression and personal fulfillment to one of serialized sound and silence. This is not to suggest that listening for appreciation is passé. But rather, listening is only one of the many means necessary to form an appreciation.

The average student needs to experience music. Regardless of their respective majors, other academic disciplines incorporate inherent experiences allowing the general student population opportunities to experience the subject matter. While the traditional methods of theory and history have become an accepted method for teaching music appreciation, they are insufficient for the non-major. Other forms of synthesis are necessary for true appreciation to occur.

Music appreciation classes need be "hands on" as well as an aesthetic education. Is one to expect a student to understand all mathematics after simply watching calculations? It is one thing to know what the calculation looks like, and yet another to understand how it is deciphered, or which numbers are to be manipulated to present the finished product. Every potential cook spends time mixing and experimenting to appreciate the art. Every general music student needs to understand the elements as well as the process of making music to achieve a true appreciation.

Educating the general student body insures a proper future for music. Ernest Boyer stated that, "Without some experience in the performing arts, we are denied the knowledge of disciplined creativity and its meaning as a bulwark of freedom and an instrument of social cohesion."[9] The students of today are the persons who will eventually serve on the school boards, the arts

[7] Anne Dhu McLucas, ed., College Music Symposium: 36:103-12. s.v. "College Music Appreciation: Pedagogical Approaches and Preliminary Findings," by Lewis Gordon.

[8] Camille M. Smith, "The Effects of Listening Perception Skills of Two Approaches to Teaching Music Appreciation to Non-Music Majors at the College Level" (Ph.D. diss., Indiana University, 1980), abstract in Dissertation Abstracts International 41 (1993), 978A.

[9] Ernest Boyer, "Integrity in the College Curriculum" Chronicle of Higher Education Vol. 29, No. 22 (13 February 1985), 21.

councils, and will be making decisions for the future of music in their respective communities. Music educators need to be committed to the future teacher as well as the common student. Because the music appreciation class is one of the many venues for the non-major and the general student body, the music appreciation class has a heightened importance.

There is a need to discover pedagogical approaches leading to true music appreciation. Traditional approaches become cumbersome in requiring formal education on the rudiments of music. Variations of the traditional approaches merely emphasize one or more conventional aspects to approach aesthetic education. Perhaps the answer is to develop exercises and activities using universally creative techniques instead of rearranging traditional approaches.

The Study

As a result, a study was devised attempting to measure the levels of appreciation. Students were asked a series of questions on the first and last days of their music appreciation classes. The results were then compared for any measurable difference in levels of appreciation. The author developed the initial survey instrument. Three colleagues then reviewed the document and appropriate changes were made. The forms were distributed among the summer semester classes at Angelo State University (San Angelo, Texas), Meredith College (Raleigh, North Carolina), and North Carolina State University (Raleigh, North Carolina). Each form had ten statements in which the respondents chose one of five Lickert-type scale responses. One free response section was also included.

From 1993 until 2000, surveys were distributed to the students in music appreciation classes at these universities. North Carolina State University was unique in that there is no music major, and all of the students taking the course would come from various academic backgrounds, none majoring in music. The study population consisted of students from a variety of academic undergraduate majors and a few graduate students at North Carolina State University.

Two classes were selected each summer semester: one would be taught with a historical methodology while the other would serve as the experimental class. Because the course was a general education elective, the students were presumed to represent two samples of a single population. All music appreciation classes from both groups met with the author in a room equipped with a stereo that had two mounted speakers on the front walls and two pianos. A survey was distributed to each student on the first day of class and again at the end of the semester. All of the students were majoring in academic disciplines other than music. Each surveyed class, both experimental and control, had the same instructor. Each of the study classes was analyzed to determine any change in the mean scores between the pre- and post-test.

In each survey session one class served as a control group while another was intended as an experimental class. The control group was taught with traditional historical methods currently available to the music appreciation instructor. That is, the class used a text with recordings that followed a chronology of music history. The experimental class followed the same chronology but incorporated compositional and performance into the curriculum.

An average of twenty-nine students were enrolled in each experimental summer semester class. An average of twenty-eight students were enrolled in the control group each year. Students discontinuing the class were dropped from the tabulations.

The results of the final survey showed that the experimental class felt a much higher appreciation for music than the control class. Students indicated the importance of music in society was significantly more important at the end of the semester than they did at the start of the term. Respondents also indicated an increase in the importance of music in Western culture.

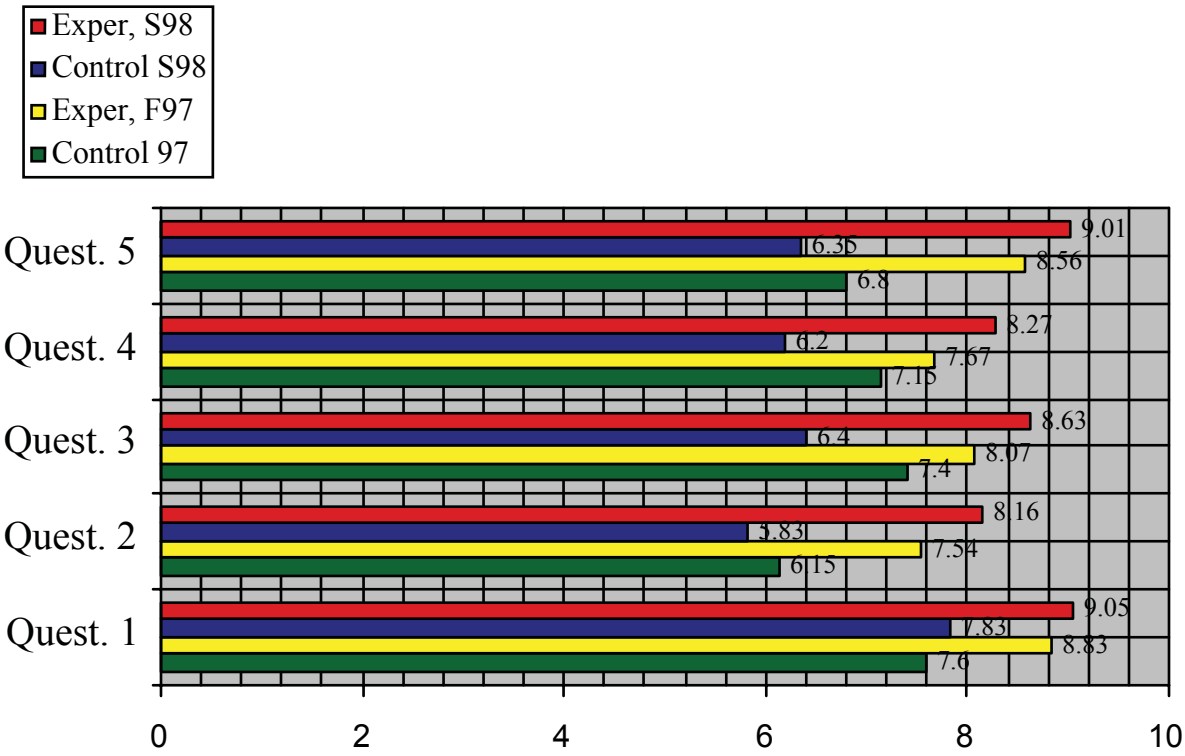
Responses also indicated a decline in beliefs relating music to a hobby or merely an entertainment medium.

The most significant increase was in the response that music was simply entertainment. The initial responses reflected a unanimous *agree* or *strongly agree*. Each year, the final survey contained unanimous responses indicating *disagrees* and *strongly disagrees*. The results of the survey indicated those methods incorporating activities in composition and performance provided the greatest increases in appreciation. An unexpected outcome of the study was the development of a new approach to teaching music appreciation.[10]

Applications of a New Approach

Years of experimenting with large nonpartisan classes coupled with the results of the various surveys served as the inspiration for attempting a new approach to teach music appreciation. Previous experimentation included activities and programs aimed at actively involving the students. Texts were changed and supplemented with a variety of materials. In addition to the texts, exercises in composition, critical listening, and associations to popular tends were introduced. When surveyed, students indicated that these additions aided in the

[10] Refer to Figure 1



	Quest. 1	Quest. 2	Quest. 3	Quest. 4	Quest. 5
Exper, S98	9.05	8.16	8.63	8.27	9.01
Control S98	7.83	5.83	6.4	6.2	6.35
Exper, F97	8.83	7.54	8.07	7.67	8.56
Control 97	7.6	6.15	7.4	7.15	6.8

Figure 1

synthesis, but fell short of actually enhancing an appreciation for music. In addition, surveys showed that students had an elevated understanding of music, but had failed to achieve a personal identification with the subject matter. This result appeared to be similar to watching bad acting: the dialogue was there, but the text lacked an emotive element. The challenge then became creating activities for persons with no prerequisite to enhance music appreciation.

A number of teaching methods were reviewed and considered for the experimental class. New combinations of traditional methods, non-traditional approaches, and a variety of unique strategies were tried on a number of classes before the start of the study. Each teaching approach considered was relative to the typical students' music background being limited to that of only exposure to popular music.[11] It soon became clear that creating was insufficient to personify the

[11] Initial surveys asked students to indicate a musical background.

experiences in music. As a result, performance experiences were incorporated into the experimental class settings.

The results of the initial survey, previous experiments, and current class participation helped form a hypothesis regarding the acquisition of music appreciation: students involved in a compositional process gain a higher appreciation for music than those studying only theory or history. In the isolated example, students demonstrated three things; 1) students could comprehend form, 2) students were capable of creating compositions, and, 3) students gained a higher appreciation of music. This premise was the subject for the experimental class.

A survey indicating the largest percentage of growth in appreciation was from classes that experimented in composition with performance.[12] Apparently, the creative process alone was insufficient. Performance of the works was necessary to include all of the expressive qualities necessary for personal identification or appreciation. Students frequently indicated a need for a better interpretation of their respective compositions as well.

Class Formatting

The class plan was based on the history of music. Assignments mirrored the various styles in the period histories. All of the assignments progressed in a logical cumulative process reflecting development of music. All compositional activities had to reflect three areas of music: texture, form, and medium. For example, Gregorian Era assignments involved monophonic sounds with limited ranges and unstructured forms. Classical compositions had sonata allegro form; two themes complete with motives, expanded ranges, and were polyphonic and/or homophonic in texture. The results included visual art with various colors pertaining to the sections, vocal cheers, rhythmic claps, variations on nursery rhymes, and colored flashlights for their projects. Previous and subsequent assignments were completed with similar results.

Questions of notation, the communication of ideas, performance mediums, and presentation were creatively solved. Traditional music notation proved too awkward and involved a number of rules threatening to quench the creative process. As a result, traditional notation was replaced by various graphic images representing time and sound. Various types of calligraphy were suggested and rejected for methods easily learned and more conducive to the process. Methods like the ancient traditions of the Native American rope tying, pictograms, and graphic illustrations were incorporated as a system of notation.[13] Another approach was to create a time-line and indicate events according to a wristwatch. Other unique systems were invented and incorporated into the class, as they became available.

Performances were the most difficult area of the course requirements. Students either embrace the idea or recoiled at the thought of making sounds in front of others. Eventually the syllabus evolved to reflect a non-value judgement for grading assignments. Completed assignments, as prescribed in the syllabus, with no performance would result in a "C" for the project. Those providing the written assignment with a pre-recorded tape would receive a "B." Students who perform live or recruit others to perform their compositions received "A's."

[12] Please refer to the compilation of the results.

[13] Natalie Curtis, ed., The Indian's Book (NY: Bonanza Books, 1987). Native Americans were known to have tied knots in ropes. The length of separation was analogous to the passage of time. The closer the knots, the more rapid the tempo.

Conclusion and Discussion

Two hundred eighty-eight questionnaires were completed returned. Descriptive statistics were calculated for the merged total number of respondents (N = 288). The results of this study indicate that students gain a significant regard for the music when musical experiences are incorporated into the traditional historical or theoretical approaches.

Perhaps it is time to augment the music appreciation syllabus with exercises intended to provide musical experiences. Such experiences should include composition and performance. Composition allows for the opportunity to symbolically represent personal perspectives into a sonic medium. Composition also allows for the recreation of a form, style, and structure fostering a deeper understanding of music. Performance allows a venue for the realization of the creative process through sound. It is easier to provide performance experiences in one semester than it is to squeeze all the music style periods into a comprehensible progression. The class is not intended to produce virtuosos any more than the traditional class is meant to develop musicologists. The class is designed to provide a sampling of music through basic personal performance resulting in a deeper sense of appreciation.

The students of today are the board members, donors, and patrons of tomorrow. These are the persons who will decide the future of the arts. These are the consumers who will enhance their surroundings by those things that are appreciated. These are the persons in need of a musical education and a heightened appreciation regardless of their personal endeavors. "We must state boldly, that the aim of our studies is the revelation of . . .visions, not proficiency in statistics, jargon, footnoting, and other double stoppings and roulades of the academic trade."[14] It is time to allow our students the experience of music appreciation.

[14] Dennis O'Brien, "Inaugural Address," (Rochester, NY: University of Rochester, 1984), 12.

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The Effects of Computer-Assisted Instruction on Middle School Students' Ability to Hear Differences in Given Pitches in Relationship to a Reference Tone

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Many research studies have been completed on the effects of computer-assisted instruction (CAI) on student achievement. Although many studies have been completed, the dependent variables being measured have often been different. Some research has studied the effects of CAI on ear training of students (Eisle, 1986; Glass, 1986; Kolb, 1985; Ozeas, 1992; Platte, 1981; Robinson, 1984). Results have been inconsistent across these studies. In the study by Eisle (1986), the results indicated significantly different gains between groups using CAI and traditional instruction. The group using CAI made higher gains between pretest and posttest on an ear-training test. This was the only research study on ear training that showed a significant relative gain for the group using CAI.

The studies by Glass (1986), Kolb (1985), Ozeas (1992), Platte (1981), and Robinson (1984) showed no significant differences between the experimental and control groups. The study by Robinson showed a significant gain between the pretest and posttest of each group, but the difference between the experimental and control group was not significant.

Other studies considered the effect of CAI on performance abilities of students (Kassner, 1992; Orman, 1995, 1998; Weeks, 1987). Of these studies, only the one by Orman found significantly higher gains for the experimental group. The others showed no significant difference between the experimental and control groups. Kassner (1992) suggested a longer treatment time in order to test the long-term effects of CAI.

Although many of the research studies using CAI have indicated no significant difference in the gains made by the subjects, many studies have indicated a positive attitude toward the use of computer technology (King, 1989; Lin, 1994; Orman, 1995; Platte, 1981; Sanders, 1980; Turk, 1985; Willett & Neutsil, 1989).

Studies have also been completed about the effects of CAI on note reading abilities of students (Hesser, 1988; Holland, 1987; Jacobsen, 1987; Orman, 1995; Ortner, 1991; Willett & Neutsil,

1989). The studies by Holland, Jacobsen, and Ortner found no significant differences between the experimental and control groups. The studies by Hesser, Willett & Neutsil, and Orman found a significant difference in favor of the groups using CAI. With these mixed results, more research needs to be completed in order provide a picture of the effects of CAI.

In this study, the researcher sought to answer the question of the effects of CAI on the abilities of middle school general music students to hear differences in notes in relation to reference tones. The null hypothesis was that there would be no significant difference between the groups using CAI and traditional methods of instruction.

Method

The subjects (N=28) for this study were students enrolled in the Music Exploratory class at Paredes Middle School. Of the students in these classes, four were enrolled in band, one in orchestra, and three in choir. No other students were enrolled in an elective music course. The class met every other day for ninety minutes. The study took place over four consecutive class periods. All students were randomly assigned to one of two groups by drawing names from a box. The students received a pretest in order to test prior knowledge of the subject matter. The researcher created the pretest for the purpose of the experiment. The pretest consisted of twenty items that asked the students to recognize notes based on a reference tone.

Following the Test I, students received two treatments using either computer aided instruction (CAI) or worksheets with stimulus tapes. The CAI group used the computer program *Dolphin Don's Music School* (Bowyer, 1998). The module that was used as a part of this study was entitled Hearing Notes. The worksheet group used teacher created materials that focused on the same concepts as the CAI group. The worksheets and stimulus tape contained twenty items. The stimulus tape played a reference tone followed by five to seven seconds of silence. The silence allowed the students to place an answer on the worksheet. Following the silence, the correct answer was given, and the pitches were played again.

Following two sessions, an intermediate (Test II) test was given to test for learning that had occurred at the midpoint of the experiment. This test was the same as the pretest. After Test II, the groups traded tasks—the CAI group completed the worksheets, and the worksheet group completed the CAI. At the conclusion of this rotation, a posttest (Test III) was given. Test III was the same as the pretest and intermediate test.

Test results for this experiment were analyzed using descriptive statistics and nonparametric tests. A Mann-Whitney U-test was performed on each of the tests (I, II, and III) in the project in order to test for a significant difference between the groups. These tests used the null hypothesis that there would be no significant difference between the scores of the two groups on the three interval hearing tests.

Results

During this project, subjects (N=28) were given three tests. The tests were to determine the subjects' ability to correctly identify a note based on a reference tone. In the following portion of this paper, Group 1 referred to the subjects who received computer-aided instruction first, and Group 2 referred to the group who received worksheet instruction first.

On the pretest, Group 1 had a mean score of 8.2 with a standard deviation of 2.28, and Group 2 had a mean of 7.8 with a standard deviation of 3.83. The mean for Group 1 on the intermediate

test was 9.5 with a standard deviation of 3.48, and the mean for Group 2 was 10 with a standard deviation of 3.26. On the posttest, Group 1 had a mean of 8.2 with a standard deviation of 4.58, and Group 2 had a mean of 10.2 with a standard deviation of 4.22. These data may be seen in Table 1 and Figure 1.

Table 1

Mean scores and standard deviations on pretest, intermediate test, and posttest

	Pretest Test I		Intermediate Test Test II		Posttest Test III	
	M	SD	M	SD	M	SD
Group 1*	8.2	2.28	9.5	3.48	8.2	4.58
Group 2**	7.8	3.83	10	3.26	10.2	4.22

*Received computer treatment before Test II and worksheet treatment before Test III

**Received worksheet treatment before Test II and computer treatment before Test III

Results from the pretest were compared using the Mann-Whitney U test. This test compared the rank order of the scores between the groups on the pretest. Group 1 had a resulting U of 119.5 and a z score of .99, and Group 2 had a U of 76.5 with a z score of -.99. These data indicated no significant difference between the two groups on the pretest.

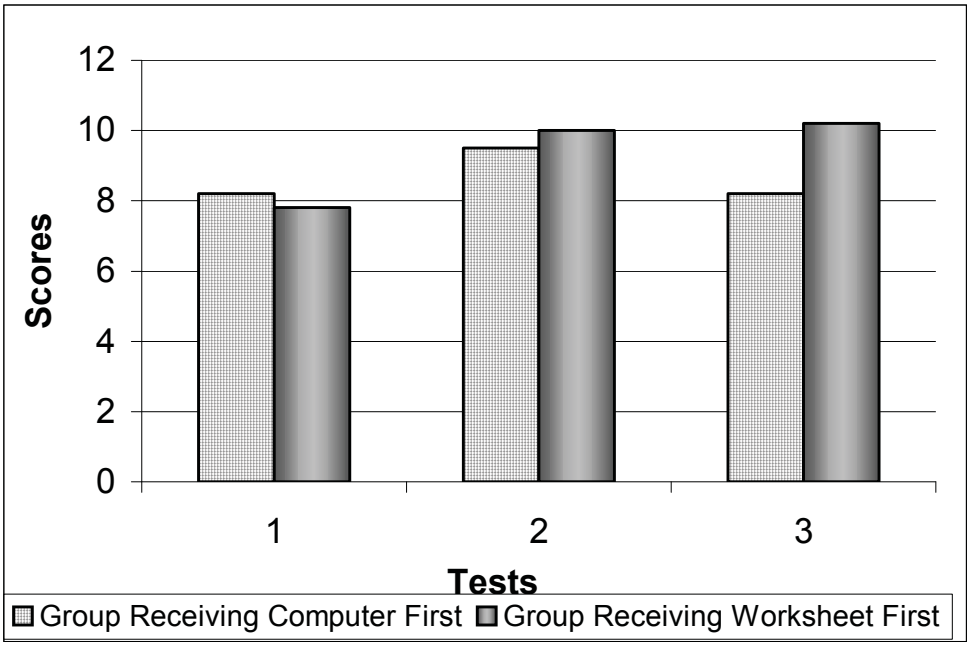

Figure 1 *Mean scores on pretest, intermediate test, and posttest*

The scores of the intermediate test were compared using the Mann-Whitney U test. The resulting U for Group 1 was 89.5 with a z score of -.391. The U for Group 2 was 106.5 with a z score of .391. No significant difference was found between the two groups following the first instructional period.

The Mann-Whitney U test was completed comparing the scores on the posttest. The resulting U for Group 1 was 79.5 with a z score of -.850. For Group 2, the resulting U was 116.5 with a z score of .850. This revealed no significant difference between the two groups.

The computer program being used collected data on each student. These data included the number of games completed, number of point accumulated, and the number of seconds that it took on the game with the best score. The group completing the computer instruction first had an average score of 356.923 with a standard deviation of 290.097. The second computer group had a mean score of 560.769 with a standard deviation of 213.247. When a t-test was completed on these data, a t-value of 2.103 was received. The null hypothesis of no significant difference between the scores received on the *Dolphin Don's Music School* (Bowyer, 1998) was not rejected.

The computer program collected the number of games completed. The mean number of games completed by the first computer group was 8.077 with a standard deviation of 9.251, and the mean number of games completed by the second computer group was 11.923 with a standard deviation of 2.985. A t-test was completed on these data, and a t-value of 1.364 was received. This failed to reject the null hypothesis of no significant difference of the number of games played by each group.

The computer program also collected the number of seconds it took for the student to complete the game that received the best score. The mean number of seconds that it took Group 1 to complete the best score was 73.0 with a standard deviation of 47.436, and Group 2 had a mean of 53.539 with a standard deviation of 15.463. The t-test showed no significant difference in the amount of time that it took each group to complete the game with the best score (df=12, t=-1.658, p=.123).

Discussion

The scores found on the tests given during this project revealed no significant differences in the groups receiving the treatment. However, it is interesting to note that gains were made after each test except for when Group 1 completed the worksheet portion of the project. This group had a decrease of 1.3 points. This may have been caused by a lack of interest due to the change in instruction because Group 1 received the computer instruction first. Although the researcher did not have an attitude evaluation component to this project, future project should include some measure of the students' interest and attitude in the work being completed. Informal observations made by the researcher indicated that students who were using the computer were focused on the activity being completed.

The lack of significant differences in the groups may have been due to the limited amount of time spent with each mode of instruction. Each group received only two periods of instruction using each mode of instruction. The students who were using the worksheets completed one worksheet that was accompanied by an audiocassette at each instructional period. The group using the computer received two fifteen-minute instructional periods. In future research, the groups should receive more time with each type of instruction before changing instruction.

In addition to no significant differences on the scores received on the interval recognition tests, there were no significant differences in the number of games played, the scores received on the tests, and the number of seconds that it took to complete the game with the best score. Although no significant differences were found, the mean and standard deviation scores showed more of a difference in the two groups.

When looking at the number of games played on the computer program, the first computer group had a range of 1 to 36 games with a standard deviation of 9.25. This large standard deviation was caused by the spread in the scores. The second computer group had a much smaller range—6 to 17. When the outliers of 1 and 36 were removed from the first group's scores, a mean of 6.7 with a standard deviation of 3.772 was received. Also, when the outliers were removed and another t-test was performed, a probability of .002 was received. With these data, the null hypothesis would be rejected that there would be no significant difference in the number of games played by each group.

During the project, the researcher learned that the use of computer-aided instruction must be carefully planned in order to not interrupt the flow of instruction. Also, students who were not using the computer on the part of the project were anxious to get to use the computer. The incentive of computer usage appeared to keep Group 2 focused while they completed the worksheet portion of the test. This information was valuable for the future research to be completed.

The researcher plans to complete future projects that compare more variables other than just hearing differences in two pitches. The software program being used has modules on note naming and hearing, rhythm reading and hearing, key signature recognition, interval reading and hearing, and chord reading and hearing. These modules provide an excellent progression of skill development as the students work through an interactive medium.

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Observation and Analysis of an Expert Wind Conductor in High School vs. College Rehearsals

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Novice music educators begin their professional lives after having spent a significant number of hours in rehearsals as members of college performing groups. Certainly, the conductors of college ensembles serve as important and significant models for music majors as they develop strategies for rehearsing middle school and high school ensembles in the future. Even so, does a college rehearsal realistically model a high school rehearsal? Do conductors rehearse groups of differing ability levels similarly, or are there differences in the way conductors rehearse college ensembles consisting of accomplished music majors versus the way they rehearse younger, less proficient ensembles?

Researchers have investigated the rehearsal procedures of expert wind conductors in a variety of settings and have identified some characteristics of the expert's rehearsal. Researchers have reported that expert conductors spend a greater portion of rehearsal time performing (Goolsby, 1999; Pontious, 1982) and that experts use verbal communication, visual gestures and modeling to bring about change in student performance (Francisco, 1994; Menchaca, 1988; Pontious, 1982). Expert conductors address a variety of performance issues in their rehearsals. Goolsby (1999) reported that experts addressed balance/blend, style, tone, intonation and other performance variables more than the novices did and that novices most frequently commented on dynamics and entrances. Menchaca (1988) observed that the conductors in his study spent a greater amount of time on fundamental elements of performance rather than on expressive elements. Pontious (1982) reported that of conductor verbalizations addressing fundamental performance categories, more than 75% addressed phrasing/dynamics, rhythm, pitch, and articulation while very little time was devoted to style, balance, tone quality, and tone production. In Francisco's study (1994), the author concluded that intonation was the most difficult performance problem to correct, that rhythm was easier to correct than intonation, and that technique was the easiest problem to correct. Francisco suggested that many technical and rhythmic errors may be self-apparent to ensemble members and require less conductor intervention, while ensemble members are more dependent upon the conductor to identify and

correct balance and interpretation. Errors in intonation may be more difficult for students to detect and to correct.

Cavitt (1998) investigated the process of error correction in five high school and five middle school expert band directors. Many commonalties were observed among the 10 master teachers observed in the study: there were high proportions of teacher verbalizations and modeling; verbalizations were frequent, brief, and primarily included directives and feedback; the rate of negative feedback was approximately twice that of positive feedback; intonation/tone were the most frequent targets of rehearsal frames and were also the shortest in terms of mean durations. While there were many similarities in the observed behaviors of the middle school and high school band directors, there were differences in the frequency of various rehearsal frame targets between the two groups. Middle school directors targeted articulation more frequently than other target categories while high school directors most frequently targeted intonation and tone. Also, high school directors were more likely to address multiple targets simultaneously or have unidentified targets in their rehearsal segments than middle school teachers.

Goolsby (1999) reported that expert teacher spent more time performing in rehearsals while novice teachers spent more time giving verbal instructions. Experts addressed balance/blend, style, tone, intonation and other performance variables more than the novices did. Furthermore, variables addressed more than twice per rehearsal among novice teachers were limited to dynamics and entrances while expert teachers commented on many variables throughout the rehearsal. Goolsby also reported more complete teaching cycles for expert teachers than novice teachers, indicating that novice teachers stopped and started without providing instruction more frequently than did the expert teachers.

Duke (2000) provides an extensive review of research that addresses instruction in music settings and looks specifically at how teacher effectiveness has been measured in research. Duke proposes the rehearsal frame as an observation unit and suggests that the rehearsal frame allows the observer to examine how teachers bring about change in specific aspects of performance. Rehearsal frames are segments of rehearsals that focus on the achievement of specific and immediate goals. The rehearsal frame may be constituted of three main parts, each of which may contain a number of teacher behaviors and student performance trials. The rehearsal frame begins with the implicit or explicit identification of one or more aspects of the performance for improvement ("targets") and may involve the whole or any part of the ensemble. The second part may involve the decontextualization and/or remediation of the target through altered practice (slower tempo, simplified articulations, etc.) or the execution of a related exercise. The teacher may give verbal directions or model the desired outcome to facilitate the independent demonstration of the desired student behavior. The third part of the rehearsal frame recontextualizes the improved aspect of performance into the full, original context. Using the rehearsal frame as a unit of observation, researchers have observed and described the teacher behaviors of expert teachers in applied music settings (Buckner, 1997; Colprit, 1998; Siebenaler, 1992) and ensemble rehearsals (Cavitt, 1998).

In the present research, I use the rehearsal frame to observe an expert wind conductor in two diverse rehearsal situations to determine if the conductor adapted his rehearsal strategy to accommodate the different age/ability levels of the two groups.

Method

The subject for this investigation was a nationally recognized wind conductor with 22 years of professional experience who regularly conducts high school honor bands and intercollegiate

honor bands across the nation. The subject agreed to participate in the study and allowed me to videotape his rehearsals with two honor groups, one consisting of high school student musicians and one consisting of college student musicians. The subject had programmed one particular piece for both group performances (Southern Harmony, by Donald Grantham), circumstances which allowed me to videotape and analyze the rehearsal process of a master teacher/conductor preparing the same literature with two groups of differing ability levels.

The subject was videotaped while rehearsing a Texas high school all-district honor group and a New England intercollegiate honor group. Both ensembles were videotaped for the entire preparation of the piece from the initial reading to the final rehearsal. Although the concert programs for both groups included other literature, only the rehearsals of the piece Southern Harmony were analyzed for this study. The total rehearsal time for the high school ensemble was approximately 7:13, with approximately 3:57 devoted to Southern Harmony. The total rehearsal time for the college ensemble was 7:40, with approximately 4:17 devoted to Southern Harmony. In all rehearsal settings, the video camera was positioned so that the subject was in full view of the camera. All equipment and materials used for video recording the rehearsals were of sufficient quality to provide clear audio and video signals. The result was two separate, complete rehearsal chronicles of the subject preparing the same piece with a high school ensemble and a college ensemble.

Analysis of the videotapes began by watching the tapes and noting the counter times for each rehearsal of Southern Harmony using a VCR with a real-time counter. Next, I watched each rehearsal again noting the counter time at the beginning of each rehearsal frame and the target(s) of each rehearsal frame. I then took the data and organized a timeline for each rehearsal that included the counter time for the start of each rehearsal frame. I identified a total of 280 rehearsal frames, 153 in the high school rehearsals and 127 in the college rehearsals. The target(s) for each rehearsal frame were then categorized using “articulation,” “dynamics,” “editorial,” “intonation/tone,” “pitch accuracy,” “rhythm accuracy,” “tempo,” “unidentified target,” “multiple targets,” and “other” as target categories. The categories and their definitions were adapted from previous research (Cavitt, 1998; Doerksen, 1999; Goolsby, 1999). For purposes of reliability, approximately 20% of the rehearsal frames were viewed by a trained observer who identified the target category for each frame. Reliability between the two independent observations was .92 (agreements divided by agreements plus disagreements).

Results

Analysis of the data indicated several similarities in the two sets of data. A chi-square analysis indicated no significant differences in the number of rehearsal frames between the two groups [X-sq (1, N=280) = 2.42, $p > .05$]. Of the 280 rehearsal frames observed, 153 (54.64%) occurred in high school rehearsals and 127 (45.36%) occurred in university rehearsals. A crosstabulation of the number of trials per rehearsal frame by ensemble level indicated no significant differences [X-sq (15, N=280) = 12.99, $p = .60$]. The mean number of trials per rehearsal frame was 2.2 (sd 2.22). There were no significant differences in the number of rehearsal frames per movement (Southern Harmony is a four movement work) for the two groups [X-sq (3, N=280) = 2.95, $p = 0.40$]. However, the fourth movement accounted for the majority of rehearsal frames for both groups (135, 48.21%) and there were twice as many rehearsal frames in the fourth movement than any other movement for both groups. The remaining three movements together accounted for just over half of all rehearsal frames (145, 51.79%).

A crosstabulation of rehearsal frame target category by ensemble level indicated significant differences [X-sq (11, N=280) = 31.19, p = .001]. Results of the crosstabulation are presented in Table 1. While this statistical test does not allow one to conclude anything other than that there is some relationship in the sample of rehearsal frames between ensemble level and target category, an examination of the raw data might suggest how the rehearsals differed. Of the 56 (20%) rehearsal frames targeting rhythm, the high school group accounted for 38 (13.57%) while the college group accounted for 18 (6.43%), more than twice as many. Of the 13 (4.64%) rehearsal frames with an unidentified target, the high school group accounted for 11 (3.93%) while the college group accounted for 2 (0.71%). Other differences were noticed in the number of tempo and articulation targets; in both categories, the number of rehearsal frames with the high school group was nearly twice that of the college group. For both ensembles, the greatest number of rehearsal frames included two targets within a single rehearsal frame (73 frames, 26.07%). Similar frequencies were observed in the two groups; the high school group accounted for 35 (12.5%) of the two-target frames and the college group accounted for 38 (13.57%). The most remarkable difference between the two groups may be in the number of rehearsal frames that included more than two targets within a single rehearsal frame. While there was only 1 high school group rehearsal frame with more than two targets (0.36%), there were 17 college group rehearsal frames with more than two targets (6.07%). Of the 280 rehearsal frames observed, 91 (32.5%) or nearly 1 out of every 3 addressed more than one target.

Table 1

Crosstabulation of Target Category by Level for All Rehearsal Frames

X-sq (11, *N*=280) = 31.19, *p* = .001

Target Category	High School	College	Total
Articulation	16 5.71%	9 3.21%	25 8.93%
Dynamics	18 6.43%	17 6.07%	35 12.50%
Editorial	3 1.07%	3 1.07%	6 2.14%
Intonation/tone	6 2.14%	4 1.43%	10 3.57%
Pitch Accuracy	6 2.14%	7 2.50%	13 4.64%
Rhythm Accuracy	38 13.57%	18 6.43%	56 20%
Tempo	19 6.79%	11 3.93%	30 10.71%
Unidentified	11 3.93%	2 0.71%	13 4.64%
Other	0 0%	1 0.36%	1 0.36%
Multiple (2)	35 12.5%	38 13.57%	73 26.07%
Multiple (3)	1 0.36%	16 5.71%	17 6.07%
Multiple (4)	0 0.00%	1 0.36%	1 0.36%

Total	153	127	280
	54.64%	45.36%	100%

Throughout both series of rehearsals, I observed that many rehearsal targets were improved to the conductor's satisfaction in a single performance trial. To better understand how the rehearsal targets compared between the two groups, I identified rehearsal frames with 2 or more student trials for further analysis (Cavitt, 1998). 158 (56.43%) of the rehearsal frames observed in the two series of rehearsals included a single student trial and 122 (43.57%) rehearsal frames included 2 or more student trials following the identification of the target or targets.

A crosstabulation of target category of rehearsal frames with two or more student trials by ensemble level indicated significant differences [X-sq (11, N=122) = 38.16, p = .0001]. Results of this crosstabulation are presented in Table 2. Again, this statistical test does not allow one to conclude anything other than that there is some relationship between ensemble level and target category in the sample of rehearsal frames. An examination of the raw data may provide some insight as to how the rehearsals differed. As before, multiple target rehearsal frames accounted for the greatest number of rehearsal frames with two or more student trials. The 48 rehearsal frames with two targets were evenly divided between the high school and college groups. Notable differences were observed in rehearsal frames targeting articulation, where the high school group accounted for all of the 11 (9.02%) rehearsal frames with two or more student trials; rehearsal frames targeting rhythm accuracy, where the high school group accounted for 18 (14.75%) of the rehearsal frames with two or more student trials and the college group accounted for 4 (3.28%) of the rehearsal frames with two or more student trials. Here again, the most remarkable difference between the two groups may be in the number of rehearsal frames with two or more student trials that had more than two targets. While the high school group had only one such rehearsal frame (0.82%), the college group had 15 (12.30%) such rehearsal frames.

Table 2

Crosstabulation of Target Category by Level for Rehearsal Frames with Two or More Trials

X-sq (11, *N*=122) = 38.16, *p* = .0001

Target Category	High School	College	Total
Articulation	11	0	11
	9.02%	0.00%	9.02%
Dynamics	2	2	4
	1.64%	1.64%	3.28%

Editorial	0 0%	1 0.82%	1 0.82%
Intonation/tone	2 1.64%	1 0.82%	3 2.46%
Pitch Accuracy	1 0.82%	0 0.00%	1 0.82%
Rhythm Accuracy	18 14.75%	4 3.28%	22 18.03%

Table 2 continues

Table 2 *Continued*

Target Category	High School	College	Total
Tempo	6 4.92%	5 4.10%	11 9.02%
Unidentified	4 3.28%	0 0.00%	4 3.28%
Other	0 0%	1 0.82%	1 0.82%
Multiple (2)	24 19.67%	24 19.67%	48 39.34%
Multiple (3)	1 0.82%	14 11.48%	15 12.30%
Multiple (4)	0 0.00%	1 0.82%	1 0.82%
Total	69 56.56%	53 43.44%	122 100%

Discussion

Much of the data indicated similarities in the two series of rehearsals. No significant differences were observed in the total number of rehearsal frames, nor were there significant differences in the number of trials per rehearsal frame between the two groups. A small majority of rehearsal frames identified in this study were comprised of a single student trial following the conductor's identification of a target or targets; in both series of rehearsals the conductor exhibited a pattern of setting and accomplishing short-term goals that were in congruence with greater musical objectives. The high number of single trial rehearsal frames suggests that most of these short-term goals were readily attainable by each group.

Of the 153 high school rehearsal frames, most addressed rhythm (24.84%) and multiple targets (23.53%), followed by tempo (12.42%), dynamics (11.76%), and articulation (10.46%). Of the 69 high school rehearsal frames with two or more student trials, most addressed multiple targets (34.78%), followed by rhythm (26.09%) and articulation (15.94%). Of the 127 college rehearsal frames, most addressed multiple targets (43.31%), followed by rhythm (14.17%), dynamics (13.39%), tempo (8.66%) and articulation (7.09%). Of the 53 college rehearsal frames

with two or more student trials, most addressed multiple targets (73.58%), followed by tempo (9.43%) and rhythm (7.55%).

The most notable differences between the two sets of data appear to be those involving multiple targets. Approximately 23.53% of all high school rehearsal frames addressed multiple targets while 43.31% of all college rehearsal frames addressed multiple targets. Of the college rehearsal frames with two or more trials, 73.58% had more than one target while only 36.23% of the high school frames with two or more trials had more than one target. The conductor was more likely to address multiple targets simultaneously with the college ensemble than with the high school ensemble. Furthermore, the conductor frequently addressed three targets simultaneously with the college group and did so only once with the high school group. In rehearsal frames that required more than one student trial, the conductor tended to focus on single issues with the high school group. However, in similar rehearsal situations with the college ensemble, the conductor tended to address two or three issues simultaneously. These findings are in accordance with previous research that reported a greater number of multiple targets occurred in high school rehearsals compared to middle school rehearsals (Cavitt, 1998), and that experts comment upon a variety of issues in rehearsal (Goolsby, 1999).

These results suggest that there may indeed be differences in how a conductor effects change in the performance of high school versus college ensembles. It appears that in instances where change in the students' performance was to require more time and attention (more than a single performance trial), the conductor frequently chose to limit the rehearsal frame to a single target. No such trend was evidenced in the college rehearsals, where in similar circumstances multiple target rehearsal frames outnumbered single target rehearsal frames nearly three to one. It may be that with high school ensembles, it is more efficient to limit the number of targets at any given time to one or two, and furthermore, to focus on single targets in more complex performance situations. Perhaps pre-service teachers would benefit from observing accomplished conductors working with high school and junior high student musicians in addition to their ongoing performance experience with expert conductors and their own college peers.

Future research will investigate how change was effected in different rehearsal frame target categories in these two series of rehearsals. There may be differences in the way conductors bring about change in specific-target rehearsal frames with different age/ability levels. For instance, is there more teacher modeling in a high school rehearsal frame targeting dynamics than in a college rehearsal frame? Additionally, I hope to observe other expert conductors in conditions similar to those in the present investigation.

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