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THE INTERRELATIONSHIP OF CONSERVATION READING READINESS AND INTELLECTUAL MATURITY MEASURES IN FIRST GRADES

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The developmental psychology of Piaget has had a profound effect on education both in Britain (Central Advisory Council for Education, 1967) and in America (Schwebel and Raph, 1973; Furth and Wachs, 1974; Piagetian Theory and Its Implications for the Helping Professions, 1970-1975).

This study focuses on the implications that Piagetian psychology has for initial reading instruction. A number of investigations have considered the relationships among selected reading variables and various Piagetian tasks, conservation ability being the most common (Almy, 1967; Goldschmid, 1967; Dombrower and Marsh, 1972). But these studies have not specifically considered the differential effect of "learning" and "development." Development here refers to the general mechanism of action and thinking whereas learning deals with the acquisition of specific facts and skills. It is further postulated that the general development of intelligence is the basis on which specific learning rests (Furth and Wachs, 1974).

In this study learning is defined as a subject's score on selected subtests of a readiness test, developmental level is the subject's score on a drawing test, and conservation ability is defined as a score on six conservation tasks.

The need for this type of study has been suggested by the literature and statements such as the following:

To neglect providing many and varied concrete experiences in the period of preoperational thought may hinder the adequate development of abstract thinking and may possibly interfere with the development of reading comprehension (Almy, 1967).

Such opportunities [concrete experiences] will likely influence ultimate reading achievement to a greater extent than specific perceptual discrimination training now offered in many nursery schools and kindergartens (Raven and Salzer, 1974).

Framework For Study

In Piaget's theory the acquisition of the schema of conservation is an

* Paper presented at the National Reading Conference, St. Petersburg, Florida, December, 1975.

important indicator of the end of the second or preoperational stage. Goldshmid (1970) states that "conservation represents a pivotal construct in the child's transition from prelogical to a logical phase of development." Since many early reading experiences require logical processes, conservation should be a good indicator of the subject's ability to cope with these experiences.

A further consideration is Hathaway and Hathaway-Theunissen's (1975) factor analytic study indicating the uniqueness of Piagetian measures as compared to traditional psychometric measures. In order for optimal learning to occur a child's conceptual level should be matched to the required task and the above research indicates the superiority of Piagetian measures in providing for that match. The success of a number of conservation training studies (Goldschmid, 1970; Crutchfield, 1975) appears to confirm the matching hypothesis mentioned above.

Method

All sixty-one children in three first grade classrooms from one school in metropolitan Winnipeg were included in the study. Fifty-seven had complete protocols; approximately half were male ($N=27$) and half were female ($N=30$). For forty-five of these subjects PMA (SRA, 1962) results from one month earlier were also available. The specifics of the sample may be found in Table I.

To assess conservation ability the Concept Assessment Kit—Conservation (Goldschmid and Bentler, 1968) was administered by one examiner during the second week of April.

The effect of learning was established through the administration of three subtests of the Canadian Readiness Test (Braun, Downing, Evanechko, and Ollila, 1970). One subtest, Technical Language of Literacy, assesses the subject's knowledge of what a letter, number, and word is. The Letter Recognition and Word Matching subtests are comparable to conventional readiness measures.

For this study development was ascertained by means of the Goodenough-Harris Drawing Test (1963). The mean of the man and woman drawings was used in the analysis.

All tests were administered during the second and third weeks of April, 1975. The order of testing was predetermined to minimize possible order effects.

Results

This study sought to clarify the relationship of development to learning using conservation ability as the dependent variable. Three specific questions were asked:

1. Is there a significant relationship between learning and conservation ability?
2. Is there a significant relationship between development and conservation ability?

3. Is the development/conservation relationship higher than the learning/conservation relationship?

Table I presents the means and standard deviations for the various instruments used; Table II presents the correlation matrix for the tests and subtests used.

Question one was confirmed since a multiple correlation coefficient of 0.368, significant at the .05 level, resulted when the three readiness subtests and conservation test results were analyzed. In fact the Technical Language of Literacy subtest contributed most to the correlation coefficient whereas the Word Matching subtest did not contribute significantly.

The second question was not confirmed. The correlation between the drawing test and conservation ability did not reach significance. A second analysis examining the relationship of intelligence quotients from the Primary Mental Abilities test and conservation scores also proved to be non-significant.

When the third question was submitted to statistical analysis a significant critical ratio of 2.396 resulted but in the wrong direction. That is, the learning measures were more highly related to conservation than the development measures. Consequently the third question could not be confirmed.

Discussion

On first examination it appears that the results of this study do not support the Piagetian concepts of development and learning. However, it may be that the instruments used do not truly reflect the hypothesized variables.

For example, the Technical Language of Literacy subtest measures the rather difficult concept of word, letter and number. Mickish (1974) found that only 57% of readers at the primer level were able to mark correctly the six words in a simple sentence. It may be that the Literacy subtest measures a variable more closely related to development than to school learning since it is significantly related to conservation ability. No ceiling effect was noted for the Literacy test although this was observed for the other readiness subtests.

It is also obvious that the conservation test does not measure the same abilities as the measures of intellectual maturity used in this study. This is a promising finding although not completely in agreement with other studies (Goldschmid, 1967; Hathaway and Hathaway-Theunissen, 1975). These studies report only low positive correlations which still allows for a considerable amount of uniqueness of the Piagetian measures. It appears that it is difficult to partial out factors related to traditional psychometrics.

A further refinement of instruments to measure the concepts of development and learning will be required before more definitive results may be expected.

TABLE I
Means and Standard Deviations of Measures Used
(N = 57 except for PMA)

Conservation	6.702	2.872
Literacy subtest	37.754	6.260
Letters subtest	27.842	2.389
Word Matching	19.404	2.078
Drawing test total	96.035	11.689
PMA (N = 45)	107.778	8.306

TABLE II
Correlation Matrix (N = 57 except PMA, N = 45)

	<i>Conservation</i>	<i>Literacy</i>	<i>Letters</i>	<i>Word Matching</i>	<i>Drawing</i>
Conservation	1.00				
Literacy	0.28*	1.00			
Letters	0.34**	0.55**	1.00		
Word Matching	0.13	-0.03	0.15	1.00	1.00
Drawing Test	-0.07	0.15	0.23	0.24	0.45**(men)
I.Q. (PMA)	0.07	0.17	0.47**	0.45**	0.28* (women)

* Significant at .05 level

** Significant at .01 level

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