Excusing Elementary School Students from Regular Classroom Activities for the Study of Instrumental Music: The Effect on Sixth-Grade Reading, Language, and Mathematics Achievement

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The purpose of the study was to ascertain whether significant differences exist in sixth-grade reading, language, and mathematics achievement between students who are excused from regular classroom activities for the study of instrumental music and students not studying instrumental music. Four public school districts from a major metropolitan area were used in the study. The study employed a single-sample multivariate matched-pairs design. Hotelling's $T^2$ for correlated samples was applied to the sixth-grade achievement data from the districts individually and computed with the Finn Multivariate program. Results from these analyses indicated that $T^2$ was not significant at the .05 level in all four school districts. Therefore, it was concluded that there was no significant difference in sixth-grade reading, language, and mathematics achievement between students who are excused from regular classroom activities for the study of instrumental music and students not studying instrumental music.

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Excusing Elementary School Students from Regular Classroom Activities for the Study of Instrumental Music: The Effect on Sixth-Grade Reading, Language, and Mathematics Achievement

The scheduling of classes in the elementary school is a professional task that calls for judgments that are as much instructional as administrative. This process, therefore, involves unique challenges for school administrators and teachers. While classroom teachers ultimately are

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provided with the flexibility to decide the amount, frequency, and timing of instruction for regular academic programs, this same flexibility is not available to either the special teacher or the classroom teacher in the scheduling of special classes.

Related to problems inherent in the scheduling of special classes are the concerns of music educators toward the scheduling of instrumental music in the elementary schools. Various educators have warned of the difficulties in scheduling elementary instrumental music (Edwards, 1969; Ford, 1967; Weerts, 1968). Specifically, Shaw (1968) believes that "this problem [scheduling] is one of the most significant aspects of the elementary instrumental music program in the public schools today" (p. 50).


Numerous authors have addressed specific problems inherent in this type of scheduling (Copland, 1960; Curatilo, 1983; Godbey, 1963; Pizar, 1971). One problem is the concern of elementary school educators, administrators, and parents toward the disruption of normal classroom activities caused by the removal of students for instrumental music instruction. Wilson (1941), for example, found that instrumental music schedules that remove students from their regular classroom activities "are not always received with enthusiasm by teachers of academic subjects, who fail to see why their subjects should be interrupted by the music program" (p. 290). Other problems found in this scheduling practice pertain to missed instructional time and how that time is to be rescheduled (Kahana, 1980; Otto, 1971).

The primary attitude on the part of teachers, administrators, and parents about missed instructional time is that a student's academic achievement will be adversely affected by absence from classroom activities. Henry (1978), summarizing these concerns, believes

if students miss academic classes, even on a rotating basis, the slower students will almost surely have trouble keeping up, and the grades of even the brightest students may fall. Confronted with lower or failing grades, some parents may panic and remove their children from the program. (p. 26)

Many pragmatic solutions have been offered to the problems inherent in this type of scheduling; however, a majority of these are based on anecdotal rather than empirical evidence. The most popular solution is an attempt by teachers and administrators to devise a new or modified instrumental music schedule. The following design options have been

If the lesson [sic] can be arranged so that they occur during subjects like spelling, general music, art, and physical education, etc., not much harm will be done, except perhaps creating a little animosity between a special teacher and the band director. (p. 49)

Four research studies sought to determine the effect of reducing academic instructional time for instrumental music instruction on an elementary student’s academic achievement. Friedman (1959) investigated the effect on reading and arithmetic achievement of children in grades 4 through 6 who were enrolled in experimental instrumental music classes in which the classroom teacher also served as the instrumental music instructor. Results from the study indicated that students in the experimental instrumental music classes did not differ significantly in reading and arithmetic achievement from students enrolled in traditional classrooms who were not studying instrumental music. While the results of this study may have had practical significance for the author’s unique situation, the applicability of these findings is limited in situations where students are excused from regular classroom activities for the study of instrumental music.

Groff (1963) studied the effect on total academic achievement of excusing elementary school students from classes to study instrumental music. Instrumental and noninstrumental music students were matched on the variables sex, IQ, and classroom teacher. The author determined that students who are excused from class for instrumental music study did not differ significantly in total academic achievement from students not studying instrumental music.

Robitaille and O’Neal (1981b) attempted to demonstrate that a pupil’s academic achievement is enhanced by participation in the instrumental music program. Fifth-grade instrumental music students and noninstrumental students were compared on the basis of reading, mathematics, language, and total battery achievement test scores. The researchers found in all aspects of comparison that the instrumental music students scored higher than the noninstrumental students.

Robitaille and O’Neal (1981a), in a follow-up test, attempted to augment their original findings. Instrumental music students were matched with noninstrumental students on the basis of IQ scores. Results from this comparison revealed no significant differences in achievement scores between the instrumental music students and noninstrumental students.

While the literature abounds with statements regarding the benefits and problems inherent in elementary school instrumental music instruction and scheduling, few of these statements have been substantiated through carefully planned scientific inquiry. Scholarly research related to elementary music scheduling, specifically the problem caused by
students being excused for instrumental music instruction during class time, is limited. Finally, music educators, school administrators, and parents need to be assured that the establishment or maintenance of an elementary instrumental music program will not adversely affect the academic progress of the students.

The present study was designed to augment previous research findings by employing stringent matching techniques and multivariate analysis procedures and by increasing external validity. The purpose of the study was to ascertain whether significant differences exist in sixth-grade reading, language, and mathematics achievement between students who are excused from regular classroom activities for the study of instrumental music and students not studying instrumental music. Specific research questions asked were:

1. Is there a significant difference in sixth-grade reading achievement between students who are excused from regular classroom activities for the study of instrumental music and those students not studying instrumental music?

2. Is there a significant difference in sixth-grade language achievement between students who are excused from regular classroom activities for the study of instrumental music and those students not studying instrumental music?

3. Is there a significant difference in sixth-grade mathematics achievement between students who are excused from regular classroom activities for the study of instrumental music and those students not studying instrumental music?

4. Are the results consistent among school districts of differing size, location, socioeconomic status, and racial balance?

METHOD

Subjects

The general setting for the study was a major midwestern metropolitan area with a 1980 population of 1,403,300. Four public school districts that excuse elementary school instrumental music students from regular classroom activities were used in the study. The districts (A, B, C, and D) were selected on the basis of important differences in size, socioeconomic level, setting, and racial composition, as well as similarities in the organization of their elementary instrumental music programs (see Table 1). The initial sample for the study was 2,167 sixth-grade students from 26 elementary schools in Districts A, B, C, and D during the academic year 1980–81.

Procedures

A single-sample multivariate matched-pairs design was employed to determine whether significant differences exist in sixth-grade reading, language, and mathematics achievement between students who are
excused from regular classroom activities for the study of instrumental music and students not studying instrumental music. The subjects were first separated into one of the following groups by school district: (a) instrumentalists (I), sixth-grade students who have received instrumental music instruction through the sixth grade; (b) noninstrumentalists (NI), sixth-grade students who have not received instrumental music instruction during regular school hours through the sixth grade; and (c) instrumental students, partial participation (IPP), sixth-grade students who have received some instrumental music instruction during regular school hours but not continually through the sixth grade.

Students in the IPP category were then discarded from further use in the study. This was done to ensure that the results of the study would not be confounded by this variable. The following information was obtained next for each student in the I and NI groups: (a) sex, (b) race, (c) IQ (before grade 6), (d) cumulative achievement test scores (before grade 6), (e) total reading, mathematics, and language achievement test scores (grade 6), (f) elementary school attended, and (g) sixth-grade classroom teacher. Subjects in the I group were assigned a consecutive even number and the NI subjects a consecutive odd number within the school districts to preserve anonymity.

Students in the I and NI groups from the same school district were matched on the following control variables according to these criteria: (a) sex, (b) race (white, black, or other), (c) IQ (range of ± 1 standard error of measurement), (d) cumulative achievement (range of ± 1 standard error of measurement), (e) elementary school attended (same school during instrumental music study), and (f) sixth-grade classroom teacher (same teacher). If more than one NI student was found to match an I student, one NI student was then randomly assigned to the pair.

After matching on the preceding control variables had been completed, the following information was obtained for each student in the matched pairs: (a) number of days absent during the 1980–81 school year, (b) whether the student was receiving a nonsubsidized, reduced-

Table 1
Comparison of School Districts A, B, C, and D

<table>
<thead>
<tr>
<th>Item</th>
<th>District A</th>
<th>District B</th>
<th>District C</th>
<th>District D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting</td>
<td>Suburban city</td>
<td>Suburban township</td>
<td>Rural county</td>
<td>Urban city</td>
</tr>
<tr>
<td>Population</td>
<td>8,282</td>
<td>29,078</td>
<td>37,464</td>
<td>385,457</td>
</tr>
<tr>
<td>Median income (in dollars)</td>
<td>31,472</td>
<td>22,793</td>
<td>18,628</td>
<td>16,872</td>
</tr>
<tr>
<td>Racial composition</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% white</td>
<td>92</td>
<td>98</td>
<td>99</td>
<td>41</td>
</tr>
<tr>
<td>% black</td>
<td>7</td>
<td>1</td>
<td>0.5</td>
<td>57</td>
</tr>
<tr>
<td>% other</td>
<td>1</td>
<td>1</td>
<td>0.5</td>
<td>2</td>
</tr>
<tr>
<td>Minutes of instrumental music instruction per week</td>
<td>70</td>
<td>70</td>
<td>80</td>
<td>70</td>
</tr>
</tbody>
</table>
price, or free lunch (used as a measure of socioeconomic status), (c) whether the student displayed aggressive-disruptive behavior in the sixth-grade classroom, and (d) whether the NI student was studying a musical instrument outside school.

A matched pair was then discarded from the study if any of the following conditions existed: (a) a student was absent for more than 20 days during the 1980–81 school year, (b) a nonmatch between students receiving nonsubsidized, reduced-price, or free lunches, (c) a student displaying aggressive-disruptive behavior determined by the sixth-grade classroom teacher, and (d) a student in the NI group taking instrumental music lessons outside school (including any wind, string, percussion, or keyboard instruments). This matching procedure yielded a final study sample of 17 matched pairs in District A, 42 in District B, 71 in District C, and 45 in District D.

Hotelling's $T^2$ for correlated samples was applied to the sixth-grade achievement data from Districts A, B, C, and D individually, and computed using the Finn Multivariate program (1978). Hotelling's $T^2$ tested whether the I and NI groups within each district differed on the set of three dependent variables simultaneously. Since the program arrangement for these tests was identical to a single-sample repeated-measures design, the multivariate correlated-samples problem was reduced to a single-sample problem. Within each matched pair, the difference scores between I and NI students on reading, language, and mathematics achievement were used as dependent variables (Tatsuoka, 1971). For testing the significance of $T^2$, the .05 level was established a priori.

Results

The mean differences and standard deviations for the difference variables from District A, B, C, and D appear in Table 2. Based on the transformation matrix setup (positive mean difference favoring the I group and negative difference favoring the NI group), all mean differences, with the exception of the reading variable in Districts A and B, favor the I group. The values for these two mean differences, however, are quite small.

Table 3 presents the correlation matrices for all four districts. The values obtained show relationships ranging from moderate negative to

<table>
<thead>
<tr>
<th>Difference variable</th>
<th>District A (n = 17)</th>
<th>District B (n = 17)</th>
<th>District C (n = 71)</th>
<th>District D (n = 45)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$MD$</td>
<td>$SD$</td>
<td>$MD$</td>
<td>$SD$</td>
</tr>
<tr>
<td>Reading</td>
<td>-0.71</td>
<td>8.73</td>
<td>-0.64</td>
<td>11.84</td>
</tr>
<tr>
<td>Language*</td>
<td>1.71</td>
<td>15.36</td>
<td>1.67</td>
<td>9.68</td>
</tr>
<tr>
<td>Mathematics</td>
<td>5.76</td>
<td>14.77</td>
<td>3.12</td>
<td>15.04</td>
</tr>
</tbody>
</table>

Note: $n$ refers to number of matched pairs.

*Language achievement data were not available in District D.
Table 3

Correlation Matrices for Difference Variables in Districts A, B, C, and D

<table>
<thead>
<tr>
<th>Difference variable</th>
<th>District A (n = 17)</th>
<th>District B (n = 42)</th>
<th>District C (n = 71)</th>
<th>District D (n = 45)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R</td>
<td>L</td>
<td>M</td>
<td>R</td>
</tr>
<tr>
<td>R</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>L</td>
<td>-0.15</td>
<td>0.10</td>
<td>0.36</td>
<td>0.08</td>
</tr>
<tr>
<td>M</td>
<td>-0.52</td>
<td>0.47</td>
<td>1.00</td>
<td>-0.52</td>
</tr>
</tbody>
</table>

Note: R = Reading; L = Language; M = Mathematics. n refers to number of matched pairs.

moderate positive, both of which are in District A. However, a majority of the correlations range from weak positive to weak negative. The negative correlations resulted because the correlations were among difference variables and not direct correlations between dependent variables.

Table 4 contains the multivariate analyses and the related effect sizes for the districts. Results from the multivariate analyses revealed that \( T^2 \) was not significant at the .05 level in all four school districts. The obtained Mahalanobis \( D^2 \) values demonstrated that all of the tests had small effect sizes (< .20), not an unusual finding in behavioral research. Therefore, had \( T^2 \) been significant, the practical value of such a finding would have been minimal.

The univariate analyses for all the districts are presented in Table 5. Only one of these values, the language variable favoring the I group in District C, reached significance. It was this variable that was responsible for \( T^2 \) in District C almost reaching significance. However, based on the findings of Hummel and Sligo (1971), it would be incorrect to interpret the significant univariate \( F \) as a real effect without first having had multivariate significance.

DISCUSSION

The data from this study do not warrant the conclusion that the population mean vectors differ. Therefore, the following conclusions are responses to the research questions posed in the initial section.

1. There is no significant difference in sixth-grade reading achievement between students who are excused from regular classroom activi-

Table 4

Multivariate Analyses and Related Effect Sizes for Districts A, B, C, and D

<table>
<thead>
<tr>
<th>Item</th>
<th>District A (n = 17)</th>
<th>District B (n = 42)</th>
<th>District C (n = 71)</th>
<th>District D (n = 45)</th>
</tr>
</thead>
<tbody>
<tr>
<td>( df )</td>
<td>3, 14</td>
<td>3, 39</td>
<td>3, 68</td>
<td>2, 43</td>
</tr>
<tr>
<td>( D^2 )</td>
<td>0.1838</td>
<td>0.1116</td>
<td>0.1116</td>
<td>0.0555</td>
</tr>
<tr>
<td>( T^2 )</td>
<td>3.1253</td>
<td>4.6870</td>
<td>7.9265</td>
<td>2.4993</td>
</tr>
<tr>
<td>( F )</td>
<td>0.9115</td>
<td>1.4861</td>
<td>2.5667</td>
<td>1.2213</td>
</tr>
<tr>
<td>( p )</td>
<td>&lt; .4605</td>
<td>&lt; .2334</td>
<td>&lt; .0617</td>
<td>&lt; .3049</td>
</tr>
</tbody>
</table>

Note: n refers to number of matched pairs.
Table 5
Univariate Analyses for Districts A, B, C, and D

<table>
<thead>
<tr>
<th>Variable</th>
<th>District A (n = 17)</th>
<th>District B (n = 42)</th>
<th>District C (n = 71)</th>
<th>District D (n = 45)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading</td>
<td>df</td>
<td>1, 16</td>
<td>1, 41</td>
<td>1, 70</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>0.1111</td>
<td>0.1239</td>
<td>1.3257</td>
</tr>
<tr>
<td></td>
<td>p</td>
<td>&lt;.7432</td>
<td>&lt;.7267</td>
<td>&lt;.2535</td>
</tr>
<tr>
<td>Language</td>
<td>df</td>
<td>1, 16</td>
<td>1, 41</td>
<td>1, 70</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>0.2095</td>
<td>1.2452</td>
<td>7.3527</td>
</tr>
<tr>
<td></td>
<td>p</td>
<td>&lt;.6533</td>
<td>&lt;.2710</td>
<td>&lt;.0085</td>
</tr>
<tr>
<td>Mathematics</td>
<td>df</td>
<td>1, 16</td>
<td>1, 41</td>
<td>1, 70</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>2.5907</td>
<td>1.8051</td>
<td>0.8727</td>
</tr>
<tr>
<td></td>
<td>p</td>
<td>&lt;.1271</td>
<td>&lt;.1865</td>
<td>&lt;.3555</td>
</tr>
</tbody>
</table>

Note: n refers to number of matched pairs.

...ties for the study of instrumental music and students not studying instrumental music.

2. There is no significant difference in sixth-grade language achievement between students who are excused from regular classroom activities for the study of instrumental music and students not studying instrumental music.

3. There is no significant difference in sixth-grade mathematics achievement between students who are excused from regular classroom activities for the study of instrumental music and students not studying instrumental music.

4. The results are consistent among four school districts that differ in size, setting, socioeconomic level, and racial composition.

This study has demonstrated in a variety of educational settings that there is no significant difference in sixth-grade reading, language, and mathematics achievement between students who are excused from regular classroom activities for the study of instrumental music and students not studying instrumental music. Furthermore, the following beliefs of many parents, teachers, and school administrators toward this scheduling practice should be reexamined in light of the results of this study:

1. School administrators' use of scheduling problems as a justification for elimination of instrumental music instruction from the elementary school curriculum.

2. Parents' beliefs that participation by their children in elementary instrumental music will result in lower academic achievement and grades.

3. Removing students from elementary instrumental music instruction as a means for improving academic achievement and grades.
4. Classroom teachers’ contention that the disruption caused by removing students from class will adversely affect those students’ achievement.

While the results of the study may not be the same in all educational settings, the data obtained should provide educators with additional empirical evidence needed to justify this scheduling practice. However, several issues have emerged that should be considered in subsequent studies.

1. Similar studies should be performed in other educational settings with different instrumental music schedules and achievement measures.
2. Similar studies should be performed in private schools of differing size, socioeconomic level, and racial composition.
3. Further control of socioeconomic status and chronological age variables should be employed in matching.
4. Other methods should be employed for ascertaining whether a student has participated in instrumental music outside school rather than obtaining this information from classroom and instrumental music teachers.
5. Studies should be made at other grade levels if similar scheduling problems exist.

REFERENCES


June 7, 1984