A STUDY OF PRACTICE ENVIRONMENTS AND INSTRUMENTAL MUSIC ACHIEVEMENT

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ABSTRACT

A STUDY OF PRACTICE ENVIRONMENTS
AND INSTRUMENTAL MUSIC ACHIEVEMENT

By

Virgil Wayne Bartman

The investigation of music students' proficiency in sight-reading and detecting errors after completing a specified practice procedure constituted the main purpose of this study. The second purpose was to investigate students' attitudes after they had practiced with a specified method. An additional related investigation was a study of the effects of certain practice environments upon learning increments.

One hundred and eight students at Jenison Junior High School participated in this experiment during the second semester of 1971. The students were given the following tests as pretest and posttest: The Watkins-Farnum Performance Scale, an error detection test, and an attitude test. Twenty units of practice were assigned to fifty-four pairs of students over a ten week period. The practice sessions were assigned twice each week for approximately twenty-two minutes a day. The students were randomly divided into three treatment groups.

One group was assigned practice time with a teacher in a traditional practice period, another group was given free practice time, and a third group was assigned practice time

without the presence of the teacher, but with prescribed methods of practice. All of the fifty-four pairs assigned to one of the three method groups, were also assigned practice environments designated as: higher or lower I.Q., practice with same or different instruments (brass and woodwind), and practice with a member of the same or opposite sex. All of the students within the groups were selected at random for the specified categories, and an attempt was made to balance numbers of students in method and practice environments.

From observation of the data, it was determined that the three methods for teaching students to detect errors in their own performance varied in effectiveness. Hypotheses were stated for dependent measures; error detection, sight-reading, and attitude. Independent variables included practice method, I.Q., instrument grouping, and sex grouping. None of the twenty-one null hypotheses in the study were rejected with a .05 level of confidence.

Students with lower I.Q. made the greatest gain in achievement when they were given a specified practice procedure without the presence of a teacher. The greatest difference with the lower I.Q. group in error detection, was the difference between the gain for those in free practice (96 raw score), and those with a specific practice procedure played on a tape recorder (106 raw score).

One initial concern of the study was to see if learning the skill to detect error in one's own performance would compliment ability to sight-read. The envisaged effect of sight-reading performance and the ability to detect error, being directly related, was dispelled in this study. According to this study there is little relationship between the two skills.

From the research in this study, the following implications were made for instrumental music educators:

1. Methods for teaching higher and lower I.Q. groups of instrumental music students should be developed with techniques that are different in presentation. A method that is appropriate for a student with a higher I.Q., is not necessarily the best for students with lower I.Q. In this study the methods used were more effective for students with lower I.Q.

2. To increase the ability of a student to observe errors in his own performance does not readily effect his possibilities for better sight-reading performance. The student can better recognize his error, but he may still not be motivated to strive for a flawless performance.

3. Music educators should develop more self-administered methods of instruction relating to music performance. Teaching music performance without the teacher's presence can be successful. The teacher in instrumental music classes can prescribe methods to give the student more independence in his practice environment.

4. Music students can practice well together in pairs of two with prescribed methods of practice. They can practice

with either members of like or different sex, or with like or unlike wind instruments, to accomplish results. This variety for student practice situations greatly increases the practice assignment possibilities for the school music educator.

5. Music educaters may use Method I designed in this study in instrumental music classes to increase learning increments for error detection. With this method a teacher does not have to be directly involved with teaching the students.

6. The attitude test (Practice Attitude Inventory) developed in this study can be used to measure changes in practice attitudes.

A STUDY OF PRACTICE ENVIRONMENTS
AND INSTRUMENTAL MUSIC ACHIEVEMENT

By

Virgil Wayne Bartman

A DISSERTATION

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DOCTOR OF PHILOSOPHY

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To my wife Marcia
my daughters Renee and Lori,
my sons Douglas and Todd.

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Grateful acknowledgment of contribution, of their time and interest toward the realization of this study, is extended to Dr. Bartlett and Dr. Sherburn.

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CHAPTER I

THE PROBLEM

Music is an established area of study in a school curriculum from kindergarden through high school. Students in music classes have the opportunity to develop their interests and skills through a variety of music learning experiences. Performance skills are taught through singing and playing experiences as a basic form of musical expression.

Teaching music skills for performance, using the medium of band and orchestra instruments, is introduced in late elementary and junior high school. Patterns of instruction in each school help to determine whether the student may start instrumental music education with a group of students or individually. At times, in instrumental music performance classes, students may study music theory and music literature along with skill development. However, the primary goal generally, is to learn to play and perform proficiently.

Music educators debate whether highly skilled performance on instruments in secondary schools is too often an over specialized goal. Some believe this is a goal achieved at the expense of broader goals of music education. These broader goals of music education are often described as music for increased aesthetic experience, or music for enriched living. These goals are served by increasing musical knowledge and sensitivity to musical expression. Whatever goals music educators advocate, instrumental teachers will probably continue to teach performance as the primary goal of instrumental music education.

In the Fifty-seventh Yearbook of the National Society of the Study of Education, the concept of music performance was discussed by McMurray:

> There are at least two important reasons why some measure of instruction in performance skills in music should be included within everyone's formal education. In the first place, no one can be said to have discovered whether or not he has talent or liking for musical performance unless he has tried it. In the second place, it seems probably that learning to hear music in its full reality is made easier of accomplishment if accompanied by training in the making of music.[1] (sic)

A music student may begin to listen more intently to sounds performed by others after experiencing his own attempts for tone production. Assuming that the student has learned to recognize a tone that is traditionally considered to be beautiful, he may be motivated to imitate this sound.

Because of the large number of students and parents interested in instrumental music, a vast amount of teaching time and effort is directed toward instrumental music

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[1]Foster McMurray, "Pragmatism in Music Education," Chapter II Basic Concepts in Music Education, Fifty-seventh Yearbook of the National Society for the Study of Education, Part I, (ed.) Nelson B. Henry (Chicago: University of Chicago Press, 1958), p. 45.

education in schools and in the home. Bobbitt outlines a dilemma that music educators of our time should attempt to solve:

> The population explosion makes it quite clear that the difficulties concomitant to music teaching in the public schools will not dissolve, nor even diminish significantly, and it would appear that the goals of music theorists and practical-minded educators should be centered around the development of teaching methods and instructional devices that can provide the most efficient utilization of available time.[2]

Need for the Study

There is a need for research and study of two current concerns of instrumental music educators: (1) To maximize student achievement in performance; (2) To increase teaching efficiency in instrumental music education. Two important divisions of music performance achievement are: (1) Sight reading skill, and; (2) Self-evaluation through error detection.

After playing an instrument for several years, music students should depend less and less on the teacher for evaluation of their own performance. Because a student spends a number of years practicing and performing music, it may be assumed that he will become qualified to listen critically to his own performance and to make valid judgments. Whether the student applies his knowledge of error

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[2]Richard Bobbitt, "The Development of Music Reading Skills," Journal of Research in Music Education, XVIII (Fall, 1970), pp. 143-156.

detection for better performance habits and techniques is undetermined.

A student must learn to evaluate his performance if he is to make changes for improvement. The skill of evaluation can be acquired over a period of some time, but it is difficult to determine how much of this skill is self-taught, and how much is learned through formal instruction. When the student is learning the skill of playing an instrument, the skill of critical listening is too often the assumed task of the teacher. Critical listening is an ability the teacher attempts to impart to his students; however, rarely does an instructor teach students to listen critically to performances when he is not present. Traditionally, in either private lessons or ensemble rehearsals, the instructor is the evaluator and communicates judgments to students.

Music teachers may neglect to insist on critical listening habits for the student's individual practice for various reasons. Possibly they may believe that students are not capable of the skill. Perhaps their own transition from a position of a student performer, to the position of teaching others, did not include proper training. Possibly the teacher presents critical listening as a by-product of performance, and thus the student consequently may learn the skill too late to be of value to him in forming efficient practice habits.

Because of the persistence of instructors to correct errors, students always depend upon the teacher to detect errors in performance. By so doing, students do not learn to

listen critically during practice sessions. Although the student can improve his performance somewhat by sheer repetition, he progresses from one selection to another without either adequate understanding of the music or constructive criticism from the teacher. There is no adequate model for substantive learning of performance evaluation skill in the individual practice setting. Refined motor skill is contingent upon critically shaping immature performances through evaluation, criticism, and repetition.

The second concern of this study for instrumental music educators is to increase their efficiency in teaching. One way to do this is to have more of the teaching and learning take place without the presence of the teacher. Programmed learning is one such means. Desirable outcomes can be designed to make it possible for students to learn without the presence of the teacher. The following summary depicts the direction of programmed instruction in recent years:

> Programmed instruction has been on the educational scene for a decade. While its use is not as widespread as was expected, it has been an impetus for several of the other important developments in instructional technology. Behavioral objectification. individualized instruction, computer assisted and computer managed instruction are all specific by-products of P I. The most important contribution of P I, however, is a concept - that instruction should be designed and presented in order to lead to intended outcomes; that, if these outcomes are not attained, the instruction, not the learner, is deficient; and that the instruction will be revised on the

> basis of learner feedback, until it does yield predictable student learning.[3]

No feasible means has yet been detected for the application of principles of programmed learning to the development of highly refined performance skills. Educators need to look for other means of optimizing their efficiency in teaching. The use of students to guide practice of other students offers a unique means for supervised instrumental achievement. This strategy would help solve the dilemma of unguided learning during individual practice - long a problem in instrumental music education.

Students likely would learn more efficiently if guided during the practice session. Students are likely to take direction from students their age as well as from teachers. Guidance can come from teachers, para-professionals, or other students. The strong influence that a student's peer has on attitude and learning should be properly directed for more efficient music teaching. Three possibilities were investigated in this study:

1. Student with teacher.
2. Student and student - without specific practice instructions.

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[3]Robert M Morgan, "A Decade of Programmed Instruction," Educational Technology, X (July, 1970), p. 30.

An application of learning principles may help instrumental music educators to improve student practice habits. One of the important goals for effective teaching is to encourage listening habits that continue to improve the student's music performance.

Directing and facilitating the music learning process should be a concern of all music educators. The process of learning to sight-read music and detect error in performance is not directly observable. Through systematic control of stimuli it is possible to make inferences about learning by observation of changes in behavior. Learning is inferred from the modifications of behavior which occur.

Music learning can be observed with an application of principles developed by "behavioristic" psychologists. An explanation of how students learn to detect errors, and to sight-read music, might be found in "reinforcement learning" as theorized by Skinner. In reinforcement learning, the important stimulus is the one immediately following the response. Thus, a student behaves because of the consequences which have followed similar behavior in the past. Underlying the method of Skinner is his conviction that behavior is determined not from within but from without. He is convinced that actions are determined by the environment; behavior is shaped and maintained by its consequences.

One of the prime considerations of Skinner's view is that the experimenter must be passive until the response is produced by the subject. When the particular response does occur, the experimenter becomes active and produces the reinforcing stimulus as quickly as possible following the response.

One of the important factors in Skinner's logic is that reinforcement of behavior is contingent upon a response. "By progressively changing the contingencies of reinforcement in the direction of the desired behavior, one can see learning occur."[4] Skinner's contingency of reinforcement includes a sequence of; response, stimulus, and reinforcement.

According to Skinner, operant discrimination is a change in behavior as the result of awareness of changes in the environment. By applying this learning theory to music learning, one may state that a student can be made to respond to error in his performance by stimuli in his environment. In an application of Skinner's logic for this study, the stimuli in each of the practice environments will alter skills of error detection and sight-reading through differences in reinforcements.

Sight-reading music and detecting error requires response to the stimuli of the printed music score. The perceptual organization of notation involves a discrimination of stimuli. For example, Lundin describes rhythm as an element that is both stimulus and response.

> Rhythm must be considered both as a stimulus object and as a response of the organism. On the stimulus side, it includes such things as markings on a printed page of music, a series of

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[4]Morris L. Bigge, Learning Theories For Teachers (New York: Harper and Row, 1964), p. 126.

> auditory beats or the particular temporal pattern some tonal stimuli follow. On the response side, rhythm is both perceptual and motor.[5]

Reward reinforcement facilitates the learning process. When an organism responds and the response is followed by a stimulus that has the function of a reward, the probability of the response occurring again is increased.

> It has been found that there are certain generalized conditioned reinforcers that tend to work fairly well for most people. These include: attention to an individual, approval of his work, affection, and acquiescence.[6]

Therefore, in learning skills necessary for performance of music, the proper manipulation of the above generalized positive reinforcers is of paramount importance in training a person to perform according to acceptable musical standards set by the teacher.

The first principle for the acquisition of a high standard of musical learning is the proper manipulation of positive reinforcers by a teacher or person who is coaching the student. "The learning of a musical skill, then, is the result of a continuous shaping process by the teacher and likewise by the student himself."[7]

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[5]Robert W. Lundin, An Objective Psychology of Music (New York: The Ronald Press, 1967), p. 101.

[6]Ibid., p. 130.

[7]Ibid., p. 131.

When the student responds to the music score with incorrect performance he should be corrected as soon as possible. Although it is probably too time consuming for the teacher to listen to each of his students in school practice time, it would be possible for students to listen to each others performances and make evaluations.

Lundin describes the important process of extinction in learning:

> This process, whereby we are able to produce novel responses, amounts to the selection of one or more natural variations of a learned behavior giving them exclusive reinforcement and allowing for the remaining variations, being less desirable responses, to die out - that is, to be subjected to what psychologists call "extinction." Extinction refers to the withholding of a reinforcement when a response is made; just as a positive reinforcement strengthens behavior, extinction weakens it.[8]

If the instrumental music student is able to select a variety of responses and reinforce only the most appropriate ones, he would more likely demonstrate desirable musical behavior. In the repetition of a musical passage, there are likely to be variations, some of which will be deemed more musical than others. Often the student can select the musical passage that is played correctly.

The shaping of better and better performances is a gradual one. The music educator should continously shape a greater accuracy in performance that will meet continously

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[8] Ibid.

higher standards. The probability of an accurate performance might be extremely low at the beginning of practice. By reinforcing a series of successive approximations, one may bring a response from imprecision to one of exactness. Lundin describes the procedure of selecting response:

> This process of response differentiation is the principle underlying the acquisition of all the most complex skills. The procedure is always one of selecting certain responses as opposed to others, by making slight changes in the direction of greater effectiveness in a given unit of musical accomplishment.[9]

The value of practice lies only in the repetition of a pattern of response that inevitably will vary and whereby the better aspects of that pattern may be reinforced by the person, his peer, or a teacher. Out of variability in the performance that does occur through repetition, the job of the teacher or student is to reinforce, to the degree that he is able, those acts of performance that he considers to be superior to the others. If he cannot do this, there is no reason to believe the performance will improve.

For the student, reinforcement may come from his own response in his evaluation of his performance based on the standard he knows. A student can discriminate that he is playing a part better. Students can be reinforced by their own behavior, if they can discriminate that they are

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[9] Ibid., p. 132.

improving. By using pairs of students practicing together, students may be motivated to discriminate and the standards for performance may be higher.

In this study an attempt was made to have learners become more aware of correct and incorrect performance response. Each time a mistake was made by one of the pair in a practice environment, the other student was to indicate the mistake to be corrected. The practice-aid is then the reinforcing stimulus which strengthens the student's awareness of correct and incorrect performance. The practice-aid can be used as a reinforcer for learning to detect errors in music performance. The aid, acting as a reinforcer, thus increases the probability of a correct response.

Purpose

This study had three main purposes: (1) To analyze error detection skills of music students practicing in a variety of environments; (2) To analyze sight-reading achievement under different practice conditions; (3) To evaluate resultant student practice attitudes.

There is need to investigate a student's reaction to his error in music performance. There is also a need to teach the skill of detecting errors. Critical listening can be taught in a private lesson or in a classroom, but possibly much could be learned from investigating listening and performance of students who are obliged to spend much time without a teacher. Students may be able to analyze strengths and weaknesses in their own playing after practice sessions are spent observing a performance of one of their own peers.

A question of particular interest was: Is there a significant difference between certain school practice environments and an increase in learning sight-reading and error detection skills? Practing with a peer, who can stimulate new interest in practice, could possibly result in an improvement of a student's performance skill. Three dichotomous variables were identified as possible effectors in grouped student practice. These variables were:

1. Intelligence Quotient (Two levels), high and low, dichotomized at the sample mean.
2. Like and Unlike instruments (Two levels), brass and woodwinds.
3. Sex - same or mixed.

The following learning environments were used to analyze self-evaluation techniques of instrumental music students:

1. Students paired with students ranking in the upper half I.Q. level in the class.
2. Students paired with students ranking in the lower half I.Q. level in the class.
3. Students paired with students with the same class of instruments, (both play woodwind, or both play brass).
4. Students paired with students with different instruments, (woodwinds paired with brass).
5. Students paired with a member of the opposite sex.
6. Students paired with a member of the same sex.

Three methods of practicing sight-reading and error detection were presented:

1. Method T - a method of having instrumental music teachers rehearse with pairs of students with what-ever traditional techniques they choose to teach. In this study, the teachers attempted to improve the student's performance by having them play through parts of the music, before and after explanations for correct performance were given. The teacher made the decision of when to have the students play alone or together. As the students played, the teacher made evaluations during the practice session.

2. Method I - a method with specific instructions for practice independent of the teacher. The teacher was not involved in any way during the practice sessions with these pairs of students.

3. Method P - a free practice time for each pair of students. No instructions were given, other than to use the designated time for practicing.

Hypotheses

The hypotheses formulated for this study relate to the main topic of interest previously presented and areas of secondary interest. These hypotheses are stated in experimental form as follows:

1. There is a significant difference among three practice methods in learning error detection.

2. There is a significant difference between higher and lower I.Q. groups in learning error detection.

3. There is a significant interaction between method and I.Q. in the error detection analysis.

4. There is a significant difference between same and different instrument practice groups in learning error detection.

5. There is a significant interaction between method and instrument in the error detection analysis.

6. There is a significant difference between two practice groups of same and different sex in learning error detection.

7. There is a significant interaction between method and sex in the error detection analysis.

8. There is a significant difference among three practice methods in learning sight-reading.

9. There is a significant difference between higher and lower I.Q. groups in learning sight-reading.

10. There is a significant interaction between method and I.Q. in the sight-reading analysis.

11. There is a significant difference between same and different instrument practice groups in learning sight-reading.

12. There is a significant interaction between method and instrument in the sight-reading analysis.

13. There is a significant difference between two practice groups of same and different sex in learning sight-reading.

14. There is a significant interaction between method and sex in the sight-reading analysis.

15. There is a significant difference among the three practice methods in attitude change.

16. There is a significant difference between higher and lower I.Q. groups in attitude change.

17. There is a significant interaction between method and I.Q. in the attitude analysis.

18. There is a significant difference between same and different instrument practice groups in attitude change.

19. There is a significant interaction between method and instrument in the attitude analysis.

20. There is a significant difference between two practice groups of same and different sex in attitude change.

21. There is a significant interaction between method and sex in the attitude analysis.

Definition of Terms

1. Error Detection Identification of music performance errors in pitch, rhythm, and miscellaneous music performance markings. The skill of detecting errors in music, presupposes a skill of internalization, or imagining the musical score.

2. Error Detection Test A measure constructed for this study, designed for a student to assess his own performance of the *Watkins-Farnum Performance Scale*. The student's performance was played back on tape for him to score with a scoring sheet that contained the music score and checking code for errors in pitch, rhythm, musical expression, and articulations.

3. Practice Attitude Inventory (PAI) An inventory constructed for this study comprised of a series of statements reflecting attitudes to which the subject is to respond. This practice inventory measures the disposition or temperament of a student toward his music practice. (Example, Page 164).

4. Peer-related Practice Junior high school activity of practicing instrumental music with another student, without the presence of adults.

5. Sight-reading The initial performance of music on an instrument, music not previously performed or studied.

Notation symbols are observed and there is a response with motor manipulation. Sight-reading on a wind instrument does not always require the process of internalization as in sight-singing. Some tones on wind instruments are produced primarily by finger placement and there is less need to internalize the sound to perform the correct pitch.

6. Sight-Reading Test The Watkins-Farnum Performance Scale In this test the student is expected to perform a series of succeeding music passages that increase in difficulty. A tempo is set for the performance of each example. If the student scores two consecutive zero scores in two of the examples he is disqualified from further performance. The test measures sight-reading performance.

Limitations

This study employed a sample of junior high instrumental music students (ages 12 - 14) from a suburban community. The dependent variables in the study, error detection achievement, sight-reading achievement, and practice attitudes, are defined in the previous section. These definitions present the confines of each term. Although there are many possible manipulations of the practice environment, only three were included in this study:

1. Students practicing with a teacher.
2. Students practicing together without specific practice instructions.

3. Students practicing together with specific practice instructions.

Procedure

One hundred and eight students, enrolled in seventh and eighth-grade band classes at Jenison Junior High School in Jenison, Michigan, were participants for this study. Three sections of students were randomly selected from the complete band sections, and a different treatment or method of practice was used in each of the three groups. The duration of the experimental period was approximately ten weeks. Practice groups met twice each week over a ten-week period with practice sessions approximately twenty-three minutes in length.

At the conclusion of the ten-week practice period the sight-reading, error detection, and attitude tests were individually administered to all subjects as a posttest. All of the same tests were previously given as pretests.

Data were analyzed by analysis of variance according to the hypotheses stated above. Computation was completed on the CDC 6500 computer at Michigan State University.

Overview

A review of related literature in Chapter II includes: studies of error detection, sight-reading, practice environments, parental practice attitudes, and a pilot study.

The design of this study with statements of the hypotheses to be tested and their analyses appear in Chapter III.

The analysis, statistical documentation and interpretation is in Chapter IV. The summation with conclusions drawn from the hypotheses tested and their implications for use by other experimenters in future studies are stated in Chapter V.

CHAPTER II

REVIEW OF THE LITERATURE

Studies were reviewed that dealt with two aspects of instrumental music achievement; error detection and sight-reading. Literature was also reviewed that pertained to: instrumental music practice environments; and parental attitudes toward music practice. Finally, a pilot study was designed to develop and evaluate methods for teaching error detection and sight-reading performance skills.

Error Detection

No previous studies were found that presented the teaching of error detection skill and analyzing error detection achievement as presented in this study. However, studies are reported that contain procedures and results that are related to this study. Sidnell developed and tested self-instructional drill materials aimed at improving student conductors' score-reading ability.[10] His study was concerned with better preparation of teacher-conductors who were training to use the skill of detecting and identifying errors made

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[10]Robert G. Sidnell, "Self-Instructional Drill Materials for Student Conductors," Journal of Research in Music Education, XIX (Spring, 1971), pp. 85-91.

in music rehearsals. He defined score-reading ability in his study as: "skill in the detection and identification of pitch and rhythm errors in instrumental performance."[11]

Drill materials used in the project were developed from instrumental performances of junior and senior high school music groups. The pitch and rhythm errors found in these performances were classified by type and were identified for a glossary of "typical student errors." Excerpts from these performances were performed and recorded by advanced college performers in such a way that a single error of pitch or rhythm marred an otherwise perfect performance. Two hundred and forty errors were recorded in this manner and were cast randomly into twenty drill types.

While reading along from a four-staved conductor's score, subjects listened to taped excerpts of four-part instrumental performances. The control group, after two hearings, was expected to locate the error, determine whether it was an error of pitch or rhythm, identify the erring instrument, and indicate how it deviated from the conductor's score. For the experimental group the items were programmed in the following manner:[12]

1. A four-bar phrase is played while the student watches the musical score. Through written response he is to indicate in what measure an error occurred.

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[11] Ibid., p. 85.

[12] Ibid., p. 88.

Reinforcement to this response is aural and is included on the training tape.

2. A smaller segment of the excerpt is performed and the student is to indicate whether the error was one of pitch or rhythm. Reinforcement is again aural.

3. Only that small portion of the score is performed that immediately surrounds the error. With the information at hand the student can specifically focus more carefully on the error. Immediate reinforcement is again provided aurally.

4. The aural stimulus presents only the single instrument performing the error in a very short fragment. The student is asked to write the error as performed while viewing the fragment as written. Reinforcement is aural.

Sidnell developed the programmed drill material according to a sequence that he considered would follow the mental activity involved in error discovery. During the experimental period both the experimental and control groups improved significantly in detecting and identifying rhythm and pitch errors. The mean gain of the control group was 11.85 compared to 26.23 of the experimental group. A t-test for small sample/matched subjects resulted in a 2.88 significance at the .05 level. The conclusions relevant to the present study were:[13]

1. Extra class drill material specifically directed to the improvement of score-reading skill is beneficial.

2. Drill material of a self-instructional nature arranged in a programmed format is superior to non-programmed material in bringing about gains in score-reading skill.

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[13] *Ibid.*, p. 91.

In the present study students were involved in experiences similar to the programmed items in Sidnell's study. The present study differed in that the reinforcement was made by a student's peer in an informal manner. The students in the Sidnell study began with a four measure phrase and proceeded to a shorter segment. In the present study, the procedure was often reversed because of the peer's immediate response to error. The Sidnell study helped to give direction for the present study with: (1) a sample of drill material used to increase error detection skill; (2) a list of variables that did not prove to be relevant for error detection achievement.

A study by Gonzo was concerned with choral teachers' ability to detect pitch errors while reading the score.[14] The purpose of the study was to determine whether differences exist between undergraduate music majors preparing for teaching careers in music and experienced secondary level choral teachers in regard to their ability to detect pitch errors.

Gonzo developed a test to measure ability to detect pitch errors within choral music excerpts. A response system was devised that allowed subjects to identify a pitch error in one of three ways:[15] (1) the subject could place a check mark

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[14]Carroll Lee Gonzo, "An Analysis of Factors Related to Choral Teachers' Ability to Detect Pitch Errors While Reading the Score," Journal of Research in Music Education, XIX (Fall, 1971), pp. 259-271.

[15]Ibid., p. 260.

in the box below the note or chord where he thought a pitch error occurred; (2) circle the note or notes believed to be in error, or; (3) write in the note or notes that were actually performed by the singers. Gonzo determined that the investigator could determine the approximate competence of each subject by the choice of response to a test item. It was determined that a subject who wrote in the incorrect note that a singer performed, possessed a greater degree of competence than the subject who circled the note or checked the box.

Gonzo found no significant difference between experienced choral teachers as a group and undergraduate music majors as a group in regard to their performance on the pitch error detection test. Gonzo concluded that the failure of the teachers to perform significantly better than the students indicates that teachers:[16] (a) do not use their pitch error detection skill in daily rehearsals; (b) use the skill, but fail to improve in it, or; (c) are not able to detect pitch errors without having first studied the score.

The Gonzo study was reviewed primarily so that the reader might compare the error detection test with the test used in the present study. The test was not used for the present study as a model or example because of the difference of performance medium and subject experience.

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[16] Ibid., p. 270.

Sight-Reading

Sight-reading for the instrumental music student infers a first performance of music that has not previously been practiced. Instrumental music educators often state that there is no "short cut" for becoming a better sight-reader. Their solution for better sight-reading skill often is to encourage the student to practice numerous music selections assuming that, such practice will decrease the chance of making errors in new music. The emphasis then, is on the amount of time spent in practice, and not the efficiency of practicing for accuracy. An efficient way to teach sight-reading is of great importance to every music educator who is concerned with performance skills.

In a study by Klemish, music reading is summarized as:[17]

> A highly complex process that involves the auditory perception of a variety of sounds, the visual perception of symbols, and a reaction to these stimuli, all of which manifests itself in performance or the conversion of symbols into sound.

Klemish investigated music reading by comparison of two teaching methods with first grade children. The basic assumption underlying the study was that music is best read in groupings of notes, and that a given grouping retains its identity in various contexts.

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[17]Janice J. Klemish, "A Comparative Study of Two Methods of Teaching Music Reading to First-Grade Children," Journal of Research in Music Education, XVIII (Winter, 1970), p. 355.

Method I in the study was labled a traditional method. First-grade music is oriented toward improving aural discrimination and understanding of melodic direction, like and unlike phrases, feeling for the tonic, melodic contour, and similar tasks that deal primarily with the melody. In addition to aural discrimination there were attempts to utilize simple visual representations of tonal patterns, such as hand movements, body movements, and pseudo-notation in the form of curved lines, dashes, and other diagrams not using the staff and conventional notation.

The emphasis was on recognition of patterns that had been sung or heard, and on preparation for moving to notation. Notation is usually taught in the next grade level but for this study, conventional notation was used two weeks prior to the end of the experimental period. Method II differed from Method I in the use of the music staff and filled-in noteheads with no use of conventional notation. Method I also employed hand and body movements to demonstrate melodic direction. A variety of techniques were employed to reinforce learning in both groups. Children wrote the patterns, formed patterns on charts, flannel boards, and chalk boards.

A pretest and posttest consisted of a test of auditory perception in which students had to imitate an aural stimulus by singing, counting the number of tones in a tonal pattern, and supplying a final tone in a melodic cadence pattern. The test was tape recorded and individually administered to each child. A written portion of the test administered to each class as a group, contained the following six parts:[18]

1. Recognition of patterns in pseudo-notation.
2. Recognition of patterns in conventional notation.
3. Discriminating between same or different patterns in pseudo-notation.
4. Discriminating between same or different patterns in conventional notation.
5. Matching notes or groups of notes to other notes or groups of notes.
6. Writing notes as they appear on flash cards.

A conclusion of study was that the effect of method was not statistically significant. However, Klemish also concluded that skills better developed under Method I were identification of melodic direction, aural matching, aural/visual matching, and singing patterns. Under Method II, using conventional notation, higher scores were achieved for recognition of patterns, writing tones dictated from the piano and dictated by numbers, and visual matching. The lack of a significant difference between the two methods suggests that it is not necessary to use pseudo-notation preliminary to the use of conventional notation.

Bobbitt and Corley developed an experimental program to teach elementary music reading skills. The program was developed in the Brookline, Massachusetts grade schools during 1966 and 1967. Because of the success of the program Bobbitt relates his suggestions for teaching these skills. No statistical tabulations were available for this study.

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[18] Ibid., p. 357.

Bobbitt suggests there is a difference between sight-reading skills for the instrumentalist and the sight-singer. He states:[19]

> It is possible, and not at all unusual to play an instrument quite well without understanding the structural nature of the music or even being aware of the laws governing the melodic progression of a given part. It is not possible to sing a group of tones derived from a specific intervallic combination without understanding the structural origin of the pitch sequence. Development of music reading skills through vocal participation ensures the pupil's actual involvement with the music.

Conclusions from Bobbitt's study emphasize use of the voice and personal involvement to assure better music reading skills.[20]

> The first and most important musical skill to be acquired by the young child is the ability to read music, in both scale and nonscale idioms, by use of the voice.
>
> There is a direct relation between the understanding of musical structure and the degree of personal involvement experienced by the individual. Pupils who are able to sightsing music, i.e., visually and aurally respond to musical symbols, and translate the sensation of pitch into tone through the use of the voice - are automatically enabled: (a) to sing a given melodic line alone or in combination with other voices; (b) to understand the meaning of accurate intonation; (c) to read parts from a musical score; (d) to learn more readily the principles of melodic transposition; (e) to take rhythmic and melodic dictation; (f) to acquire an intervallic

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[19] Richard Bobbitt, "The Development of Music Reading Skills," Journal of Research in Music Education, XVIII (Fall, 1970), p. 154.

[20] Ibid., p. 155.

> sensitivity for melodic progression, including the function of tendency tones and other important directional units; and (g) to gain insight into basic problems in music theory and the general structure of any musical style where melody is a factor.

The system for developing music reading skills in the Brookline Schools is founded upon a concept that one should begin with the learning of intervals in carefully selected combinations that are not limited to stylistic pitch classes (scales), and are not based upon tonal harmonic progressions in the traditional sense of major and minor keys. Instructional materials must be programmed so that pre-established subject matter is separated into small steps organized into logical sequence, and the learning of each item is reinforced through repetitive affirmation and immediate application.

During the Brookline experiment, where no single group received more than 20-25 sessions meeting once per week for about 30 minutes, Bobbitt found that fifth-grade children, who were previously unable to recognize consistently any intervals at all, were enabled to identify and sing octaves, perfect fourths, and major and minor thirds. They were also able to combine these intervals in a melodic situation and to recognize their structure in two-part framework. Bobbitt concluded that a continuation of programmed instruction in music reading as he developed, would undoubtedly produce the kind of hearing capacity that leads to musical literacy.

Sight Singing Literature

Most of the literature pertaining to music reading is about sight singing. Because some of the basic responses for the instrumentalist are similar, sight singing literature will also be reviewed. As the vocalist adjusts his voice, so also the instrumentalist must adjust embouchure and mental concept of pitch and tone, while observing interval changes.

Much of the historical development of sight singing from the time of Guido d'Arezzo to the present has been researched thoroughly by Ottman in a section of his dissertation. Repetition of his anthological account seems unnecessary; however, this source is recommended to the reader.[21] A few studies of sight singing research that can relate to the present study will be reviewed. Two areas will be emphasized: (1) the effectiveness of various kinds of drill as teaching devices for improved ability to sight sing; (2) factors that correlate with sight singing ability.

Much has been accomplished through the utilization of electronic tape recording devices in the field of ear training and in the field of sight singing. Teaching machines can be programmed for instruction of music fundamentals up through any level of information desired. The one underlying benefit

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[21] Robert W. Ottman, "A Statistical Investigation of the Influence of Selected Factors on the Skill of Sight-Singing" (unpublished Ph.D. dissertation, North Texas State College, 1956), pp. 3-37.

for both the student and the instructor is the limitless opportunity for drill, the necessary ingredient to achievement of the highest possible level of any skill.

Experimental studies related to different kinds of drill in sight singing have only recently increased in number, due mainly to technological advancement. Earlier studies by Bean,[22] Stokes,[23] and Christ[24] have pointed the way to further experimentation. Examples of this are the several experiments done with the tachistoscope, a device used to accelerate skills in word-reading, employed by Stokes and Christ in their studies.

The study by Cookson, conducted at Northwestern University in the summer of 1949, was an initial application of tape recorders as a teaching device for music skills.[25] A class of sixteen subjects received ear training drill over a six-week period involving occasional reinforcement tests and a final placement test. Scores from the final test compared

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[22]Kenneth L. Bean, "An Experimental Approach to the Reading of Music," Psychological Monographs, L (1938), pp. 1-79.

[23]Charles F. Stokes, "An Experimental Study of Tachistoscopic Training in Reading Music" (unpublished Ph.D. dissertation, Teachers College, University of Cincinnati, 1944).

[24]William E. Christ, "The Reading of Rhythm Notation Approached Experimentally According to Techniques and Principles of Word Reading" (unpublished Ph.D. dissertation, Indiana University Music Library, 1953).

[25]Frank B. Cookson, Recordings and Self Tutoring (Cleveland: The Brush Development Co., 1949), pp. 5-8.

with scores of regular music theory classes indicated that 75 percent of the experimental class accomplished twice the amount of ear training material that would normally be expected of such a class.

Spohn[26] further investigated the potential of tape-recorded music drill, realized in Cookson's study, in its application to the skill of "aural comprehension." The control group developed aural comprehension through conventional classroom methods, whereas the experimental group, using the same material, developed their aural comprehension utilizing specially prepared tape recordings outside of class. The control group registered an average percentage decrease of 57.68 percent, while the experimental group displayed an average percentage decrease of 80.33 percent leaving a difference of 22.65 percent between the two groups in percentage decrease.

The obvious conclusion drawn from these results is that the use of tape-recorded drills and exercises is a valid method for development of aural comprehension. In the present study recommended practice procedures were pre-recorded and used as a guide for a controlled practice environment. Music practice and directions for finding errors in music, by this means, may be considered drill material. Directed practice and instructions for finding music error, along with a

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[26]Charles L. Spohn, Jr., "An Exploration in the Use of Recorded Teaching Material to Develop Aural Comprehension in College Music Classes" (unpublished Ph.D. dissertation, Ohio State University, 1959).

team-learning environment, resulted in a type of practice drill. Although the researcher cannot claim a new method of programmed drill, the use of the tape recorder for motivation in a practice environment can be considered a related technique.

Studies by Salisbury and Smith[27] and Dean[28] included factors that were correlated with sight singing ability. Salisbury and Smith found the main evaluating factors to be dictation, pitch and tonal memory; whereas Dean, through determining the value of using the Seashore Measures of Musical Talent in the prediction of success in sight singing, found the Seashore pitch test and Seashore tonal memory test the most valuable in such a prediction.

Ortmann investigated the effect of melodic memory as part of aural perception.[29] The subjects were required to notate immediately short melodic phrases of five notes each as they were played on the piano. The results of this study enabled Ortmann to list, in order of difficulty, certain characteristics of melodic material. Conjunct and disjunct motion

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[27]Frank S. Salisbury and Harold B. Smith, "Prognosis of Sight Singing Ability of Normal School Students," Journal of Applied Psychology, XIII (1929), pp. 425-439.

[28]Charoles D. Dean, "Predicting Sight Singing Ability in Teacher Education," Journal of Educational Psychology, XXVIII (November, 1937), pp. 601-608.

[29]Otto Ortmann, "Some Tonal Determinants of Melodic Memory," Journal of Educational Psychology, XXIV (September, 1933), pp. 454-456.

with wide interval leaps were found to be most difficult to perceive.

In the experimental study by Ottman a number of factors were investigated utilizing several standard published tests as well as tests devised by Ottman himself.[30] The specific standard tests were The Seashore Measures of Musical Talent, The American Council on Educational Psychological Examination for College Freshmen, and The Nelson-Denny Reading Test (music reading). The factors and variables examined and compared in this study included tonic memory, melodic modulation, melodic dictation with and without rhythm, identification of isolated intervals, music literacy and two questionnaires--one for faculty evaluation of individual student musicianship and one for students to furnish general information.

The effects of scale, harmony, and tonality related to interval accuracy in melodic sight singing was the subject of a study by Marquis.[31] That experimenter also investigated the relationship of scale, harmony, and tonality to the basic difficulties of interval quality. The element of rhythm was present in this study, but controlled by simple usages. To accomplish this, Marquis approached the problem three different ways

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[30] Robert W. Ottman, "Statistical Investigation of the Influence of Selected Factors on the Skill of Sight-Singing" (unpublished Ph.D. dissertation, North Texas State College, 1956), pp. 3-37.

[31] James H. Marquis, "A Study of Interval Problems in Sightsinging Performance with Consideration of the Effect of Context" (unpublished Ph.D. dissertation, State University of Iowa, 1963).

as stated in the following hypotheses related to first-year college-level sight singing students:

1. The percentage of errors made in singing a music interval will differ, depending on the context in which the interval appears.

2. Those who make errors in singing a given interval presented in melodic context will tend, also, to make errors in singing the same interval presented in isolation.

3. The percentage of errors made in singing an isolated interval at sight differs from that made in singing the same interval under different conditions of context.[32]

Two criterion tests were devised and tested for reliability and validity--the Sightsinging Criterion and the Isolated Intervals Criterion tests. These tests were designed to produce statistics which would test the above stated hypotheses. The Sightsinging Criterion was found to have a reliability of .979 (Spearman-Brown), significant at .01 level of confidence. Validities of .776 and .828 were drawn from correlation coefficients with grade points in the sight singing and ear training course and scores on a semester Aural Skills Dictator Test which evaluated interval scale and chord perception; both were significant at .01 level. The Isolated Intervals Criterion was found to have a reliability of .830 (Spearman-Brown), significant at .01 level of confidence, and internal validity was claimed.

Buttram investigated the influence of four factors--

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[32] *Ibid.*, p. 5.

interval quale, pitch distance, tonal context, and relative distinctiveness--on the identification of musical intervals presented in a harmonic context. The term "quale," used in psychology, refers to the combination of two different musical tones resulting in a unified, distinctive effect possibly serving as a basis for interval identification. The feeling of harmony or tonality was created by the initial sounding of I-V-I chord progression before each interval was presented for identification. Then the tones composing the interval presented were drawn from those contained in the I, IV, or V chords of the same key. Buttram sums up the resulting conclusions of his study stating:

> Interval identification, as it occurred in this study, might best be described as a series of judgments based on a variety of characteristics of the interval and on the experience of the subjects with these characteristics.[33]

It is difficult to relate directly sight singing with instrumental music sight-reading because of the obvious differences of technique and tone production. Some educators advocate that if the instrumentalist is able to sing the notation correctly, he may be able also to play it more correctly on an instrument. Even if this was accepted by instrumental music teachers, they would often find this simple solution difficult to implement. Music educators can accept the similarity of

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[33]Joe B. Buttram, "The Influence of Selected Factors on Interval Identification," Journal of Research in Music Education, (Fall, 1969), p. 315.

mental process regardless of the performance medium.

Environment

The purpose of this part of the review is to select a few statements that relate to music learning environments. This is done rather than following another pursuit, that of reviewing studies emphasizing the importance of heredity or environment, or genetics and psychology. Material will be selected that pertains to current philosophies about music learning. Special attention would be given such variables as environments, sex groupings, I.Q., sociological status, and peer relationships.

Leonhard and House describe music learning environments that stress attention for individual opportunities:

> All musical instruction should provide for the students to initiate and develop individualized assignments.
>
> Teachers of instrumental classes should encourage pupils to play pieces of their own choice, to develop practice materials directly pertinent to their own playing problems, and to explore music outside the instruction book being used. These individualizing procedures stand in sharp contrast to teaching in which the entire group proceeds at the same pace on identical material selected by the teacher.[34]

Petzold suggests that the environment must include more opportunity for the student to make his own judgments. He

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[34]Charles Leonhard and Robert W. House, Foundations and Principles of Music Education (New York: McGraw-Hill Book Co., 1972), p. 311.

suggests that the teacher can teach more efficiently by allowing the child to assume more of the responsibility to learn:

> Rote learning of songs, particularly if the process is carried on in a routine way, fails to provide the child with opportunities to become independent; to develop the ability to evaluate critically the accuracy of responses as compared with the stimulus; or to become aware of the subtle differences between similar but not identical musical material. Aural understanding, which is the reflection of accurate auditory perception, results from intelligent thought and not from mechanical imitation, from judgments made independently by the child in terms of his understanding of basic musical concepts and not from judgment made for the child by the teacher.[35]

Rote learning is essential for the student who begins to participate in instrumental music performance. However, the young instrumental music student should soon learn to make judgments that will help him to progress without the presence of the instructor.

The next study is reviewed to present a current approach for having the students assume more of this responsibility. A study by Puopolo was concerned with the efficiency of individual practice, particularly, of beginning instrumental music students.[36] This study is concerned with a

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[35]Robert G. Petzold, "Development of Auditory Perception of Musical Sounds by Children in the First Six Grades," Journal of Research in Music Education, XI (Spring, 1963), p. 21.

[36]Vito Puopolo, "The Development and Experimental Application of Self-Instructional Practice Materials for Beginning Instrumentalists," Journal of Research in Music Education, XIX (Fall, 1971), pp. 342-349.

A number of practice problems including the problem of identifying practice errors. Although this study could also be reviewed in the section on error detection, the relevance for the present study seems best to relate to environmental factors affecting achievement.

The purpose of the study was to facilitate the teaching and learning of instrumental performance through the application of programmed procedure to individual practice. One of his specific purposes was to determine the relationship of music achievement, social status, and I.Q. with both programmed practice and performance achievement.

In his study he describes personal characteristics that aid the development of music performance skill. In this discussion, the typical practice errors made by young instrumentalists were also listed:

> The application of knowledges and development of skills are dependent upon the child's capacity for patience, self-discipline, self-assessment, perseverance, and thoroughness. He may (1) practice too fast, sacrificing accuracy for speed; (2) spend most of his time practicing what he can already do well and avoid what is difficult; (3) repeat material without detecting or correcting mistakes; (4) not remember a musical concept correctly, thus practicing it incorrectly; or (5) not know how to approach a particular problem by himself.[37]

The study investigated the feasibility of structured, programmed practice with tape-recorded materials and its effect upon the performance achievement of beginning elementary cornet

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[37] *Ibid.*, p. 342.

students. The main hypothesis was that structured practice with recorded tapes containing programmed material would produce a difference in performance achievement as compared with unstructured, nonprogrammed practice. The study also examined: (1) interactions between programmed practice and each independent variable, (music achievement, social status, and I.Q.) with respect to cornet performance achievement, and (2) the relationship of performance achievement to music achievement, social status, and I.Q.

The experimental treatment consisted of structured daily practice with ten weekly twenty-minute tapes containing programmed material. The control method consisted of daily twenty-minute practice of the same material, but in a nonstructured manner without tapes. The effects of each mode of practice upon performance achievement were measured with the Watkins-Farnum Performance Scale. Two-way analysis of variance, t-test, and correlation were the procedures used to test the hypotheses.

Programmed practice was found to be significantly superior to nonprogrammed practice. Of the control group, students of above-average music achievement displayed greater gains than those of below-average music achievement. Of the experimental group, no significant difference in cornet performance was found between students of above-average and below-average prior music achievement. There was no significant difference in cornet performance achievement between students of above-average and below-average social status, with or without programmed practice. Of the control group, no significant difference in cornet performance achievement existed between above-average I.Q. students and those of below-average I.Q. In the experimental group, below-average I.Q. students showed greater performance achievement than those of above-average I.Q.

There are those who stress the importance of group learning and those who stress individual attention for learning. MacPherson presents two views to the issue:

> We are convinced that the student who is to be academically and subsequently successful must learn to learn some things on his own. Perhaps that is why, when students come to school wanting to talk to one another as they learn, we persistently try to stop them. Perhaps that is why we pit student against student in a competetion for smiles, grades, badges and contingencies. Perhaps we are engaged in a continuing struggle to partially replace natural group learning by more culturally useful individual learning.[38]

The question of the advantages of individual or group instruction can be presented in mathematics or music. Can a group learn more than would the most able member of the group working independently? Or, can a group do less well than would the most able person in the group? In a music ensemble, individual performances within the group can vary, but one may be wrong to assume that the person with an inferior performance is learning less than his more skillful peer.

The teacher must attempt continually to understand the

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[38]Eric D. MacPherson, "How Much Individualization?," The Mathematics Teacher LXV (May, 1972), p. 478.

nature of the individuals within each music learning environment. Investigations reveal rather regular trends in motor skill and coordination right through adolescence with no marked slackening of development.[39] Simple reaction time, the time it takes to respond to a sound, appears to reach a maximum level at around thirteen or fourteen and shows little sex difference.

> In tests involving spatial eye-hand coordination (as rapidly inserting a stylus the size of a pencil in a hole only slightly larger) or temporal eye-hand coordination (as pressing a button when a rotating disk gets to a given point), a maximum level is reached between fourteen and fifteen, with boys showing better performance.[40]

General intelligence as measured by current tests develops gradually, with rate of development slowing down during the early and middle teens, and growth continuing until approximately the end of the teens. Various sub-abilities show different growth patterns and tend to become more independent of each other as age increases during the teens.

Measured intelligence has been shown to be associated with success in school and life, but the association is not always accurate. The degree of association is far from perfect, and will vary from no association in some areas to fairly substantial association in other areas.

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[39]Raymond G. Kuhlen, The Psychology of Adolescent Development (New York: Harper and Brothers, 1952), p. 44.

[40]Ibid., p. 45.

> Success in school or life is in no sense a product of "intelligence" per se, but the product of a number of factors (motivation, health, good emotional adjustment, adequate background skills and knowledge, etc.). Education has important contributions to make in promoting the acquisition of those skills, attitudes, concepts, and habits which will result in successful use of native ability.[41]

The motivation of peer approval is a strong influence for the adolescent. Perhaps this motivation properly channeled in a controlled environment can be used to a great advantage in music practice. The challenge for the music educator is to understand this motivation:

> Almost inevitably, the adult looks at and evaluates the adolescent from the adult point of view. Although adolescents need adult acceptance, and thus adult standards have psychological relevance, it is likely that how an adolescent stands in the peer culture is much more important to him.[42]

Kuhlen makes the following statement about the limitations of a teacher's understanding of adolescent development, and encourages more research in this area:

> The need for systematic study (in contrast to casual observation) of individuals, in instances where special study is desirable, is well demonstrated by the research showing that teachers are not able to make accurate judgments about their students, and by evidence that knowledge of the principles and facts of development is not a guarantee that their applications will be possible. Thus, special efforts to understand individuals will require the use of methods by which systematic study can be made.[43]

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[41] Ibid., p. 140.

[42] Ibid., p. 620.

[43] Ibid., p. 640.

Attitude in Performance

Attitude can be one of the most important factors in music practice and performance achievement. The attitude of parents, peers, and teachers greatly affect how much the student is motivated to practice and perform on his instrument.

The LeBlanc Study[44] investigated home influences on a child's attitude. The study presents the results of an exploratory investigation of parental attitudes associated with the playing or nonplaying of music instruments by children.

Three factors were involved in determining whether or not a child learns to play a musical instrument:

1. Aptitude of the child.
2. Efforts of the music educator.
3. Attitude and actions of parents.

The study investigated attitudes related to musical training of 300 mothers of school aged children in a major metropolitan area. The reference to instruments in the report was on customary band and orchestra instruments. According to the study, there is less concern with parental attitudes than any other subject which directly affects music education. This report was based on the infrequent publication of articles and studies on parental attitudes. It is assumed by the writer that the parent's attitude toward music training will often

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[44] G. LeBlanc Corporation, The Influence of Parents' Attitude on Children's Musical Activity (Kenosha: G. LeBlanc Corp., 1961).

influence directly the child's attitude.

According to the study, whether the parent is a player or a nonplayer of an instrument, makes a difference in how parents view their child and his practice commitments on an instrument. Whether the child is male or female makes a considerable difference in parental attitudes towards the child's playing of a music instrument. There is a feeling among some parents that playing on an instrument is more appropriate for one sex than for the other. Mothers who are nonplayers feel it is less appropriate for boys than girls to play musical instruments.

Mothers who are nonplayers tended to see the learning experience as much less pleasant for the child than did the parents who were players. According to the study, "practice noise" appeared to be the prime concern of the father of the family. Getting the child to practice appears to be the prime concern of the mother. The attitude of the father appeared to have a strong influence on the children's musical activity, but playing an instrument is more highly correlated with the education of the mother than with that of the father.

Pilot Study

A pilot study was carried out during the Fall and Winter of 1969. The purpose of the pilot study was to determine the efficiency of various practice environments with junior high instrumental music students. The study was to serve as a model for the present research; therefore, the methods and procedures for the research were a modification of those in the pilot study. This section includes the pilot study procedure, data gathering devices, the findings, analysis, and conclusions.

Students were selected from grades seven and eight and were divided into pairs for the pilot study. There were two categories:

1. Students who only studied their instrument with instruction from band class.
2. Students who practiced in pairs and studied their instrument in band class.

The students in group two were paired on the basis of previous playing skill, and personality compatibility determined by the teacher. In the early development of the study the teacher gave personal help during the beginning of the practice sessions. As the study progressed the students were given less and less guidance.

The students practicing in pairs were taken from band class twice a week for about twenty minutes, they were assigned a practice room and were given the following instructions on tape:

> One of you will play the piece that is on the music stand and the other person is to listen. The person on the right side of the music rack may start first. The person listening must watch the music and say "stop" as soon as he sees or hears a mistake in pitch, rhythm, or any other error not related to pitch or rhythm. An example of an error to be counted that is not related to pitch or rhythm might be a dynamic marking, repeat, or slurring. Do not count fuzzy starts or bad tones that you could consider as a mistake. In other words watch pitch, rhythm, and markings in the

music. After stopping your partner explain the error and then take your turn playing the music. A tape recorder will be running during your playing but it will NOT be used as a test grade.

Spend about ten minutes taking turns playing and stopping your partner as soon as a mistake is made. In the following ten minutes play until you have some rests before you talk about the mistakes. A person will come in to remind you that there are ten minutes to go. In other words in the last ten minutes let the person play longer, up to a resting place in the music, before you point out the mistakes.

Now listen, here is an example of two students working the way that you are to work.

The taped music example was performed by two students who were instructed how to stop one another as mistakes were made. The two students rehearsed until the routine was learned, and then the practice session was recorded on tape. The students selected for the example were a brother and sister playing a saxophone and a clarinet. The students were not identified and their playing and speaking was not identified by anyone listening to the tape during the study.

The taped instructions were played twice and were not part of the twenty minutes used for the practice session. After the instructions were played the students were asked if they understood what they were to do, if they indicated they did not understand, the instructions were repeated one more time. The student operating the tape recorder during the playing of the instructions, was in the room with the students only briefly to notify them of the last ten minutes of their practice time, and at the conclusion of the practice time.

Students were free to choose known or unknown music. It was assumed that the selection of music would make no difference if there was a variety and if the selection was within the technical level of the students. All comments made by the students during the pretest, posttest, and practice sessions were taped and observed.

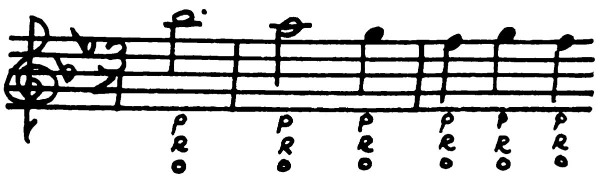
Students practicing in pairs were given practice instructions as previously listed. A comparison of achievement was made with another pair of band students who were not taking part in the paired practice group. The practice for those students who practiced together with instructions on a tape recorder was referred to as "peer-related." Band class met five days a week with a fifty-five minute period. Peer-related practice sessions were held twice a week, with twenty minutes for each session.

The Watkins-Farnum Test Form A was used as a pretest, and the test Form B was used as a posttest. In the Watkins-Farnum Test the student qualified for each succeeding example as they progress in difficulty by earning a score above zero. The student is disqualified to continue by receiving two consecutive zero scores.

After administering the Watkins-Farnum Performance Scale to a random sample of twelve students it was found that students from one grade level would qualify to play approximately the same number of examples in the test. In the pilot study the tenth example was found to be the highest example that the best scoring student qualified to take. The last example that the best scoring student qualified to take in Form B was example number eleven. An attempt was then made to administer the Watkins-Farnum Performance Scale without the presence of an experienced music teacher, by taping the performance and correcting the test with the replay of the tape.

Both junior and senior high students were trained to administer the tests in the pilot study. The senior high students worked the most efficiently, and did a thorough job of test administration. One skill that the students administering the pretest and posttest had to develop was starting the student over on an example if the tempo of the performance began to slow down.

In the pilot study a technique was developed to enable the students taking the sight reading test, to score this test. The students listened to the playing of their performances after the completion of a selected number of examples, and scored their own performances by indicating any error they heard on a score sheet.



The above reproduction of the score included the letters PRO directly beneath the notation. The letters represented the following: P to represent an error in pitch, R to represent a rhythmic error, and O to represent any other error, such as an error in articulation and dynamics. Rhythm errors were to be marked for: ignoring a rest, failure to give a rest its correct value, and not giving a note its correct value.

The letters PRO as illustrated, were in a vertical position under each note and students were given scoring instructions. Tape recorded instructions directed the students to cross through the letter representing the kind of error that they heard. Each student had a copy of the notation and observed it as the tape was replayed. The "correct" score for each student was determined by having a music teacher also score the replay of the performance. By comparing the student's score with the teacher's score, a percentage score was obtained for each student. If the student marked ten errors compared to twenty errors identified by the teacher, a raw score of 10/20 or .50 was given.

At the beginning of the study, the playback of the tape recorder after the completion of the performance test was operated by a teacher. This was done to allow the student to identify his errors as he listened to his own performance. Later in the pilot study, these duties of operating the tape recorder became the responsibility of a trained high school student. The instructions recorded for the student participating in the test were pre-recorded on another tape recorder to assure the same instructions for all subjects. The instructions for the error detection part of the pilot study were recorded as follows:

> Listen to your playing and check through R if you hear a mistake in rhythm. Check through P if you hear a mistake in pitch, in other words, a mistake in pitch is a wrong note. Check through O if you hear another

mistake. The O may be mistakes in repeats, loud and soft playing, tonguing or slurring, or some other mistake.

In the first few sessions of the pilot study the entire twenty minutes of practice was spent with the procedure of stopping whenever a mistake was made. Later it was assumed that this procedure would not be good for overall achievement because students should also learn to play a piece of music as a continuous whole. Because of this assumption the students were instructed to spend only the first ten minutes of their peer-related practice with a stop and start procedure. The remaining ten minutes were used for playing longer selections without interruptions. At the end of longer sections approximately sixteen measures, each student's partner was still encouraged to remember as many mistakes as possible, to talk about the errors, and then to take his own turn performing.

At the beginning of the pilot study all of the tests and practice groups were supervised or attended by a teacher. Often the students would look to the teacher to make judgments or confirm an idea presented by one of the students. In all these occurrences when students questioned the teacher, no comment was made to help the student, no comment other than encouragement to solve the problem as best possible by themselves. Their own ideas were encouraged with comments, "What do you think," and "Why don't you do what you think is right." In all occurrences throughout the study the students accepted this answer and attempted to solve their problem.

Later in the study when the teacher was not in the room it was found, from the playback of the tape, that students enjoyed working together and they kept busy working during the twenty minute time span. Longer and shorter time limits were occasionally used, but the twenty minute period for these junior high school students seemed to work the best. Occasionally during the taped sessions there was discussion, a question, or a difference of opinion.

The students became involved in evaluation or analysis of a performance, and appeared to become more critical of their own performance, whether the responses were correct or incorrect. For the majority of the students in the control group, very little outward emotional response was apparent during the posttest. Students that had been participating in the experimental group frequently made one of the following remarks in their posttest: "I blew that one," and "I made that mistake again."

When the students stopped to correct each other, errors were often not completely corrected, nevertheless, a discussion usually followed and some correct adjustments, as well as incorrect adjustments, were made. From a personal observation it was concluded that in the first part of the study when the teacher was in the room, the teacher's presence helped to encourage a smooth procedure for practice. It was also found that both the presence of a tape recorder, and possibly the student's suspicion that the tape would be replayed for some purpose, motivated the students to concentrate on the practice activities. One result of the use of a tape recorder was that the students seemed to respond in a more relaxed and natural way.

When the students stopped during the practice session, one of the following situations developed: a mistake was correctly observed and the student was informed of the correct way; a mistake was correotly observed but wrongly corrected; no mistake was made but the student observing thought that he had detected an error; also, mistakes were made and neither student observed them. In the practice session of the experimental group there was never a time when no comments were made by students during the practice. In the practice sessions of the experimental group, the students readily gave their advice and seemed to enjoy finding the errors in the other student's performance. Often if an error was pointed out and a wrong correction was given, a discussion would follow. It was hoped that both correct and incorrect responses would help the students to become as critical of themselves as of others.

The students did communicate their feelings about leaving the scheduled band practice to participate in the study. Because the few chosen students appeared to be a group having special privileges, the attitude of these students was very positive. Questions that students were motivated to ask outside of the taping sessions were no doubt answered by a variety of persons including students, band instructors, or possibly parents. Rarely, however, did the students continue their discussion in such a way that it was real apparent that they were seeking further help after their practice session. Any

motivation to find answers to questions originating in the practice session, was considered a good response.

The results of the pilot study posttest are shown in Tables 1, 2 and 3. (Table 2, page 55; Table 3, page 56) A non-parametric analysis of the pilot study findings was made. The Mann-Whitney U Test was used to test for significant differences between experimental and control groups. The probability of .10 for sight-reading and .05 for error detection was deemed appropriate for further investigation. The Watkins-Farnum Performance Scale was used for a sight-reading score. The raw scores and gain scores for sight-reading are given in Table 1.

TABLE 1

PILOT STUDY WATKINS-FARNUM PERFORMANCE SCALE
POSTTEST RESULTS FOR SIGHT-READING

Student	Practice Type	Pre	Post	Score Gain	Rank of Gain
B	Peer	12	48	36	1
A	Peer	12	42	30	2
D	Peer	24	48	24	3
H	Peer	22	40	18	4
G	Band	17	31	14	5.5
E	Band	12	24	14	5.5
C	Band	55	66	11	7.5
F	Band	39	50	11	7.5

$U = 3$ $p =< .10$ (one tail)

The error detection scores in Table 2 are given in a percentage form. Student B in Table 2 detected 13 errors in the pretest, compared to 38 errors found by the teacher. The fraction 13/38 indicates 34% accuracy in error detection. On the posttest, student B detected 50 of the 51 errors, or 98%. The difference between error detection scores in the pretest and posttest is 64%.

TABLE 2

PILOT STUDY POSTTEST RESULTS
FOR ERROR DETECTION

Student	Practice	Pre		Post		Gain	Rank of Gain
B	Peer	13/38	34%	50/51	98%	64%	1
C	Peer	23/32	72%	23/23	100%	28%	3
D	Peer	3/13	23%	16/24	67%	44%	2
*							
A	Band	8/21	38%	13/20	65%	27%	4
E	Band	7/23	30%	15/32	47%	17%	5
F	Band	7/17	41%	12/23	52%	11%	6

$U = 3$ $p = < .05$

*(Students G and H did not complete the error detection test)

TABLE 3

PILOT STUDY MEAN GAINS OF GROUPS IN
ERROR DETECTION AND SIGHT-READING POSTTESTS

Group	Test	Mean Gain
Peer-related	Sight-reading	25.7 Raw Score
Band practice	Sight-reading	16.7 Raw Score
Peer-related	Error Detection	45.6% More Accuracy
Band practice	Error Detection	18.3% More Accuracy

The pilot study warranted the following tentative conclusions:

1. The gain of sight-reading and error detection achievement (Table 1 and 2) for those students in peer-related groups was greater than for students in regular band class.

2. Gain scores in sight-reading achievement and error detection skill can be raised by the methods employed in the pilot study.

Summary

The reviewed literature helped to give direction for the present study with drill materials for increasing error detection achievement. Such studies also led to the development of the methods for peer-related music practice.

The review of sight-reading literature included methods and techniques used in previous studies that measured sight-reading skill. The programmed methods discussed in the sight-reading studies led to the development of tape recording instructions in the present study. Sight singing literature was reviewed because it is closely related to the skill of sight-reading instrumental music.

A review of environmental studies contributed to the development of the paired practice method in the present study. The attitude review was used to varify the importance of attitude variables for music practice. The pilot study served as the primary research design and measurement model for the present study. Factors derived from certain conclusions of all of the reviewed documentations have, in varying degrees, contributed to the experimental design, limitations, and instruments of measurement of the present study.

CHAPTER III

DESIGN OF THE STUDY

Study Location

In recent years there has been considerable interest in and experimentation of, "middle schools" or "intermediate" schools. These schools, formerly designated as Junior High schools, are neither elementary nor secondary, containing grades 5-8, 6-8, 7-8, or 7-9. American schools are generally classified as either elementary or secondary. However, the middle school designed to serve the pre-adolescent and early adolescent, or later childhood from approximately 10-14 years of age, established a third category. Many schools now have their levels of instruction in elementary, middle, and secondary schools.

The middle school has been developed out of necessity for more buildings for larger numbers of students, and also because of new programs developed for the psychological and social nature of the pre-high school age group. Educators now recognize that more attention must be directed toward this age group of students. Some educators think that this age group needs special attention because of the changing times. Havighurst remarks that the adolescent middle school student

is much more sophisticated today, more aware of the reality of human nature and society, even though he may not understand much of what he sees.[45]

The following description of the American Junior High school is given by Howard and Stoumbis in a recent publication:

> The American junior high school is frequently described as a unique institution intended to provide an educational program best suited to the needs of that unique age, early adolescence. With a curriculum explicity designed for this aim, and teachers specifically trained for the early adolescent age group, the junior high school should, and often does, attain this unique purpose. Even today it is easy to start a lively argument as to how much success is achieved in this worthy enterprize by the junior high school, and there may be even more disagreement regarding its function, purpose and structure. This is at least partially due to the changing nature of the American society and to the modification of the several factors that brought the junior high school into being. A variety of reasons were behind its origin and growth, with no single cause really predominating, but most of these reasons no longer exist or are considerably altered.[46]

Although the students participating in this study were from a school with the official name of Junior High, the facilities and faculty were in accord with a middle school concept.

The population for this study was a junior high school wind instrument class in Jenison, a suburb of Grand Rapids,

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[45] Robert J. Havighurst, "Lost Innocence-Modern Junior High School Youth," Bulletin of the National Association of Secondary School Principals (April, 1965, loc. cit.), pp. 3-4.

[46] Alvin W. Howard and George C. Stoumbis, The Junior High and Middle School: Issues and Practices (New York: Intest Educational Publishers, 1970), p. 3.

located in Ottawa County, Michigan. The Junior High at the time of the study included grades seven and eight with an enrollment of 292 in the seventh grade and 279 in the eighth grade. In the 1970 and 1971 school year all instrumental music students were band students.

The following sociological observation of the community of Jenison was made in a survey by Western Michigan University:

> Jenison is an excellent example of a typical suburban type community. It serves as a desirable residential area of the greater Grand Rapids Community. There is little or no industry within the boundaries of the School district; consequently, most of the residents are either employed as professional personnel, in the service occupations or in industry in the Grand Rapids and Grand Haven areas.[47]

Sample

One hundred and eight boys and girls, enrolled in grades seven and eight during the 1970 and 1971 school year in the Jenison Public Junior High School, served as subjects for the investigation. The mean age of the sample for the fifty girls at the beginning of the study was thirteen years and two months; the mean age for the fifty-eight boys was thirteen years and one month.

The one hundred and eight students were randomly selected from a total of one hundred and fifty students enrolled

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[47]Roland S. Strolle, Survey of Jenison Public Schools (Kalamazoo: Western Michigan University School of Education, 1969), p. 2.

in instrumental music classes for band students. These students were chosen to provide a random sample of students from instrumental music classes, and to provide sufficient numbers of subjects for a crossed analysis of variance design. All students' numbers were assigned, except percussion students. Numbers were placed in a box out of which the first one hundred and eight were selected as subjects. Twelve percussionists were not included in the study because their limited experience with reading melodic music would present them with severe practice handicaps.

Seventh and eighth grade students met in separate classes for band. Band class was a course that students who had successfully completed elementary band, or equivalent training, could elect in their curriculum. The average experience was 3.5 years of band instrument study. Class time for seventh grade band was from 10:00 A.M. until 11:00 A.M. Class time for the eighth grade band was from 11:05 until 12:05.

The 108 subjects were divided into 54 pairs. Each pair was assigned two 20 minute practice sessions each week for a consecutive ten week period. Each pair was randomly assigned one of three methods of practice.

1. Method T - a method of having instrumental music teachers rehearse with pairs of students with what-ever traditional techniques they choose to teach.

2. Method I - a method with specific instructions for practice independent of the teacher.

3. Method P - a free practice time for each pair of students.

Each pair was manipulated so that the following practice environments were represented in each method of practice. (Table 4)

TABLE 4

PRACTICE ENVIRONMENTS

Students paired with students ranking in the upper half of all subjects, as determined by intelligence quotient scores
Students paired with students ranking in the lower half of all subjects, as determined by intelligence quotient scores
Students paired with students with the same class of instruments, (both play woodwind, or both play brass)
Students paired with students with different instruments, (woodwinds paired with brass)
Students paired with a member of the opposite sex
Students paired with a member of the same sex

All method groups and environment groups were relatively balanced in number of students; however, the individual band class sizes were not the same. The eighth-grade band class contained 46 students and the seventh-grade band class contained 62 students who were subjects in the study.

Practice Methods

The first of the three methods (T), was a traditionally oriented twenty minute rehearsal with a teacher. Each of three teachers instructed one pair of students. They rotated their teaching time so that each pair was instructed by the same teacher each third practice time. This procedure was used to eliminate teacher effect. The teachers gave the pair of students music, and determined in what way they would help the students practice. Each practice session was recorded in order to insure reasonable experimental control.

The second method (I) included the following instructions on tape:

> One of you will play the music that you must place on the music stand and the other person is to listen. The person on the right side of the music stand may start first. The person listening must watch the music and say "stop" as soon as he sees or hears a mistake in pitch, rhythm, or any other error not related to pitch or rhythm. An example of an error to be counted that is not related to pitch or rhythm might be a dynamic marking, repeat, or a slur. Do not count fuzzy starts or bad tones that you could consider as a mistake. In other words, watch for errors in pitch or rhythm. Also watch for incorrect observance of repeat and expression markings. After stopping your partner, talk about the mistake, and then take your turn playing the music. A tape recorder will be running during your playing but the playback of your playing will Not be used as a test grade.
>
> Spend about ten minutes taking turns playing and stopping your partner as soon as mistakes are made. After practicing in this way for ten minutes, spend the remaining ten minutes playing until you have some rests or stopping places in the music. In other words, in the last ten minutes let the person play longer, up to measure rests, before you point out mistakes. Use any music of your choice that is in your music folio.

> Now listen, here is an example of two students working the way that you are to work.

A recording of two persons discussing and practicing, was included on the tape. The students performing the example on tape were not involved in any other part of the study. The instructions for treatment I were played twice, once before the first and once before the second practice session. All operation of tape recorders was done by trained high school students.

The third treatment was labled P. In this method instructions were given as follows:

> Practice together for twenty minutes, use the twenty minutes to practice music from your music folio. A tape will run during your practice time, but it will not be used for any grade.

The instructions for treatment P were played before the first and second practice session.

Data Gathering Instruments

I.Q. Measure. The guidance and testing department of Jenison Public Schools made all intelligence quotient scores available for the study. Lorge-Thorndike Intelligence Scores were available from testing in the Fall of the years 1968 and 1969. The I.Q. scores of subjects in the seventh grade ranged from 83 to 132 with a mean score of 104. Eighth grade scores ranged from 76 to 131 with a mean score of 109. The standard deviation for the scores in each grade was 16.

Sight-Reading Measure. The Watkins-Farnum Performance Scale was used as a pretest and a posttest for sight-reading.[48] Form A was used as a pretest and Form B was used as a posttest. The reliability coefficient for forms A and B is .95. The Watkins-Farnum Performance Scale is the only standardized music test for measuring wind instrument performance, available at this time. The following description of the test is given by the author:

> The Watkins-Farnum Performance Scale for Band Instruments represents an adaptation of an original scale devised and standardized for the cornet. The scale was carefully constructed to meet both musical and scientific criteria for reliability and validity.[49]

The following commentary was made in the Measurements Yearbook about the Watkins-Farnum Performance Scale:

> The reliabilities claimed range from .87 to .94. Validity coefficients, based on correlation with instructor's ratings, lie in the region of .68 to .87. These are extremely good figures for any music test.[50]

Directions in the Watkins-Farnum test manual were tape recorded and played for each student taking the test. While

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[48] John G. Watkins, and Stephen E. Farnum, The Watkins-Farnum Performance Scale (Winona: Hal Leonard Music Inc., 1954).

[49] John G. Watkins, Objective Measurement of Instrumental Performance (New York: T.C. Bureau of Publications, 1942), p.2.

[50] Oscar K. Buros (ed.), The Fifth Mental Measurements Yearbook (New Jersey: The Gryphon Press, 1959), p. 254.

the student played the examples of the test, his performance was tape recorded on another machine.

In the Watkins-Farnum Performance Scale the student, who is performing, qualifies for each succeeding example until he is disqualified by two consecutive zero scores. In the pilot study it was found that students in the seventh and eighth grade would qualify to play approximately the same number of examples in the test. Because of this, it was possible to assign the number of examples to be played, with a reasonable amount of assurity that before completion of the assigned examples, two consecutive zero scores would be made. To avoid having students earn a score that would qualify them to play more than assigned, each student was encouraged to attempt completion of eleven musical examples.

The scoring of all the sight-reading performances on tape was completed by three music instructors at a later time. Each student's performance in the Watkins-Farnum test was scored by all three of the instructors. Table 5 contains details of the persons scoring the sight-reading tests.

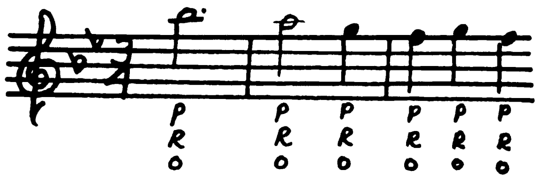
TABLE 5

MUSIC JUDGES FOR SIGHT-READING MEASURE

Instructor	Degree	Major Instrument	Experience
A	B.A. Ohio State	Cornet	29 teaching years
B	M.Mus. University of Michigan	Bassoon	11 teaching years
C	B.A. Bob Jones University	Cornet	12 teaching years 3 performing years

The mean score was thus derived from the judges' scores, and was used for each student's pretest and posttest. The scoring by three evaluators from the tape, was completed according to the instructions for scoring in the Watkins-Farnum Performance Scale test manual. Reliability across judges was found to be sufficiently high ($r = .97$) as determined by the Kendall Coefficient of Concordance procedure. This procedure was used because the data were ordinal and many ties occurred.

Error Detection Measure. The error detection test was devised as part of the sight-reading test. The test consisted of a playback of the student's performance of the Watkins-Farnum Performance Scale, following the instructions about scoring. Before the playback of the sight-reading performance, another tape recorder in the testing room was used to play pre-recorded instructions for scoring. Each student was given several sheets with the music score of Watkins-Farnum test examples that they had performed. The format was changed, and each music score line was separated only enough to insert three letters underneath the notation. Each music score was spaced with room to include the letters P, R, and O, representing pitch, rhythm, and other.



The instructions for the error detection test were taped as follows:

> Listen to your playing and check through the letter R with a pencil if you hear a mistake in rhythm. Check through P if you hear a mistake in pitch; in other words, a mistake in pitch is a wrong note. Check through O if you hear any other mistake. The O may be mistakes in repeats, loud and soft playing, tonguing or slurring errors, or some other mistakes.

The error detection test was corrected or scored by having one teacher listen to each tape, and marking the errors with the same procedure used by the student. For a final score to be used as a raw score, a comparison was made of the student's and the teacher's scoring of the student's errors. The raw score for this test was derived by placing the student's number of measures containing an error, over the teacher's score. The raw score was a percentage; for example, on the pretest the student may have identified 50 out of the 100 measures with errors (50%). On the posttest he may have identified 50 out of the 75 measures with errors (66%). The student thus had a gain score of 16%.

Because the score was based on a comparison of a student's score with a teacher's score for standard comparison, the same teacher scored each student's errors. The reliability of the teacher's scoring was examined with a test-retest method and a rank correlation was determined to be .97. (See Table 40, page 166) The error detection sheet was corrected and compared with the student's score as described, assuming a correct response by the teacher.

In the error detection test the students were instructed to score all observed errors, but in the final tabulation only the number of measures with errors indicated within them, were counted. If there were two errors marked by the student within a measure, and the comparison with the teacher's showed that the teacher had found three errors, the student was still given full credit for identifying mistakes within the measure. The specific areas of error, namely pitch, rhythm, and other, were used only as an aid for the student and not for correction and score tabulation. It was found in the pilot study that neither student nor teacher had sufficient time to score every note in rapidly moving passages of music notation.

<u>Attitude Measure</u>. An attitude scale was constructed by having

a large number of junior high school students from the Western Michigan area write two positive and two negative statements about their practice attitudes (See page 159). From approximately 400 of these statements, forty were selected on the basis of most repeated thoughts. These forty statements were reviewed and rated on a numerical scale by a Michigan State University graduate music education class.

Content validity was achieved by using statements representing the population of student attitudes. The graduate students were asked to rank the statements in a range from 1 to 10, the positive side of practice attitude was to be indicated by a higher number, and the negative side of a practice attitude indicated by a lower number. The Thurstone and Chave method was used to determine a scale value.

Sixteen statements were selected from the forty ranked by the graduate class. (See page 161) Eight of these were positive statements and eight were negative statements. These sixteen statements were used in the final construction of an attitude measure.

Each question on the Practice Attitude Inventory (PAI) was either a positive or a negative statement about practice. It was assumed that liking to practice more, was an indication of positive attitude, disliking practice would be a negative attitude toward practicing. Scoring instructions for the PAI are included in the appendix, page 124.

From the possible sixteen questions answered by the student, fourteen were used in scoring. Two questions with

the lowest reliability were eliminated and the remaining fourteen questions were used for the PAI. Each statement was subjected to test stability over two test administrations. The reliability of the total PAI was computed with a test-retest administered to seventh and eighth grade band students in an area school. The test was given on a Tuesday and again on Thursday of the same week. Fifty-five students completed both tests. The Pearson Product correlation coefficient was determined at .77. This level of consistency was acceptable for the purposes of this study.

Design and Analysis

Testing the hypotheses of this study required a factorial analysis of variance design. The subjects' raw scores in sight-reading and error detection constituted the initial dependent measures for analysis. Table 6 illustrates the initial design considered for the ANOVA.

TABLE 6

CATEGORICAL COMPARISON FOR INITIAL ANALYSIS OF VARIANCE DESIGN

Low I.Q.								High I.Q.							
Lo Att				Hi Att				Lo Att				Hi Att			
Mix (Instrument)		Same		Mix		Same		Mix		Same		Mix		Same	
S	D	S	D	S	D	S	D	S	D	S	D	S	D	S	D

(Same and Different Sex)

All conditions could not be met for crossed classification because a sufficient number of subjects was unavailable. It was necessary to discard the original design and analysis plans. Instead of the design in Table 6, two way analyses of variance were used to measure three dependent variables: error detection, sight-reading, and attitude. Practice attitude was included as a dependent variable. Four independent variables were analyzed in relation to each of the dependent measures. These dependent variables were method, I.Q., instrument, and sex. Therefore, three designs took the place of the original grand design. Admittedly, the α level was increased but no other tenable means of saving these data seemed appropriate.

Three separate analyses were made with the subject's scores from error detection achievement, sight-reading skill, and practice attitude score. Table 7 illustrates the three by two design for analysis of variance. The T represents a method with a teacher teaching a pair of students in a traditional way. The I represents a method of specified practice for the students. The P represents a method of students practicing any way they chose.

TABLE 7

ANOVA FOR THE CONSIDERATION OF METHOD/I.Q.
IN RELATION TO EACH OF THE
DEPENDENT VARIABLES

	T	I	P
High I.Q.	N=12	N=12	N=12
Low I.Q.	N=12	N=12	N=12

A similar analysis of variance was used for method and instrument. In this analysis eight subject scores were available for each of the cells. Three analyses were made with this design and scores were used from error detection, sight-reading, and PAI gain. Table 8 illustrates the three by two design for instrumentation.

TABLE 8

ANOVA FOR THE CONSIDERATION OF METHOD/INSTRUMENT
IN RELATION TO EACH OF THE
DEPENDENT VARIABLES

	T	I	P
Mixed	N=8	N=8	N=8
Same	N=8	N=8	N=8

Finally, a third design was used for method and sex. Because of the number of subject numbers in the cells, N=10 was available for the method and sex analysis of variance. Scores from error detection, sight-reading, and PAI were used.

Table 9 illustrates the three by two design for method and sex.

TABLE 9

ANOVA FOR THE CONSIDERATION OF METHOD/SEX
IN RELATION TO EACH OF THE
DEPENDENT VARIABLES

	T	I	P
Mixed	N=10	N=10	N=10
Same	N=10	N=10	N=10

One hundred and eight subjects were equally divided into twenty-seven pairs of higher I.Q., and twenty-seven pairs of lower I.Q. An attempt was made to divide randomly mixed and same instrument practice groups into balanced groups, within the two I.Q. groups. Because of the set instrumentation in the bands, it was only possible to have forty-five subjects with mixed instrument practice (woodwinds with brass), compared to sixty-three subjects practicing with like instrument pairs (woodwinds with woodwinds and brasses with brasses).

An attempt was also made to divide randomly students into balanced practice groups with the same sex and mixed sex. The groups of same sex and mixed sex were also to be balanced in each of the I.Q. and instrument categories. Because of the number of boys and girls available it was only possible to have thirty-six subjects practice with the opposite sex, compared to seventy-two subjects practicing with like sex. Students were randomly assigned the three practice methods;

therefore this equal distribution was controlled at the beginning of the project.

Analysis

Raw data from the individual gain scores were transferred to mark sense scoring sheets and computer cards. The cards were processed by Evaluation Services of Michigan State University. To aid in error detection and sight-reading computation, 100 was added to each gain score. If the posttest resulted in a loss in score, this amount of loss was subtracted from 100. If there was no change in pretest and posttest, the gain score was listed as 100. A gain in the posttest score was added to 100 to make the raw score. Attitude scores were not altered for computation.

Selection of a computer program for analysis was chosen with the consultation of Roy Gabrials from Michigan State University Evaluation Services. The analysis of variance used in this study was computer programmed by Robert I. Jennrich.[51]

The computer programming for the analysis of variance provided the following information: means, reduced sum of squares, degree of freedom, mean square, control word interaction, and replication.

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[51]Robert I. Jennrich, <u>1604 Analysis of Variance</u> (University of Wisconsin, 1961).

CHAPTER IV

PRESENTATION OF THE DATA

Review of Procedure

The investigation of proficiency in error detection and sight-reading after practice with a specified method, constituted the first purpose of this study. The second purpose was to investigate attitude change after practice with a specified method. An investigation of the effect of practice environments upon error detection, sight-reading, and attitude was also researched.

One hundred and eight Jenison junior high band students participated in the experimental period which occurred during the second semester of 1971. All of the one hundred and eight students were given individual error detection, sight-reading, and attitude pretests before the beginning of the twenty units of practice. At the conclusion of ten weeks of practice the same tests were given again as posttests. In the sight-reading test, Form A of the Watkins-Farnum Performance Scale was used for the pretest, Form B was used for the posttest. In the analysis of attitude, only posttest scores were used. Attitude pretests were available for comparison. Because many pretest scores were already highly positive, the comparison could inaccurately demonstrate a negative attitude with very slight differences in pretest and posttest scores.

The test scores were recorded on computer cards for processing by Michigan State University Evaluation Services. Nine analyses of variance were used to determine the acceptance or rejection of the hypotheses.

Hypotheses

Hypothesis 1

There is no significant difference among three practice methods in learning error detection.

Hypothesis 2

There is no significant difference between higher and lower I.Q. groups in learning error detection.

Hypothesis 3

There is no significant interaction between method and I.Q. in the error detection analysis.

The means for the above are shown in Table 10.

TABLE 10

MEAN SCORES ERROR DETECTION ANALYSIS
PRACTICE METHOD AND I.Q.

	T	I	P
Hi IQ	$\bar{x}$ = 105.91 n = 12	$\bar{x}$ = 103.91 n = 12	$\bar{x}$ = 104.92 n = 12
Lo IQ	$\bar{x}$ = 115.66 n = 12	$\bar{x}$ = 119.17 n = 12	$\bar{x}$ = 91.75 n = 12

The analysis of variance for the above data is in Table 11 (Page 78).

TABLE 11

ANOVA FOR DEPENDENT MEASURE: ERROR DETECTION
INDEPENDENT VARIABLES: PRACTICE METHOD AND I.Q.

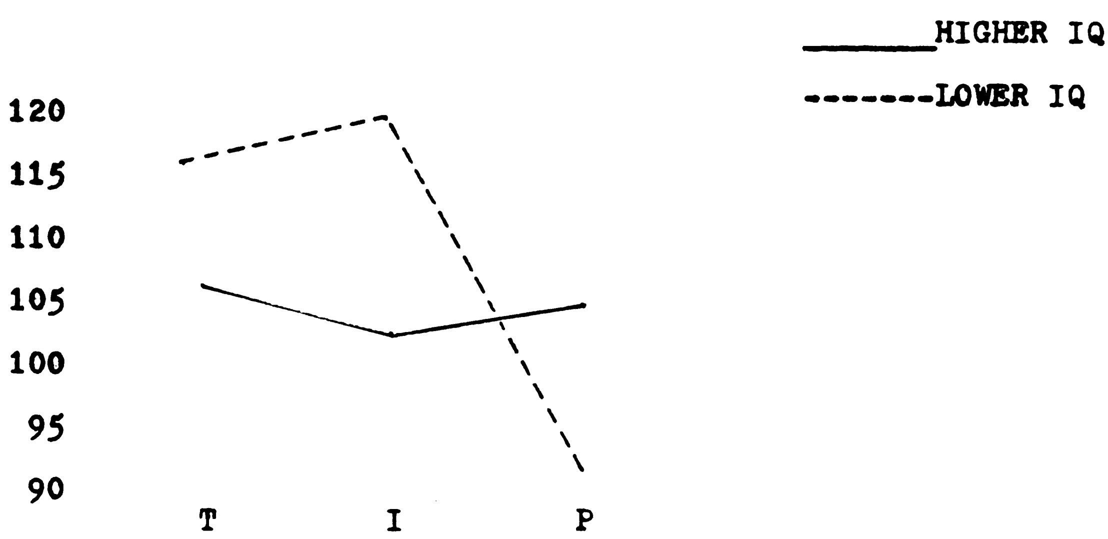
Source	SS	df	MS	F
Total	35599.889			
Method	2641.85	2	1320.42	2.911*
IQ	280.4	1	280.4	.62
M IQ Inter	2726.9	2	1363.45	3.004**
Within	29948.8	66	453.76	

* P =<.10   ** P =<.08

The interaction is noted below in Figure 1.

FIGURE 1

ERROR DETECTION METHOD/I.Q. INTERACTION



Hypothesis 4

There is no significant difference between same and different instrument practice groups in learning error detection.

Hypothesis 5

There is no significant interaction between method and instrument in the error detection analysis.

The means for the above are shown in Table 12.

TABLE 12

MEAN SCORES ERROR DETECTION ANALYSIS
PRACTICE METHOD AND INSTRUMENT GROUPING

	T	I	P
Mixed	$\bar{x} = 112.62$ $n = 8$	$\bar{x} = 113.25$ $n = 8$	$\bar{x} = 106.62$ $n = 8$
Same	$\bar{x} = 103.00$ $n = 8$	$\bar{x} = 106.00$ $n = 8$	$\bar{x} = 96.25$ $n = 8$

The analysis of variance for the above data is in Table 13.

TABLE 13

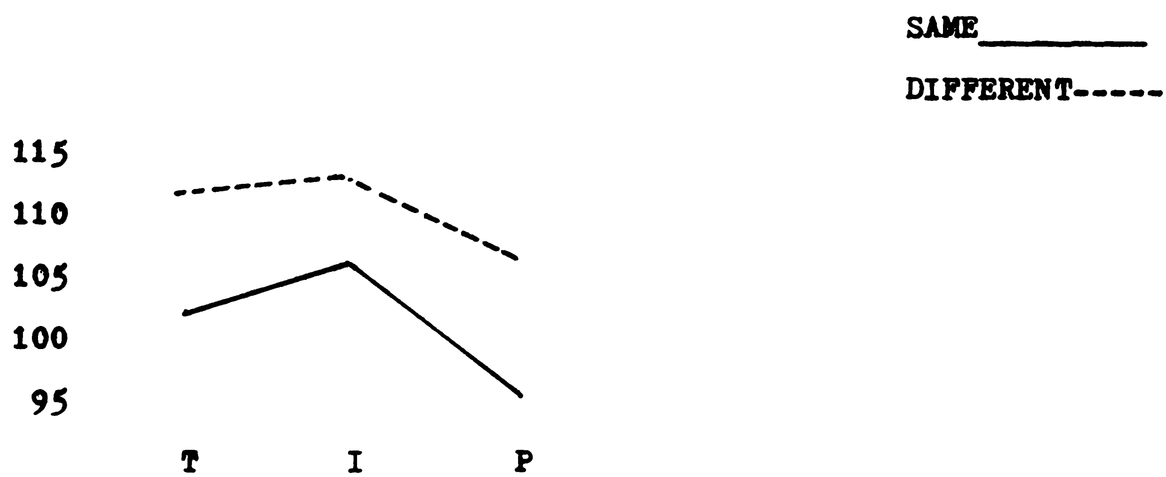
ANOVA FOR DEPENDENT MEASURE: ERROR DETECTION
INDEPENDENT VARIABLES: PRACTICE METHOD AND INSTRUMENT GROUPING

Source	SS	df	MS	F
Total	25997.917	47	553.147	
Method	591.792	2	295.896	.43
Instru	990.083	1	990.083	1.47
M Ins Inter	21.292	2	10.646	.015
Replic	4719.583	7	674.226	

Neither method nor instrument (main effects) were found to be significant. There was no significant interaction as noted below in Figure 2.

FIGURE 2

ERROR DETECTION METHOD/INSTRUMENT INTERACTION



Hypothesis 6

> There is no significant difference between two practice groups of same and different sex in learning error detection.

Hypothesis 7

> There is no significant interaction between method and sex in the errer detection analysis.
>
> The means for the above are shown in Table 14.

TABLE 14

MEAN SCORES ERROR DETECTION ANALYSIS
PRACTICE METHOD AND SEX

	T	I	P
Mixed	$\bar{x}$ = 112.00 n = 10	$\bar{x}$ = 110.20 n = 10	$\bar{x}$ = 105.90 n = 10
Same	$\bar{x}$ = 111.90 n = 10	$\bar{x}$ = 113.00 n = 10	$\bar{x}$ = 101.20 n = 10

The analysis of variance for the above data is in Table 15.

TABLE 15

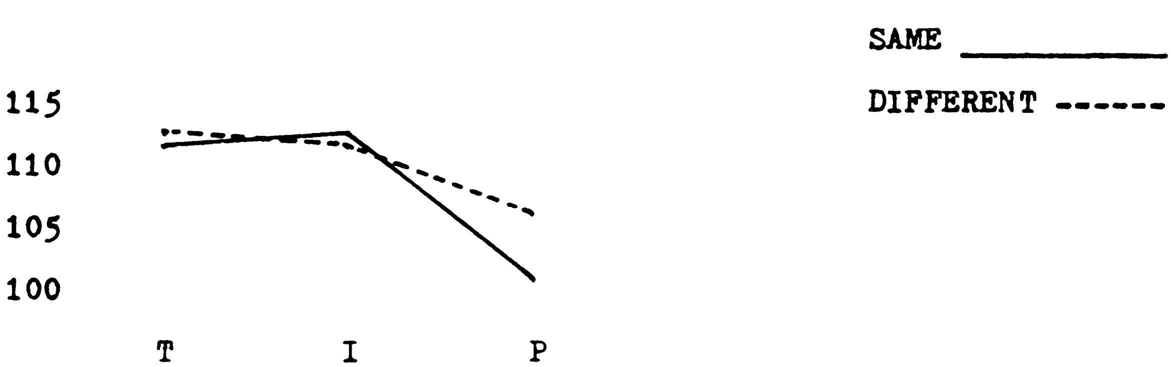
ANOVA FOR DEPENDENT MEASURE: ERROR DETECTION
INDEPENDENT VARIABLES: PRACTICE METHOD AND SEX GROUPING

Source	SS	df	MS	F
Total	31507.933	59	534.066	
Method	903.233	2	451.617	1.22
Sex	96.267	1	96.267	.27
M S Inter	53.433	2	26.717	.071
Replic	3238.600	9	359.844	

Neither method nor sex (main effects) were found to be significant. There was no significant interaction as noted below in Figure 3.

FIGURE 3

ERROR DETECTION METHOD/SEX INTERACTION



<u>Hypothesis 8</u>

There is no significant difference among three practice methods in learning sight-reading.

<u>Hypothesis 9</u>

There is no significant difference between higher and lower I.Q. groups in learning sight-reading.

<u>Hypothesis 10</u>

There is no significant interaction between method and I.Q. in the sight-reading analysis.

The means for the above are shown in Table 16.

TABLE 16

MEAN SCORES SIGHT-READING ANALYSIS
PRACTICE METHOD AND I.Q.

	T	I	P
Hi IQ	$\bar{x}$ = 111.92 n = 12	$\bar{x}$ = 107.84 n = 12	$\bar{x}$ = 112.66 n = 12
Lo IQ	$\bar{x}$ = 112.84 n = 12	$\bar{x}$ = 107.42 n = 12	$\bar{x}$ = 106.75 n = 12

The analysis of variance for the above data is in Table 17.

TABLE 17

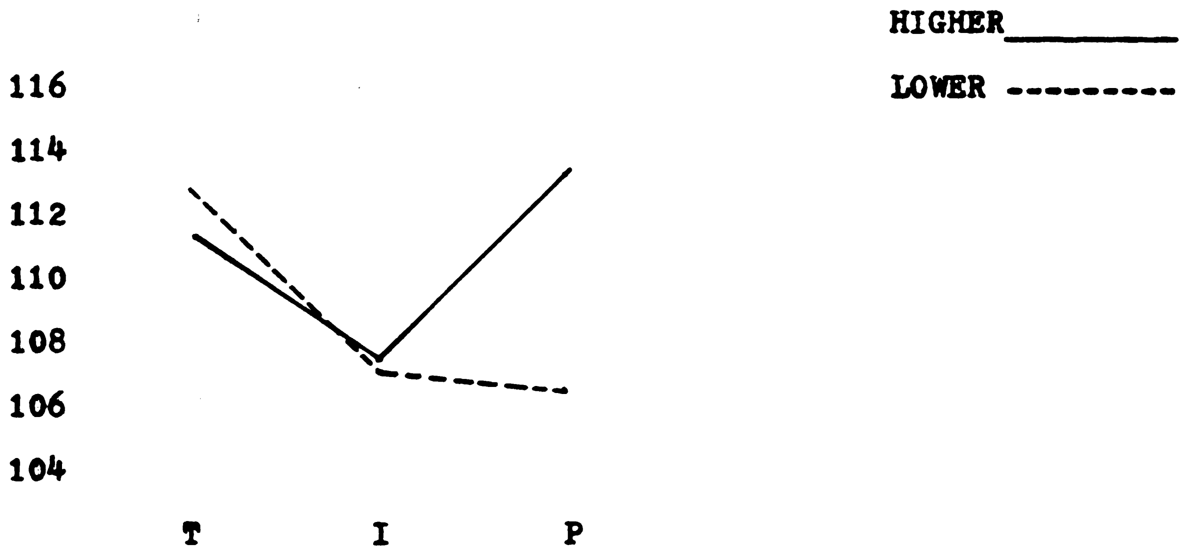
ANOVA FOR DEPENDENT MEASURE: SIGHT-READING
INDEPENDENT VARIABLES: PRACTICE METHOD AND I.Q.

Source	SS	df	MS	F
Total	5460.653	71	76.911	
Method	395.444	2	197.722	3.03
I Q	.347	1	.347	.005
M IQ Inter	10.778	2	5.388	.07
Replic	715.517	11	65.047	

Neither method nor I.Q. (main effects) were found to be significant. There was no significant interaction as noted below in Figure 4.

FIGURE 4

ERROR DETECTION METHOD/I.Q. INTERACTION



<u>Hypothesis 11</u>

> There is no significant difference between same and different instrument practice groups in learning sight-reading.

<u>Hypothesis 12</u>

> There is no significant interaction between method and instrument in the sight-reading analysis.

> The means for the above are shown in Table 18.

(Page 84).

TABLE 18

MEAN SCORES SIGHT-READING ANALYSIS
PRACTICE METHOD AND INSTRUMENT

	T	I	P
Mixed	$\bar{x}$ = 114.75 n = 8	$\bar{x}$ = 110.13 n = 8	$\bar{x}$ = 102.75 n = 8
Same	$\bar{x}$ = 112.63 n = 8	$\bar{x}$ = 109.50 n = 8	$\bar{x}$ = 108.88 n = 8

The analysis of variance for the above data is in Table 19.

TABLE 19

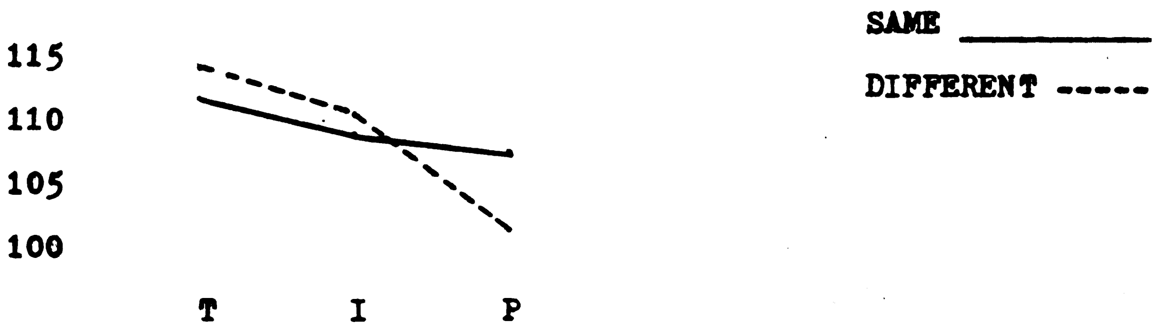
ANOVA FOR DEPENDENT MEASURE: SIGHT-READING
INDEPENDENT VARIABLES: PRACTICE METHOD AND INSTRUMENT GROUPING

Source	SS	df	MS	F
Total	4442.479	47	94.520	
Method	496.167	2	248.083	1.50
Instru	15.187	1	15.188	.07
M I Inter	154.500	2	77.250	.41
Replic	1364.979	7	194.997	

Neither method nor instrument (main effects) were found to be significant. There was no significant interaction as noted below in Figure 5 (Page 85).

FIGURE 5

SIGHT-READING METHOD/INSTRUMENT INTERACTION



Hypothesis 13

There is no significant difference between two practice groups of same and different sex in learning sight-reading.

Hypothesis 14

There is no significant interaction between method and sex in the sight-reading analysis.

The means for the above are shown in Table 20.

TABLE 20

MEAN SCORES SIGHT-READING ANALYSIS
PRACTICE METHOD AND SEX

	T	I	P
Mixed	$\bar{x}$ = 112.40 n = 10	$\bar{x}$ = 110.50 n = 10	$\bar{x}$ = 105.50 n = 10
Same	$\bar{x}$ = 110.60 n = 10	$\bar{x}$ = 106.00 n = 10	$\bar{x}$ = 110.50 n = 10

The analysis of variance for the above data is in Table 21 (Page 86).

TABLE 21

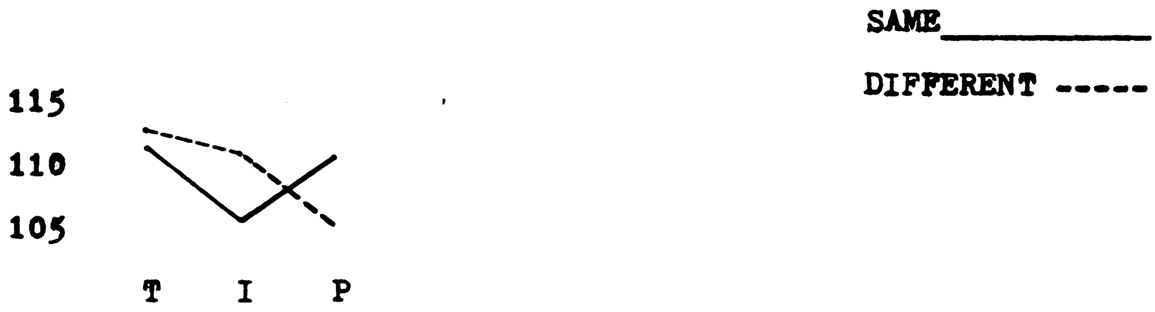
ANOVA FOR DEPENDENT MEASURE: SIGHT-READING
INDEPENDENT VARIABLES: PRACTICE METHOD AND SEX

Source	SS	df	MS	F
Total	6523.933	59	110.575	
Method	290.633	2	145.317	1.82
Sex	9.600	1	9.600	.12
M S Inter	486.300	2	243.150	3.07
Replic	714.267	9	79.363	

Neither method nor sex (main effects) were found to be significant. There was no significant interaction as noted below in Figure 6.

FIGURE 6

SIGHT-READING METHOD/SEX INTERACTION



Hypothesis 15

There is no significant difference among the three practice methods in attitude change.

Hypothesis 16

There is no significant difference between higher and lower I.Q. groups in attitude change.

Hypothesis 17

There is no significant interaction between method and I.Q. in the attitude analysis.

The means for the above are shown in Table 22.

TABLE 22

MEAN SCORES ATTITUDE ANALYSIS
PRACTICE METHOD AND I.Q.

	T	I	P
Hi IQ	$\bar{x}$ = 31.4 n = 12	$\bar{x}$ = 33.5 n = 12	$\bar{x}$ = 32.7 n = 12
Lo IQ	$\bar{x}$ = 33.3 n = 12	$\bar{x}$ = 31.0 n = 12	$\bar{x}$ = 29.6 n = 12

The analysis of variance for the above data is in Table 23.

TABLE 23

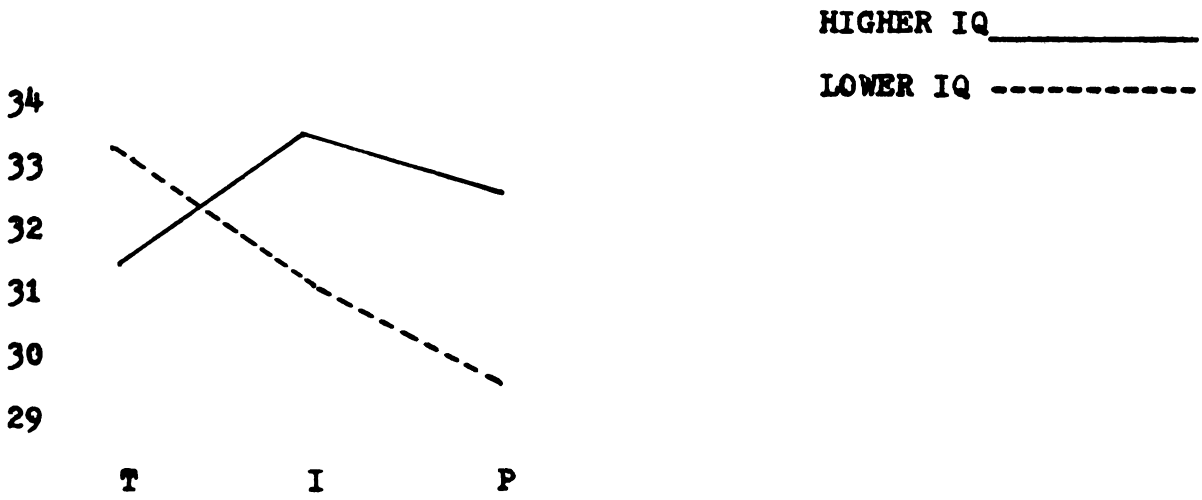
ANOVA FOR DEPENDENT MEASURE: ATTITUDE
INDEPENDENT VARIABLES: PRACTICE METHOD AND I.Q.

Source	SS	df	MS	F
Total	1505.5	71		
Method	22.75	2	11.375	.549
I Q	26.888	1	26.888	1.299
Inter	89.695	2	44.847	2.166
Within	1366.166	66	20.699	

Neither method nor I.Q. (main effects) were found to be significant. There was no significant interaction as noted in Figure 7.

FIGURE 7

ATTITUDE METHOD/I.Q. INTERACTION



<u>Hypothesis 18</u>

> There is no significant difference between same and different instrument practice groups in attitude change.

<u>Hypothesis 19</u>

> There is no significant interaction between method and instrument in attitude analysis.
>
> The means for the above are shown in Table 24.

TABLE 24

MEAN SCORES ATTITUDE ANALYSIS
PRACTICE METHOD AND INSTRUMENT

	T	I	P
Mixed	$\bar{x}$ = 33.3 n = 8	$\bar{x}$ = 34.1 n = 8	$\bar{x}$ = 30.0 n = 8
Same	$\bar{x}$ = 31.1 n = 8	$\bar{x}$ = 32.6 n = 8	$\bar{x}$ = 32.3 n = 8

The analysis of variance for the above data is in Table 25.

TABLE 25

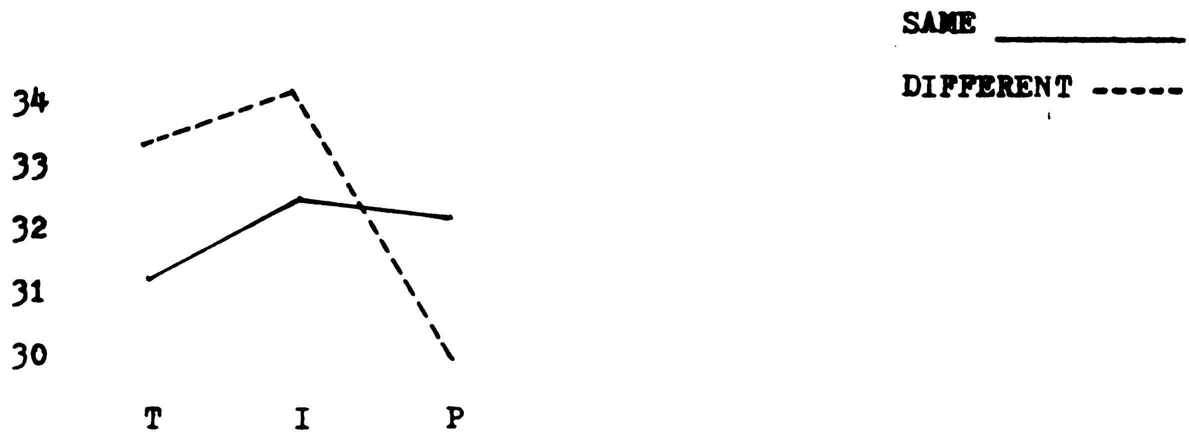
ANOVA FOR DEPENDENT MEASURE: ATTITUDE
INDEPENDENT VARIABLES: PRACTICE METHOD AND INSTRUMENT

Source	SS	df	MS	F
Total	1024.479	47		
Method	40.542	2	20.270	.909
Instru	2.521	1	2.521	.113
Inter	44.792	2	22.396	1.004
Within	936.625	42	22.301	

Neither method nor instrument (main effects) were found to be significant. There was no significant interaction as noted below in Figure 8.

FIGURE 8

ATTITUDE METHOD/INSTRUMENT INTERACTION



Hypothesis 20

There is no significant difference between two practice groups of same and different sex in attitude change.

Hypothesis 21

There is no significant interaction between method and sex in the attitude analysis.

The means for the above are shown in Table 26.

TABLE 26

MEAN SCORES ATTITUDE ANALYSIS
PRACTICE METHOD AND SEX

	T	I	P
Mixed	$\bar{x}$ = 32.3 n = 10	$\bar{x}$ = 30.5 n = 10	$\bar{x}$ = 31.9 n = 10
Same	$\bar{x}$ = 31.2 n = 10	$\bar{x}$ = 30.7 n = 10	$\bar{x}$ = 32.5 n = 10

The analysis of variance for the above data is in Table 27.

TABLE 27

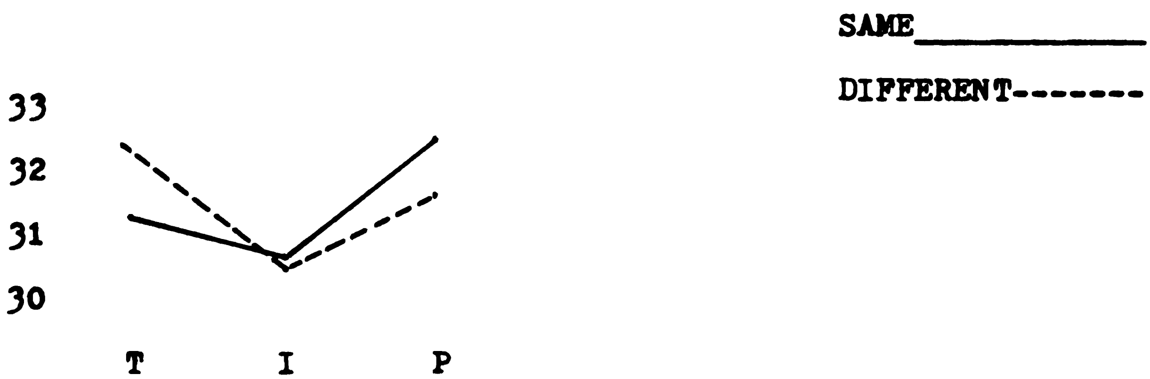
ANOVA FOR DEPENDENT MEASURE: ATTITUDE
INDEPENDENT VARIABLES: PRACTICE METHOD AND SEX

Source	SS	df	MS	F
Total	2265.000	59		
Method	27.230	2	13.615	.329
Sex	.150	1	.150	.004
Inter	7.900	2	3.950	.096
Within	2229.700	54	41.290	

Neither method nor sex (main effects) were found to be significant. There was no significant interaction as noted below in Figure 9.

FIGURE 9

ATTITUDE METHOD/SEX INTERACTION



In summary, two of the twenty-one hypotheses were rejected (Page 77). Hypothesis one was rejected at the .10 level of confidence. Hypothesis three was rejected at the .08 level of confidence.

CHAPTER V

SUMMARY AND CONCLUSIONS

Summary

One purpose of this study was the investigation of music students' proficiency in sight-reading and detecting errors after completion of a specified practice procedure. The second purpose was to investigate students' after they had practiced with a specified method. The effects of some practice environments upon learning increments were also investigated.

One hundred and eight students at Jenison Junior High School participated in this experiment during the second semester of 1971. The students were given the following tests as pretest and posttest: The Watkins-Farnum Performance Scale, an error detection test, and an attitude test. Form A of the Watkins-Farnum Performance Scale was used as a pretest for sight-reading, Form B was used as a posttest. In the analysis of attitude, only posttest scores were used.

Twenty units of practice were assigned to fifty-four pairs of students over a ten week period. The practice sessions were assigned twice each week for approximately twenty-two minutes a day. The students were randomly divided into three treatment groups. These three groups (T, I, and P), were compared in all analyses.

One group was assigned practice time with a teacher in a traditional practice period (Method T), another group was given free practice time (Method P). A third group was assigned practice time without the presence of a teacher, but with prescribed methods of practice (Method I). All of the fifty-four pairs assigned to one of the three method groups (T, I, and P - 18 pairs in each), were also assigned practice environments designated as: higher or lower I.Q., practice with same or different instruments (brass and woodwind), and practice with a member of the same or opposite sex. All of the students within the groups were selected at random from the specified categories, and an attempt was made to balance numbers of students in method and practice environments.

Conclusions

Three main hypotheses and eighteen secondary hypotheses stated in null form, were tested for statistical significance producing the following research results and conclusions:

Hypothesis 1

There is no significant difference among three practice methods in learning error detection.

Rejected. $F = 2.91$ $P = < .10$

T $\bar{x} = 110$ I $\bar{x} = 111$ P $\bar{x} = 98$

Students who work in small groups with a teacher and students who work in groups with a prescribed method of practice, have a greater increment of learning to detect errors, than those students who practice without guidance. The mean score of the students practicing with a teacher (110), and the mean score of those students practicing without a teacher (111), but with a prescribed method of practice, are one point apart. Students can learn error detection skill with these methods with or without the presence of the teacher, and have approximately the same increment in learning.

The mean score of students practicing without a teacher, but with a prescribed method, was slightly higher than the traditional way of practice with a teacher. In this study, students did slightly better in error detection learning when the teacher was not directly involved. Students practicing in the P group ended with a lower error detection posttest score than a pretest score. The conclusion is that guidance is necessary for learning error detection. Students will not increase their error detection skills by only spending time practicing together.

In review, the last two numbers in the raw score above 100 indicate the gain score. 110 indicates a gain of 10 points in detecting error from the pretest to the posttest. 98 indicates a loss of 2 points in error detecting achievement.

Hypothesis 2

There is no significant difference between higher

and lower I.Q. groups in learning error detection.

Accepted. $F = .62$

Higher $\bar{x} = 100$ Lower $\bar{x} = 113$

There is no significant difference between the increments of learning error detection for students with higher and lower I.Q. However, the mean score for the students with low I.Q. was higher than for students with higher I.Q.

Possibly the gain for the low I.Q. group can be attributed to the motivation to learn from a peer. Perhaps the students found that their practice partner was on a similar performance level, with the same frustrations for trying to succeed. Practicing with a student who had similar performance problems became a motivation for students to try for greater achievements.

Instrumental music teachers should give the lower I.Q. level students in their classes more opportunities to work and practice together. Such an opportunity should be given in addition to small group help given in a traditional environment with teachers giving the guidance.

When the students practice in pairs independently from a teacher, specific goals should be outlined for the student. As demonstrated in this study, communication of procedures and goals can be presented with a tape recorder, without the presence of a teacher.

<u>Hypothesis 3</u>

There is no significant interaction between method and I.Q. in the error detection analysis.

Rejected. $F = 3.004 \quad P = < .08$

There is an interaction between the methods of this study, and students with either higher or lower I.Q.'s, in the learning increments of detecting error in one's own performance.

The gain in error detection achievement for students with higher I.Q. was about the same with all three teaching methods. Students with lower I.Q. gained most when they had guided practice without the presence of a teacher (Method I). These students with lower I.Q. gained the least when they were given free practice time (Method P). The greatest variation in achievement with the three methods was made by students with lower I.Q.

<u>Hypothesis 4</u>

> There is no significant difference between same and different instrument practice groups in learning error detection.

Accepted. $F = 1.47$

Same $\bar{x} = 109 \quad$ Different $\bar{x} = 110$

Woodwind students practicing with other woodwind students, or brass playing students who practice with other brasses, will have no greater increment in learning error detection than those practicing with mixed pairs of woodwind and brass.

Students are not distracted in their learning of error detection when they help another student practice on an instrument that they do not play. Students will be concerned about the notation and music performance, and will not be detracted by the mechanical differences of their practice partner's instrument.

Hypothesis 5

> There is no significant interaction between method and instrument in the error detection analysis.
>
> Accepted. F = .015

There is no interaction between the methods of this study, and the practice environment with same or mixed instruments, in the learning increments of detecting error in one's own performance.

Hypothesis 6

> There is no significant difference between two practice groups of same and different sex in learning error detection.
>
> Accepted. F = .27
>
> Same $\bar{x}$ = 107   Mixed = 110

There is no statistical difference in the increment of learning error detection for male and female students practicing music together, or students practicing with the same sex. Junior high wind instrument music students are not detracted or motivated in their error detection learning by having boys and girls paired together in practice sessions. Neither are they detracted or motivated by practicing with students of their own sex.

Hypothesis 7

There is no significant interaction between method

and sex in the error detection analysis.

Accepted. $F = .071$

There is no interaction between the methods of this study, and male and females practicing either with their own or opposite sex, in the learning increments of detecting error in one's own performance.

Hypothesis 8

There is no significant difference among three practice methods in learning sight-reading.

Accepted. $F = 3.03$

T $\bar{x} = 112$ I $\bar{x} = 107$ P $\bar{x} = 107$

Independent practice, traditional practice procedures without a teacher, and a prescribed method of practice, all have about the same effect on the increment of learning sight-reading. Spending time practicing together, seemed to be important for increasing skill in sight-reading in this study. The presence and guidance of a teacher had only a small influence for students to achieve greater sight-reading skill.

Hypothesis 9

There is no significant difference between higher and lower I.Q. groups in learning sight-reading.

Accepted. $F = .005$

Higher $\bar{x} = 109$ Lower $\bar{x} = 109$

The difference of higher and lower I.Q. does not influence increments in learning sight-reading with the three methods used in this study. Although I.Q. had a considerable effect on error detection achievement in this study, I.Q. had no measurable effect on learning sight-reading.

Hypothesis 10

> There is no significant interaction between method and I.Q. in the sight-reading analysis.
>
> Accepted. F = .07

There is no interaction between the methods of this study, and students with either higher or lower I.Q.'s, in the learning increments of sight-reading.

Hypothesis 11

> There is no significant difference between same and different instrument practice groups in learning sight-reading.
>
> Accepted. F = .07
>
> Same $\bar{x}$ = 110 Different $\bar{x}$ = 109

Woodwind students practicing with other woodwind students, or brass playing students who practice with other brasses, will have no greater increment in learning to sight-read, than those practicing with mixed pairs of woodwind and brass.

Hypothesis 12

> There is no significant interaction between method and instrument in the sight-reading analysis.
>
> Accepted. F = .41

There is no interaction between the methods of this study, and the practice environment with same or mixed instruments, in the learning increments of sight-reading.

Hypothesis 13

> There is no significant difference between two practice groups of same and different sex in learning sight-reading.
>
> Accepted. $F = .12$
>
> Same $\bar{x} = 109$ Mixed $\bar{x} = 107$

There is no statistical difference in the increment of learning sight-reading for male and female junior high school students practicing together, or with the same sex.

Hypothesis 14

> There is no significant interaction between method and sex in the sight-reading analysis.
>
> Accepted. $F = 3.07$

There is no interaction between the methods of this study, and male and females either practicing music with their own sex or opposite sex, in the learning increments of sight-reading.

Hypothesis 15

> There is no significant difference among the three practice methods in attitude change.
>
> Accepted. $F = .549$
>
> T $\bar{x} = 32.4$ I $\bar{x} = 32.3$ P $\bar{x} = 31.2$

Independent practice, traditional practice procedures without a teacher, and a prescribed method of practice, all have about the same effect on practice attitude.

Hypothesis 16

> There is no significant difference between higher

and lower I.Q. groups in attitude change.

Accepted. $F = 1.299$

Higher $\bar{x} = 32.5$ Lower $\bar{x} = 31.3$

The difference of higher and lower I.Q. does not influence attitude with the three methods used in this study.

Hypothesis 17

There is no significant interaction between method and I.Q. in the attitude analysis.

Accepted. $F = 2.166$

There is no interaction between the methods of this study, and students with either higher or lower I.Q.'s, in practice attitude.

Hypothesis 18

There is no significant difference between same and different instrument practice groups in attitude change.

Accepted. $F = .113$

Same $\bar{x} = 32.0$ Different $\bar{x} = 32.5$

Woodwind students practicing with other woodwind students, or brass playing students who practice with other brasses, will have about the same practice attitude as those practicing with mixed pairs of woodwind and brass.

Hypothesis 19

There is no significant interaction between method and instrument in the attitude analysis.

Accepted. $F = 1.004$

There is no interaction between the methods of this study, and the practice environment with same or mixed instruments, in practice attitude.

Hypothesis 20

> There is no significant difference between two practice groups of same and different sex in attitude change.
>
> Accepted. F = .004
>
> Same $\bar{x}$ = 31.5 Different $\bar{x}$ = 31.5

There is no statistical difference in practice attitude for male and female students practicing music together, or students practicing with the same sex. Junior high wind instrument music students are not motivated in their practice by having boys and girls paired together in practice sessions. Neither are they detracted or motivated by practicing with students of their own sex.

Hypothesis 21

> There is no significant interaction between method and sex in the attitude analysis.
>
> Accepted. F = .096

There is no interaction between the methods of this study, and males and females either practicing music with their own sex or opposite sex, in practice attitude.

Discussion

Error Detection. From observation of the data, it is determined that the three methods for teaching students to detect errors in their own performance varied in effectiveness. Students who practiced by themselves with free practice time experienced a loss in error detection achievement. Students in groups T and I made a gain score of 10 or more. In this study tape recorded instructions helped produce the same learning increments in error detection, as the presence of a teacher giving personal help.

Within each method group, students with varied environments also had varied results in achievement. Students in lower I.Q. groups gained considerably over those students in higher I.Q. practice groups. For higher I.Q. groups, error detection achievement was about the same in all three methods.

Students with lower I.Q. made the most error detection achievement when they were given a specified practice procedure without the presence of a teacher. Students in lower I.Q. groups practicing without instructions, had a considerable loss in gain score. The greatest difference with the lower I.Q. group in error detection, was the difference between the gain for those in free practice (91.75), and those with a specific practice procedure (119.17). Students practicing with a specific practice procedure on tape scored 27.42 points higher than students practicing with free practice time.

Sight-Reading. In learning sight-reading, students with higher I.Q. gained the least in the I practice method. When students in the higher I.Q. groups practiced with teacher guidance, or with free practice time, a minimum gain score of 11 was achieved. Students within the lower I.Q. group achieved more with traditional teacher guidance.

One initial concern of this study was to see if learning to detect error in one's own performance would compliment ability to sight-read. It was thought that possibly learning in the one area would influence the other to about the same degree. This envisaged effect of sight-reading performance and the ability to detect error, being directly related, was dispelled in this study. The correlation between the change in sight-reading and error detection scores was rho = +.042 (Pearson product-moment).

Students may know where they make the errors, but this is not helpful to motivate them to play without error. Perhaps there are other factors that contribute to better sight-reading achievement that are more crucial. Perhaps a student's expectation to make errors in performance, depends primarily on how much desire he has to eliminate error. Knowledge of an error apparently does not motivate most students to accordingly correct their errors for a better performance.

Teachers who instruct students to become better in error detection achievement, should not expect these students to gradually eliminate their errors, and thus become better sight-readers. Perhaps instilling a desire for precision in all school class work is a factor for motivating students to become better music performers.

Sex. The possibility that junior high students would be more motivated if they practiced music with students of the opposite sex, was also disproven. Despite the varied stages of social, physical, and psychological maturity in junior high school, these students can practice instrumental music with mixed, as well as the same sex.

At seventh and eighth grade levels, the student's reaction of being assigned to practice with the opposite sex, appears to be one of embarassment. This was true for the boys in this study; the girls were often noncommittal in their attitudes about practicing music with boys. Music educators should use freedom to assign practice to all pairs in their classes, without a concern to match sex.

Instrument. When students practiced with the same instrument type, brass with brass, and woodwind with woodwind, those practicing with a teacher (Method T), or with a specified practice procedure (Method I), made the best gains in detecting error. When the students practiced with the instruments mixed in free practice time (Method P), the least amount of gain in error detection was made.

When the students practiced in mixed instrument groups for learning better sight-reading, the group practicing with free practice time, was again the group with the least amount of gain. When students practiced with like instruments, the gains in sight-reading were similar in all three methods.

I.Q. Students with low I.Q. had a significantly greater increment in learning to detect error with the methods used in this study, than students with higher I.Q. See error detection and sight-reading, pages 102 and 103.

Attitude. Student attitudes varied only slightly with three methods of practicing, lower and higher I.Q., instrument, and sex. Students seemed to adjust to a variety of practice situations with no measureable effect on attitude.

The student who is given freedom to practice as he chooses does not change his attitude for music practice. Neither will students who are given practice guidance, with either personal help or taped instructions, alter their attitudes about instrumental music practice. Attitudes developed over a longer period of time are not altered by a practice method carried over a few months.

What has been found true of the students who took part in this study cannot be assumed to be true of every junior high school student. The conclusions drawn from this study relate primarily to the sample from which data were obtained.

From the research in this study, one can make the following implications for instrumental music educators:

1. Methods for teaching higher and lower I.Q. groups of instrumental music students should be developed with techniques that are different in presentation. A method that is appropriate for a student with a higher I.Q., may not

necessarily be best for students with lower I.Q.

2. To increase the ability of a student to observe errors in his own performance does not readily effect his possibilities for better sight-reading performance. The student can better recognize his error, but he may still not be motivated to strive for a flawless performance.

3. Music educators should develop more self-administered methods of instruction relating to music performance. Teaching music performance without the teacher's presence can be successful. The teacher in instrumental music classes can prescribe methods to give the student more independence in his practice environment.

4. Music students can practice well together in pairs of two with prescribed methods of practice. They can practice with either members of like or different sex, or with like or unlike wind instruments, to accomplish results. This variety for student practice situations greatly increases the practice assignment possibilities for the school music educator.

5. Music educators may use Method I designed in this study in instrumental music classes to increase learning increments for error detection. With this method a teacher does not have to be directly involved with teaching the students.

6. The attitude test (Practice Attitude Inventory) developed in this study can be used to measure changes in practice attitudes.

Suggestions For Future Research

1. A similar study should be developed for students in high schools and colleges, to investigate the effect of these practice methods upon more advanced music students.

2. A similar study should be made involving a variety of populations to investigate social and cultural influences upon attitude and learning increments.

3. A similar study should be developed with pairs of students with opposing I.Q. levels, and opposing practice attitudes.

4. Experimental testing of factors other than practice techniques for improving sight-reading ability, should be investigated.

BIBLIOGRAPHY

BIBLIOGRAPHY

Books

Bigge, Morris L. Learning Theories For Teachers. New York: Harper and Row, 1964.

Brown, J.S. The Motivation of Behavior. New York: McGraw Hill and Co., 1961.

Buddenbrock, W. The Senses. Ann Arbor: The University of Michigan Press, 1958.

Buros, Oscar K. (ed.) The Fifth Mental Measurements Yearbook. New Jersey: The Gryphon Press, 1959.

Farnsworth, Paul R. The Social Psychology of Music. New York: Dryden Press, 1958.

Gagnè, Robert M. The Conditions of Learning. New York: Holt, Rinehart and Winston, 1965.

Gardner, J.W. Excellence. New York: Harper and Row, 1961.

Guilford, J.P. The Nature of Human Intelligence. New York: McGraw-Hill, 1967.

Hall, J.F. Psychology of Motivation. Philadelphia: Lippincott, 1961.

Havighurst, R.J. Developmental Tasks and Education. New York: Longmans, Green and Co., 1948.

Henry, Nelson B. (ed.) Basic Concepts in Music Education: The Fifty-Seventh Yearbook of the National Society for the Study of Education. Chicago: The University of Chicago Press, 1958.

Howard, Alvin W., and George C. Stoumbis. The Junior High and Middle School: Issues and Practices. New York: Intest Educational Publishers, 1970.

Hunt, J. McV. Intelligence and Experience. New York: Ronald Press, 1961.

Jaques-Dalcroze, Emile. Rhythm, Music and Education. Trans. by Harold F. Rubinstein. New York: G.P. Putnam's Sons, 1931.

Knuth, William E. Achievement Tests in Music. Minneapolis: Educational Test Bureau, 1936.

Kuhlen, Raymond G. The Psychology of Adolescent Development. New York: Harper and Brothers, 1952.

Kwalwasser, J. Exploring the Musical Mind. New York: Coleman-Ross, 1955.

Leonhard, Charles, and Robert W. House. Foundations and Principles of Music Education. New York: McGraw-Hill Book Co., 1972.

Lundin, Robert W. An Objective Psychology of Music. New York: The Ronald Press, 1967.

Murphy, G. Human Potentialities. New York: Basic Books, 1958.

Schauffler, R., and S. Spaeth. Music as a Social Force in America and the Science of Practice. New York: Caxton Institute, 1927.

Sinnott, E.W. The Biology of the Spirit. New York: Viking, 1955.

Spitzer, Herbert F. Teaching Elementary School Mathematics. Washington, D.C.: National Education Association, 1970.

Watkins, John. Objective Measurement of Instrumental Performance. New York: T.C. Bureau of Publications, 1942.

Periodicals

Bailey, Ben E. "The Development and Validation of a Test of Listening Skill." Journal of Research in Music Education, XVI, No. 1 (Spring, 1968), 59-63.

Bean, Kenneth L. "An Experimental Approach to the Reading of Music." Psychological Monographs, L, (1938), 1-79.

Bell, H. "Rest Pauses in Motor Learning as Related to Snoddy's Hypothesis of Mental Growth." Psychological Monographs, LIV, No. 1 (1942), 1-38.

Beisman, G.L. "Effect of Rhythmic Accompaniment upon Learning of Fundamental Motor Skills." American Association of Health, Physical Education and Recreation, Research Quarterly, XXXVIII (May, 1967), 172-176.

Bobbitt, Richard. "The Development of Music Reading Skills." Journal of Research in Music Education, XVIII, No. 3 (Fall, 1970), 143-156.

Brenner, Flora M. "The Relation Between Musical Capacity and Performance." Psychological Monographs, XXXVI (1926), 246-256.

Burns, Richard. "Methods for Individualizing Instruction." Educational Technology, XI (June, 1971), 55-56.

Buttram, Joe B. "The Influence of Selected Factors on Interval Identification." Journal of Research in Music Education, XVII, No. 3 (Fall, 1969), 309-315.

Colwell, R. "An Investigation of Musical Achievement Among Vocal Students, Vocal-Instrumental Students, and Instrumental Students." Journal of Research in Music Education, XI, No. 2 (Summer, 1963), 123-130.

Dean Charoles D. "Predicting Sight Singing Ability in Teacher Education." Journal of Educational Psychology, XXVIII, (November, 1937), 601-608.

Farnsworth, Paul R. "Auditory Acuity and Musical Ability in The Four Grades." Journal of Psychology, VI (1938), 95-98.

Farnsworth, Paul R. "Musical Talent and the Left Hand." School Musician, (1932), 11-12.

Freeman, Frank S. "Tests and Reviews." The Fifth Mental Measurements Yearbook, (ed.) Oscar K. Buros, New Jersey: The Gryphon Press, (1959), 481.

Fluke, John and Jack N. Sparks. "The Construction, Validation, and Standardization of a Test in Music Perception for High School Performance Groups." Journal of Research in Music Education, XIII, No. 4 (Winter, 1965), 224-234.

Gates, G.S., and L.Q. Rissland. "The Effect of Encouragement and of Discouragement Upon Performance." Journal of Educational Psychology, XIV (1923), 21-26.

Gilbert, G.M. "Sex Differences in Musical Aptitude and Training." Journal of General Psychology, XXVI (1942), 19-33.

Gonzo, Carroll Lee. "An Analysis of Factors Related to Choral Teachers' Ability to Detect Pitch Errors While Reading The Score." Journal of Research in Music Education, XIX, No. 3 (Fall, 1971), 259-271.

Gutsch, Kenneth U. "Instrumental Music Performance: One Approach Toward Evaluation." Journal of Educational Research, LIX (1966), 377-380.

Henkin, R.I. "The Prediction of Behavior Response Patterns to Music." Journal of Psychology, XLIV (1957), 111-127.

Klemish, Janice J. "A Comparative Study of Two Methods of Teaching Music Reading to First-Grade Children." Journal of Research in Music Education, XVIII, No. 4 (Winter, 1970), 355-364.

Lazarus, R.S., and C.W. Ericksen. "Effects of Failure Stress Upon Skilled Performance." Journal of Experimental Psychology, XLIII (1952), 100-105.

Leavitt, H.J., and H. Schlosberg. "The Retention of Verbal and of Motor Skills." Journal of Experimental Psychology, XXXIV (1944), 404-417.

Lehman, H.C. "Chronological Age vs. Physical Peak Performance." American Journal of Psychology, LVIV (1951), 161-187.

Lehman, H.C. "Intellectual vs. Physical Peak Performance." Scientific Monthly, LVI (1945), 127-137.

Leonhard, Charles. "Human Potential and the Aesthetic Experience." Music Educators Journal, LIV (April, 1968), 41.

Mainwaring, J. "Kinaesthetic Factors in the Recall of Musical Experience." British Journal of Psychology, XXIII (1932), 284-307.

MacPherson, Eric D. "How Much Individualization?" The Mathematics Teacher, LXV, No. 5 (May, 1972), 477-478.

McMurray, Foster. "Pragmatism in Music Education." Basic Concepts in Music Education, Fifty-seventh Yearbook of the National Society for the Study of Education, (1958), 30-61.

Mielke, Rolland E. "Individualized Instruction." Educational Technology, X, No. 12 (December, 1970), 55.

Morgan, Robert M. "A Decade of Programmed Instruction." Educational Technology, X (July, 1970), 30.

Ortmann, Otto. "Some Tonal Determinants of Melodic Memory." Journal of Educational Psychology, XXIV (September, 1933), 454-456.

Owens, W.A. Jr. "Note on the Effects of Practice upon Trait Differences in Motor Skills." Journal of Educational Psychology, XXXIII (1942), 144-147.

Petzold, Robert G. "Development of Auditory Perception of Musical Sounds by Children in the First Six Grades." Journal of Research in Music Education, XI, No. 1 (Spring, 1963), 21-43.

Puopolo, Vito. "The Development and Experimental Application of Self-Instructional Practice Materials for Beginning Instrumentalists." Journal of Research in Music Education, XIX, No. 3 (Fall, 1971), 342-349.

Rives, James A. "A Comparative Study of Traditional and Programmed Methods for Developing Music Listening Skills in the Fifth Grade." Journal of Research in Music Education, XVIII, No. 2 (Summer, 1970), 126-133.

Salisbury, Frank S., and Harold B. Smith. "Prognosis of Sight Singing Ability of Normal School Students." Journal of Applied Psychology, XIII, (1929), 425-439.

Schultz, E.J. "Testing Listening Power in Music." Journal of Proceedings of the Music Supervisors National Conference, Twenty-sixth year, Chicago: Music Supervisors National Conference, (1933), 307-310.

Seashore, R.H., C.E. Buxton, and I.N. McCollom. "Multiple Factorial Analysis of Five Motor Skills." American Journal of Psychology, LIII (1940), 251-259.

Sidnell, Robert G. "Self-Instructional Drill Materials for Student Conductors." Journal of Research in Music Education, XIX, No. 1 (Spring, 1971), 85-91.

Spohn, Charles L. "Programming the Basic Materials of Music for Self-Instructional Development of Aural Skills." Journal of Research in Music Education, XI, No. 3 (Fall, 1963), 91-98.

Stecklein, John E., and James Aliferis. "The Relationship of Instrument to Music Achievement Test Scores." Journal of Research in Music Education, V, No. 1 (Spring, 1957), 3-15.

Travis, R.C. "The Effect of the Length of the Rest Period on Motor Learning." Journal of Psychology, III (1937), 189-194.

Vaughn, J., and C.M. Diserens. "The Experimental Psychology of Competition." Journal of Experimental Education, VII (1938), 76-97.

Wesley, S.M., D.Q. Corey, and B.M. Stewart. "The Intra-Individual Relationship Between Interest and Ability." Journal of Applied Psychology, XXXIV (1950), 193-197.

Whittemore, I.C. "The Influence of Competition on Performance: An Experimental Study." Journal of Abnormal and Social Psychology, XIX (1924), 236-253.

Wright, F.A. "The Correlation Between Achievement and Capacity in Music." Journal of Educational Research, XVII (1928), 50-56.

Dissertations

Beisman, Gladys Lang. "The Effect of Rhythmic Accompaniment During Teaching of Fundamental Motor Skills to Elementary School Children." Unpublished Ed.D. dissertation, State University of New York, 1964.

Bond, Marjorie Helen. "Rhythmic Perception and Gross Motor Performance." Unpublished Ph.D. dissertation, University of Southern California, 1958.

Christ, William E. "The Reading of Rhythm Notation Approached Experimentally According to Techniques and Principles of Word Reading." Unpublished Ph.D. dissertation, Indiana University Music Library, 1953.

Coppock, Doris E. "Development of an Objective Measure of Rhythmic Motor Response." Unpublished Ph.D. dissertation, State University of Iowa, 1964.

Kersey, Robert Edwin. "An Investigation of the Effects of an Exploratory Program in Instrumental Music on the Aural Perception of Instrumental Timbre." Unpublished Ed.D. dissertation, University of Maryland, 1966.

Marquis, James H. "A Study of Interval Problems in Sight-singing Performance with Consideration of the Effect of Context." Unpublished Ph.D. dissertation, State University of Iowa, 1963.

Ottman, Robert W. "A Statistical Investigation of the Influence of Selected Factors on the Skill of Sight-Singing." Unpublished Ph.D. dissertation, North Texas State College, 1956.

Ray, Harry B. "An Experimental Approach to the Reading of Pitch Notation." Unpublished Ph.D. dissertation, Indiana University, 1964.

Spohn, Charles L. Jr. "An Exploration in the Use of Recorded Teaching Material to Develop Aural Comprehension in College Music Classes." Unpublished Ph.D. dissertation, Ohio State University, 1959.

Stokes, Charles F. "An Experimental Study of Tachistoscopic Training in Reading Music." Unpublished Ph.D. dissertation, Teachers College University of Cincinnati, 1944.

Measures

Beach, Frank A. Beach Music Test. Kansas: Kansas State Teachers College, Bureau of Educational Measurements, 1930.

Jennrich, Robert I. 1604 Analysis of Variance. University of Wisconsin, 1961.

Lorge-Thorndike Intelligence Tests. Boston: Houghton Mifflin Co., 1959.

Watkins, John G., and Stephen E. Farnum. The Watkins-Farnum Performance Scale. Winona: Hal Leonard Music Inc., 1954.

Miscellaneous

Barch, A.M. "Permanent Work Decrements in the Performance of a Pursuit Task Arising from Short Periods of Massed Practice." Research Bulletin, USAF Air Training Command, Human Resources Research Center, (January, 1952), 52-57.

Havighurst, Robert J. "Lost Innocence-Modern Junior High School Youth." Bulletin of the National Association of Secondary School Principals, (April, 1965).

G. LeBlanc Corporation. The Influence of Parents' Attitude on Children's Musical Activity. Kenosha: LeBlanc Corporation, 1961.

Spohn, Charles L., and William Poland. An Evaluation of Two Methods Using Magnetic Tape Recordings for Programmed Instruction in the Elemental Materials of Music. Final Report of Title VII, Project No. 876, National Defence Education Act of 1958, Grant No. 7-34-0430-172, Columbus, Ohio: The Ohio State University, November, 1963.

Strolle, Roland S. Survey of Jenison Public Schools. Kalamazoo: Western Michigan University School of Education, 1969.

APPENDIX A

SUBJECT INFORMATION

TABLE 28

SUBJECT INFORMATION: I.Q., SEX, INSTRUMENT AND METHOD

Subject	I.Q.	Sex	Method	Sex of Partner	Instrument	Instrument/Partner
1	112	Male	T	Same	Woodwind	Brass
2	103	Female	T	S	W	W
3	113	M	T	Other	B	W
4	96	F	T	S	W	W
5	108	M	T	S	B	B
6	98	F	T	O	W	B
7	113	F	P	S	W	W
8	96	F	I	S	W	W
9	117	F	P	S	W	W
10	108	F	I	S	W	W
11	105	F	P	S	W	W
12	95	F	T	O	W	B
13	107	F	P	S	W	W
14	97	M	I	S	B	B
15	82	M	T	S	W	B

TABLE 28--Continued

Subject	I.Q.	Sex	Method	Sex of Partner	Instrument	Instrument/Partner
16	102	M	I	S	W	B
17	108	M	T	S	B	W
18	106	F	I	S	W	W
19	112	F	I	O	W	B
20	108	F	T	S	W	W
21	101	M	T	O	B	W
22	109	M	P	S	B	B
23	90	F	P	S	W	W
24	106	M	T	O	B	W
25	90	F	T	S	W	W
26	123	F	P	S	W	W
27	90	F	P	S	W	W
28	131	F	I	O	W	B
29	107	F	T	S	W	W
30	101	M	T	S	W	B
31	111	M	P	S	B	B

TABLE 28--Continued

Subject	I.Q.	Sex	Method	Sex of Partner	Instrument	Instrument/Partner
32	86	F	P	S	W	W
33	124	F	T	S	W	W
34	81	M	I	S	B	B
35	115	F	T	S	W	W
36	115	F	I	S	W	W
37	96	M	I	S	B	B
38	102	F	P	O	W	B
39	99	F	T	S	W	W
40	114	F	I	S	W	W
41	98	M	P	O	B	W
42	124	M	P	S	B	B
43	113	M	I	S	W	B
44	105	F	I	S	W	W
45	86	F	P	O	W	W
46	83	M	T	S	B	B
47	107	F	I	S	W	W

TABLE 28--Continued

Subject	I.Q.	Sex	Method	Sex of Partner	Instrument	Instrument/Partner
48	131	M	T	S	B	B
49	92	M	I	O	B	W
50	76	M	I	S	B	B
51	117	F	P	O	W	B
52	110	F	P	O	W	W
53	100	M	I	O	P	W
54	99	F	I	O	W	B
55	112	M	I	S	B	B
56	106	F	T	O	W	B
57	122	M	T	S	B	B
58	91	F	I	O	W	B
59	114	F	I	O	W	B
60	106	M	I	S	W	B
61	114	M	P	O	W	W
62	111	M	I	S	B	W
63	100	F	P	S	W	W

TABLE 28--Continued

Subject	I.Q.	Sex	Method	Sex of Partner	Instrument	Instrument/Partner
64	94	F	T	S	W	W
65	101	F	T	S	W	W
66	84	F	I	S	W	W
67	94	F	I	S	W	W
68	101	M	I	S	W	B
69	99	M	I	O	B	W
70	100	M	P	O	W	W
71	92	F	P	O	W	B
72	108	F	P	O	W	B
73	109	M	P	S	B	B
74	124	M	I	S	B	B
75	100	M	P	S	B	B
76	117	M	P	S	B	B
77	113	M	T	S	B	B
78	119	F	P	S	W	W
79	106	M	P	S	B	B

TABLE 28--Continued

Subject	I.Q.	Sex	Method	Sex of Partner	Instrument	Instrument/Partner
80	127	F	I	O	W	B
81	100	M	I	S	B	B
82	125	F	T	S	W	W
83	115	M	I	S	B	W
84	109	M	T	S	B	W
85	108	M	I	S	B	W
86	108	M	I	S	B	W
87	105	M	P	S	B	B
88	129	F	T	S	W	W
89	101	M	P	O	B	B
90	121	M	I	S	B	B
91	95	M	T	O	B	W
92	113	F	T	O	W	B
93	113	F	T	S	W	W
94	124	M	I	O	B	W
95	110	F	T	S	W	W

TABLE 28--Continued

Subject	I.Q.	Sex	Method	Sex of Partner	Instrument	Instrument/Partner
96	111	M	P	O	B	W
97	116	M	T	O	B	W
98	86	M	I	O	B	W
99	101	M	P	S	B	B
100	91	M	P	S	B	B
101	91	F	I	O	W	B
102	90	M	T	S	B	B
103	104	M	P	O	B	W
104	98	M	T	O	W	B
105	91	M	T	S	B	B
106	100	F	T	O	W	B
107	100	F	I	S	W	W
108	119	M	I	O	B	W

APPENDIX B

ATTITUDE TEST RAW DATA

TABLE 29

ATTITUDE TEST RAW SCORES

Subject	Score	Subject	Score	Subject	Score
1	20	19	36	37	25
2	38	20	32	38	32
3	30	21	32	39	33
4	29	22	25	40	30
5	32	23	30	41	27
6	36	24	25	42	34
7	32	25	34	43	37
8	31	26	33	44	27
9	37	27	20	45	27
10	37	28	38	46	29
11	33	29	31	47	35
12	39	30	31	48	36
13	30	31	32	49	30
14	27	32	34	50	33
15	30	33	39	51	29
16	34	34	40	52	37
17	35	35	28	53	32
18	34	36	39	54	30

(Scoring Procedures)

Positive Statement

(✓✓) Strongly Agree = 3

(✓) Agree = 2

(x) Disagree = 1

Negative Statement

(x) Disagree = 3

(✓) Agree = 2

(✓✓) Strongly Agree = 1

TABLE 29--Continued

Subject	Score	Subject	Score	Subject	Score
55	36	73	36	91	34
56	28	74	34	92	33
57	34	75	34	93	27
58	24	76	30	94	24
59	31	77	32	95	38
60	42	78	25	96	33
61	31	79	35	97	34
62	28	80	30	98	38
63	27	81	28	99	28
64	30	82	35	100	42
65	37	83	42	101	39
66	33	84	33	102	31
67	32	85	37	103	30
68	31	86	36	104	26
69	33	87	21	105	29
70	39	88	34	106	36
71	33	89	28	107	33
72	28	90	32	108	28

APPENDIX C

SIGHT-READING AND ERROR DETECTION TEST RAW DATA

TABLE 30

SIGHT-READING AND ERROR DETECTION GAIN SCORES FOR SUBJECTS

Subject	S R Pre	S R Post	Gain +100	E D Pre	E D Post	Gain +100
1	43.3	54.3	111	15	56	141
2	37.3	51.3	114	30	50	120
3	46	66	120	53	56	103
4	41	41	100	13	17	104
5	23.8	37.7	114	38	37	99
6	42.7	44.7	102	45	60	115
7	47	62	115	31	33	102
8	29.7	47.3	118	0	20	120
9	31	55.3	124	38	45	107
10	41	37.3	96	19	44	125
11	4	21.7	118	26	25	99
12	32	53.7	122	0	92	192
13	2.7	44.7	102	19	38	119
14	33.7	52.7	119	34	29	95
15	18.3	20	102	30	30	100

TABLE 30--Continued

Subject	S R Pre	S R Post	Gain +100	E D Pre	E D Post	Gain +100
16	31.7	33	102	32	50	118
17	35	48	113	43	22	79
18	72.7	78.7	106	41	52	111
19	63	75	112	43	48	105
20	56.7	61.3	105	0	13	113
21	34.3	38.3	104	38	23	85
22	24.7	36.7	112	17	50	133
23	29.3	39.7	110	0	28	128
24	59.7	68	108	61	50	89
25	49	62.3	113	40	61	121
26	53.7	55.3	101	15	55	140
27	45.3	54.7	109	63	29	66
28	38	65	127	38	65	127
29	52	52	100	27	26	99
30	3.7	18	115	7	29	122
31	41	50.3	109	32	55	123

TABLE 30--Continued

Subject	S R Pre	S R Post	Gain +100	E D Pre	E D Post	Gain +100
32	2	20	118	33	82	149
33	No scores			23	67	144
34	49.3	63.3	115	74	58	84
35	77.7	86	108	27	70	143
36	56	60	104	60	59	99
37	No scores			26	21	95
38	48.7	56	107	40	53	113
39	56	57.3	101	22	43	121
40	63.3	75.7	112	50	29	79
41	41	45.3	104	64	58	94
42	53	52.3	99	92	52	60
43	62.7	70.3	108	69	77	92
44	7.3	15.3	108	31	33	102
45	10.3	15.3	105	31	59	128
46	0	6	106	39	46	108
47	27	33	106	45	38	93

TABLE 30--<u>Continued</u>

Subject	S R Pre	S R Post	Gain +100	E D Pre	E D Post	Gain +100
48	13.3	41.3	128	38	45	107
49	21	25	104	17	50	133
50	0	8	108	72	100	128
51	46.3	28.3	82	21	64	143
52	3	7	104	.6	0	99
53	18.3	33	115	48	46	98
54	59.7	67.3	108	28	63	135
55	27.3	40.7	113	60	67	107
56	50.7	60	110	39	38	99
57	42.3	51	109	40	31	91
58	19	25	106	17	43	126
59	30	32.3	102	52	50	98
60	45	57	112	42	70	128
61	57	77.3	120	55	27	70
62	52	66.3	114	55	43	87
63	12.7	5.3	93	17	35	118

TABLE 30--Continued

Subject	S R Pre	S R Post	Gain +100	E D Pre	E D Post	Gain +100
64	34.7	33	99	27	22	95
65	39	48	109	44	50	106
66	51	56	105	0	60	160
67	43	39.3	96	21	26	105
68	47	50.3	103	15	14	99
69	29	31.7	103	48	62	114
70	62.3	75	113	30	28	98
71	25	22	97	45	13	68
72	4.7	9.3	105	38	33	95
73	23.3	21.7	98	8	28	120
74	44.7	55	111	39	44	105
75	28.3	32.7	104	43	32	89
76	29.7	42.7	113	53	42	89
77	34	43.3	109	43	20	77
78	45.7	56	111	21	26	105
79	22.3	32	110	60	37	77

TABLE 30--Continued

Subject	S R Pre	S R Post	Gain +100	E D Pre	E D Post	Gain +100
80	35	45.3	110	36	43	107
81	24	34	110	33	11	78
82	50	51	101	75	70	95
83	50	48.3	98	17	44	127
84	36.7	58.3	122	47	53	106
85	43	56.3	113	32	46	114
86	49	54.3	105	69	50	81
87	40.3	37.3	97	52	27	75
88	47	57.7	110	52	47	95
89	26	35	109	20	27	107
90	26	32	106	63	51	88
91	8.3	42	134	0	0	100
92	38.7	36	98	15	30	115
93	28.3	34.3	106	61	65	104
94	62	64	102	33	28	95
95	22.3	25	103	31	61	130

TABLE 30--Continued

Subject	S R Pre	S R Post	Gain +100	E D Pre	E D Post	Gain +100
96	41.3	55.3	114	17	36	119
97	30.3	52.3	122	34	43	109
98	0	10.7	111	25	30	105
99	17	29.3	112	64	46	82
100	4.3	31.7	127	42	18	76
101	22.3	25	103	26	75	149
102	5.3	28.3	123	16	12	96
103	37.3	41	104	50	64	114
104	30	47.7	118	41	54	113
105	0	7	107	0	0	100
106	52.3	58.3	106	33	36	103
107	46	52.3	106	15	64	149
108	50	52	102	29	21	92

TABLE 31

PRETEST SIGHT-READING RAW SCORES

Subject	Judge X	Judge Y	Judge Z	Mean
1	43	45	42	43.3
2	32	43	37	37.3
3	45	47	46	46
4	40	41	42	41
5	22	25	24	21.7
6	36	46	46	42.7
7	47	47	47	47
8	24	34	31	29.7
9	27	32	34	31
10	42	40	41	41
11	6	3	3	4
12	25	33	38	32
13	5	2	1	2.7
14	30	33	38	33.7
15	16	19	20	18.3
16	26	32	37	31.7
17	31	37	37	35
18	66	78	74	72.7
19	59	67	63	63
20	54	58	58	56.7
21	32	32	39	34.3
22	25	28	21	24.7
23	26	31	31	29.3
24	54	62	63	59.7

TABLE 31--Continued

Subject	Judge X	Judge Y	Judge Z	Mean
25	43	50	54	49
26	50	55	56	53.7
27	39	50	47	45.3
28	42	36	36	38
29	51	52	53	52
30	4	3	3	3.7
31	35	45	43	41
32	1	2	3	2
33	40			N.S.
34	50	48	50	49.3
35	72	82	79	77.7
36	55	56	57	56
37				N.S.
38	42	50	54	48.7
39	50	62	56	56
40	57	65	63	63.3
41	39	39	45	41
42	50	57	52	53
43	60	66	62	62.7
44	4	18	11	10.3
45	6	8	14	7.3
46	0	0	1	0
47	26	27	28	27
48	10	14	16	13.3

TABLE 31--Continued

Subject	Judge X	Judge Y	Judge Z	Mean
49	14	20	19	21
50	0	2	0	0
51	41	50	48	46.3
52	0	1	8	3
53	10	28	27	18.3
54	56	65	58	59.7
55	23	31	28	27.3
56	50	52	50	50.7
57	33	47	47	42.3
58	13	22	22	19
59	28	31	31	30
60	44	44	47	45
61	52	61	58	57
62	44	60	52	52
63	10	19	14	12.7
64	32	37	35	34.7
65	37	41	39	39
66	49	50	51	51
67	34	48	47	43
68	39	52	50	47
69	28	27	32	29
70	63	62	62	62.3
71	22	30	23	25
72	2	11	3	4.7

TABLE 31--Continued

Subject	Judge X	Judge Y	Judge Z	Mean
73	18	26	26	23.3
74	40	49	44	44.7
75	28	27	30	28.3
76	26	33	30	29.7
77	29	38	35	34
78	39	50	47	45.7
79	18	24	25	22.3
80	36	32	37	35
81	24	24	24	24
82	49	50	51	50
83	47	53	50	50
84	31	39	40	36.7
85	38	46	45	43
86	47	50	50	49
87	40	43	38	40.3
88	38	54	49	47
89	23	27	28	26
90	25	26	27	26
91	5	11	9	8.3
92	36	34	46	38.7
93	25	34	26	28.3
94	54	67	65	62
95	14	30	23	22.3
96	40	40	37	41.3

TABLE 31--Continued

Subject	Judge X	Judge Y	Judge Z	Mean
97	28	33	30	30.3
98	0	1	0	0
99	10	17	24	17
100	1	9	3	4.3
101	21	21	25	22.3
102	0	11	5	5.3
103	37	39	36	37.3
104	21	36	33	30
105	0	0	1	0
106	45	62	50	52.3
107	44	47	47	47
108	42	54	54	50

TABLE 32

POSTTEST SIGHT-READING RAW SCORES

Subject	Judge X	Judge Y	Judge Z	Mean
1	55	54	54	54.3
2	55	50	49	51.3
3	68	69	61	66
4	41	40	42	41
5	47	34	32	37.7
6	43	49	42	44.7
7	67	65	59	62
8	48	47	47	47.3
9	57	58	54	55.3
10	44	41	37	37.3
11	21	18	16	21.7
12	57	54	50	53.7
13	43	49	42	44.7
14	54	49	55	52.7
15	20	18	14	20
16	35	27	27	33
17	50	48	46	48
18	80	85	71	78.7
19	78	75	72	75
20	59	66	59	61.3
21	41	37	37	38.3
22	41	35	34	36.7
23	41	39	39	39.7
24	70	68	57	68

TABLE 32--Continued

Subject	Judge X	Judge Y	Judge Z	Mean
25	69	60	58	62.3
26	62	55	49	55.3
27	56	56	52	54.7
28	70	62	60	65
29	51	52	53	52
30	22	14	18	18
31	52	53	46	50.3
32	25	15	13	20
33	59	57	50	57
34	68	65	57	63.3
35	93	87	80	86
36	60	59	61	60
37	44	46	40	44
38	54	56	58	56
39	51	61	60	57.3
40	79	78	70	75.7
41	44	47	45	45.3
42	52	54	51	52.3
43	74	68	59	70.3
44	20	10	8	15.3
45	21	13	12	15.3
46	5	6	7	6
47	33	33	33	33
48	42	39	43	41.3

TABLE 32--Continued

Subject	Judge X	Judge Y	Judge Z	Mean
49	25	25	25	25
50	1	17	6	8
51	30	30	25	28.3
52	2	0	19	7
53	28	38	33	33
54	66	67	69	67.3
55	47	38	37	40.7
56	60	64	56	60
57	54	50	49	51
58	26	24	25	25
59	40	23	23	32.3
60	60	57	54	57
61	81	79	72	77.3
62	73	66	60	66.3
63	12	3	4	5.3
64	34	35	30	33
65	50	48	46	48
66	56	56	56	56
67	41	35	42	39.3
68	55	57	49	50.3
69	33	31	31	31.7
70	80	76	69	75
71	20	23	23	22
72	11	8	9	9.3

TABLE 32--Continued

Subject	Judge X	Judge Y	Judge Z	Mean
73	25	21	19	21.7
74	55	54	56	55
75	41	30	27	32.7
76	48	47	33	42.7
77	50	41	39	43.3
78	56	56	56	56
79	34	34	28	32
80	52	47	37	45.3
81	35	36	31	34
82	51	51	51	51
83	50	45	50	48.3
84	64	55	56	58.3
85	60	52	57	56.3
86	60	48	51	54.3
87	43	31	39	37.3
88	62	59	52	57.7
89	40	31	33	35
90	32	32	32	32
91	38	44	44	42
92	36	36	36	36
93	39	32	32	34.3
94	67	70	55	64
95	30	25	20	25
96	55	59	52	55.3

TABLE 32--Continued

Subject	Judge X	Judge Y	Judge Z	Mean
97	54	52	51	52.3
98	16	5	11	10.7
99	29	27	32	29.3
100	36	30	29	31.7
101	25	25	25	25
102	28	28	29	28.3
103	42	41	40	41
104	48	48	47	47.7
105	2	9	10	7
106	56	61	55	58.3
107	59	56	52	52.3
108	55	51	50	52

TABLE 33

ERROR DETECTION RAW SCORES

Subject	Pre%	Post%	Pre	Post	Gain*
1	3/20**	10/18	15	56	141
2	8/27	9/18	30	50	120
3	10/19	14/25	53	56	103
4	2/16	5/29	13	17	104
5	10/26	10/27	38	37	99
6	10/22	6/10	45	60	115
7	5/16	12/36	31	33	102
8	0/9	3/15	0	20	120
9	10/26	17/38	38	45	107
10	4/21	17/39	19	44	125
11	2/7	3/12	26	25	99
12	0/18	34/37	0	92	192
13	5/27	11/29	19	38	119
14	11/32	11/38	34	29	95
15	25/25	15/15	100	100	100
16	12/37	14/28	32	50	118
17	6/14	5/23	43	22	79
18	7/17	12/23	41	52	111
19	6/14	12/25	43	48	105
20	0/8	3/24	0	13	113

* Gain plus 100

** Indication that the student identified 3 of the 20 measures that had errors within them.

TABLE 33--Continued

Subject	Pre%	Post%	Pre	Post	Gain
21	8/21	7/31	38	23	85
22	3/18	16/32	17	50	133
23	0	9/32	0	28	128
24	11/18	7/14	61	50	89
25	8/20	14/23	40	61	121
26	2/13	6/11	15	55	140
27	15/24	5/17	63	29	66
28	8/21	13/20	38	65	127
29	8/30	11/43	27	26	99
30	3/44	6/21	7	29	122
31	12/37	17/31	32	55	123
32	4/12	9/11	33	82	149
33	3/13	16/24	23	67	144
34	17/23	15/26	74	58	84
35	3/11	7/10	27	70	143
36	9/15	22/37	60	59	99
37	8/31	4/19	26	21	95
38	8/20	10/19	40	53	113
39	5/23	6/14	22	43	121
40	8/16	7/24	50	29	79
41	9/14	11/19	64	58	94
42	12/13	11/21	92	52	60
43	10/13	29/42	69	77	108
44	8/26	5/15	31	33	102

TABLE 33--Continued

Subject	Pre%	Post%	Pre	Post	Gain
45	10/32	13/22	31	59	128
46	0/10	0/10			100
47	10/22	6/16	45	38	93
48	5/13	9/20	38	45	107
49	5/29	25/50	17	50	133
50	23/32	23/23	72	100	128
51	3/14	14/22	21	65	143
52	2/32	0/1	.6		99
53	13/27	16/35	48	46	98
54	5/18	5/8	28	63	135
55	12/20	24/36	60	67	107
56	9/23	5/13	39	38	99
57	8/20	12/39	40	31	91
58	5/30	3/7	17	43	126
59	13/25	16/32	52	50	98
60	8/19	7/10	42	70	128
61	6/11	3/12	55	25	70
62	5/9	13/30	55	43	87
63	3/18	11/31	17	35	118
64	3/11	2/9	27	22	95
65	7/16	7/14	44	50	106
66	0/24	20/33	0	60	160
67	4/19	6/23	21	26	105
68	4/27	4/28	15	14	99

TABLE 33--Continued

Subject	Pre%	Post%	Pre	Post	Gain
69	12/25	13/21	48	62	114
70	3/10	5/18	30	28	98
71	5/11	4/23	45	13	68
72	10/26	6/18	38	33	95
73	2/25	5/18	8	28	120
74	9/23	8/18	39	44	105
75	15/35	7/22	43	32	89
76	9/17	8/19	53	42	89
77	12/28	5/25	43	20	77
78	11/32	11/32	34	34	100
79	3/5	11/30	60	37	77
80	13/36	23/54	36	43	107
81	3/9	1/9	33	11	78
82	12/16	26/37	75	70	95
83	1/6	14/32	17	44	127
84	15/32	16/30	47	53	106
85	8/25	6/13	32	46	114
86	11/16	15/30	69	50	81
87	12/23	8/30	52	27	75
88	13/25	14/30	52	47	95
89	4/20	6/22	20	27	107
90	25/40	18/35	63	51	88
91	10/18	10/18	56	56	100

TABLE 33--Continued

Subject	Pre%	Post%	Pre	Post	Gain
92	4/27	7/23	15	30	115
93	11/18	15/23	61	65	104
94	6/18	8/29	33	28	95
95	9/29	20/33	31	61	130
96	2/12	10/28	17	36	119
97	12/35	12/28	34	43	109
98	6/25	8/27	25	30	105
99	21/33	11/24	64	46	82
100	5/12	15/28	42	18	76
101	9/34	9/12	26	75	149
102	4/25	3/25	16	12	96
103	8/16	7/11	50	64	114
104	9/22	7/13	41	54	113
105	32/32	11/11	100	100	100
106	6/18	5/14	33	36	103
107	3/20	9/14	15	64	149
108	9/31	6/28	29	21	92

APPENDIX D

RELIABILITY CALCULATIONS FOR SIGHT-READING JUDGES

TABLE 34

COEFFICIENT OF CONCORDANCE FOR RELIABILITY OF SIGHT-READING JUDGES

Judge	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
A	1	2	3	4	5	6	7	9	9	9	11	12.5	12.5	14	16	16	16	18
B	1	4	3	5	2	10.5	7	6	23	12.5	8.5	12.5	21.5	10.5	21.5	8.5	14.5	19
C	1	3	2	5	4	12	9	6	11	8	14	14	16.5	18.5	26	7	10	16.5
	3	9	8	14	11	28.5	23	21	43	29.5	33.5	39	50.5	43	63.5	31.5	40.5	53.5
	88.5	82.5	83.5	77.5	81.5	63	68.5	70.5	48.5	62	58	52.5	41	48.5	28	60	51	38
	7832.25	6806.25	6972.25	6006.25	6642.25	3969	4692.25	4970.25	2352.25	3844	3364	2756.25	1681	2352.25	784	3600	2601	1444

TABLE 34--<u>Continued</u>

Judge	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
	20	20	20	22.5	22.5	24	25.5	25.5	27.5	27.5	30.5	30.5	30.5	30.5	34	34	34
	24.5	32	19	14.5	35	27	27	19	29.5	43	45.5	24.5	16.5	27	29.5	31	50
	21	24	28	14	35.5	22	34	18.5	24	14.5	41.5	24	20	28	31	30	54
	65.5	76	67	51	93	73	86.5	63	81	112	117.5	79	67	85.5	94.5	95	138
	26	15.5	24.5	40.5	-1.5	18.5	5	28.5	10.5	-20.5	-26	12.5	24.5	6	-3	3.5	47
	676	240.25	600.25	1640.25	2.25	342.25	25	812.25	110.25	240.25	676	156.25	600.25	36	9	12.25	2209

TABLE 34--Continued

Judge	36	37	38	39	40	41	42	43	44	45	46	47	48	49
	37	37	37	39.5	39.5	41.5	41.5	43.5	43.5	46.6	46.6	46.6	46.6	50
	33.5	43	16.5	37.5	58	37.5	37.5	37.5	40.5	33.5	47.5	52	40.5	54.5
	32.5	32.5	28	35.5	46	38.6	38.6	38.6	38.6	46	46	57	46	58.5
	103	112.5	81.5	112.5	143.5	117.6	117.6	119.6	122.6	126.1	140.1	155.6	133.1	163
	11.5	21	10	21	52	26.1	26.1	28.1	31.1	34.6	48.6	64.1	41.6	71.5
	132.25	441	100	441	2704	681.21	681.21	789.61	967.21	1197.16	2361.96	4108.81	1730.56	5112.25

TABLE 34--Continued

Judge	50	51	52	53	54	55	56	57	58	59	60
	50	50	53	53	53	55.5	55.5	57	58	59	60
	43	47.5	50	45.5	56	54.5	50	53	59	57	60
	56	49.5	54	43	51.5	49.5	46	51.5	54	58.5	60
	149	147	157	141.5	160.5	159.5	151.5	161.5	171	174.5	180
	57.5	55.5	65.5	50	69	68	60	70	79.5	83	85.5
	3306.25	3080.25	4290.25	2500	4761	4624	3600	4900	6320.25	6889	7832.25

APPENDIX E

ANALYSES RAW DATA

TABLE 35

SUBJECT NUMBERS AND GAIN SCORES FOR ERROR DETECTION 3X2 ANALYSIS

T						I						P						
*5	17	48	57	77	84	94	86	85	60	43	3	7	9	42	76	79	96	
**99	79	107	91	77	106	95	81	114	128	92	103	102	107	60	89	77	119	HI IQ
1	35	56	88	93	95	55	10	108	74	80	59	22	51	52	61	73	26	
141	143	99	95	104	130	107	125	92	105	107	98	133	143	99	70	120	140	
2	21	30	39	102	91	50	49	16	8	98	14	38	41	71	75	99	100	
120	85	122	121	96	100	128	133	118	120	105	95	113	94	68	89	82	76	LO IQ
104	6	12	15	25	106	58	54	44	107	69	67	27	11	63	87	89	103	
113	115	192	100	121	103	126	135	102	149	114	105	66	99	118	75	107	114	

* Top line indicates subject number

** Second line indicates a raw score under each subject number

TABLE 36

SUBJECT NUMBERS AND GAIN SCORES FOR SIGHT-READING 3X2 ANALYSIS

	T						I						P						
	*5	17	48	57	77	84	94	86	85	60	43	3	7	9	42	76	79	96	
**	114	113	128	109	109	122	102	105	113	112	108	120	115	124	99	113	110	114	HI IQ
	1	35	56	88	93	95	55	10	108	74	80	59	22	51	52	61	73	26	
	111	108	110	110	106	103	113	96	102	111	110	102	112	82	104	120	98	101	
	2	21	30	39	102	91	50	49	16	8	98	14	38	41	71	75	99	100	
	114	104	115	101	123	134	108	104	102	118	111	119	107	104	97	104	112	127	LO IQ
	104	6	12	15	25	106	58	54	44	107	69	67	27	11	63	87	89	103	
	118	102	122	102	113	106	106	108	108	106	103	96	109	118	93	97	109	104	

* Top line indicates subject number

** Second line indicates a raw score under each subject number

TABLE 37

ATTITUDE RAW SCORE METHOD/I.Q.

*	1	35	56	88	93	95	55	10	108	74	80	59	22	51	52	61	73	26	
**	20	28	28	34	27	38	36	37	28	34	30	31	25	29	37	31	36	33	
																		HI	IQ
	5	15	48	57	77	84	94	86	85	60	43	3	7	9	42	76	79	96	
	32	35	36	34	32	33	24	36	37	42	37	30	32	37	34	30	35	33	
	104	6	12	15	25	106	58	54	44	107	69	67	27	11	63	87	89	103	
	26	36	39	30	34	36	24	30	27	33	33	32	20	33	27	21	28	30	
																		LO	IQ
	2	21	30	39	102	91	50	49	16	8	98	14	38	41	71	75	99	100	
	38	32	31	33	31	34	33	30	34	31	38	27	32	27	33	34	28	42	

* Indicates subject number

** The <u>raw score</u> is under each subject number

TABLE 38

SUBJECT NUMBERS AND GAIN SCORES IN 3X2 SEX ANALYSES

SIGHT-READING

*	**	T				I				P		
6	102	91	134	3	120	58	106	38	107	70	113	
12	122	92	98	19	112	69	103	45	105	71	97	
21	104	97	122	28	127	80	110	51	82	89	109	MIXED
24	108	104	118	53	115	94	102	52	104	96	114	
56	110	106	106	54	108	108	102	61	120	103	104	
1	111	65	109	10	96	67	96	9	124	42	99	
5	114	77	109	18	106	74	111	11	118	63	93	
30	115	84	122	40	115	83	98	23	110	79	110	SAME
35	108	93	106	50	108	85	113	31	109	87	97	
57	109	95	102	62	114	107	106	32	118	100	127	

ERROR DETECTION

6	115	91	100	3	103	58	126	38	113	70	98	
12	192	92	115	19	105	69	114	45	128	71	68	
21	85	97	109	28	127	80	107	51	143	89	107	MIXED
24	89	104	113	53	98	94	95	52	99	96	119	
56	99	106	103	54	135	108	92	61	70	103	114	
1	141	65	106	10	125	67	105	9	107	42	60	
5	99	77	77	18	111	74	105	11	99	63	118	
30	122	84	106	40	79	83	127	23	128	79	77	SAME
35	143	93	104	50	128	85	114	31	123	87	75	
57	91	95	130	62	87	107	149	32	149	100	76	

* Top line indicates subject number

** Second line indicates a <u>raw score</u> to the right of each subject number

TABLE 38--<u>Continued</u>

ATTITUDE

T *	T **	T *	T **	I *	I **	I *	I **	P *	P **	P *	P **	
6	36	91	32	3	30	58	24	38	32	70	39	
12	39	92	33	19	36	69	33	45	27	71	33	
21	32	97	34	28	38	80	30	51	29	89	28	MIXED
24	25	104	26	53	32	94	24	52	37	96	33	
56	28	106	36	54	30	108	28	61	31	103	30	
1	20	65	37	10	37	67	32	9	37	42	34	
5	32	77	32	18	34	74	34	11	33	63	27	
30	31	84	33	40	30	83	42	23	30	79	35	SAME
35	28	93	27	50	33	85	37	31	32	87	21	

* Indicates subject number

** Raw score for each subject

TABLE 39

SUBJECT NUMBERS AND GAIN SCORES IN 3X2 INSTRUMENT ANALYSES

SIGHT-READING

	T				I				P			
	* 12	17	21	30	28	58	60	62	38	41	51	71
MIXED	** 122	113	104	115	127	106	112	114	107	104	82	97
	56	91	92	97	68	80	83	98	72	89	96	103
	110	134	98	122	103	110	98	111	105	109	114	104
	2	20	25	48	8	34	40	50	11	23	31	42
SAME	114	105	113	128	118	115	112	108	118	110	109	99
	64	77	88	102	67	74	81	107	73	76	87	100
	99	109	110	123	96	111	110	106	98	113	97	127

ERROR DETECTION

	T				I				P			
	12	17	21	30	28	58	60	62	38	41	51	71
MIXED	192	79	85	122	127	126	128	87	113	94	143	68
	56	91	92	97	68	80	83	98	72	89	96	103
	99	100	115	109	99	107	127	105	95	107	119	114
	2	20	25	48	8	34	40	50	11	23	31	42
SAME	120	113	121	107	120	84	79	128	99	128	123	60
	64	77	88	102	67	74	81	107	73	76	87	100
	95	77	95	96	105	105	78	149	120	89	75	76

* Top line indicates subject number

** Second line indicates a raw score under each subject number

TABLE 39--Continued

	ATTITUDE											
	T				I				P			
MIXED	*12	17	21	30	28	58	60	62	38	41	51	71
	**39	35	32	31	38	24	42	28	32	27	29	33
	56	91	92	97	68	80	83	98	72	89	96	103
	28	34	33	34	31	30	42	38	28	28	33	30
SAME	2	20	25	48	8	34	40	50	11	23	31	42
	20	32	34	36	31	40	30	33	33	30	32	34
	64	77	88	102	67	74	81	107	73	76	87	100
	30	32	34	31	32	34	28	33	36	30	21	42

* Top line indicates subject number

** Second line indicates a raw score under each subject number

APPENDIX F

CONSTRUCTION OF AN ATTITUDE TEST

FORTY STATEMENTS USED TO DEVELOP AN ATTITUDE SCALE

1. Practice takes too long.
2. Practice can be done when there are other things that I would like to do.
3. The best amount of time to practice is about 10 minutes a day.
4. Practicing on an instrument gets boring day after day.
5. Most of the time playing an instrument outside of class time is fun.
6. I like to practice when I have a bad day, it makes me feel happy.
7. I don't like to practice because my parents are always telling me to practice.
8. When I play no one is around and I play to challenge myself.
9. Practice should be done when there is something good to play.
10. Practice is done when one is told to practice and not for long periods of time.
11. Practice is a drag when dull music is played over and over.
12. When I practice I'm not happy because I don't understand the music.
13. Practicing an instrument should be done when there is a certain amount of time that I have to practice, this includes music that I don't like to play.
14. When we play songs and I practice on them too much at home or in my practice time, it gets sickening.
15. I like to practice when I don't have anything special to practice on.
16. I don't mind practicing.
17. I practice when I feel I need practicing.
18. I like to practice with a lot of people with someone to help me.

19. I do not like to play dull music in a noisey room.

20. Practice should be done when there is music I like.

21. Practice is good when I can make up different rhythm patterns for scales.

22. Practice should be done alone and at home.

23. In practice you should count out the music and study it.

24. Practice is not so bad because we have good music.

25. Practice is good it helps you become a better player.

26. I don't like to practice when we are playing ball.

27. Practice is hard when we play dull music over and over.

28. I don't like to practice by myself for any length of time.

29. I like to practice with people who are better than me but don't tell me what to do.

30. I like to practice with someone to help me.

31. Practice is best in a group of kids or alone where its quiet.

32. A variety of songs, scales, and assignments is good practice.

33. I like to make my own music.

34. I don't like to have anyone listen.

35. I don't like to practice easy music.

36. I don't mind practice but I don't get it very well.

37. Practice over the music and then practice on the parts that were wrong.

38. Practice is best on modern songs.

39. I like to practice alone and correctly.

40. I like to practice more than a half hour at a time.

SELECT STATEMENTS TAKEN FROM FORTY AFTER THEY WERE GIVEN A SCALE VALUE BY THE GRADUATE CLASS

Low

Practice takes too long.

Practicing on an instrument gets boring day after day.

Practice is done when one is told to practice and not for long periods of time.

Practice is a drag when dull music is played over and over.

When I practice I'm not happy because I don't understand the music.

When we play songs and I practice on them too much at home or in my practice time, it gets sickening.

Practice should be done when there is music I like.

I don't like to practice by myself for any length of time.

High

Most of the time playing an instrument outside of class time is fun.

When I play no one is around and I play to challenge myself.

In practice you should count out the music and study it.

Practice is good, it helps you become a better player.

A variety of songs, scales, and assignments is good practice.

Practice over the music and then practice on the parts that were wrong.

I like to practice alone and correctly.

I like to practice more than a half hour at a time.

NUMERICAL SCALE VALUE FOR FORTY STATEMENTS

1.	S = 2.01	21.	S = 9.78
2.	S = 7.91	22.	S = 8.59
3.	S = 6.21	23.	S = 10.01
4.	S = 1.97	24.	S = 9.96
5.	S = 10.12	25.	S = 10.68
6.	S = 9.70	26.	S = 5.78
7.	S = 5.92	27.	S = 5.00
8.	S = 11.16	28.	S = 3.73
9.	S = 5.92	29.	S = 7.41
10.	S = 3.36	30.	S = 7.88
11.	S = 3.91	31.	S = 8.77
12.	S = 3.42	32.	S = 10.96
13.	S = 9.87	33.	S = 9.83
14.	S = 4.18	34.	S = 6.44
15.	S = 7.62	35.	S = 6.91
16.	S = 8.59	36.	S = 6.18
17.	S = 5.80	37.	S = 11.01
18.	S = 6.77	38.	S = 6.58
19.	S = 5.56	39.	S = 10.54
20.	S = 4.77	40.	S = 10.76

(1 is low, 11 is high)

RELIABILITY TEST-RETEST FOR ATTITUDE TEST

Reliability	No.	Statement
.84	1.	Practice takes too long.
.76	3.	Practice on an instrument gets boring day after day.
.73	4.	Most of the time, playing an instrument outside of class time is fun.
.80	5.	When I play no one is around and I play to challenge myself.
.82	6.	Practice is done when one is told to practice and not for long periods of time.
.78	7.	Practice is a drag when dull music is played over and over.
.92	8.	When I practice I'm not happy because I don't understand the music.
.69	9.	When we play songs and I practice on them too much at home or in my practice time, it gets sickening.
.80	11.	In practice you should count out the music and study it.
.76	12.	Practice is good it helps you become a better player.
.73	13.	I don't like to practice by myself for any length of time.
.69	14.	A variety of songs, scales, and assignments is good practice.
.73	18.	Practice over the music, and then practice on the parts that were wrong.
.73	20.	I like to practice more than a half hour at a time.

PRACTICE ATTITUDE INVENTORY*

Name ________________ Grade _______

Read through these statements carefully and place a check (✓) if you agree with the statement. Place a double check (✓✓) if you strongly agree with the statement. Place an (X) if you disagree with the statement, or any part of it, or if it does not express your own particular attitude. Obviously this is not a test. People differ very widely in their attitudes. Please indicate your own attitude by a check, a double check, or a cross.

( ) 1. Practice takes too long.

( ) 2. The best amount of practice time is about 10 minutes a day.

( ) 3. Practice on an instrument gets boring day after day.

( ) 4. Most of the time, playing an instrument outside of class time is fun.

( ) 5. When I play no one is around and I play to challenge myself.

( ) 6. Practice is done when one is told to practice and not for long periods of time.

( ) 7. Practice is a drag when dull music is played over and over.

( ) 8. When I practice I'm not happy because I don't understand the music.

( ) 9. When we play songs and I practice on them too much at home, or in my practice time, it gets sickening.

( ) 10. Practice should be done when there is music I like.

( ) 11. In practice you should count out the music and study it.

( ) 12. Practice is good it helps you become a better player.

( ) 13. I don't like to practice by myself for any length of time.

( ) 14. A variety of songs, scales, and assignments is good practice.

( ) 15. I don't like to have anyone listen.

( ) 16. I don't like to practice easy music.

( ) 17. I don't mind practice but I don't get it very well.

*This caption was not on the student's test sheet.

( ) 18. Practice over the music, and then practice on the parts that were wrong.

( ) 19. I like to practice alone and correctly.

( ) 20. I like to practice more than a half hour at a time.

APPENDIX G

RELIABILITY CALCULATIONS FOR SCORING ERROR DETECTION

TABLE 40

COMPUTATION OF COEFFICIENT OF CORRELATION FOR ERROR DETECTION SCORING RELIABILITY

Student	Scores		Ranks		D	D^2
	Test 1	Test 2	Test 1	Test 2		
A	13	13	2.5	2.0	.5	.25
B	9	9	10.0	11.0	1.0	1.00
C	2	4	33.5	25.5	8.0	64.00
D	4	4	27.0	25.5	1.5	2.25
E	3	5	30.5	21.5	9.0	81.00
F	2	3	33.5	30.5	3.0	9.00
G	-1	-2	42.5	45.0	2.5	6.25
H	-2	-1	45.5	41.0	4.5	20.25
I	-7	-7	58.0	57.0	1.0	1.00
J	-6	-4	57.0	51.5	5.5	30.25
K	13	13	2.5	2.0	.5	.25
L	9	9	10.0	11.0	1.0	1.00
M	8	7	14.5	16.5	2.0	4.00
N	8	7	14.5	16.5	2.0	4.00
O	8	8	14.5	14.5	0.0	0.00
P	4	4	27.0	25.5	1.5	2.25
Q	0	1	40.5	38.5	2.0	4.00
R	0	-2	40.5	45.0	4.5	20.25
S	-11	-10	60.0	60.0	0.0	0.00
T	-2	-4	45.5	51.5	6.0	36.00
U	12	12	5.0	4.0	1.0	1.00

TABLE 40--Continued

Student	Scores		Ranks		D	D^2
	Test 1	Test 2	Test 1	Test 2		
V	9	10	10.0	7.0	3.0	9.00
W	6	6	18.0	18.0	.5	.25
X	5	3	21.5	30.5	9.0	81.00
Y	7	8	17.0	14.5	2.5	6.25
Z	2	2	33.5	35.5	2.0	4.00
A'	-2	-3	45.5	48.0	2.5	6.25
B'	-4	-4	53.0	51.5	1.5	2.25
C'	-5	-8	55.0	58.0	3.0	9.00
D'	-5	-5	55.0	55.5	.5	.25
E'	13	10	2.5	7.0	4.5	20.25
F'	10	10	6.5	7.0	.5	.25
G'	4	2	27.0	35.5	8.5	72.25
H'	3	3	30.5	30.5	0.0	0.00
I'	2	3	33.5	30.5	3.0	9.00
J'	1	2	37.5	35.5	2.0	4.00
K'	-3	-2	50.0	45.0	5.0	25.00
L'	1	2	37.5	35.5	2.0	4.00
M'	-10	-9	59.0	59.0	0.0	0.00
N'	-3	-4	50.0	51.5	1.5	2.25
O'	10	11	6.5	5.0	1.5	2.25
P'	1	1	37.5	38.5	1.0	1.00
Q'	9	9	10.0	11.0	1.0	1.00
R'	9	9	10.0	11.0	1.0	1.00

TABLE 40--Continued

Student	Scores Test 1	Scores Test 2	Ranks Test 1	Ranks Test 2	D	D^2
S'	8	9	14.5	11.0	3.5	12.25
T'	5	5	21.5	21.5	0.0	0.00
U'	4	5	27.0	21.5	5.5	30.25
V'	-1	-2	42.5	45.0	2.5	6.25
W'	-3	-2	50.0	45.0	5.0	25.00
X'	-3	-4	50.0	51.5	1.5	2.25
Y'	13	13	2.5	2.0	.5	.25
Z'	5	6	21.5	18.5	3.0	9.00
A''	5	4	21.5	25.5	4.0	16.00
B''	4	3	27.0	30.5	3.5	12.25
C''	5	5	21.5	21.5	0.0	0.00
D''	5	3	21.5	30.5	9.0	81.00
E''	1	-1	37.5	41.0	3.5	12.25
F''	-3	-1	50.0	41.0	9.0	81.00
G''	-5	-4	55.0	51.5	3.5	12.25
H''	-2	-5	45.5	55.5	10.0	100.00

$$\text{rho} = 1 - \frac{6 \quad (E\ D^2)}{N \quad (N^2-1)}$$

$$1 - \frac{6(948.50)}{215940}$$

$$1 - \frac{589100}{215940}$$

$$1 - .026$$

$$\text{rho} = .97$$

APPENDIX H

ERROR DETECTION SCORING SHEET

1

2