

Effects of a Perceptual-Motor Program on Achievement of First Graders

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THIS study is submitted with the hope that it will help curriculum coordinators avoid the pressures of commercial interests in recommending physiology of readiness exercises for intact classes of children rather than for specific children who have been diagnosed as in need of such exercises.

Readiness for learning is not a state that comes to all children automatically; rather, the state must be attained. For the child to attain readiness and to be successful with learning, a number of skills and abilities must be developed. Perceptual-motor development is currently receiving much discussion as one of the correlates of readiness for reading as well as for other areas of academic achievement. Kephart (1962) states that perceptual-motor emphasis should be included in the plans for *every* learning activity of children.

"Consonant with the total organic and developmental approach characterized by theoreticians such as Piaget has been the tendency to look at reading as one part of a larger perceptual-motor response to the environment, and at failures to achieve mastery in differentiating the visual symbols of the printed page as potentially a part of perceptual immaturity" (Falik, 1969, p. 395). The relationship of perceptual and language learnings, including reading, has been dis-

cussed for many years. "It is well known that ability to deal with symbolic and conceptual materials is based upon consistent and veridical perceptions of the environment" (Kephart, 1964, p. 201).

Many theoretical articles have been published concerning the relationship between perceptual and language learnings; however, only a minimal number of research studies can be found in the literature. Among the few which have been published is a recent series of experiments aimed at gaining insight into the relationships between perceptual skills, general intellectual abilities, race, and later success in reading (Scott, 1970) which indicated that regardless of race (Caucasian or Negro), kindergarten children with limited perceptual experiences are more likely to encounter difficulties with reading than those who have had adequate perceptual experiences. Therefore, Scott suggested that children who evidence perceptual difficulties should probably experience sequential, perceptual learning before early reading.

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Falik (1969) designed a study to determine if providing a special curriculum based on perceptual-motor development would have any differential effect on the readiness of kindergarten children and if there would be a significant effect on reading skills after the children had started to learn to read. The perceptual-motor curriculum included activities as suggested by Kephart (1962) as well as added activities involving those intended to improve a child's body image. Results of the study indicated that there was little difference between experimental and control groups at the end of the kindergarten year. Additionally, lasting effects on reading were not in evidence. The author of this study strongly suggests, however, that more research on the role of perceptual-motor training is needed, with a clearer design and a tighter control of variables.

Another study with similar findings is that of Keim (1970), who investigated the effects of a visual-motor training program on the readiness and intelligence of kindergarten children. When experimental and control groups were compared for intelligence and readiness at the end of the year, no significant differences were found.

Hedges (1965), while working with 160 first graders, found after an 11-week experiment that the total mean gain of students enrolled in a perceptual-motor training program was greater than the mean gain in achievement, as measured by the Stanford Achievement Test, of students in a control group, but that the amount of gain was not statistically significant. When the students were measured by the Gates Reading Test, the total mean gain of the group in the perceptual-motor training program was statistically significant in two of six comparisons with the control group.

A study involving 637 students and designed to investigate the effects of a specific perceptual program on reading achievement in a first grade population was conducted by Rosen (1968). The Frostig Program for the Development of Visual Perception was used as the training program for experimental groups over a 29-day period. Twelve experimental classes received 30 minutes of visual

perception training each day of the training period. Fifteen minutes of the 30-minute period were deducted from regular reading instruction. Control groups received 15 minutes of additional reading instruction over and above the regular reading sessions. Post-testing revealed the superiority of experimental groups over control groups in perceptual abilities; however, superiority in these abilities was not reflected in comparable superiority in reading measures.

Literature exists which suggests that a substantial number of disabled readers reflect a perceptual-motor immaturity or retardation (Fabian, 1945; Silver, 1952; Lachmann, 1960). Bond and Tinker (1957) suggest that a number of disabled readers evidence poor sensory-motor coordination and that, furthermore, the sensory-motor problems often are due not to specific disabilities but rather to lack of sensory-motor training.

There has been a sufficient amount of interest in the relationship between perceptual-motor development and achievement to lead to the use of a number of teaching strategies intended to employ body and sensory development. Such strategies have been incorporated into the curricula of many schools.

The present study was initiated to provide information to classroom teachers, special teachers, and to curriculum personnel concerning the effects, if any, on general academic achievement of the use of the program, *Physiology of Readiness* (Getman and Kane, 1964), which is intended to develop body and sensory skills. General academic achievement was defined in this study as word reading, paragraph meaning, spelling, and arithmetic as measured by the Stanford Achievement Test. Specifically, this study tested the following hypothesis:

First grade children of the Clayton School District, Clayton, Missouri, who undergo the *Physiology of Readiness* exercises for 20 minutes daily over a period of 21 weeks will not differ significantly in general academic achievement from first grade children in the Clayton School District who do not experience the *Physiology of Readiness* exercises.

The following assumptions were made in relation to the study:

1. Academic performance in today's schools depends heavily upon form and symbol recognition and interpretation.

2. There are perceptual skills which can be developed and trained.

3. The development of perceptual skills is related to the levels of coordination of the body systems; that is, the better the coordination of the body parts and body systems, the better the prospects are for developing perception of forms and symbols.

4. The child whose perceptual skills have been developed and extended is the child who is free to profit from instruction and to learn independently. The greater the development of the perceptual skills, the greater the capacity for making learning more effective (Getman and Kane, 1964).

Procedure

Nine first grade classes totaling 152 students in five elementary schools of the Clayton School District, Clayton, Missouri, comprised the population sample for this study. There were two intact first grades in each of four schools and one intact first grade in a fifth school. Students were randomly assigned within each class to the experimental or control group for that class.

During the first week of November 1966, the Stanford-Binet Intelligence Scale and the Stanford Achievement Test were administered to all subjects in the study.

The complete battery of the Stanford Achievement Test, Primary I, Form W, i/t/a Edition, was given to two classes within the experimental group and to two classes within the control group. The i/t/a version was used for these classes because the teachers employed i/t/a reading procedures. All other classes in both groups were administered the Stanford Achievement Test, Primary I, Form Y. These tests included sections on word reading, paragraph meaning, spelling, and arithmetic.

Post-tests were given to both the experimental and control groups between the dates of April 20, 1967, and April 27, 1967. The Stanford Achievement Test, Primary I, Form W, i/t/a Edition, was readministered to the classes which had been pretested with that instrument. All other subjects were given the Stanford Achievement Test, Primary I, Form W.

During the five months which elapsed between pretesting and post-testing, teachers of the experimental group used the exercises for the development of perception for children as specifically directed in the manual of the *Physiology of Readiness* (Getman and Kane, 1964). The manual presents six areas of developmental experiences with body and perceptual skills. These areas include: Practice in General Coordination, Practice in Balance, Practice in Eye-Hand Coordination, Practice in Eye Movements, Practice in Form Perception, and Practice in Visual Memory.

Training sessions of 20 minutes were

Test	Groups	Pretest Mean	SD	Post-test Mean	SD	Post-test Minus Pretest Differences	Experimental Increase Minus Control Increase
Stanford Achievement Test							
Word reading	Experimental	16.28	8.86	27.75	5.26	+ 11.47	- 0.61
	Control	17.39	8.12	29.47	7.31	+ 12.08	
Paragraph meaning	Experimental	7.71	9.81	27.25	9.28	+ 19.54	+ 1.22
	Control	9.99	8.84	28.31	9.62	+ 18.32	
Spelling	Experimental	5.19	5.20	14.23	4.61	+ 9.04	- 1.02
	Control	5.43	5.00	15.49	5.54	+ 10.06	
Arithmetic	Experimental	29.69	12.71	47.12	9.42	+ 17.43	- 1.67
	Control	30.60	13.21	49.70	12.52	+ 19.10	
Stanford-Binet Intelligence Scale	Experimental	113.44	19.33				
	Control	115.13	13.84				
N for Control = 77 N for Experimental = 75							

Figure 1. Changes in Achievement and Differences Between Groups

conducted with the experimental classes during each school day from November 28, 1966, to April 5, 1967. The times during the school day when students participated in the perceptual-motor activities were not controlled; the sessions were conducted when feasible according to the scheduling necessary within each elementary school. Teachers of the control groups were asked to spend time as they would have normally; they were in no way to change classroom procedures from those they would typically use.

The reader should note that *each* of the nine teachers taught her own children using the Kane-Getman materials. During the 20 minutes, her control group remained with another teacher who acted in a supervisory capacity only. These children worked on regular classroom activities as they would have had there been no experiment. There was an attempt to eliminate the teacher as a variable; each of the nine teachers worked with both experimental and control groups of her class. In one of the schools there was only one first grade classroom; therefore, a second grade teacher was asked to "watch over" the children in the control group.

Results and Data Analysis

The data collected for both the control and experimental groups indicating changes in achievement are summarized in Figure 1.

Inspection of Figure 1 reveals that the growth or increase between pretesting and post-testing not only was not greater for the

experimental group than for the control group, but was less in three out of four areas: (a) word reading, (b) spelling, and (c) arithmetic. However, the difference was not statistically significant even at the .05 level.

Multivariate analysis of variance yields the following information:

H_0 , the null hypothesis of the test for homogeneity of dispersions for the two groups, was not rejected, thus supporting the group populations of the IQ test, the four pretests, and the four post-tests as having essentially equal dispersions.

H_1 , which asserts the equality of group centroids for all of these nine tests, was also not rejected. Data for these two hypotheses are summarized:

$$H_0: M = 61.24, F_{73809}^{15} = 1.275, P = > .05$$

$$H_1: \lambda = 0.92, F_{142}^9 = 1.330, P = > .05$$

A covariance analysis was made to determine whether or not there were differences in post-tests after taking into account initial differences in IQ and pretests. The results indicate that there were no differences in post-tests after adjusting for initial differences on the pretests. No trends were significant at the .05 level. (See Figure 2.)

F-ratio for H_0 , overall discrimination = 150.

Univariate F-ratios, $df_1 = 1$ and $df_2 = 149$ for the adjusted pretests and post-tests, yield the following: None are significant at the .05 level. (See Figure 3.)

Examination of the differences in mean gains between experimental and control

Test	Groups	Pretest Mean	Post-test Mean	Post-test Minus Pretest	Experimental Increase Minus Control Increase
<i>Stanford Achievement Test</i>					
Word reading	Control	17.4	29.5	+12.1	-0.40
	Experimental	16.5	28.2	+11.7	
Paragraph meaning	Control	10.0	28.3	+18.3	+1.60
	Experimental	7.8	27.7	+19.9	
Spelling	Control	5.4	15.5	+10.1	-2.00
	Experimental	5.4	14.5	+ 8.1	
Arithmetic	Control	30.6	49.7	+19.1	-1.50
	Experimental	30.2	47.8	+17.6	

Wilks's lambda = 9.22

Figure 2. Changes in Achievement and Differences Between Experimental and Control Groups After Covariance Adjustment of Pretest Scores

Variable		Among Mean Sq.	Within Mean Sq.	F-Ratio
Word reading	Pretest	29.72	59.53	0.50
	Post-test	61.81	32.36	1.91
Paragraph meaning	Pretest	175.24	75.15	2.33
	Post-test	13.34	67.12	0.20
Spelling	Pretest	0.09	23.52	0.00
	Post-test	37.54	21.85	1.72
Arithmetic	Pretest	5.97	115.19	0.05
	Post-test	130.89	78.30	1.67

Figure 3. Univariate F-Ratios for the Adjusted Pretests and Post-tests

groups for each class, the mean gain between pretesting and post-testing for the control group subtracted from the mean gain between pretesting and post-testing for the experimental group, yields the data reported in Figure 4.

No statistical sophistication is necessary to gather by inspection of Figure 4 that not only did the Physiology of Readiness exercises not result in significant mean gains in achievement, but, if anything, they had a slightly deleterious effect in most instances. It is also apparent that when allowing each class equal weight, regardless of class size, the average growth for all nine classes was less in two out of the four test factors: spelling and arithmetic.

Classes	Word Reading	Paragraph Meaning	Spelling	Arithmetic
1	0.00	+ 5.10	+ 0.66	- 2.00
2	+ 1.89	- 1.00	- 1.67	+ 3.20
3	- 0.50	+ 3.37	- 0.89	- 10.76
4	+ 2.60	- 0.53	+ 0.02	+ 4.50
5	+ 3.23	+ 6.23	+ 0.44	- 2.22
6	+ 1.13	+ 3.75	+ 0.87	- 8.00
7	- 2.15	- 3.04	- 3.81	- 3.09
8	- 0.89	+ 3.50	- 1.72	- 4.45
9	- 1.33	- 1.00	- 2.67	- 0.12
Total	+ 3.98	+ 16.38	- 8.77	- 22.94
Average	+ 0.44	+ 1.82	- 0.97	- 2.25

Figure 4. Mean Gain for Control Group Subtracted from Mean Gain for Experimental Group

T-tests of the difference in mean gains yield significance at the .01 level in a few instances as, for example, paragraph meaning for Classes 1 and 5 (positive) and arithmetic for Classes 3 and 6 (negative); but since there is no pattern or direction to these differences, they are not reported. In fact these could have occurred by chance.

It may be concluded that, for the first grade Clayton children, it was a waste of time to employ the materials for all children. Here, once again, we see the folly of doing

the same thing for all children in the same way at the same rate. It may very well be that there were specific children for whom the materials and exercises were beneficial. However, the individual variance of such cases, if any, was lost in the larger group variances. The principal and the curriculum coordinator, to the extent to which this study can be generalized, may wish to be quite skeptical, therefore, of the use of Physiology of Readiness materials for intact classes.

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