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ABSTRACT

To determine the multivariate relationships of measures of convergent thinking, divergent thinking, and self-concept with reading achievement was the purpose of this study. Measures of verbal divergent thinking and self-concept were administered to 188 fourth and sixth grade students from an urban, lower middle class elementary school. Reading achievement and intelligence scores were identified from school records. Correlational and multiple regression analyses were conducted for the total sample and by sex and grade level for word knowledge and comprehension. The findings indicated that intelligence and the divergent thinking variables were highly related with reading, that intelligence and flexibility were generally predictive of reading achievement, that the combination of convergent thinking, divergent thinking, and self-concept variables accounted for approximately 60 percent of the variance in reading achievement, and that the addition of fluency, originality, and self-concept produced complex and interactional relationships with sex and grade level. (WR)

ABSTRACT

The Interrelationships of Measures of Convergent Thinking, Divergent Thinking, and Self-Concept to Upper Grade Reading Achievement

by

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Purpose: To determine the multivariate relationships of measures of convergent thinking, divergent thinking, and self-concept with reading achievement.

Method: Measure of verbal divergent thinking and self-concept were administered to 188 fourth- and sixth-grade students from an urban, lower middle class elementary school. Reading achievement and intelligence scores were identified from school records. Correlational and multiple regression analyses were conducted for the total sample and by sex and grade level for word knowledge and comprehension.

Findings and Conclusions: Intelligence and the divergent thinking variables were highly related with reading. The results of the multiple regression analysis indicated that intelligence and flexibility were generally predictive of reading achievement. However, the addition of fluency, originality, and self-concept

produced complex and interactional relationships with sex and grade level. This combination of convergent thinking, divergent thinking, and self-concept variables accounts for approximately 60% of the variance in reading achievement. These results suggest the need to include measures of the integrative aspects between these factors in a model explaining the reading process.

THE INTERRELATIONSHIPS OF MEASURES OF CONVERGENT THINKING, DIVERGENT THINKING, AND SELF-CONCEPT TO UPPER GRADE READING ACHIEVEMENT*

by

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Purpose

This research was conducted to determine the relationships measures of convergent thinking, divergent thinking, and self-concept with reading achievement. The extent that sex and grade level influence the relationships was also of concern. Two specific questions were investigated:

1. What is the multivariate relationship between intelligence, each verbal divergent thinking ability, self-concept and word knowledge, and does this relationship vary with sex and grade level?
2. What is the multivariate relationship between intelligence, each verbal divergent thinking ability, self-concept and reading comprehension, and does this relationship vary with sex and grade level?

*Paper presented at the 19th annual convention of the International Reading Association, New Orleans, La., May 2, 1974. This paper is partially based on a thesis submitted by the first author as partial fulfillment of the M.S. Degree at Purdue University.

Related Literature

Several studies have shown that divergent thinking, combined with intelligence measures, improves our ability to predict academic achievement. Feldhusen, Denny, and Condon (1965) reported significant correlations among a standa'd achievement score in reading, verbal and quantitative ability measures, and tests of originality, fluency, and flexibility. Flexibility was the divergent thinking variable most highly correlated with reading achievement. When 97 of the students were tested four years later, flexibility was again a significant correlate with reading achievement and appeared in the optimum prediction sets for both males and females in the prediction of reading achievement (Feldhusen, Treffinger, & Elias, 1970). MacDougall (1966) found low but significant relationships between critical reading and creative thinking scores in grades four and five, but not six. She reported that verbal creativity was more highly related to reading than nonverbal creativity and that flexibility, among fluency, flexibility, originality, and elaboration, showed the highest relationship with the critical reading scores.

Lavin's (1965) review of the literature concerning prediction of academic achievement suggested that independent variables studied should include convergent thinking abilities, divergent thinking abilities, assessments of prior knowledge, and self-concept and other personality variables. The variables considered in the present study, intelligence, divergent thinking, and self-concept, were based on Ruddell's (1972) Communication Model, which emphasized three processes that readers use in comprehending

oral and written language. Ruddell stated that meaning is derived through the interpretation process, a function of experience, memory, critical and creative thinking abilities. Affective mobilizers, the interests, attitudes, and values of the child direct his involvement in all stages of the reading process.

Research supports the conclusions that convergent thinking, divergent thinking, and self-concept are important cognitive and personality dimensions to be considered in a study of reading. Sex differences are well-established as a factor in reading achievement. Few studies have investigated the interrelationships of sex and grade level with these variables and reading achievement.

Procedures

The sample included all of the fourth- and sixth-grade classes of a lower middle class, almost exclusively white, urban elementary school. The pupils were from intact classrooms. The sample included 188 boys and girls, (91 boys, 97 girls; 96 sixth-graders, 92 fourth-graders).

The instruments administered by trained examiners were the Torrance Tests of Creative Thinking (TTCT, Torrance, 1966) and the Piers-Harris Children's Self-Concept Scale (SC, Piers & Harris, 1964). Subtests of the TTCT (Just Suppose, Unusual Uses, and Product Improvement) were chosen to yield scores for verbal fluency, verbal flexibility, and verbal originality. These abilities in the D-T process were noted by Guilford (1959) as being used in understanding symbolic and semantic content, factors important in reading. The TTCT were scored by a trained scorer following directions described by Torrance (1966).

The self-concept measure evaluated the way a child feels about himself in the areas of behavior, intellectual and school status, physical appearance and attributes, anxiety, popularity, and happiness and satisfaction (Piers & Harris, 1964).

Scores from the Word Knowledge (WK) and Reading (Comprehension, RC) Subtests of the Metropolitan Achievement Test (MAT, Durost, Bixler, Hildreth, Lund & Wrightstone, 1962) and the Otis-Lennon Mental Ability Tests (Otis-Lennon, 1969), administered one month previously by the classroom teachers, were identified from school records.

Incomplete data resulted in the elimination of three fourth-grade males, two fourth-grade females, four sixth-grade males, and three sixth-grade females.

Correlational and multiple regression analyses were computed with the total sample (N = 188), by sex (girls' N = 97, boys' N = 91), and by grade level (grade 6 N = 96, grade 4 N = 92). The alpha level of .05 was used.

Results

Table 1 summarizes the findings concerning the interrelationships of the measures of convergent thinking, divergent thinking, and self-concept with word knowledge. Flexibility added significantly to the prediction of word knowledge (reading) achievement for the total sample and the boys' subsample. There were complex interactions among the variables and the factors of sex and grade level.

Table 2 summarizes the findings concerning the interrelationships of the measures of convergent thinking, divergent thinking,

Table 1

Multiple Regression Analyses Summary Table

For Word Knowledge

Group	Predictors	R	R^2	F
Total (N=188)	1. IQ	.678	.460	78.84***
	2. Flexibility	.748	.560	5.67*
	3. Originality	.752	.565	3.51
	4. Fluency	.754	.568	n.s.
	5. Self-concept	.754	.569	n.s.
Boys (N=91)	1. IQ	.707	.500	39.86**
	2. Flexibility	.764	.583	5.29*
	3. Originality	.772	.596	1.75
	4. Self-concept	.773	.597	n.s.
	5. Fluency	.773	.598	n.s.
Girls (N=97)	1. IQ	.637	.405	34.76**
	2. Flexibility	.729	.531	.93
	3. Self-concept	.733	.537	1.78
	4. Fluency	.735	.539	2.91
	5. Originality	.744	.554	2.80
Grade 6 (N=96)	1. IQ	.763	.582	77.83**
	2. Flexibility	.780	.608	1.63
	3. Originality	.784	.615	1.72
	4. Fluency	.785	.616	n.s.
	5. Self-concept	(did not compute)		
Grade 4 (N=92)	1. IQ	.756	.572	58.14**
	2. Flexibility	.783	.613	.72
	3. Self-concept	.786	.617	1.04
	4. Fluency	.787	.619	n.s.
	5. Originality	(did not compute)		

* $p < .05$ ** $p < .01$ *** $p < .001$

Table 2

Multiple Regression Analyses Summary Table

For Reading Comprehension

Group	Predictors	R	R^2	F
Total (N=188)	1. IQ	.709	.503	188.52***
	2. Flexibility	.753	.567	25.29**
	3. Originality	.765	.585	8.23**
	4. Self-concept	.767	.588	n.s.
	5. Fluency	(did not compute)		
Boys (N=91)	1. IQ	.727	.529	100.03***
	2. Flexibility	.745	.555	5.19*
	3. Originality	.765	.586	6.39*
	4. Self-concept	.769	.591	n.s.
	5. Fluency	.770	.592	n.s.
Girls (N=97)	1. IQ	.689	.475	85.92***
	2. Flexibility	.762	.581	23.84**
	3. Self-concept	.787	.620	9.51**
	4. Originality	.792	.628	n.s.
	5. Fluency	.793	.628	n.s.
Grade 6 (N=96)	1. IQ	.738	.544	112.27***
	2. Flexibility	.743	552	1.54
	3. Originality	.763	.582	6.58*
	4. Fluency	.763	.582	n.s.
	5. Self-concept	.763	.582	n.s.
Grade 4 (N=92)	1. IQ	.784	.615	143.47***
	2. Flexibility	.808	.653	9.88**
	3. Fluency	.811	.657	n.s.
	4. Self-concept	.811	.657	n.s.
	5. Originality	.811	.657	n.s.

* $p < .05$ ** $p < .01$ *** $p < .001$

and self-concept with reading comprehension. Flexibility added significantly to the multiple correlation between intelligence and reading achievement for the total sample and in all subsamples. In one subsample, originality added significantly to the multiple correlation; in another subsample, self-concept added significantly to the multiple correlation. The relationships of intelligence, fluency, flexibility, originality, and self-concept are not simple and constant. There were complex interactions among the variables and the factors of sex and grade level in this sample for both measures of reading achievement.

Discussion and Implications

This study examined the relationships among basic cognitive and affective processes in reading as described by Ruddell's Communication Model (1972). The results support the conclusion that under a multidimensional view of human abilities, divergent thinking abilities and self-concept add significantly to the relationship between intelligence and reading achievement.

The comgination of convergent thinking, divergent thinking, and self-concept variables accounts for 60 to 70% of the variance in reading achievement, while 30 to 40% remains unexplained. These results suggest the need to include other measures, including assessment of the integrative aspects between these factors in a model explaining the reading process.

Guilford (1959) suggested that "the best position for educators to take is that possibly every intellectual factor can be developed in individuals at least to some extent by learning (p. 478)." Many authors have written about the need to

humanize education, to involve the child in thinking processes, and to develop increased sensitivity and flexible relationships to his environment (Bruner, 1966; Glasser, 1969; Rogers, 1969; Williams, 1969). An assumption of the present study is that reading programs will be more effective if some of the divergent thinking abilities are developed through the reading program. To provide the kinds of experiences that will stimulate individual growth in reading, curriculum and teaching methods should be developed to foster qualities of open-mindedness, tolerance for uncertainty, preference for complexity, motivation for learning, and search for meaning. Perhaps the most important implication for teachers is that by providing appropriate training in divergent thinking processes with critical reading skills, the child will be better able to process information effectively as well as seek new information from his environment.

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APPENDIX A

Correlation Matrix

	S-C	IQ	WK	Comp	Flu	Flex	Orig
S-C	1.00						
IQ	.15	1.00					
WK	.15	.68	1.00				
Comp	.12	.71	.82	1.00			
Flu	.17	.47	.56	.50	1.00		
Flex	.21	.47	.60	.56	.93	1.00	
Orig	.06	.35	.40	.33	.87	.76	1.00