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ABSTRACT

DISTAR (Direct Instruction Systems for Teaching Arithmetic and Reading) is a structured program designed to present basic skills and concepts in such a way that the child's complete mastery of each step in the programed sequence is ensured before proceeding to subsequent steps. This study investigated the effects of the program using 52 children (approximately 95 percent were black and about equal numbers were boys and girls) in DISTAR (D) and Non-DISTAR (ND) groups, with 26 each in first and second grades. The Auditory Association and Verbal Expression subtests of the Illinois Test of Psycholinguistic Ability were administered individually, while the Stanford Early School Achievement Test (for first grade) and the Metropolitan Achievement Test (for second grade) were administered in groups. Findings showed that the average reading scores of D children exceeded those of ND children in both first and second grades and that the average verbal expression scores of first-grade ND children were higher than those of children in D classes. (JM)

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EFFECTS OF A STRUCTURED PEDAGOGY ON CHILDREN'S LANGUAGE

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One manifestation of the drive toward acceleration that has characterized the post-Sputnik era in American education has been the proliferation of prescriptive teaching programs. The ever-increasing critical assessment by the public of the state of American education, coupled with the impetus of the compensatory education movement helped set the stage for programs marked by a didactic teaching model with instruction teacher-centered, and-directed, and an invariant instructional sequence, pattern, and approach.

THE DISTAR PROGRAM

DISTAR (Direct Instruction Systems for Teaching Arithmetic and Reading) which exemplifies this approach, is based on the language programs of Siegfried Engelmann, who, with Carl Bereiter, developed an "empirically-based" structured program for working with culturally disadvantaged preschool children (Bereiter and Engelmann, 1966). The program consists of instructional techniques and materials which are structured in such a way that teacher and paraprofessional implementation may be monitored very closely. The programmed lessons are designed to present basic language, reading, (and number) skills and concepts in a logical sequence, providing for diagnosis, analysis, evaluation, and

review. DISTAR practitioners are to ensure the child's complete mastery of each step in the programmed sequence before proceeding to subsequent steps. Positive reinforcement, often in the form of tangible rewards for appropriate behavior, is included as an important facet of the program, as is some parent involvement in the children's school learning. Precise hand signals and verbal cues are used extensively by the teachers and para-professionals to elicit specific verbal responses from the individual child or the group. The language program stresses the teaching of concepts selected as those most basic to the child's understanding of what is being taught in school. Habits of language usage, such as the use of full statements to identify or describe the quality of objects, are practiced and reinforced through the teaching strategy of pattern drill. DISTAR's reading program introduces a phonemic system utilizing the traditional orthography with a few specific DISTAR symbols added (to represent long vowel sounds, silent letters, and some consonant blends) that are later phased out. It is a heavy code emphasis approach with the primary focus on word attack skills, and, as such, incorporates and emphasizes those elements of initial reading instruction which Chall's survey of the research (1967) led her to conclude contribute to higher reading achievement at least up to the end of the third grade.

RELATED RESEARCH

Research on DISTAR has been both sparse and often subject to flaws in design. A methodologically sound study by Knudsen (1971) compared the achievement of children attending school in above average SES neighborhoods using DISTAR with those using traditional curricula. After one year, she

found significant differences in favor of the DISTAR group on all subtests of both the Gates-MacGinitie Reading and Wide Range Achievement tests. Williamson (1970) found like results with a sample of 89 first-graders at the close of one year of instruction. Investigations conducted by Polk revealed different results at the two grade levels studied. Kindergarten children in the DISTAR group obtained significantly higher scores on the Peabody Picture Vocabulary Test posttest ($p < .05$) than their counterparts did in the control group. In addition, they attained higher scores on the New York City Prereading Assessment, Visual Discrimination Subtest ($p < .01$), but did not differ on the Language Subtest (Polk, 1973b). At first grade level, the two treatment groups performed equally well on the Peabody and Gates-MacGinitie tests. However, children in the control group out-scored the DISTAR group ($p < .002$) on the Reading Comprehension Subtest (Polk, 1973a). Young (1974) hypothesized that language patterning approaches such as DISTAR would not contribute to active or productive language performance. In order to test this, he randomly assigned 300 preschool children to two different treatment groups, one of which was DISTAR, while the other was a language experience approach. Language samples from subjects were analyzed for number of communication units, number of modifiers, number of words, average length of communication units, and number of language mazes. He found that samples drawn from children in the language experience approach contained more words and modifiers than those drawn from children in the DISTAR treatment. An additional interesting finding was that the language experience approach was more effective when taught by teachers than by aides, whereas the aides were more effective using DISTAR.

In light of both the sparsity and the inconsistency of research findings on DISTAR to date, the present study was undertaken in order to continue the investigation into DISTAR's effects on children's oral language and reading achievement. In addition, it was hoped that by following up subjects initially studied by Polk (1973a,b), it would provide some longitudinal data on the effects of the program. It was hypothesized that:

1. children in the DISTAR program would not perform better on productive oral language measures than children in the Non-DISTAR program;
2. children in the DISTAR program would achieve higher reading scores in word knowledge than children in the Non-DISTAR program;
3. children in the DISTAR program would not achieve higher reading comprehension scores than children in the Non-DISTAR program.

METHODOLOGY

SAMPLE: All children in the sample were attending four schools designated as eligible for Title I programs, i.e., serving economically disadvantaged groups and having a significant number of children with reading scores "below grade". A twenty-five percent sample was randomly drawn from the group of children who had been in the DISTAR (D) and Non-DISTAR (ND) groups in 1972-73. This yielded 52 children in the D and in the ND groups, with 26 each in first and second grades. Approximately 95% of the children were black. Approximately equal numbers of boys and girls were in the D and ND groups. ND groups may be characterized as traditional kindergarten and primary grade classes, with generally a more child-centered emphasis than in the D groups. The teaching of reading was conducted through the

use of basal readers which differed from the DISTAR reading program in that, though also geared to small group instruction, it permitted more variation in children's responses as well as more child-to-child interaction. There was, as well, less emphasis particularly of a highly systematized nature on the teaching of decoding skills.

INSTRUMENTS: Two subtests of the Illinois Test of Psycholinguistic Ability (ITPA) were selected for use as language measures, i.e., Auditory Association and Verbal Expression. Reading tests administered in the schools were the source of the reading scores. The Stanford Early School Achievement Test (SESAT), Level II, used for first grades, yielded scores on: Letters and Sounds, Aural Comprehension, Word Reading and Sentence Reading. The Metropolitan Achievement Test (MAT), Primary II, used for second grades, yielded scores on: Word Knowledge, Reading Comprehension and Total Reading.

PROCEDURES: The sub-tests of the ITPA were administered to the children individually by the investigators using the standardized procedures. Auditory Association (which includes items such as, Cotton is soft; stones are ____. An explosion is loud; a whisper is _____) was administered first. The Verbal Expression measure involved the child's describing each of four objects (ball, block, envelope, button), in response to the direction "Tell me all about this". The administration of the test was sufficiently complex to make training sessions necessary.

The ITPA tests were scored using the standards and procedures provided by the publisher. Inter-scorer reliability, established by having a 10% sample of the protocols scored independently by each of the three scorers, was satisfactory.

Verbal Expression scores were based on the child's total responses scorable within the standard categories: label, color, shape, composition, function, major parts, numerosity, other characteristics, comparison, person, place or thing. This appeared to the investigators to be analagous to a verbal fluency measure. It was decided also to count the number of different categories a child used in responding so that a measure analagous to verbal flexibility would be obtained. While this latter measure would necessarily be more limited in range, it appeared to be of sufficient interest to warrant its calculation.

Reading tests were administered by classroom teachers and paraprofessionals to groups in their respective schools during the regularly scheduled district and city-wide testing program. Scoring was carried out by the test publishing service. Data were analyzed using Analysis of Variance and t tests. Correlations among the variables under consideration were computed, as well.

FINDINGS

Children in the DISTAR and Non-DISTAR groups did not differ in Auditory Association in either first-or second-grade. Significant differences were found on the Verbal Expression (VE) and Verbal Expression Categories (VEC) measures in the first-grade sample, favoring the ND group (See Table I). No differences were found in the second-grade group on either Verbal Expression or Verbal Expression Categories. Thus, the hypothesis which stated that higher productive language would not be associated with participation in the DISTAR program was supported partially.

TABLE I

Mean ITPA Verbal Expression (VE) and Verbal Expression Categories (VEC) Scores for D and ND First Graders

Score	DISTAR (N=26) Mean	S.D.	Non-DISTAR (N=26) Mean	S.D.	t	p
VE	26.08	7.72	31.63	10.18	2.24	.05
VEC	19.08	4.45	22.26	5.51	2.31	.05

Reading scores for first-grade children were available on a very limited basis. Only those designated as "target" children were selected for testing by the school district. (A "target" child is one who has significant economic as well as educational disadvantage). This, plus the problems associated with group testing programs (e.g., absence, incomplete responses) lead to having scores available for only 9 D and 6 ND children. Analyses were completed on these numbers, but clearly conclusions can be drawn most tentatively. The scores of the children in the D group were higher than those in the ND group. (See Table 2). The suggestion in the hypotheses that there would be differences in the achievement patterns associated with word knowledge and comprehension is not tenable. Rather, participation in DISTAR was associated with achievement over the four sub-test measures.

TABLE 2*

Mean Reading Scores of First Graders on Stanford Early School Achievement Sub-tests for D and ND Groups, May, 1974

Test	DISTAR (N=9) Mean	S.D.	Non-DISTAR (N=6) Mean	S.D.	t	p
Letters & Sounds	37.55	3.57	26.55	9.89	2.61	.05
Aural Comprehension	21.22	1.98	13.17	7.57	2.55	.05
Word Reading	49.88	8.22	20.17	5.91	8.14	.01
Sentence Reading	22.88	9.48	12.66	5.99	2.56	.05

*F test applied for homogeneity of variance; Cochran and Cox correction, t = 2.55

Second-grade children in the DISTAR program scored significantly higher on both Word Knowledge and Reading Comprehension Sub-tests, (See Table 3). With respect to the study's hypotheses, the D group's achievement confirmed the expectation of higher Word Knowledge scores, but refuted the expectation of higher comprehension among ND children.

TABLE 3

Mean Reading Raw Scores of Second Grade Children on Metropolitan Achievement Test, Form F, April 1974

Test	DISTAR (N=26) Mean	S.D.	Non-DISTAR (N=26) Mean	S.D.	F	p
Word Knowledge	30.69	7.83	14.91	9.84	5.47	.02
Reading Comprehension	33.96	8.49	25.58	9.49	11.41	.01
Total	65.12	14.78	50.50	18.48	9.48	.01

In summary, the average reading scores of children in the DISTAR program exceeded those of children in Non-DISTAR programs, in both the first-and-second grades. The average Verbal Expression scores of children in first grade Non-DISTAR classes were higher than those in DISTAR classes.

DISCUSSION AND IMPLICATIONS

The hypothesized differences between achievement in tasks likely to be associated with rote learning (e.g. word knowledge) and those likely to be associated with meaningful learning (e.g. reading comprehension) were not found. It seems plausible that the differences both in learning experiences and in test content are not independent at the early stages of reading skill development. A child's achievement on a reading comprehension task in the early grades may be closely tied to basic word recognition or decoding skills which are so heavily featured by DISTAR. Intercorrelations obtained among the MAT and SESAT sub-test scores for this sample provide support for this contention (r's ranged from .84 to .98). It appears that these tests measured highly similar things in this sample.

The finding of Verbal Expression scores higher in the ND group at the end of grade one and not at the end of grade two may be attributable to expressive language differences in the children initially (on which we have no data) or to differences in school-related learning experiences. It may be argued that the Verbal Expression scores' differences reflect the more child-talk-centered Kindergarten experience of the ND group and the more structured-directed-talk Kindergarten experience of the D group. This variation in Kindergarten experience was not true for children who were finishing second-grade, since for them, the DISTAR program was introduced

at the usual beginning of "formal" learning experiences in first grade. The possibility of different effects attributable to the time when structured language and reading programs are introduced have been a matter of interest to Early Childhood Educators for some time.

The implications of this study for further research include the need for development of carefully designed longitudinal studies in which the effects of structured language programs on receptive language and productive language at early and later developmental levels are investigated. The development and use of instruments sensitive enough to tap more than the merely superficial levels of both receptive and productive language would seem mandatory for such research. In addition, we deem it important to investigate the long term effects of structured language programs on reading comprehension at those intermediate grade levels where the mechanical decoding process itself does not confound the measurement of reading comprehension.

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