The Influence of Three Least Restrictive Environments on the Content Motor-ALT and Performance of Moderately Mentally Retarded Students

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The purpose of this investigation was to determine which of three least restrictive classroom environments would provide the greatest opportunity for mentally retarded students to practice on-task motor behavior. The experimental design used in this investigation consisted of three intact groups, each containing 10 moderately mentally retarded subjects ranging in age from 5 to 12 years. Static and dynamic balance measures were taken to evaluate the acquisition of overall balance performance while controls were placed on intelligence quotients and ability. Academic Learning Time (ALT) was also recorded in order to determine differences in content motor behavior. A significant relationship occurred between static balance and ALT. In addition, the peer tutors significantly increased the time moderately mentally retarded students practiced content motor behavior, which established the peer-tutor classroom setting as the least restrictive environment for enhancing motor performance.

Substantial research indicates the ability of children with mental retardation to make gains in their motor performances (Brown, 1968; Corder, 1966; Cratty, 1974; LeBlanc, 1975; Rarick & Beuter, 1981). In the past, results typically reiterated the low physical and motor ability of subjects with mental retardation (Frith & Frith, 1974; Gieger, 1975; Henderson, Morris, & Ray, 1981). Most of these studies were conducted in self-contained settings.

A few investigators have begun to monitor the influence of mainstreaming on these low motor profile children (Karper & Martinek, 1983; Rarick & Beuter, 1981; Sherrill & Kelly, 1980). Although the implementation of the mainstreaming process remains controversial, authorities continue to support mainstreaming as the preferred environment for educating the disabled child in physical education (Aufderheide, Knowles, & McKenzie, 1981; Aufderheide, McKenzie, & Knowles, 1982; Bechtold, 1977; Beuter, 1984; Karper & Martinek, 1982; Karper & Martinek, 1983). In addition, there has been an impetus to develop peer-tutor environments in special education as a viable alternative to mainstreamed or self-contained environments (Allen, 1976; Boutwell, 1972; Elliot & Vasta, 1970; Folio & Norman, 1981; Marlow, 1979; Snapp, Oakland, & Williams, 1972; Snyder, Appolloni, & Cook, 1977; Strain, Kerr, & Ragland, 1979).

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It should be obvious, however, that in order to verify the effectiveness of establishing unique environments for programming purposes in physical education, criteria for measurement must include motor parameters. Since it is common knowledge that mentally retarded children can increase their present levels of motor performance, and that peers have been used to increase classroom academic performance, it seems feasible to investigate whether or not peers can be used to increase motor parameters. The purpose of this investigation was to identify which of three least restrictive physical education environments would generate the greatest opportunity for moderately mentally retarded students to practice on-task motor skill behavior.

Method

Subjects

The subjects were 30 moderately mentally retarded students between the ages of 5.9 years and 12.8 years, with a mean age of 9.9 years, attending a large school system in the Southwestern part of the United States. None of the subjects exhibited any known conditions in addition to their mental retardation.

Treatment

The 30 subjects were randomly assigned to one of three treatment groups, each group representing a type of classroom structure naturally found in an educational setting: the peer-tutor environment (P-T), the self-contained environment (S-C), and the specific-mainstreamed environment (S-M).

The first group was assigned to the P-T treatment and included 20 students, half of whom were classified as moderately mentally retarded. The remaining 10 students were intellectually normal fifth grade peer-tutors who were selected for participation by their classroom teachers. Each peer-tutor was assigned to one moderately mentally retarded subject and asked to guide him or her through student-paced tasks which were directed by the teacher and congruent with a sequentially arranged balance unit.

The second group was assigned to the S-C treatment and also included 10 moderately mentally retarded subjects. No other students were included in this treatment group. As in all the groups, each student was guided by the teacher through the balance unit; there were no paraprofessional aides.

The third group was assigned to the S-M treatment. To make the mainstreaming process as natural as possible, the subjects in this group were subdivided into four separate classes. Two classes contained 20 intellectually normal students and three mainstreamed moderately mentally retarded subjects. The remaining two classes contained 20 intellectually normal subjects as well, but only two moderately mentally retarded subjects were placed in each class. This enabled an examination of an equal number of subjects (10) in each treatment group. Data were pooled from the 10 mentally retarded subjects in the four classes and treated as one independent variable for the analyses.

The mentally retarded subjects and the intellectually normal students in each of the six classes were required to participate in a sequentially arranged balance unit specifically task-analyzed for the experimental population and adapted from the literature (Capon, 1975; Kalakian & Eichstaedt, 1982). Sitting balance, kneeling balance, standing balance, elevated standing balance, dynamic floor balance, and dynamic beam balance were the tasks for
the unit. These tasks were in turn broken down into several enabling activities and were taught in a sequential order with respect to student acquisition. The ultimate goal of the unit was to increase static and dynamic balance ability. The three groups had 6 weeks of the prescribed student-paced balance activity during half-hour sessions twice a week. Content motor-ALT was recorded during each session.

The ALT-PE of each student was measured to determine which educational setting yielded the greatest opportunity for student motor development. In the past, all easy responding was counted as ALT-PE (Siedentop, Birdwell, & Metzler, 1979). What should be focused on, according to Metzler (1983), is motor-ALT. This does not count accruals obtained by watching demonstrations and by listening to teacher instruction. It lends itself well to the motor learning characteristics of mentally retarded individuals who are typically unable to learn through abstract communication or incidentally through group demonstrations (Drowatzky, 1971). According to Parker and O’Sullivan (1983), time-on-task in physical education is the time a student spends practicing on a skill at a level where learning occurs. Concrete on-task practicing has to be performed for effective skill acquisition. For the purpose of this investigation, on-task behavior is defined as the amount of time a student spends engaged in motor appropriate activity.

For this reason, a duration recording technique was selected as the best method of measuring the content motor-ALT of this special population. According to Siedentop, Tousignant, and Parker (1982), the duration recording option yields a cumulative time which is the most valid representation of ALT-PE. The present procedure was designed to monitor a single student’s involvement in subject matter motor content. Subject matter motor content was delineated by Siedentop et al. (1982) as referring to class time when the primary focus is on motor involvement. In the present investigation, only engaged subject matter content was measured with a stopwatch to monitor the time each target subject engaged in this behavior.

Two separate coders were trained to use the 1982 Version II ALT-PE duration recording option. Siedentop et al. (1982) believed the use of the two coders would enhance the “believability or validity of an experimental effect” (p. 32). Observer training consisted of videotape practice until interrater reliability had reached 90%. Reliability checks were computed periodically throughout the experiment with scores ranging from 93% to 96%.

Two recorders systematically selected the students they were to monitor during each of the one-half hour class sessions. A stopwatch was started at the moment a target subject engaged in subject matter motor content at an appropriate level of difficulty. This meant the subject was engaged in high success and low error rate motor involvement. The stopwatch was terminated whenever the subject ceased motor engagement. At the end of the half-hour teaching session, a mean score was calculated using the two recorders’ scores obtained from observing each target subject. This score represented the motor-ALT of that particular class session. This procedure was employed for each of the groups with the data tabulated and used to compare each of the groups. Academic learning times were collected twice for all subjects, at least 3 weeks apart.

**Balance Measures**

The measures used to evaluate the acquisition of motor skill consisted of a dynamic and static balance test. An instrument designed by Papcsy (1968) measured dynamic balance. Split-half reliability for this instrument was reported at .95. The test consisted of four 3.048 cm beams of varying widths and heights. The first beam measured 17.78 cm wide
and 15.24 cm high; the second, 12.7 cm wide and 20.32 cm high; the third, 7.62 cm wide and 25.4 cm high; and the fourth, 3.81 cm wide and 30.48 cm high. Each beam was elevated by supports 10.16 cm off the floor and spaced 1.524 m apart. In addition, the beams were all calibrated and numbered every 5.08 cm in order: 1-5, 6-10, 11-15, and 16-20.

Each subject was instructed to start at the beginning of the 17.78 cm-wide beam labeled “1-5.” After stepping onto the beam, the subject was to proceed by walking toward the end labeled “5.” All four beams were attempted in order of the numbered calibrations. A subject completed one trial when a foot touched the floor before reaching the end, or completed the entire sequence to “20.”

Scoring was accomplished by recording the number at which the subject was standing when balance was lost. Only one foot had to be in a calibrated area to be counted. All subjects received three practice trials before attempting the test. During practice, a trial was made on each beam even if the subject had not been able to complete the preceding beam. Each child was given five trials during the actual test, and the mean of the five trials represented the child’s dynamic balance beam score.

The other instrument utilized was Test 3, Levels I and II of Cratty’s (1969) Six-Category Gross-Motor Test. This instrument was used to measure static balance and has a reliability coefficient of .91. A pretest using these dependent measures was given prior to any independent manipulation.

### Results and Discussion

Inspection of the ALT results revealed significant differences among the three treatment groups ($F_{2,27} = 42.58$, $p < .001$). The means, standard deviations, and ranges by group are displayed in Table 1. These data represent the average amount of ALT-PE by minutes and seconds coded during the observation sessions. Displayed in Table 2 is the analysis of differences among groups.

To determine where the differences occurred, an analysis was conducted using a Student Neuman-Keuls multiple comparison test. The results of this test revealed the P-T group as being significantly superior to the S-C and S-M groups ($p < .05$). This lends support to the special education studies that reported the efficacy of peer-tutors on classroom skills and establishes peer tutoring as a viable alternative to self-contained and typical mainstreamed environments (Boutwell, 1972; Snapp, Oakland, & Williams, 1972; Snyder.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Means, Standard Deviations and Ranges by Minutes and Seconds of Group Motor Academic Learning Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>Range</td>
</tr>
<tr>
<td>---------</td>
<td>---------------------------------------------------</td>
</tr>
<tr>
<td>Student-helper</td>
<td>17.27</td>
</tr>
<tr>
<td>Self-contained</td>
<td>10.02</td>
</tr>
<tr>
<td>Specific mainstreamed</td>
<td>6.08</td>
</tr>
</tbody>
</table>
Table 2

Academic Learning Time Analysis of Differences Among Groups Summary Table

<table>
<thead>
<tr>
<th>Group</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>2</td>
<td>644.64</td>
<td>322.32</td>
<td>42.58</td>
</tr>
<tr>
<td>Within groups</td>
<td>27</td>
<td>204.40</td>
<td>7.57</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td>849.04</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Appolloni, & Cook, 1977). It was also determined through this procedure that the S-C group was able to produce significantly more ALT than the S-M group (p < .05). It is obvious from these results that the tendency to support the mainstreaming impetus is not maintained in this investigation. Aufderheide et al. (1982) compared the time teachers interacted with mildly handicapped and nonhandicapped students in a mainstreamed physical education environment and reported no significant differences between the groups. In both cases the disabled students in the mainstreamed classes were not receiving adequate teacher attention, which resulted in low time-on-task.

Inspection of the mean achievement scores obtained by each experimental group for static and dynamic balance (Tables 3 and 4) revealed the P-T group as superior. The S-C group achieved the second greatest progress, followed by the S-M group which actually regressed in static balance. These results were not statistically significant, however. A power test revealed insufficient power for both measures. Power and static and dynamic balance was .15 and .25, respectively.

Although there have been some excellent studies examining the appropriateness of mainstreaming, no research could be found that compared the efficacy of different environments on the learning of psychomotor skills. Unfortunately, the data collected and analyzed for balance performances in the present study were not convincing. Although mean differences among the groups showed considerable variability, they simply were not significant. As indicated by the ex post facto analysis, the power to establish significance was extremely low, and although an ANCOVA is an extremely sensitive and powerful statistic, the population studied was just too limiting. Future investigations examining environmental differences should compute power prior to the experiment by using the error variance established in this investigation.

Table 3

Unadjusted and Adjusted Static Balance Achievement Scores

<table>
<thead>
<tr>
<th>Group</th>
<th>Unadjusted X achievement</th>
<th>Adjusted X achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-H student helper</td>
<td>1.40</td>
<td>1.80</td>
</tr>
<tr>
<td>S-C self-contained</td>
<td>.40</td>
<td>.18</td>
</tr>
<tr>
<td>S-M specific-mainstreamed</td>
<td>.10</td>
<td>-.22</td>
</tr>
</tbody>
</table>
Table 4

Unadjusted and Adjusted Dynamic Balance Achievement Scores

<table>
<thead>
<tr>
<th>Group</th>
<th>Unadjusted X achievement</th>
<th>Adjusted X achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-H student helper</td>
<td>17.30</td>
<td>21.18</td>
</tr>
<tr>
<td>S-C self-contained</td>
<td>10.40</td>
<td>8.28</td>
</tr>
<tr>
<td>S-M specific-mainstreamed</td>
<td>7.90</td>
<td>6.14</td>
</tr>
</tbody>
</table>

Results of the Pearson Product Moment Correlation indicated a significant positive correlation between ALT-PE and static balance ($r = .32$, $p < .05$). As students were exposed to greater amounts of ALT-PE, their ability to perform a static balance increased. Although Aufderheide et al. (1982) and Shute, Dodds, Placek, Rife, and Silverman (1982) are among the few who have utilized ALT-PE in studying special populations, no investigator has used the ALT-PE concept to examine peer tutoring, or determined a tenable relationship between ALT-PE variables and achievement. Siedentop (1983) indicated that this issue deserves direct consideration.

Conclusion

Affective benefits resulting from mainstreaming efforts have been clearly identified in a multiplicity of studies (Elliot & Vasta, 1970; Marlow, 1979; Snyder et al., 1977). Although affective learning is integral to human development, the primary criterion for placement in regular physical education should be psychomotor performance. For this reason, physical educators are faced with the philosophical dilemma of whether to include a disabled student in regular physical education for the affective benefits which are clearly gained through integration and to ignore psychomotor learning, or segregate a student in a self-contained setting where a concentrated, adapted and modified effort to enhance psychomotor skills could result. This is only one problematic issue among the several ambiguities surrounding mainstreaming.

Placing children in environments that limit ample time to acquire skill mastery is contrary to the assumptions about time-on-task for learning. Curricular decisions should be based on the inherent value of physical education to develop the whole child by establishing class settings which are less likely to restrict progress. In order to do this, it is crucial that physical educators identify what children need, and then establish an environment that can fulfill those needs.

Student placement deserves careful examination. Placing students in existing environments for administrative exigency may be considered malfeasance. A least restrictive physical education environment should be the class setting that provides the student with ample time for motor development through short-term skill acquisition. According to this investigation, that setting might be a peer-tutor environment. Although not statistically significant on each dependent measure, the results of this investigation should contribute to a research foundation upon which future investigators can probe the efficacy of realistic placements for special populations.
References


LEAST RESTRICTIVE ENVIRONMENTS


