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ABSTRACT

By keeping abreast of the latest research in the field, music educators can better understand how practicing helps students to use practice methods that are the most effective. The purpose of this study was to determine the relative effectiveness of modeling and silent analysis on the performance ability of advanced elementary school instrumentalists. This research focused on two questions: (1) are modeling and silent analysis effective practice techniques when compared with free practice or sight reading; and (2) do modeling and silent analysis differ in their effectiveness as practice techniques? Forty sixth grade band students were assigned to one of four practice conditions and asked to perform a composition after a brief practice session. The four practice sessions were: (1) modeling; (2) silent analysis; (3) free practice; and (4) control. Statistical analyses revealed that modeling was significantly different when compared to the three other groups in improving students' performances of the composition. When looking at the gain scores, both modeling and silent analysis appeared to be more effective than free practice in helping to improve elementary students' performing level. Additionally, the gain scores revealed that practice of any kind is better than simply sight reading. The article begins by discussing the related literature. It includes four tables of scores and a graph of mean gain scores of practice groups, and concludes with an 18-item reference list. (Author/DK)

The Effect of Modeling and Silent Analysis on the Performance Effectiveness of Advanced Elementary Instrumentalists

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Abstract

The purpose of this study was to determine the relative effectiveness of modeling and silent analysis on the performance ability of advanced elementary school instrumentalists. Forty 6th grade band students were assigned to one of four practice conditions and asked to perform a composition after a brief practice session. The four practice conditions were modeling, silent analysis, free practice, and control. Statistical analyses revealed that modeling was significantly different (p .05) when compared to the other three groups in improving students' performances of the composition. When looking at the gain scores, both modeling and silent analysis appeared to be more effective than free practice in helping to improve elementary students' performing level. Additionally, the gain scores revealed that practice of any kind is better than simply sight-reading.

A concern of music educators is the boasting of some students about the amount of time they spent in the practice room, rather than on what they actually accomplished musically through practicing (Ross, 1987). To combat this student attitude, music educators need to help students understand the values of practicing and what it is that they should be achieving musically in the practice room. By keeping abreast of the latest research in the field, music educators can better understand how practicing helps students to use practice methods which are the most effective.

Two practice methods which have received recent attention by music educators and researchers are modeling and silent analysis (Coffman, 1990). Modeling (both dural and visual examples) plays a central role in the teaching methodology of Shinichi Suzuki (Brathwaite, 1988). A more common example of modeling used informally everyday in music classrooms, is when a music teacher sings a musical phrase for his/her students and then has them sing or play it back.

Silent analysis or mental practice, is another successful rehearsal technique that has been studied by music educators and researchers (Green & Gallwey, 1986; Kohut, 1985; Ristad, 1982). Further, Glover, Bruning, and Ronning (1990) wrote of the acceptance of mental practice by cognitive psychologists, "A large body of evidence shows that materials high in imagery are more memorable and that learners instructed to create images will enhance their learning (p. 138)."

The purpose of this study was to determine the relative effectiveness of modeling and silent analysis on the performance ability of advanced elementary school instrumentalists. This research focused on two questions: 1) Are modeling and silent analysis effective practice techniques when compared with free practice or sight-reading? 2) Do modeling and silent analysis differ in their effectiveness as practice techniques?

Related Literature

The first music related investigation of mental practice was a study conducted by Rubin-Rabson (1941). The subjects in her investigation consisted of nine skillful young pianists, who participated in a series of studies on memorizing piano music. The effects of prestudy of material to be learned and mental rehearsal at different times during the learning process were studied. She found that mental practice overlearning was preferable over physical practice overlearning in remembering memorized keyboard music. Further, mental practice was found to be the most helpful when executed about midway through the practice session.

Duerksen (1972) made a call for further research in the area of mental practice and its effect upon musical performance, especially among "secondary and elementary school students" (p. 14). Surprisingly, however, no research involving mental practice and music performance was conducted. Mental rehearsal of musical behaviors, unlike research in sport psychology, held little interest to music psychologists and educators (Coffman, 1988). In recent years, however there has been much attention given to research in the area of the effect of mental practice and imagination on performance of instrumentalists (Coffman, 1990; Ross, 1985; Rosenthal, Wilson, Evans, & Greenwalt, 1987; and Wapnick, Gilsig, & Hummel, 1982).

An investigation by Wapnick, Gilsig, and Hummel (1982) was the first study, since Rubin-Rabson's to look into the effect of mental practice on musical behavior. The purpose of this investigation was to determine the effectiveness of mental practice when compared to an equal amount of time in psychomotoric practice. A secondary purpose was to determine if the effectiveness of mental practice could be enhanced through guided analysis. The study consisted of two experiments: (1) Trumpet and trombone majors (n=20) were assigned randomly to two treatment groups (mental and physical practice); and (2) College pianists (n=45) were randomly assigned to three treatment groups (mental and physical practice, and guided analysis). The two experiments provided contradictory results, with subjects in the first receiving higher ratings under mental rehearsal than under exclusive practice; while the second revealed no significant difference between the groups.

Ross (1985) again tested the effectiveness of mental practice in improving trombone performance. Subjects consisted of thirty college trombonists from three colleges, who were assigned to one of five experimental practice conditions: (1) all physical practice, (2) all mental practice, (3) a combination of physical and mental practice, (4) mental practice with simulated slide movement, and (5) no practice (control). His findings were consistent with those in physical education research, being that a combination of physical and mental practice was more effective than mental or no practice, and physical practice resulted in higher scores than no practice.

The relative effectiveness of five different practice conditions was studied by Rosenthal, Wilson, Evans, and Greenwalt (1988). Sixty college music students were assigned to five practice conditions and then asked to perform a composition after a brief practice session. The five practice conditions were modeling, singing, silent analysis, free practice, and control. Analysis determined that modeling and free practice were the most effective practice conditions for mastering the excerpt, while singing and silent analysis were no more effective than sight-reading. Subjects in the silent analysis group, however, were more accurate in their performance of rhythms in the musical passage.

Coffman (1990) studied types of practice (physical, mental, alternating physical/mental, and motivational control) and aural

knowledge of results on the performance effectiveness of pianists. Music education and music therapy majors (n=40) participated in a pre-test and post-test design using one of the eight treatment variables. The dependent variables consisted of performance time, number of pitch errors, and number of rhythm errors. Results indicated that: (1) all three practice conditions had significantly shorter performance times than did the control group, (2) treatments using physical practice and alternating mental/physical practice yielded significantly shorter performance times than did the mental practice treatment alone, and (3) the physical treatment did not differ significantly from the alternating mental/physical practice treatment in improving performance time.

Procedures

This study consisted of a multi-group, pretest-posttest control group design. Advanced students enrolled in a 6th grade elementary band program (wind instrumentalists, n = 40) served as the subjects of this investigation. The term advanced was defined in this study as students who were in their second year of instruction in a two-year elementary band program. All 40 subjects were from a rural public elementary school. Using a randomization table, the students were randomly assigned to three experimental groups and one control group, with each having ten students. The four groups were: (a) Modeling - subjects were asked to listen to a tape recording of the etude with the printed music available and after a period of two minutes study and review, to perform the etude; (b) Silent Analysis - subjects were asked to rehearse mentally the etude for two minutes, and then perform the etude; (c) Free Practice - subjects practiced the etude for two minutes using their instruments, and then performed the etude; (d) Control Group - subjects practiced an unrelated etude, and then sight-read the etude used by the three experimental groups. The control group was used to compare the effectiveness of the three practice techniques over sight-reading.

The etude selected for this study was "Study No. 10," from 24 Arban-Klose-Concone Studies for Band Instruments, arranged by Harold W. Rusch (1955). This example was used because of its obscurity, suitability for all wind band instruments, and because it fulfilled the requirements of the evaluation criteria. The tape recording of the etude used with the modeling group was a recording of a violin performance major. This precaution was taken to avoid bias toward any of the band instruments used in the study.

The experiment was conducted in a small room equipped with a chair, music stand, tape recorder, stopwatch, and metronome. When the subjects arrived, a research assistant thanked each participant for his/her cooperation and asked them to be seated. S/he then assured them that their participation in the study was confidential and in no way would affect their grade in band. Each student was then asked to sight read the etude (Study No. 10, 24 Arban-Klose-Concone Studies for Band Instruments, Rusch, 1955) for the pre-test. The research assistant then read one of the following sets of instructions, adapted from Rosenthal, et al. (1987), according to the treatment group in which the subject was randomly placed:

Modeling - Please look at the musical example on your music stand, you will listen to a recording of this musical example and then be asked to perform it to the best of your ability on your instrument. Do you have any questions?

Silent Analysis - Please look at the musical example on your music stand and study it silently for 2 minutes. Imagine yourself performing the musical example, but do not use your hands to practice. When the time is up, I will ask you to perform the musical example to the best of your ability on your instrument. Do you have any questions?

Free Practice - Please look at the musical example on your music stand and practice it continuously for 2 minutes. When the time is up, I will ask you to perform the musical example to the best of your ability. Do you have any questions?

Control Group - Please look at the musical example on your music stand (Study No. 1, 24 Arban-Klose-Concone Studies for Band Instruments, Rusch, 1955) and practice it for the next two minutes. When the time is up, you will be asked to sight-read a different musical example to the best of your ability on your instrument. Do you have any questions?

The research assistant then allowed the subject to practice using the assigned technique for 2 minutes, using the stopwatch to keep track of the time elapsed. Next the assistant turned on the tape recorder, announced the identification number, played four beats on the metronome, and turned off the machine at the completion of the subject's performance.

Scoring of the subjects' performances was accomplished by awarding one point for each accurately played measure. Attention was given to correct pitch, rhythm, and articulation; no attempt was made to evaluate the quality of sound, interpretation, or dynamics. If any part of a measure was incorrect, points were not awarded. A total of 12 points were possible, as there were 12 measures in the etude.

To avoid bias, the performances were mixed and the order known only by the research assistant until after the evaluation was completed. By doing this, it was impossible for the evaluator to know from which group the performance belonged.

Results

A graduate teaching assistant at the University of Miami, not involved with the study, scored 10 performances to check the reliability of the scoring. An inter-judge correlation coefficient was obtained (r = .98), and was thought to represent a suitable amount of agreement between the two evaluators.

The data are based on pretest and posttest scores of 40 randomly selected, advanced (grade 6) wind instrumentalists from an intact rural elementary school band program. The sample included players of most of the typical beginning school band wind instruments and appeared to reflect more or less typical balance of instrumentation for beginning bands. A large proportion of the sample played either trumpet (30%), flute (25%), clarinet (17%), or saxophone (17%). There were fewer hornists (3%) and trombonists (8%) represented. The gender distribution of the sample was 72% female and 28% male.

Table 1 provides a breakdown of the pretest, posttest, and gain mean scores of each group (modeling, silent analysis, free practice, and control). The gain score represents the change in performance from pretest to posttest after the treatment (practice condition).

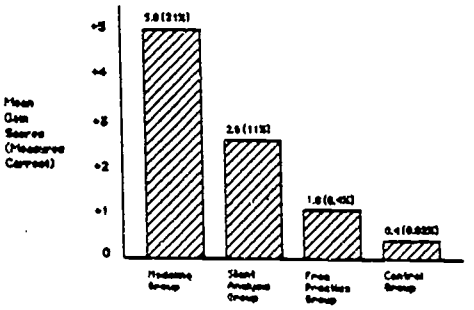
TABLE 1
Pre- and Posttest Means and Gain Scores

Group	Pretest	Posttest	Gain
Modeling	2.8	7.8	5.0
Silent Analysis	3.5	6.1	2.6
Free Practice	5.1	6.1	1.0
Control	8.3	8.7	0.4

Figure 1 represents the relative improvements of each of the four groups, as represented by the gain scores of each group (5.0 for modeling, 2.6 for silent analysis, 1.0 for free practice, and 0.4 for control).

Modeling
20

Figure 1. Mean gain scores of practice groups.



Using the ABSTAT statistical package (Anderson-Bell, 1987), a Two-Way Analysis of Variance (ANOVA) with Replications was conducted comparing the pre- and posttest scores by the three experimental groups and one control group. The data revealed a statistically significant ($p<.05$) main effect from pretest to posttest. Further, the significant interaction effect suggested there was no difference among the four groups' pre-post gain scores.

TABLE 2
Summary of Two-Way Analysis of Variance with Replications, Pretest and Posttest Scores by Treatment

Source	df	SS	MS	F	*p*
Test	1	101.250	101.2500	16.9220	0.0002
Treatment	3	166.600	55.5333	0.9901	0.4084
Test X Treatment	3	63.350	21.1167	3.5293	0.0244
Within	72	2234.600	5.9833		
Total	79	2565.800	62.0723		

To test the null hypothesis (that no differences exist between the four means of the groups) the resulting gain scores were analyzed using a One-Way Analysis of Variance (ANOVA) (see Table 3). With the significance level set at .05 ($p<.05$), the null hypothesis was rejected.

TABLE 3
Summary of One-Way Analysis of Variance, Gain by Treatment

Source	df	SS	MS	F	*p*
Treatment	3	126.700	42.2333	3.52925	0.0244
Error	24	430.800	11.9667		
Total	27	557.500			

A Scheffe Test was utilized to detect the significant differences between the means of the gain scores for each of the four groups; Table 4 presents the results of this sub-analysis. Only one pairwise group was significantly different from the others at the .05 level, that being modeling and the control group.

TABLE 4
Summary of Scheffe Test of Differences of Gain Means

		Treatment		
Treatment	Mean	Free Practice	Silent Analysis	Modeling
Control	0.4000	NS	NS	p<0.0458
Modeling	1.0000	NS	NS	
Silent Analysis	2.6000	NS		
Free Practice	5.0000			
Note: NS, F statistic not significant at the .05 level				

Discussion

This study supports earlier research (Rosenthal, Wilson, Evans, & Greenwalt, 1987; and Coffman, 1990) that held modeling to be an effective practice method. This finding lends support to the teaching philosophies of Pestalozzi, Suzuki, and Gordon (Schleuter, 1984), all of which emphasize the importance of modeling as a teaching technique for elementary music instruction. In addition, the results concerning modeling seem to lend credence to elementary band methods which employ cassette recordings of professional musicians performing the musical examples. An example of such a beginning instrumental method book is Jump Right In: The Instrumental Series (Grunow & Gordon, 1989).

The results regarding silent analysis did not prove to be significantly different from either free practice or the control group. This conflicts with data presented in Rubin-Rabson (1941), Wapnick, Gilsig, & Hummel (1982), Ross (1985), and Coffman (1990). Perhaps the reason for this contradiction is that the studies mentioned above utilized samples of a more advanced age. According to Piaget's theory of developmental intelligence (Glover, Bruning, & Filbeck, 1983), the subjects used in the current study were at the concrete operations stage of development. Children that are in concrete operations (approximately age 7 to 11) can master problems in a concrete and logical way, but are not capable of abstract thought. Since silent analysis is an abstract process, it may be reasonable to assume easy to assume that the technique would not be as successful at the elementary school level.

When examining the gain scores, the means for modeling and silent analysis were higher than for free practice in helping to improve elementary students' performance level. Additionally, the mean gain scores suggest that practice of any kind is better than simply sight-reading.

Future research needs to be pursued to help better define the effectiveness of modeling and silent analysis as practice methods for elementary band students. Research in the fashion of Ross (1985) and Coffman (1990) in which the two techniques are combined, should be conducted to see the effect on elementary band students' performance level. Further, research needs to be conducted using a larger sample and examining both the short and long term effects of these practice techniques. Additionally, research would be helpful in determining the effectiveness of other practice conditions and how other practice techniques compare to the current methods studied.

Finally, modeling seems to be a helpful practice technique and should be used by music educators to help students make better use of their practice sessions. The data suggest that silent analysis, contrary to previous studies using older subjects, does not appear to be as effective with elementary music students. By keeping this information and other data in mind, music educators can help to make practicing a more meaningful and productive activity for their young musicians.

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