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ABSTRACT

This study assessed long-term effects of an early education intervention for specific learning disabilities. Children at risk for learning problems were observed in classrooms performing analyzed tasks in five content areas: perceptual-motor, auditory, visual, cognitive, and social-emotional. Small-group instruction was then directed to the 37 at-risk kindergarten students, focusing on four categories of learning strategies: (1) attending to increasing numbers of items and sets, both visual and auditory; (2) remembering increasing numbers of items, both visual and auditory; (3) demonstrating knowledge of the meaning of the type of question asked (what, when, where, whom); and (4) sorting and categorizing at different levels of abstraction and in different perceptual modes. Immediate post-intervention results suggested that the task analysis intervention had been effective, when student performance was compared to a contrast group of 33 children. Results of an 8-year follow-up study indicated that the task analysis students continued to perform at achievement levels which were average or better for their age group, compared to the contrast group and a current cohort group. The intervention effects appeared to be most salutary upon children who were moderately at-risk. (JDD)

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A TASK-ANALYSIS PROGRAM OF EARLY INTERVENTION: EIGHT-YEAR OUTCOMES

This study assessed long term effects of an early education intervention for specific learning disabilities; this intervention was developed from a task analysis of kindergarten curricula. The overall purposes were:

1. To determine the degree to which the children in the task-analysis intervention maintained initial academic improvement;

2. To compare the progress of the intervention group with a contrast group of at-risk children as well as a randomly sampled cohort who did not receive the intervention;

3. To assess differential effects of this intervention on individuals.

The initial project was funded by the U.S. Office of Education, Bureau for the Educationally Handicapped, P.L. 91-230; the purpose was to develop a model center for the early prevention and remediation of learning problems, particularly specific learning disabilities. Throughout that demonstration project, task analyses were conducted in five content areas of the kindergarten and first grade: perceptual-motor; auditory; visual; cognitive; and social-emotional.

The theory of the task analysis intervention was derived from the investigations of developmental psychologists and educators concerning a sensitive, if not critical, period in children's lives for mastering certain areas of learning (Brim & Kagan, 1980; Flavell, 1963; Montessori, 1917). The beginning of school may be a sensitive period for children at-risk for learning problems, not only because of the demands of work and group learning, but also because it is a period of rapid cognitive transition and growth (Piaget 1923/26, 1936/52). An effective educational intervention should ameliorate factors that prevent individual children from progressing in a typical manner. The task analysis program was designed on the basis of the assumption that children at-risk for learning problems often had not mastered basic academic tasks in the early sequences of primary school instruction. Therefore, their mastery of subsequent learning sequences became progressively difficult. Through learning the basic tasks and the principal idea of the intervention children also learned to proceed logically through the steps of academic tasks, and could then build on that foundation for achievement.

The analyzed tasks were used daily within the classrooms both to observe individual children performing the steps of the task. This observation allowed the classroom teacher and the special education teacher to develop a detailed learning profile on specific strengths and weaknesses of each child, and to provide instruction at the points where it was required. Instruction was primarily directed to small groups of three to

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four children.

The emphasis on clarifying a sequence of steps in the performance of academic tasks led to a particular change in teaching. This consisted of an explicit focus on the categories of learning strategies as well as the development of curricular activities that facilitated such a focus. Four categories of learning strategies developed from the observed needs of the students, as follows:

1. Attending to increasing numbers of items and sets, both visual and auditory;
2. Remembering increasing numbers of items, both visual and auditory;
3. Demonstrating knowledge of the meaning of the type of question asked (what, when, where, whom);
4. Sorting and categorizing at different levels of abstraction and in different perceptual modes;

Immediate post-intervention results of the feasibility and replication studies suggested that the task analysis intervention had been effective. Most of the at-risk children who had received this intervention were performing as typical first graders. Most of their counterparts who had not received it were having difficulty with school. Subsequently, an eight year follow-up study of the effects of this early educational intervention was carried out. Beginning and end points of the study coincided with salient age-related theoretical points in cognitive development. At the time of the intervention the children were in kindergarten and first grade, and at the time of the follow-up, they were in seventh and eighth. According to Piagetian theory, both periods involve turning points in cognitive development, particularly from a qualitative viewpoint. In educational terms, eight years is also a long enough period of time to produce evidence regarding the impact of particular educational experiences.

Three groups of subjects participated in the follow-up study (total N=77). All were concurrently middle school students in a Northeastern industrial city. Two of the subject groups had been selected while they were in kindergarten. The third group of subjects was selected at the time of the follow-up study eight years later, when they were in middle school. The original kindergarten at-risk experimental population had been identified by school psychologists using the Jansky Screening Index for potential educational handicaps. Two samples were drawn from this at-risk population, a treatment sample and a contrast group.

Thirty of the original subjects (17 males and 13 females) who had participated in the early intervention program in kindergarten and first grade had continued in the school system through seventh grade. Twenty-two subjects from the original 33 contrast subjects had stayed in the system through fifth grade and 17 (12 males and 5 females) from this original untreated group had continued through seventh grade. This group had received whatever special programs were offered at their schools whenever a program for individual students was considered appropriate.

An additional current cohort subject group was selected at

the time of the follow-up study. Subjects (19 males and 11 females) were selected by random sampling from a total pool of age-matched students who had been in the same school system as the original subjects from kindergarten through middle school (N=561). The current cohort, which did not necessarily excluded at-risk students, was assumed to represent the full range of academic achievement of middle school students in this school system.

All available archival data on all subjects was recorded and analyzed. Outcome measures used were the Metropolitan Reading Readiness Test, Gates-Macginitie Reading Test, Iowa Tests of Basic Skills, and the Cognitive Abilities Test. Data points for these measures were post-kindergarten, first, third, sixth, and seventh grades. To summarize the results of the study: the task analysis students continued to perform for eight subsequent years at achievement levels which were average or better for their age group. The task-analysis intervention group consistently achieved at significantly higher levels ($p < .01$ at minimum) than a contrast group that was initially selected in kindergarten. Therefore, initial gains of the task-analysis group were maintained. On the basis of these results, it appears that early post-treatment performance was predictive of later performance in the primary years and beyond. The task-analysis group also performed at least as well as the randomly selected group of current cohorts on all measures at each data point. Also, performance was not discernibly related to background variables such as gender, race, or family status. With regard to the randomly selected group of current cohorts, the task analysis intervention group also performed at least as well on all measures.

The major impact of this study is that it adds weight to the importance of early educational interventions for learning problems. Other intensive, closely supervised intervention programs have also demonstrated positive long term effects. In addition, the effects appeared to be most salutary upon children who were moderately at-risk; subjects who did not progress to average achievement levels were primarily those who had been at lowest levels at the post-treatment point of the intervention program.

SETTING OF THE STUDY: Northeastern Industrial City (Pop. 75,000)

THE SUBJECT GROUPS

I. Task Analysis Intervention Subjects

A. Identified 1975 in kindergarten as at-risk for learning problems

B. Instrument: Jansky Screening Index

C. Selected from at-risk pool by school: Schools selected for demographic representation of total population

II. Contrast Subjects

A. Identified in same kindergarten screening as above

B. Selected at random from total at-risk population

III. Current Cohort Subjects

A. Subject Pool 1983: All like-aged students who had stayed in the school system through middle school (1975-83)

B. Selected by random sampling

C. Assumed to represent the range of academic achievement of middle school students in this school system

SUMMARY OF THE INTERVENTION

1. Task analysis of all activities in kindergarten curriculum into sequences necessary for mastery of the activity
2. Observation of students on steps of each task by special education and classroom teachers
3. Provide instruction required OR
4. Further analyze and break down a sequence that is difficult for an individual child or children
5. Develop activities/tools/instruction for the new steps
6. Divide tasks into skill areas
7. Develop detailed profiles of strengths and weaknesses of each child

FOCUSES OF TASK CONTENT

FOUR CATEGORIES DERIVED FROM THF OBSERVED NEEDS OF STUDENTS

1. Attention to increasing numbers of items and sets, both visual and auditory;
2. Memory for an increasing number of items, both visual and auditory
3. Demonstrated knowledge of the meaning of the type of question asked (What, when, where, whom);
4. Ability to sort and categorize at different levels of abstraction and perceptual modes

Appendix C

CODE VISUAL: ORDERING BY SIZE PROGRESSION	School	
	Teacher	Grade

PROJECT MECCA. TITLE VI. G. P L 91-230 1974

TASK ANALYSIS FORM

FOR DUPLICATION

Refer to instructions for the use of this form in PROJECT MECCA A LEARNING ADVENTURE MANUAL

TASK DESCRIPTION

CHILD WILL BE ABLE TO ORDER OBJECTS ACCORDING TO A STATED CONFIGURATION
(EX: SMALLEST TO LARGEST; LARGEST TO SMALLEST)

TASK LEVELS	STUDENTS' NAMES ▷							
(Mark an "X" in the appropriate column as level is attained.)								
1. Child is able to visually discriminate differences in size in objects.								
2. When given a pattern, child is able to discriminate differences in size.								
3. Child is able to place objects on pattern accurately, in random order.								
4. Given a size progression pattern, child is able to place matching objects on pattern, accurately.								
5. Child is able to perform step #4 given only one spatial cue, (margin on left).								
6. Child is able to perform step #4 without any pattern, thus displaying memory recall and understanding of concept of size and ordering.								
DATE OF BEGINNING								
COMPLETING TASK								

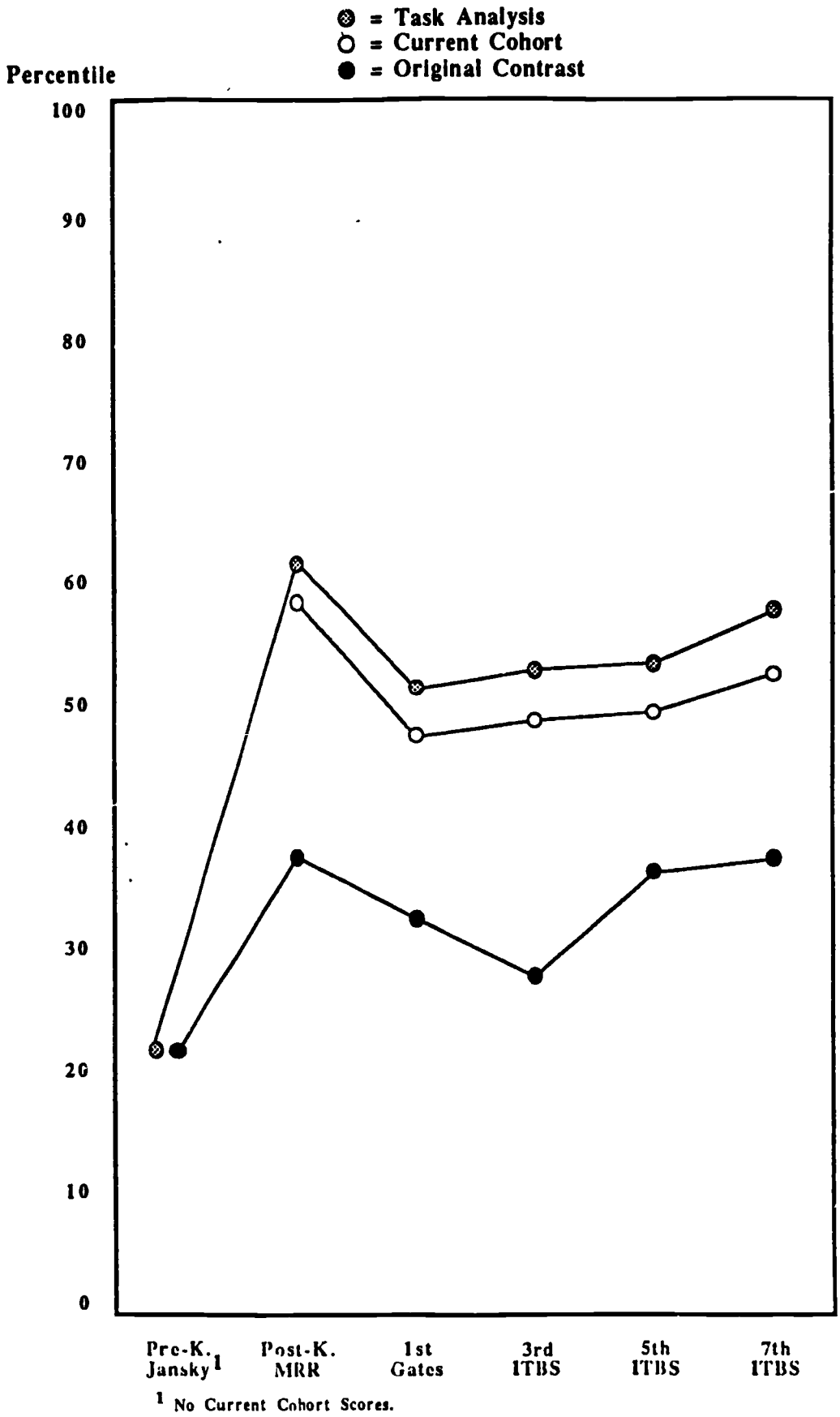

Figure 2: Summary Comparisons among 3 Groups on Achievement Tests from Pre-kindergarten to Seventh Grade.

POST-INTERVENTION RESULTS

Xs, Standard Deviations and F Ratios

Pre- and Post- Kindergarten Scores of Reading Readiness

Pre-Kindergarten Jansky Screening

	N	X	s.d.	df	F
Task analysis	37	27.1	5.4	1/68	.83
Contrast	33	26.0	6.0		

Post-Kindergarten Jansky

	N	X	s.d.	df	F
Task analysis	37	53.3	9.8	1/68	9.61*
Contrast	33	46.6	9.9		

Metropolitan Reading Readiness: post-kindergarten

	N	X	s.d.	df	F
Task analysis	37	60.5	7.8	1/68	12.94**
Contrast	33	52.2	9.4		

*p<.05

**p<.01

LONGTERM RESULTS

Differences among means were significant ($p \leq .05$ at post 1st grade and $p \leq .01$ at all others) at every data collection point between the task analysis intervention group and the original contrast group: kindergarten, first grade, third grade, and fifth grade.

Summary Statistics of Achievement Tests

First Grade to Seventh Grade

Ns, Xs, and Standard Deviations for the 3 Groups

First Grade Gates Macginitie Reading Test

	N	X	s.d.
Task analysis	25	50.77	8.3
Contrast	23	42.80	7.6
Current Cohort	30	49.83	7.2

Summary Statistics

Third Grade Iowa Tests of Basic Skills Composite

	N	X	s.d.
Task analysis	30	107.73	7.7
Contrast	14	98.64	10.23
Current Cohort	30	106.13	9.2[illegible]

ITBS Reading: Third Grade Scores

	N	X	s.d.
Task analysis	30	106.73	8.73
Contrast	27	99.41	7.75
Cohort	30	105.67	8 76

Fifth Grade ITBS Composite

	N	X	s.d.
Task analysis	30	134.80	12.89
Contrast	22	122.27	12.00
Current Cohort	30	131.07	11.64

Seventh Grade ITBS Composite

	N	X	s.d.
Task analysis	30	160.23	17.37
Contrast	14	143.20	16.48
Current Cohort	30	156.63	23.26

THE THREE GROUPS AT SEVENTH GRADE

Descriptive Statistics

	T-A N=30	Contrast N=17	Cohort N=30
Age(Months)	158.2	157.4	161.4
Males	57%	53%	63%
Black	20%	29%	23%
Hispanic	13%	6%	7%
White	47%	65%	70%
Special Education[1]	27%	41%	17%
2-Parent Home	73%	65%	70%
Cognitive Abilities Tests			
CAT Verbal[2]	101.00	94.72	102.07
CAT Non-verbal	98.27	94.00	100.17
CAT Quantitative	101.37	90.83	100.43

[1] Does not include speech defects, gifted, or tutoring

[2] All single variable statistical differences non-significant ($p<.05$)

[redacted]

[redacted]

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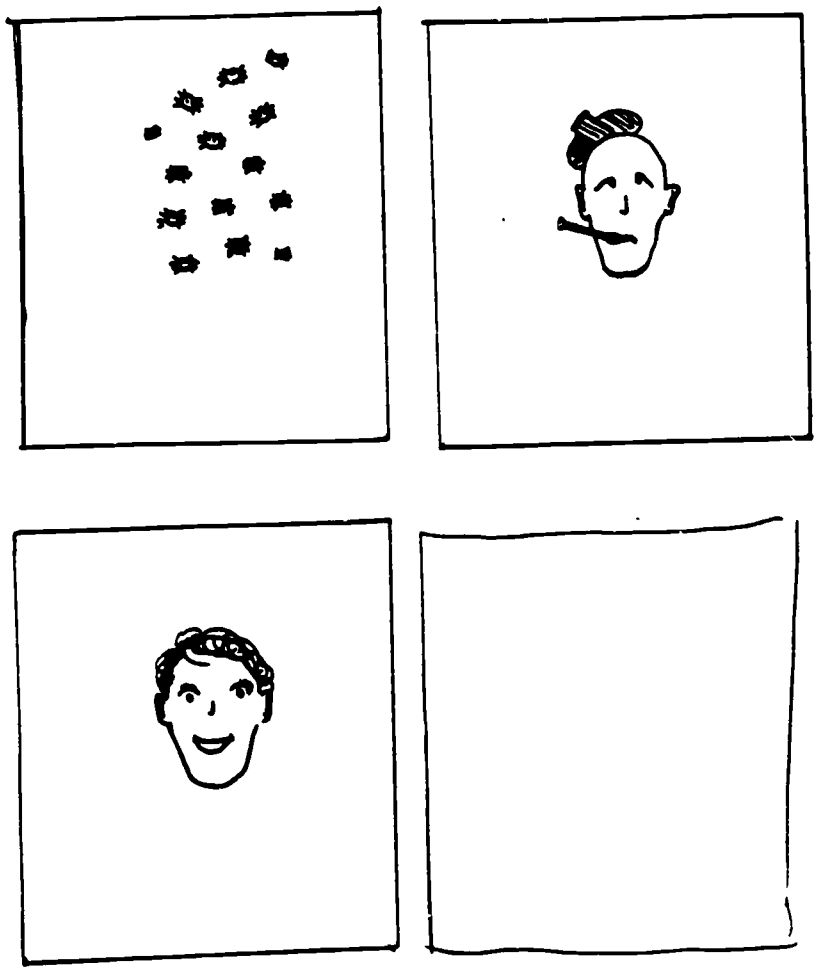
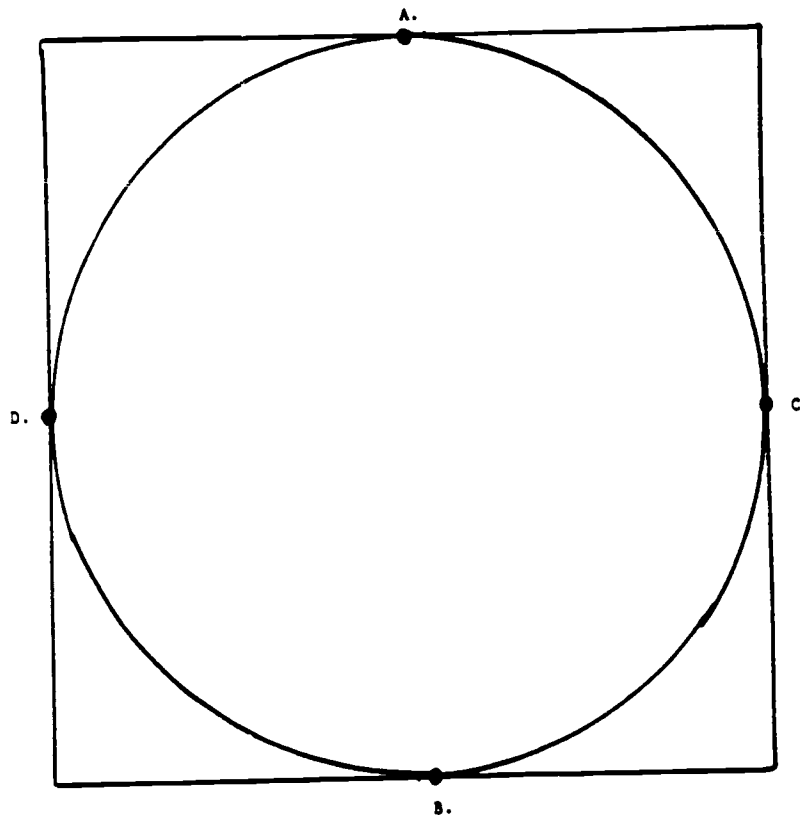


Pre-Test #1



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Pre-Test #2

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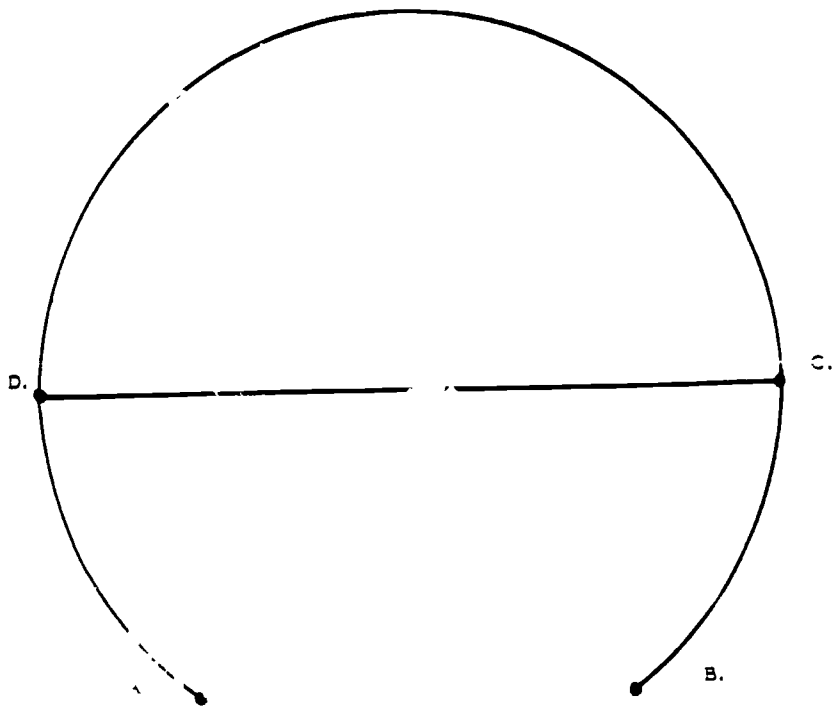

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Table 15

Percentage of subjects with Isolation of Variable Process

	Grade	Sick/Healthy Task	Plants Task
Neimark(1975)	7 & 8	45-50%	—
	bright 7 & all 9	75%	—
Kuhn & Brannock(1977)	5	—	50%
	6	—	75%
Rothenberg	7 & 8	63%[1]	65%[2]

[1] Task-analysis = 80%
Cohort = 47%

[2] Task-analysis = 77%
Cohort = 53%