A STUDY OF THE EFFECTS OF A SPECIFIC EDUCATIONAL THERAPY ON LANGUAGE DEVELOPMENT, VISUAL PERCEPTION DEVELOPMENT, INTELLECTUAL FUNCTIONING AND ACADEMIC ABILITY OF CHILDREN CLASSIFIED AS EDUCABLE MENTALLY RETARDED

Thesis for the Degree of Ed. D.
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William Eugene Rice

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This is to certify that the

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A STUDY OF THE EFFECTS OF A SPECIFIC EDUCATIONAL THERAPY ON LANGUAGE DEVELOPMENT, VISUAL PERCEPTION DEVELOPMENT, INTELLECTUAL FUNCTIONING AND ACADEMIC ABILITY OF EDUCABLE MENTALLY RETARDED CHILDREN

presented by

WILLIAM EUGENE RICE

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ABSTRACT

A STUDY OF THE EFFECTS OF A SPECIFIC EDUCATIONAL THERAPY ON LANGUAGE DEVELOPMENT, VISUAL PERCEPTION DEVELOPMENT, INTELLECTUAL FUNCTIONING AND ACADEMIC ABILITY OF CHILDREN CLASSIFIED AS EDUCABLE MENTALLY RETARDED

By William Eugene Rice

The primary purposes of this study were to investigate the effects of a classroom-organized program for the specific educational training of mental functions of educable mentally retarded students placed in public school special classes. Effects were measured in four areas: (1) Language Ability, (2) Visual Perception Ability, (3) Intellectual Functioning and (4) Academic Ability. The Specific Educational Therapy (SET) used in this study consisted of two commercially available programs for classroom use: (1) The Peabody Language Development Kit, Level 1 and (2) The Frostig Program for the Development of Visual Perception. SET was presented in two instructional modes: (1) using specialist-teachers and (2) using classroom-teachers.

Eighty-two educable mentally retarded students placed in ten primary and early elementary classrooms were divided into two experimental groups and one control group. For the first experimental group SET was taught by teacher-specialists; for the second experimental

group SET was taught by classroom teachers and SET was not used with the control group. The therapy program spanned a six and one-half month period. The three groups were statistically matched on twenty-one variables operationally defining the four areas investigated. These variables were derived from the subtests and summary scores of five psychological tests:

(1) Illinois Test of Psycholinguistic Ability.

(2) The Frostig Developmental Test of Visual Perception.

(3) Wechsler Intelligence Scale for Children.

(4) Lee-Clark Reading Readiness Test.

(5) Wide Range Achievement Test.

For each of the twenty-one variables, the following two independent hypotheses were evaluated on the basis of an analysis of covariance, planned comparisons technique.

Ho:1 There will be no differences in the post-test (dependent variable score) between the combined experimental groups and the control groups after means are adjusted for initial variance as measured by pre-test scores.

Or symbolically: $(M_1 + M_2) = 2\ M_c$.

Ho:2 There will be no difference in the post-test (dependent variable score) between

the experimental-specialist-teacher and the experimental classroom-teacher groups after means are adjusted for initial variance as measured by pretest scores. Or symbolically: $(M_1 = M_2)$.

Within the limitations imposed by the nature of the sample and the procedures used in this investigation, it was concluded from the data gathered that:

1. A specific educational therapy program as taught by either teacher-specialists or classroom teachers to educably mentally retarded classes can result in significant improvement of the classes' language ability.
2. The relative effectiveness of a teacher-specialist's as compared to a classroom teacher's presentation of a specific educational therapy program was supported.
3. That a specific educational therapy program effects visual perception development, intellectual functioning or academic ability cannot be supported or denied by the evidence of this study.
4. A specific educational therapy program tends to reduce disparity between language ability and intellectual functioning of educable mentally retarded classes.

A STUDY OF THE EFFECTS OF A SPECIFIC EDUCATIONAL THERAPY ON LANGUAGE DEVELOPMENT, VISUAL PERCEPTION DEVELOPMENT, INTELLECTUAL FUNCTIONING AND ACADEMIC ABILITY OF CHILDREN CLASSIFIED AS EDUCABLE MENTALLY RETARDED

By

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To the Ingham Intermediate Board of Education, administration and professional staff, I am thankful for unmeasurable support, endless patience and encouragement and the time to complete the work that was required. Grateful appreciation is also extended to the administration, staff and students of the school districts who granted permission to pursue this investigation.

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DEDICATION

To the Ingham Intermediate Board of Education,
Administration and Professional Staff

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

LIST OF APPENDICES

CHAPTER I

THE PROBLEM

Background

In public school special education programs for the educable mentally retarded, there has been a marked shift away from the specific educational training of mental functions. The omission of such training seems based, in part, on the assumption that the educable mentally retarded's learning abilities are more similar to, than different from, his normal peers. Acting on this assumption, there has been general agreement that educational goals for the retarded should be the same as for non-retardates but at a lower level and with less academic emphases.

Research assessing the consequences of special class placement for the educable mentally retarded has, most frequently, failed to support the educational expectations that such placement results in better academic performance or improved social or personal adjustment. In fact, research in the area of the efficiency of such programs has been characterized by negative findings over the past thirty years.

Recent research findings in the area of learning

disabilities have in effect, challenged the assumption that the educable mentally retarded's learning abilities are more similar to, than different from, his educationally normal peers. Such findings have suggested that many children diagnosed as educable mentally retarded could be more accurately described as having developmental disorders of learning and language functions, which commonly occur without any impairment of intelligence. Such research has also suggested that standardized intelligence test scores can be particularly misleading in the learning and language disordered child. Additional findings in this area of research have supported the belief that learning disabilities are found among children who are otherwise average in intelligence as well as among children who are below average or superior in intelligence.

One possibility that these research findings seem to suggest is that many children placed in special education classrooms for the educable mentally retarded may have normal abilities in some areas and markedly limited abilities in other areas. Because of this, such children may give the appearance of mental retardation but training of the limited functions may even successfully remove some of them from the educational classification of mental retardation. In other words, the learning potential of the educable mentally retarded group may be quite different than previously assumed.

Research is noted then in four different areas: (1) the present curricular emphases, educational goals and objectives of public school special education classrooms for the educable mentally retarded: (2) the academic, social and personal consequences of special class placement for the retarded: (3) educational concept and diagnosis of educable mental retardation and (4) learning disabilities and educational therapy. Taken as a whole, this body of research seems to have something important to say about the understanding and education of the educable mentally retarded. The implications are not clear, however, since several interpretations can reasonable be generated from this number of variables and the wealth of data.

One possible interpretation is that the negative findings associated with special class educational programs result, in part, from an interaction of the goals, objectives and curriculum of such programs, with the learning abilities and training needs of the educable mentally retarded. On this basis it is reasonable to speculate that special class placement has been educationally disappointing because of the omission of specific educational training of functions from the curriculum of pupils whose basic learning needs include such training.

There is a need then to investigate educational and psychological consequences of including specific

educational training of functions in the curriculum of special classes for the educable mentally retarded. To the extent the situation approaches that described, it suggests certain educational implications:

A. A possible need to modify the educational concept of the learning potential of certain children classified as educable mentally retarded and re-evaluate educational curriculum objectives and goals.

B. A possible need to modify the current role of the school diagnostician that emphasizes psychological assessment for the purpose of classification and educational placement, to give more emphasis to psychological assessment for the purpose of estimating the development of cognitive-perceptual-motor functions and the need for and nature of appropriate educational therapy.

C. A possible need to modify the present intelligence quotient based classification of educable mental retardation.

Statement of the Problem

This study investigates certain consequences of specific educational therapy on language development, visual perception development, intellectual functioning

and academic ability of children classified as educable mentally retarded and educationally placed in public school special classes.

The question considered is whether or not commercially available, classroom-oriented versions of materials for the specific educational training of mental functions are relatively more effective than the traditional materials which minimize or omit such training.

A second question relevant to the problem is considered. There are, presently, two possible ways of introducing the specific educational therapy into the curriculum, i.e., the classroom teacher and specialists such as speech therapists and teachers of the physically handicapped. The additional question considered is whether or not there are differential consequences, resulting from the classroom teacher or teacher specialists using the specific educational therapy.

The recent publications of a language development program[1] and a visual perception development program[2] have provided the opportunity to study their effects when training is provided in the classroom.

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[1]Lloyd M. Dunn and James O. Smith. Peabody Language Development Kits, Level 1. American Guidances Services, Inc., Minneapolis, 1965.

[2]Marianne Frostig and David Horne. The Frostig Program for the Development of Visual Perception. Follett Publishing Company, Chicago, 1964.

The effects of the specific educational therapy on language development will be assessed by a standardized measure of language, the Illinois Test of Psycholinguistic Abilities (ITPA).[3] The nine subtests and summary score of the ITPA will provide an opportunity to investigate any differential effects of the therapy.

The effects of the specific educational therapy on visual perception development will be assessed by a standardized measure of visual perception, the Developmental Test of Visual Perception (DTVP).[4] The five subtests and summary score of this test will, also, provide an opportunity to investigate any differential effects of the therapy.

The influence of the specific educational therapy on the intellectual functioning of the subjects will be measured by a standardized test of intelligence, the Wechsler Intelligence Scale for Children (WISC).[5]

The influence of the specific educational therapy on the academic ability of the subjects will be measured

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[3]James J. McCarthy and Samuel A. Kirk. The Illinois Test of Psycholinguistic Abilities (Experimental Edition). The University of Illinois Press, Urbana, 1961.

[4]Marianne Frostig, D. E. Lefever and J. R. B. Whittlesey. The Marianne Frostig Developmental Test of Visual Perception. Consulting Psychologist Press, Palo Alto, 1964.

[5]David Wechsler, Wechsler Intelligence Scale for Children, Psychological Corporation, New York, 1949.

TABLE 1-1

SUMMARY OF HYPOTHESES

Variables	Combined - Experimental x Control	Specialist Teacher x Classroom Teacher
ITPA	Ho:	Ho:
Language Quotient	1	2
Auditory-Vocal Automatic	1a	2a
Visual Decoding	1b	2b
Motor Encoding	1c	2c
Auditory-Vocal Assn.	1d	2d
Visual-Motor Sequencing	1e	2e
Vocal Encoding	1f	2f
Auditory-Vocal Sequencing	1g	2g
Visual-Motor Assn.	1h	2h
Auditory Decoding	1j	2j
DTVP		
Perceptual Quotient	3	4
Eye-Motor	3a	4a
Figure-Ground	3b	4b
Shape Constancy	3c	4c
Position in Space	3d	4d
Spatial Relations	3e	4e
WISC		
Intelligence Quotient	5	6
LCRRT		
Reading Readiness	7	8
WRAT		
Reading	9	10
Spelling	11	12
Arithmetic	13	14

by a standardized reading readiness test, the Lee-Clark Reading Readiness Test (LCRRT),[6] and a standardized achievement test, the Wide Range Achievement Test (WRAT).[7]

Hypotheses to be Evaluated

There are four sets of major hypotheses in two areas to be evaluated. These are stated in the form of null hypotheses. (see Table 1-1)

The first set of major hypotheses are related to language development as assessed by the Illinois Test of Psycholinguistic Ability:

Ho:1 There will be no differences in the post-test Language Quotients between the experimental and control groups after means are adjusted for initial variance as measured by pretest scores.

Ho:2 There will be no differences in the post-test Language Quotients between the experimental-specialist-teacher and experimental-classroom-teacher groups after means are adjusted for initial variance as measured by pretest scores.

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[6]Murray Lee and Willis W. Clark. Lee-Clark Reading Readiness Test (1962 Revision). California Test Bureau, Monterey, 1960.

[7]J. F. Jastak and S. R. Jastak, The Wide Range Achievement Test, Guidance Associates, Wilmington, 1965.

The following sub-hypotheses result from the sub-tests of the Illinois Test of Psycholingustic Abilities and provide a further basis for investigating effects on language development:

Ho:1a There will be no differences in the post-test Auditory-Vocal Automatic Scores between the experimental and control groups after means are adjusted for initial variance as measured by pretest scores.

Ho:2a There will be no differences in the post-test Auditory-Vocal Automatic Scores between the experimental-specialist-teacher and experimental-classroom-teacher groups after means are adjusted for initial variance as measured by pretest scores.

Ho:1b There will be no difference in the post-test Visual Decoding Scores between the experimental and control groups after means are adjusted for initial variance as measured by pretest scores.

Ho:2b There will be no differences in the post-test Visual Decoding Scores between the experimental-specialist-teacher and experimental-classroom teacher groups after means are adjusted for initial variance as measured by pretest scores.

Ho:1c There will be no differences in the post-test Motor Encoding Scores between the experimental and control groups after means are adjusted for initial variance as measured by pretest scores.

Ho:2c There will be no differences in the post-test Motor Encoding Scores between the experimental-specialist-teacher and experimental-classroom-teacher groups after means are adjusted for initial variance as measured by pretest scores.

Ho:1d There will be no differences in the post-test Auditory-Vocal Association Scores between the experimental and control groups after means are adjusted for initial variance as measured by pretest scores.

Ho:2d There will be no differences in the post-test Auditory-Vocal Association Scores between the experimental-specialist-teacher and experimental-classroom-teacher groups after means are adjusted for initial variance as measured by pretest scores.

Ho:1e There will be no differences in the post-test Visual-Motor Sequencing Scores between the experimental and control groups after means are adjusted for initial variance as

measured by pretest scores.

Ho:2e There will be no differences in the post-test Visual-Motor Sequencing Scores between the experimental-specialist-teacher and experimental-classroom-teacher groups after means are adjusted for initial variance as measured by pretest scores.

Ho:1f There will be no differences in the post-test Vocal Encoding Scores between the experimental and control groups after means are adjusted for initial variance as measured by pretest scores.

Ho:2f There will be no differences in the post-test Vocal Encoding Scores between the experimental-specialist-teacher and experimental-classroom-teacher groups after means are adjusted for initial variance as measured by pretest scores.

Ho:1g There will be no differences in the post-test Auditory-Vocal Sequencing Scores between the experimental and control groups after means are adjusted for initial variance as measured by pretest scores.

Ho:2g There will be no differences in the post-test Auditory-Vocal Sequencing Scores between the experimental-specialist-

teacher and experimental-classroom-teacher groups after means are adjusted for initial variance as measured by pretest scores.

Ho:1h There will be no differences in the post-test Visual-Motor Association Scores between the experimental and control groups after means are adjusted for initial variance as measured by pretest scores.

Ho:2h There will be no differences in the post-test Visual-Motor Association Scores between the experimental-specialist-teacher and experimental-classroom-teacher groups after means are adjusted for initial variance as measured by pretest scores.

Ho:1j There will be no differences in the post-test Auditory Decoding Scores between the experimental and control groups after means are adjusted for initial variance as measured by pretest scores.

Ho:2j There will be no differences in the post-test Auditory Decoding Scores between the experimental-specialist-teacher and experimental-classroom-teacher groups after means are adjusted for initial variance as measured by pretest scores.

The second set of major hypotheses are related to

visual perception development as assessed by the Frostig Developmental Test of Visual Perception:

Ho:3 There will be no differences in the post-test Perceptual Quotients between the experimental and control groups after means are adjusted for initial variance as measured by pretest scores.

Ho:4 There will be no difference in the post-test Perceptual Quotients between the experimental-specialist teacher and experimental-classroom-teacher groups after means are adjusted for initial variance as measured by pretest scores.

The following sub-hypotheses result from the sub-tests of the Frostig Developmental Test of Visual Perception and provide a further basis for investigating effects on visual perception development:

Ho:3a There will be no differences in the post-test Eye-Motor Scores between the experimental and control groups after means are adjusted for initial variance as measured by pre-test scores.

Ho:4a There will be no differences in the post-test Eye-Motor Scores between the experimental-specialist-teacher and experimental-classroom-teacher groups

after means are adjusted for initial variance as measured by pretest scores.

Ho:3b There will be no differences in the post-test Figure-Ground Scores between the experimental and control groups after means are adjusted for initial variance as measured by pretest scores.

Ho:4b There will be no differences in the post-test Figure-Ground Scores between the experimental-specialist-teacher and experimental-classroom-teacher groups after means are adjusted for initial variance as measured by pretest scores.

Ho:3c There will be no differences in the post-test Size Constancy Scores between the experimental and control groups after means are adjusted for initial variance as measured by pretest scores.

Ho:4c There will be no differences in the post-test Size Constancy Scores between the experimental-specialist-teacher and experimental-classroom-teacher groups after means are adjusted for initial variance as measured by pretest scores.

Ho:3d There will be no differences in the post-test Position in Space Scores between the

experimental and control groups after means are adjusted for initial variance as measured by pretest scores.

Ho:4d There will be no differences in the post-test Position in Space Scores between the experimental-specialist-teacher and experimental-classroom-teacher groups after means are adjusted for initial variance as measured by pretest scores.

Ho:3e There will be no differences in the post-test Spatial Relations Scores between the experimental and control groups after means are adjusted for initial variance as measured by pretest scores.

Ho:4e There will be no differences in the post-test Spatial Relations Scores between the experimental-specialist-teacher and experimental-classroom-teacher groups after means are adjusted for initial variance as measured by pretest scores.

The third set of major hypotheses are related to intellectual functioning as assessed by the Wechsler Intelligence Scale for Children:

Ho:5 There will be no differences in the post-test Intelligence Quotients between the experimental and control groups after means

are adjusted for initial variance as measured by pretest scores.

Ho:6 There will be no differences in the post-test Intelligence Quotients between the experimental-specialist-teacher and experimental-classroom-teacher groups after means are adjusted for initial variance as measured by pretest scores.

The fourth set of major hypotheses are related to academic ability as assessed by the Lee-Clark Reading Readiness Test and the Wide Range Achievement Test:

Ho:7 There will be no differences in the post-test Reading Readiness Scores between the experimental and control groups after means are adjusted for initial variance as measured by pretest scores.

Ho:8 There will be no differences in the post-test Reading Readiness Scores between the experimental-specialist-teacher and experimental-classroom-teacher groups after means are adjusted for initial variance as measured by pretest scores.

The following hypotheses result from the three tests of the Wide Range Achievement Test:

Ho9 There will be no differences in the post-test Reading Scores between the experimental

and control groups after means are adjusted for initial variance as measured by pretest scores.

Ho:10 There will be no differences in the post-test Reading Scores between the experimental-specialist-teacher and experimental-classroom-teacher groups after means are adjusted for initial variance as measured by pretest scores.

Ho:11 There will be no differences in the post-test Spelling Scores between the experimental and countrol groups after means are adjusted for initial variance as measured by pretest scores.

Ho:12 There will be no differences in the post-test Spelling Scores between the experimental-specialist-teacher and experimental-classroom-teacher groups after means are adjusted for initial variance as measured by pretest scores.

Ho:13 There will be no differences in the post-test Arithmetic Scores between the experimental and control groups after means are adjusted for initial variance as measured by pretest scores.

Ho:14 There will be no differences in the post-test

Arithmetic Scores between the experimental-specialist-teacher and experimental-classroom-teacher groups after means are adjusted for initial variance as measured by pretest scores.

Definition of Terms

The terms specific education therapy, language ability, visual perception development, academic ability, academic ability development and educably mentally retarded are operationally defined for purposes of this study.

Specific Educational Therapy, the independent variable, refers to the treatment used and will be comprised of the Peabody Language Development Kit (PLDK) and the Frostig Program for the Development of Visual Perception (FPDVP). The PLDK will be used daily for approximately thirty minutes. The FPDVP will be used three times a week for approximately thirty minutes.

Language Ability refers to the ability to understand what others communicate and in expressing thoughts, ideas or wants, at any point in time. For this study, language ability is operationally defined as the scores received on the ITPA.

Language Development is operationally defined as the improvement of scores from pretest to post-test on the ITPA. It refers to an improvement in both the ability to

understand what others communicate and in expressing thoughts, ideas or wants.

Visual Perception Ability will refer to the ability to recognize and discriminate visual stimuli and to interpret those stimuli by associating them with previous experiences, at any point in time. For this study, visual perception ability is operationally defined as the scores received on the DTVP.

Visual Perception Development is operationally defined as the improvement of scores from pretest to post-test on the DTVP. It refers to an improvement in both the ability to recognize and discriminate visual stimuli, and to interpret those stimuli by associating them with previous experiences.

Academic Ability refers to achievement in those abilities most important in learning to read, in prerequisites of numerical thinking and in the sensorimotor control required in learning to write, at any point in time. For this study, academic ability is operationally defined as the scores received on the LCRRT and the WRAT.

Academic Ability Development is operationally defined as the improvement of scores from pretest to post-test on the LCRRT and the WRAT. It refers to an improvement in achievement in those abilities most important in learning to read, in prerequisites of numerical thinking and in the sensorimotor control required in

learning to write.

Educable Mental Retardation (EMR) refers, in general, to the two levels of measured intelligence designated as "Mild" and "Borderline Mental Retardation" by the American Association on Mental Deficiency. This includes an I.Q. range of 50-83.

Organization of the Study

The general plan of this study is to present in Chapter II a review of research related to educational objectives for the EMR and consequences of special class placement, educational concept and diagnosis of EMR and learning disabilities and educational therapy. In Chapter III the design of the study will be described with reference to experimental design, statistical hypotheses, type of analysis, sampling procedure and method of treatment. The results of the analysis are reported in Chapter IV. Chapter V includes the summary, conclusions, discussion and recommendations.

CHAPTER II

REVIEW OF THE LITERATURE

The literature included in this review is organized under four subsections:

1. Educational objectives for the educable mentally retarded.
2. Consequences of special class placement.
3. Educational concept and diagnosis of educable mental retardation.
4. Learning disabilities and educational therapy.

Educational Objectives for the Educable Mentally Retarded

In public school special education classrooms for children educationally classified as educable mentally retarded, it has been traditional to place curricular emphasis on life adjustment programs. A study by Stevens[1] also reveals that over the past quarter century there has been general agreement that educational objectives for such students should include: tool subjects, making a living and using one's leisure time wisely. Stevens also

[1]Godfrey D. Stevens, "An Analysis of the Objectives for the Education of Children with Retarded Mental Development", American Journal of Mental Deficiency, 63: No. 2, September, 1958.

writes that there has been general agreement that the educational goals for the retardate should be the same as for all learners, but at a lower level. These educational assumptions have apparently resulted from a conceptualization of the mentally retarded child as more similar to, than different from, his normal peers. As a further consequence of this characterization, according to Stevens, there has been a marked shift away from the specific educational training of mental functions which represented the influence of European physiologically oriented workers.

Sparks and Blackman[2] have observed that there appears to be increasing emphasis on special class placement and special preparation of teachers for the educable mentally retarded. This they note is occurring despite the lack of empirical evidence that differences actually exist in regard to special class teacher techniques, materials or content. Simches and Bohn[3] have reported on their study of major curriculum guides for the EMR. They concluded that existing programs for the mentally retarded did not differ appreciably from those offered

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[2]H. L. Sparks and L. S. Blackman, "What is Special about Special Education Revisited: The Mentally Retarded", Exceptional Children, 31: 242-47, January 1965.

[3]Gabriel Simches and Raymond J. Bohn. "Issues in Curriculum: Research and Responsibility". Mental Retardation, 1: 84-87, 115-17, 1963.

normal groups. In their review of research in the area of special classes for the mentally retarded, Blackman and Heintz[4] concluded: "Special educators are still faced with the task of developing educational methodologies which, when applied to the mentally retarded, will prove superior to methods currently in use". The special education classrooms in Ingham County also reflect the philosophical and curricular effects of the national trends as reported by Stevens and others. In particular, the conceptualization of the educable mentally retarded child and his educational needs has been consistent with general trends reported above.[5]

Consequences of Special Class Placement

Research assessing the consequences of special class placement, however, has frequently failed to support the expectations that such placement results in better academic performance or improved social or personal adjustment. (Fine[6]

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[4]Leonard S. Blackman and Paul Heintz, "The Mentally Retarded", Review of Educational Research, 36: 5-36, February 1966.

[5]Personal conversations with administration and professional staff of the Ingham Intermediate School Board.

[6]Marvin J. Fine, "Security Patterns of Educable Mentally Retarded Boys in Relation to Special Class Placement" (paper read at Annual AAMD Convention, Chicago, May 1966.

Sparks and Blackman,[7] Johnson,[8] Kaplan[9]). After reviewing research related to the consequences of special class placement, Johnson[10] has observed that educable mentally retarded pupils placed in such classrooms achieved significantly less than comparable pupils placed in regular classrooms. This has obtained in spite of small class size, specially trained teachers and disproportionately higher costs. Johnson further stated that even advantages in terms of personal and social development which might result from special grouping appears slight and probably not particularly meaningful. Johnson tends to attributed these consequences to teacher training programs stressing the inability of the retarded and the stress placed on establishing good mental hygiene programs.

Studies in this area have not been unanimously

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[7]Sparks and Blackman, op. cit.

[8]Orville G. Johnson, "Special Education for the Mentally Retarded-A paradox". Exceptional Children, 29: 62-69, October 1962

[9]Marvin S. Kaplan, "An Investigation of the Anxiety Levels of Mentally Handicapped Children with Special Consideration of the Effects of Special Education Classes" (Unpublished Ph.D. Dissertation, Michigan State University 1961).

[10]Johnson, op. cit.

negative. Kern and Pfaeffle[11] report finding evidence of better social adjustment for retarded students specially placed, than for retarded students placed in regular classes. In spite of such occasional findings, however, the trend seems overwhelming and is clearly stated by Blackman and Heintz.[12] In their review of Goldstein, Moss and Jordan's research on the education of the mentally retarded, they stated:

> It is the opinion of the reviewers that this methodologically sophisticated study of the efficiency of special classes for the mentally retarded blends into the long line of negative findings which have characterized this area of research for the past thirty years.[13]

Educational Concept and Diagnosis of the Educable Mentally Retarded

One of the consequences of the research generated by the interest in determining the role of language and visual perception development on functioning in school, has been to seriously question the present educational

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[11] William H. Kern and Heinz Pfaeffle, "A Comparison of Social Adjustment of Mentally Retarded Children in Various Educational Settings," American Journal of Mental Deficiency, 67: 407-13, November 1962.

[12] Blackman and Heintz, op. cit.

[13] Herbert Goldstein, James W. Moss and Laura J. Jordan, The Efficacy of Special Class Training on the Development of Mentally Retarded Children, U.S. Department of Health, Education and Welfare, Office of Education, Cooperative Research Project No. 619 (Urbana: Institute for Research on Exceptional Children, University of Illinois, 1965).

conceptualization of children classified as educably mentally retarded. Lampert[14] made one of the strongest statements when he asserted that the diagnosis of mental retardation in noninstitutionalized children is incorrect in 85 to 90 percent of cases. . . Most of these children have developmental disorders of learning and language function "which commonly occur without any impairment of intelligence". Among learning and language disorders, Dr. Lampert included problems in reading that prevent word recognition and the comprehension of word meaning in printed, written or spoken speech and in expression. "The greatest single cause of misdiagnosis of mental retardation is failure to separate intelligence from language, speech, sensory, motor and spatial modalities with respect to testing", he maintained . . . The standard intelligence tests are "notoriously misleading" in the language disordered individual, he continued, in part because of associated problems in behavior, spatial relationships and motor function.

In a statement before the Ad Hoc Committee on the Handicapped, Sengstock, National Association for Retarded Children, Inc., stated:

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[14]"Diagnosis of Retardation Said to be Often Wrong", Medical Tribune. Report on an address given by Dr. Morris H. Lampert before the section on neurology and psychiatry at the Annual Meeting of the Southern Medical Association, December 1, 1965.

> It is predicted that by 1975 there will be 75 million children in our school-age population. . . of these 12 million will be handicapped. Within this handicapped population, it is estimated that there will be some three million mentally retarded (considering a precise definition of this disability category) and another three million with specific learning disability which will represent a functional retardation, unless strategic special intervention takes place.

In his statement before the Senate Subcommittee on Education, Kirk also made reference to this situation:

> These children are in our schools and are in general failing, particularly in some aspect of behavior or communication . . . Actually this group of children cuts across various disability groupings. Thus, learning disabilities are found among children who are otherwise average in intelligence as well as among children who are below average or superior in intelligence. . . Many such children . . . are diagnosed as mentally retarded but (who) are better classified as learning disabilities since they have normal abilities in some areas and markedly limited abilities in other areas, giving the appearance of mental retardation. Remediation programs for some of these children will successfully remove them from the classification of mental retardation.[15]

Reviewing recent research in mental retardation involving the structure of intelligence, classification systems and achievement, Blackman and Heintz[16] comment that the meaning, weight and interpretation from the research are conflicting. However, the studies in learning reviewed find that the mentally retarded possess

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[15] Samuel Kirk. "Statement before the Senate Subcommittee on Education", A. C. L. D. Special Report on Legislation and Learning Disabilities, 1968.

[16] Blackman and Heintz, op. cit.

less than normal skill in perception, transfer, concept formation and retention. They conclude their review with the suggestion that the future in educational research with the mentally retarded points to the evaluation and development of his psycho-educational abilities, disabilities and school tasks so that these three variables may be better integrated.

Reflecting the current confusion in special education are the conflicting positions taken by Patterson and Stiskin. Patterson[17] takes the position that schools should be encouraged to place pupils in regular classrooms except in extreme cases where special classrooms or schools may be required. Taking the opposite position, Stiskin[18] advocates extending special education to the 15 to 18 percent of the school population considered "slow learners". He takes the position that such pupils need more specialized attention rather than the regular school work presented at a slower rate. Stiskin identifies the learning problem areas as including coordination, speech and language, memory and attention span and ability to abstract.

It is clear, however, that even among mentally retarded students not all have the same degree of

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[17]P. L. Patterson, "The Normality of Exceptional Children," Rehabilitation in Canada, 12: 9-14, (Fall-Winter) 1965-1966.

[18]Hershel M. Stiskin, "The Slow Learner and the Yeshiva," Jewish Parent, 17: 8-10, October 1965.

difficulty in learning school material, nor similar learning blocks where the degree of learning handicap is equivalent. Because of this, it is to be expected that any two seemingly similar educable mentally retarded students could have totally different experiences in any educational environment, be it a special class or a regular classroom. This situation makes it difficult to know whether Patterson and Stisken are in essential agreement or disagreement, if the learner and the learning situation were defined along different dimensions. This may well be more at the root of confusion in special education than anything more patently philosopical.

One possible set of different dimensions are those used in the area of learning disabilities and one advocate of using these dimensions is Hirsch.[19] She questions the educational value of current approaches to homogeneous grouping based on chronological age and IQ. These approaches are described as inefficient because they are not educationally meaningful. A learning disability approach is described as having more educational meaning. The dimensions of learning disabilities, the "Disability Groupings", would permit a diagnostic

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[19]Ester Hirsch, "Another Approach to Homogeneity in the Mentally Retarded", New Frontiers in Special Education, Selected papers from the 43rd Annual CEC Convention, Portland, Oregon, April 20-24, 1965. (Washington, D.C., Council for Exceptional Children, no date), pp. 57-60.

approach to instruction based on psychological estimates of the student's level of functioning in each possible cognitive area. Such diagnostic information would provide a bases for the teacher to structure each child's instruction to provide for maximum individual growth. Blackman,[20] too, proposes an approach to the education of EMR students based on those psychoeducational characteristics of the student that may be relevant to academic achievement. He suggests that instructional procedures could then make allowances for and accomodate such characteristics. As defined by Blackman, the unique purpose of special education is to train retarded pupils to the highest possible levels of academic competence. He maintains this can best be accomplished by considering their specific learning abilities in relation to the requirements of the material to be learned. In this way, he predicts, classroom education for the EMR can become based on a blend of psychology, education and computer science.

Learning Disabilities and Educational Therapy

As recently as 1966 Bateman[21] has written that

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[20]Leonard S. Blackman, "The Brave New World of Special Education" (paper presented at the 90th annual meeting of the American Association on Mental Deficiency, Chicago, Illinois, May 10-14, 1966).

[21]Barbara Bateman, "Learning Disorders," Review of Educational Research, 36: 93-119, February 1966.

none of the major survey textbooks deals specifically with learning disabilities as such. Noting the increasing interest, however, she points out that the Review of Educational Research has now included a chapter in this area for the first time; that a tabulation of the sessions of the 1965 Annual Convention of the Council for Exceptional Children revealed that learning disability was second only to mental retardation in the number of sessions and papers presented; and that, the entire December 1964 issue of Exceptional Children was devoted to this topic as was the April 1965 issue of Mental Retardation. She attributes this upsurge of interest, in part, to two things. First, to the development of a broad educational movement toward a more scientific approach to learning situations which is based on a psychoeducational philosophy. Secondly, to the recent emergence of new diagnostic philosophies and instruments having rather direct educational implications for curriculum and educational therapy. According to Bateman, in order to include all problems currently labeled as such, it is necessary to describe learning disabilities as "those deviations in the learning processes which are associated with an educationally significant discrepency between apparent capacity for language or cognitive behavior and actual level of language or cognitive performance".

As recent as this upsurge in interest in learning disabilities appears to be, it clearly has its roots as far back as the eighteenth century. Itard revealed an interest in a sensory motor approach to learning and describes such training in his Wild Boy of Aveyron (1849). Montessori modified these early methods as she applied them to teaching the retarded (1912).

More recent literature has expressed an interest in the role of both language development and sensory motor development on school achievement. Kephart focusing on sensory motor development has written:

> Many children are coming into our schools lacking in basic perceptual-motor skills. As a result of this basic lack, they are less able to participate in the formal educational activities which are arranged for them and they are less able to learn from these activities. They become slow learners in the classroom. . . We may have to bring the equivalent of ladders to climb, fences to walk, or horses to ride into the classroom and help the child to build up the sensory-motor skills which are required by the more complex activities of reading, writing and arithmetic.[22]

In the area of language development Speidel[23] has recommended the need for a systematic program of language instruction. His investigation of the listening, speaking, reading and writing skills of 209 retarded, special class students revealed that listening comprehension was their least developed skill, followed

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[22]Newell C. Kephart, "The Slow Learner in the Classroom", Columbus: Charles E. Merrill Books, Inc., 1960, p.17.

[23]E. B. Speidel, "Language Achievements of Mentally Retarded Children", Dissertation Abstracts, 19: 3180, 1958.

by speaking. Speidel believed language training would lead to the development of these deficient skills and provide a base for developing competence in the tool subjects.

More recently, McCarthy and Scheerenburger[24] summarized the recent research on language development and wrote: ". . . there appears to be ample justification to regard language development and remediation as an integral part of the academic curriculum for retardates, since tool subjects and content studies assume minimal linguistic adequacy." In concluding their overall review the authors, like Bateman, note a remarkable growth in studies on education and learning problems. They additionally suggest, however, that continued development will require, in part, a greater utilization of public school programs for research purposes.

Myklebust and Boshes[25] have delineated areas of dysfunction as seen in children with what they term "language disorders" and "perceptual defects" and make recommendations for scientifically oriented educational

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[24]James J. McCarthy and Richard C. Scheerenburger, "A Decade of Research on the Education of the Mentally Retarded", Mental Retardation Abstracts 3: 481, October - December 1966.

[25]Helmer R. Myklebust and Benjamin Boshes, "Psychoneurological Learning Disorders in Children", Archives of Pediatrics, New York, June 1960.

therapy based on specific knowledge of the area of dysfunction.

Frostig[26] has investigated visual and motor aspects of perceptual functioning and has found significant correlations existing between deficit functioning in visual perception and poor school performance.

In a study of the effectiveness of the Frostig program for developing visual perception, Allen[27] used sixteen educable mentally retarded children. He placed ten students in his experimental group which was trained for one semester with Frostig materials and six students were placed in a control group that received no specialized training. The Frostig Developmental Test of Visual Perception was administered to both groups before and after the experimental group had received the specialized training. Allen's analysis of the gain scores lead him to report that the specialized training had improved three of the five tested visual perceptual skills.

In another study of the Frostig program,

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[26]Marianne Frostig, "The Frostig Program for the Development of Visual Perception," Chicago: Follett Co., 1964.

[27]Robert M. Allen, Isadore Dickman and Thomas D. Haupt. "A Pilot Study of the Immediate Effectiveness of the Frostig-Horne Training Program with Educable Retardates," Exceptional Children 33: 41-42, September 1966.

Rosen[28] explored the effects of a specific visual perception training program on achievement in reading. He used a much larger sample but a shorter training period. In his study he used a stratified random sample consisting of twenty-five first grade classrooms of 703 pupils. The experimental classes received Frostig training for a twenty-nine-day period. During this same period the control classes received fifteen minutes more time over and above regularly scheduled reading instruction. Differences in pretest Frostig perception scores as well as the other criterion scores among groups were found to be unreliable, demonstrating equivalence of groups prior to training. Analysis of variance of post-test scores revealed improvement in perceptual abilities trained but the improvement was not reflected in comparable superior performance in the reading measures. In fact, in some instances the control classes excelled in a task involving reading comprehension. Rosen summarized his study with the following conclusion:

> Within the various limitations of this study, which include the time and nature of the training program, the specific measuring instruments, and differential teacher effects, it appears evident that the training of certain visual perception capabilities by means of the specific adoptation of the Frostig program for undifferentiated groups

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[28]Carl L. Rosen, "An Experimental Study of Visual Perceptual Training and Reading Achievement in First Grade," Perceptual and Motor Skills, 22: 979-986, 1966.

of first grade pupils, did not result in signficant improvement in reading scores.

Barsch[29] has developed a functional organization scale for evaluating organic children which includes many items related to visual perceptual functioning. He emphasized that the primary concern is with the manner in which the problem interferes with learning and that the level of learning therapy needs to be based on the child's primary learning problems. Kephart,[30] under controlled conditions, has observed that there are visual perception correlates of learning that are amenable to specific training. Llorens,[31] Gesell[32] and Winter Haven,[33] among others, have all reported educationally significant improvement following visual perceptual therapy for children retarded in visual perception development.

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[29]Ray H. Barsch. "Evaluating the Organic Child: The Functional Organization Scale," The Journal of the Genetic Psychology, 100: 345-354, 1962.

[30]Newell C. Kephart, "Visual Skills and their Relation to School Achievement," American Journal of Opthalmology., 36: 794-799, 1953.

[31]Lela A. Llorens and others. "Training in Cognitive-Perceptual-Motor Functions," American Journal of Occupational Therapy, 19, 1964.

[32]A. Gesell and L. B. Ames. "The Development of Directionality in Drawing," Journal of Genetic Psychology., 68: 45-61, 1946.

[33]Procedure Guide to Perceptual Forms, (Clinical Edition), Publication Committee, Winter Haven Lions Club, P.O. Box 1045, Winter Haven, Florida, 1962.

Painter[34] investigated the effects of a rhythmic and sensory motor activity program on body image, perceptual motor integration and psycholinguistic competence of kindergarten children. She divided the twenty lowest functioning students into an experimental and control group. The experimental group was given a systematic rhythmic and sensory motor activity program based on nine movement areas of Barsch's theory and on suggestions from Kephart. Significant mean gains were made by the experimental group in the areas of remediation. This study demonstrates the value of a group approach within a public school setting for the amelioration of certain types of learning disabilities.

Kephart,[35] a Purdue University psychologist, has studied children reported to lack readiness for language processes such as reading. His suggestions for therapy included teaching such skills as lateral dominance, directional knowledge, smooth eye movements, manual dexterity and eye-hand coordination. Students with learning disabilities were given specialized therapy based on Kephart's recommendations in a study reported

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[34]Genevieve Painter, "The Effect of a Rhythmic and Sensory Motor Activity Program on Perceptual Motor Spatial Abilities of Kindergarten Children," Exceptional Children, 33: 113-116, October 1966.

[35]Kephart, op. cit.

by Halgren.[36] The gain of the group receiving the specialized therapy was described as approximately twice as great as that for a control group receiving traditional remedial reading. Halgren also reported observing an upward shift of seven IQ points for the experimental group. A similar study reported by Rutherford[37] was also described as producing significant results.

Getman[38] has described six basic developmental processes. He describes these as: general movement (creeping); special movement (manipulative skills); eye movement; communication; visualization and visual perceptual organization (reading). Among the activities suggested for developing skills are stomach rolls, ballon tossing, ocular pursuit, sound identification, tactual identification of objects and the counting of objects left to right.

Getman's methods were studied by McKee[39] who

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[36]M. R. Halgren, "Opus in See Sharp," Education, 81: 369-371, February 1961.

[37]W. L. Rutherford, "Perceptual-Motor Training and Readiness," a paper read at the annual meeting of the International Reading Association, Detroit, 1965.

[38]G. N. Getman, "The Visumotor Complex in the Acquisition of Learning Skills," Learning Disorders, Vol. 1, Jerome Hellmuth, editor, Seattle: Special Child Publications, 1965, pp. 49-76.

[39]G. W. McKee., et.al., "The Physiology of Readiness," Minneapolis: P. A. S. S., 1964.

reported his experimental group's gains in reading comprehension was significantly greater than those of the control group. Kelly[40] used 213 students in his study of the relationship between scores from a visual screening test and reading ability. Referring to Getman's stress on visual factors, Kelly reported a close relationship between these variables and a lesser but still important relationship between test scores and school grades. Lyons and Lyons[41] have also supported Getman's position when reporting measurable intellectual growth for children who have undergone visual training.

There has been some criticism of visual training and the emphasis placed on it by some educators. Hardesty[42] denies that any study in the literature definitely establishes a correlation between faulty eye coordination and reading problems. Gordon calls visual training worthless and Goldberg rates it as of no value. Brandon takes the position that faulty reading is a

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[40]C. R. Kelly, "Visual Screening and Child Development," Raleigh, N. C.: North Carolina State College, 1957. (mimeographed)

[41]C. V. Lyons and E. B. Lyons, "The Power of Visual Training as measured in Factors of Intelligence," Journal of the American Optometric Association, 256-262, December 1954.

[42]H. H. Hardesty, et al., "Eye Exercises," The Collected Letters of the International Correspondence Society of Ophthalmologists and Otolarnygologists, Series 4, November 1966.

psychological problem and that most poor readers are normal, ophthalmologically speaking. Blackhurst states that an optometrist who offers visual training either does not understand the problem or is trying to pad his office practice.[43]

In a review of the pre-readiness approaches, Krippner[44] however reports that a growing body of research lends support to learning disability theorists. He also suggests a similarity of their approach to the writings of Piaget who has traced the connection between perceptual knowledge, motor activity and abstract thinking. He also notes a similarity to Hebb's theorizing about the relationships of various neurological levels to learning. Krippner concludes his review with his evaluation that more research needs to be done before the importance of pre-readiness factors can be clearly determined and before the most appropriate methods of therapy can be adopted.

Consistently significant correlations between language ability and mental age for school-age subjects

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[43] Ibid.

[44] Stanley Krippner, "Evaluating Pre-Readiness Approaches to Reading," Education, 87: 12-20, September 1966.

have been reported by Ammons,[45] Dunn,[46] and McCarthy.[47] On the basis of their findings they have raised the question of a possible cause-and-effect relationship and thereby related language ability to school performance. Hart,[48] Smith[49] and Blessing[50] have all observed improvement in the language ability of children retarded in language development following language development therapy.

Blessing studied the effect of intensive,

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[45]Robert B. Ammons, Paul R. Arnold and Robert S. Herrman. "The Full-Range Picture Vocabulary Test: IV. Results for a White School Population," Journal of Clinical Psychology, 6 (April 1950) 164-69.

[46]Lloyd M. Dunn. Manual, Peabody Picture Vocabulary Test. American Guidance Service, Inc., Minneapolis, 1959.

[47]James J. McCarthy and Samuel A. Kirk. The Construction, Standardization and Statistical Characteristics of the Illinois Test of Psycholinguistic Abilities. Photo Press, Inc., Madison, Wisconsin, 1963. p. 42.

[48]N. W. M. Hart. "The Differential Diagnosis of the Psycholinguistic Abilities of the Cerebral Palsied Child and Effective Remedial Procedures," Special Schools Bulletin, No. 2, Brisbane, Australia, 1963.

[49]J. O. Smith. "Effects of a Group Language Development Program upon the Psycholinguistic Abilities of Educable Mental Retardates," Special Education Research Monograph No. 1, George Peabody College, 1962.

[50]K. R. Blessing. "An Investigation of a Psycholinguistic Deficit in Educable Mentally Retarded Childjren: Detection, Remediation and Related Variables," (Unpublished doctoral dissertation, University of Wisconsin, 1964).

small-group language remediation on vocal encoding. He used forty subjects, eight to fifteen years old, enrolled in public school special classes. Instruction was in groups of three to five children and conducted by student teachers. He reports that the experimental group made significantly greater gains than did the control group in vocal encoding as measured by the ITPA. Blessing also reported that the overall ITPA language age was not significantly affected by his treatment and that Binet Vocabulary scores were similarly not affected. He concluded that the results of his study may be said to provide substantial evidence of the efficiency of remediating a single psycholinguistic deficit and of using pretest profiles of educable mentally retarded children in planning remedial programs.

Ensminger[51] has reported on the effects of the Peabody Language Development Kit, on psycholinguistic abilities and intellectual functioning of slow learning children. He analyzed the mean gains of the Illinois Test of Psycholinguistic Abilities raw scores from pretesting to post-testing. He reported that while the differences between his experimental and control groups

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[51]Everett E. Ensminger. "The Effects of a Classroom Language Development Program on Psycholinguistic Abilities and Intellectual Functioning of Slow Learning and Borderline Retarded Children". (Unpublished Ed.D. Dissertation, University of Kansas, 1966).

were not significant as a whole, the differences were significant for those subjects below a mental age of seventy-eight months. He also reports that his statistical analysis revealed a significant difference within the experimental group itself when subjects at or below a mental age of seventy-seven months were compared with those subjects at or above a mental age of seventy-eight months. He reports that he did not find differences in intellectual functioning following his treatment.

Ensminger suggested that since other studies have revealed that as the IQ decreases, the discrepancy between language age and mental age increases (with language age consistently lower than mental age), more needs to be known about the relationship between language age and mental age. He also suggested that language age may be a more valid predictor of academic achievement than mental age. He proposed a need to investigate the effects of a language program on the academic achievement of educable mentally retarded pupils.

In Ensminger's study, the PLDK was taught by the classroom teachers. He suggests that the PlDK might be a more effective treatment if taught by a specialist.

In their manual, Dunn and Smith[52] report two incomplete studies using the PLDK in its experimental

[52]Dunn and Smith. op cit. pp. XIX-XX.

form. The most comprehensive study (Dunn and Mueller, 1965) involves 734 first-grade disadvantage children, divided into ten experimental groups and 150 control subjects. On the basis of their first year's results, they reported:

> One can be optimistic about the effectiveness of even the experimental version of the PLDK in stimulation of both language facility and verbal intelligence, as well as enhancing the school progress of grade-one disadvantaged children. It would appear that this can be done effectively by the regular classroom teacher without assistance, working with her total group of approximately thirty pupils at one time.

A second study (Forgnone, in preparation) was reported that employed the PLDK (experimental) and the Frostig Program for the Development of Visual Perception with educable mentally retarded children. He used two experimental groups and a control group in his design. One experimental group received visual perception training, the second experimental group was taught with the PLDK. The treatment period extended over three months and was instructed by the classroom teacher. It was reported that the short, intensive visual perceptual training program produced significant gains in perceptual skills but the gains in language ability were not significant. Dunn and Smith comment: "Thus the factor of length of time of language training with educable retardates needs investigation, especially when the language lessons are

taught by the classroom teacher." They also note that research employing the PLDK has been with the experimental edition and not with the refined instrument now available.

In partial agreement with the Forgnone study was a pilot study by Rice and Suit.[53] Their investigation involved two classrooms and forty-eight pupils matched on IQ, visual perception ability and reading ability. Following six weeks of visual perception training, the experimental group made significantly greater gains than did the control group in reading ability.

A three-year experimental preschool project now in its third year at Indiana University is reported by Spicker, Hodges and McCandless.[54] In their study they used five-year-old children, IQ between 50 and 85, who came from families of the lowest socio-economic class. Children with gross pathology were excluded on the basis of medical and psychiatric examinations. Those selected were placed in one of four groups with about fifteen children in each. Their experimental preschool class (EPS) received the diagnostically based curriculum; a

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[53]William E. Rice and Donald T. Suit. "Perceptual Training and Word Recognition." (Unpublished Pilot Study, 1964).

[54]Howard H. Spicker, Walter L. Hodges and Boyd R. McCandless, "A Diagnostically based Curriculum for Psychosocially Deprived, Preschool, Mentally Retarded Children: Interim Report," Exceptional Children, 33: 215-20, December 1966.

kindergarten curriculum; a regular control group (RC) remained at home and received only the pretesting and post-testing; a diffusion control group (DC) also remained at home and received only the pretesting and post-testing. Their study calls for three successive kindergarten replications and a follow-up of all children through completion of at least third grade.

In developing their curriculum the authors assumed psychoeducational disabilities in language, motor coordination and problems in perception, motivation and socialization. They also assumed that if the exact nature of the problem areas could be assessed, specific therapeutic measures could be developed to remedy the problems. For example, they found language behavior to be one of the most serious psychoeducational disabilities. In particular their students lacked the ability to cope with elaborative language i.e., they lacked the adjectives, adverbs, prepositions and conjuctions necessary to differentiate people or objects with respect to size, color, shape, texture or function. School activities then were used to elicit and reinforce elaborative language.

An analysis of variance design was used to examine the data from each of the pretest and post-test measures. Pretest IQ differences among groups were not reliable. On the post-test, the EPS group's mean score

was reliably greater than the two at home control groups (RC and DC), but not significantly different from the mean score of the KC group. All four groups were observed to make reliable gains from pretest to posttest.

A substudy in the area of language development was made by Stearns.[55] The effects of a general, nonspecific kindergarten program on language development as measured by the ITPA was primarily investigated. On this basis no diagnostic language treatment was used during the first semester but specific lessons were added for the experimental group during the second semester. Adding specific lessons at mid-year was expected to accelerate language score gains in addition to the general gains made in the first semester. Test results however did not reveal the predicted acceleration. As a tentative conclusion from this it was suggested that an effective language program must consist of a total curriculum which emphasizes language development throughout the day in addition to structured lessons.

The first grade follow-up IQ scores revealed that the two at home control groups gained about 10 IQ points by the end of first grade. The kindergarten

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[55] K. E. Stearns, "Experimental Group Language Development for Psycho-socially Deprived Preschool Children," unpublished doctoral dissertation, Indiana University, 1966.

control group regressed nearly eight points during the same period. The IQ of the experimental group remained relatively highest but only the differences between it and the kindergarten control group were significant.

The mean language age of the experimental group also remained relatively highest; however, the differences were not statistically significant. Additionally it was observed that each of the groups made smaller gains in first grade than they had in kindergarten. It was suggested that language improvement occurs more readily during the preschool years and the results imply a need for a language development program during early school years.

Summary

Authority has been cited to support the position that present educational curriculum in special education programs in general (including Ingham County), do not include an emphasis on either language or visual perception development. Additional authority and research has been cited to support the position that children with remedial developmental deficits are frequently educationally placed in special classes for the mentally retarded and that special class placement frequently fails to result in either better academic performance or improved personal-social adjustment. It appears possible,

if not likely, that pupils are being taken out of regular classrooms and placed in special classrooms whose curriculum is no better suited to their learning needs than was the regular classroom. Such a misplacement of students seems a possible description of the present situation in view of the negative research findings of the consequences of special class placement.

If this does represent the current state of affairs in relation to special education classrooms, specific educational therapy as defined in this investigation, could reasonably be expected to result in statistically significant improvement in language abilities, visual perception abilities, intellectual functioning and academic abilities of the students involved. As Blackman and Heintz[56] report, "Perceptual training of the mentally retarded appears to be effective, with side benefits accruing to achievement and intelligence;" but, conversely, they comment that, ". . . research findings in the area of perception still leave unsettled the issue of whether the mildly non-organic-retarded individual manifests perceptual deficits relative to his normal counterpart."

Research findings have been reported supporting the dual positions that children with retarded visual perception development and/or retarded language development

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[56]Blackman and Heintz, op. cit., p. 18.

are vulnerable to learning difficulties in school. Much of the research reported also supports the position that in such cases, accelerated development in the deficient functions is frequently associated with participation in specific educational therapy which may also result in significant gains in both academic ability and intellectual functioning.

The studies reviewed, however, have involved children of a rather broad age range. They have been educationally placed in clinics, regular classrooms and classrooms for the educable mentally retarded. The educational therapy used as treatment has included clinically-derived programs and programs in their experimental forms. The results of the investigations are also frequently difficult to compare because some have used classroom teachers as instructors, others have used specialists in the schools and still others have used clinical specialists.

As reviewed, the studies have generally focused on the singular results of visual perceptual training or language training or the differential efficiency of the two treatments on visual perception ability and language ability. Few of the studies have also considered the effects of educational therapy on academic ability. None of the studies have used both visual perceptual training and language training with the same experimental

group. Commenting on this point in a personnel communication, Marianne Frostig stated:

> The program [Frostig-Horne], while it focuses on training of visual perception, must incorporate sensory-motor and language training if it is to be maximally effective.

Many of the studies have based their statistical analysis on mean pretest-post-test raw gain scores. In "Preparation of Research Proposals," Krathwohl (1964) however warned:

> Although not readily apparent, [regression effect] is nonetheless a real error which can occur whenever there is an imperfect correlation between two variables, one of which is used as a basis for selection of an extreme group in which to observe the other variable . . . . The result is that on retest, even with no treatment, a low group's mean will move toward the mean of the parent group.

As compared to the research as reviewed, information may result that is not readily available from existing studies. Some of the unique aspects include:

A. The sample is entirely comprised of pupils placed in primary and early-elementary Type A classrooms. This group approximates the mental age range for which the specific educational therapy was intended.

B. The specific educational therapy treatment will be entirely comprised of commercially available materials and directions that will facilitate treatment replication. To provide a direct comparison of results, the same

materials will be used by both classroom-teacher instructors and specialist-teacher instructors with groups of comparable size.

C. The specific educational therapy will include both language training and visual perceptual training. As well as studying the effect on visual perception and language abilities, the effect of the therapeutic intervention on academic ability will be considered.

D. Changes in the students' scores will be studies in a design that will minimize regression effects on post-test analyses.

CHAPTER III

DESIGN OF THE STUDY

Experimental Design

Statistical Hypotheses

There are two major questions of concern in this study. Each of these questions is evaluated in terms of the same twenty-one dependent variables. For each dependent variable, then, there are two corresponding hypotheses - one for each major question. These have been stated verbally in their null form in Chapter I. Each of the hypotheses take one of two forms, depending upon the major question under which it is categorized.

The first major question concerns whether or not the experimental group mean is equal to the control group's. For each of the twenty-one variables this question and its alternative may be expressed symbolically as:

H_o: $(M_1 + M_2) = 2 M_3$; and there is no effect of treatment measured on the dependent variable.

H_a: $(M_1 + M_2) \neq 2 M_3$; and there are treatment effects measured on the dependent variable.

Where,

M_1 = Experimental - Specialist - Teacher

Group Mean,

M_2 = Experimental - Classroom - Teacher Group Mean, and

M_3 = Control Group Mean.

The second major question concerns whether or not the experimental-specialist-teacher group mean is equal to the experimental-classroom-teacher group mean. For each of the twenty-one variables this question and its alternative may be expressed symbolically as:

H_o: $M_1 = M_2$; and there is no effect of treatment measured on the dependent variable.

H_a: $M_1 \neq M_2$; and there are treatment effects measured on the dependent variable.

Where,

M_1 = Experimental - Specialist - Teacher Group Mean,

M_2 = Experimental - Classroom - Teacher Group Mean, and

M_3 = Control Group Mean.

Statistical Analysis

Because of the nature of the sample and administrative considerations, complete randomization was not accomplished. Additionally, analysis of variance of the pretest data revealed that the sample means were not equal for all variables. On this basis it was thought advisable to equate the groups by analysis of covariance if possible

and thereby allow the testing of all hypotheses. Analysis of covariance as a technique for making comparisons is recommended by Feldt.[1] His study compares (1) stratification of experimental samples and use of a factorial design, (2) analysis of covariance, and (3) analysis of variance of difference scores. According to Feldt, covariance is the most precise. He cautions, however, that regression lines must be nearly parallel or the procedure is invalidated.

Prior to using covariant analysis, then, a test for heterogenity of regression of each post-test on its pretest was performed to determine that an analysis of covariance of the data was appropriate. Happily, all variables were within allowable limits with but one exception (see Appendix A). The usual assumptions were made relative to normal distribution and equal variance in the absence of major concerns.[2]

It was suggested that because of the specific nature of the hypotheses that independent planned comparisons would be a more powerful test than a general analysis of variance.[3] According to this model, the means

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[1]Leonard S. Feldt, "A Comparison of the Precision of Three Experimental Designs Employing a Concomitant Variable", Psychometrika, 23: 4, December 1958.

[2]Merle W. Tate, Statistics in Education, New York: John Wiley and Sons, Inc., 1955, p. 523.

[3]Uldis Smidchens, Bureau of Educational Research, Michigan State University.

of groups are compared by a modification of analysis of covariance. The technique employs a separate analysis for each specific planned comparison.[4] In this study two planned comparisons were made for each variable.

The F statistic computed will be evaluated by the following decision strategy:

At the .05 level of significance with (1, 78) degrees of freedom,

$F_{.95\ (1,\ 78)} = 3.98$, consequently:

A) for obtained F values greater than 3.98 the null hypotheses will be rejected and it will be concluded that the data supports the alternative hypotheses, otherwise for obtained F values equal to or less than 3.98,

B) the null hypotheses cannot be rejected and there is not enough evidence to warrant the conclusion that mean differences truly exist among treatment groups.

Sample

The primary and early elementary Type A special education students of Ingham County, Michigan (excluding Lansing School District) constitute both the population and the sample for this investigation. These educable mentally retarded (EMR) students were educationally

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[4] William L. Hays. Statistics for Psychologists, (New York: Holt, Rinehart and Winston, 1963) pp. 475-82.

placed in ten classrooms according to Michigan standards (see Appendix B). The classrooms were in eight school districts. The various school districts making up the sample represent a socioeconomic and cultural population ranging from rural to urban, village to city and agrarian to academic (see Appendix C). Even though a variety of school districts are included the sample cannot be considered wholly representative. For instance samples from "central city" schools are not included. Additionally, instead of choosing subjects at random, all students placed in the Type A classrooms were used. Clearly then, the deficiencies in randomization place limitations on generalization since the sample cannot be described as representative of the EMR population in general. The focus of this study is the classroom, however, and the lack of randomness and the restrictions placed on generalizing do not appear as severe a limitation as would be the loss of the integrity of the functioning classroom.

The variables most closely observed are IQ, perceptual quotient, language quotient, academic ability and chronological age. Inasmuch as the total sample source was initially included in the study, such variables as sex, race and socioeconomic status are indirectly controlled through the actuality of educational placement

in the special education rooms. This investigation represents an attempt to study effects of actual classroom procedures and therefore direct control of the teacher variable was avoided because it would significantly change the focus of the study.[5]

In order to observe any differential effects of classroom-teachers or teacher-specialists using the specific educational therapy, two experimental groups were established. Classrooms were randomly assigned to the treatment and control groups. As it turned out, it was necessary to drop two of the classrooms from the control group. One classroom was dropped because of extremely atypical[6] enrollment and a second because it went on a half-day attendance basis. Eight additional students were lost between pretesting and post-testing because of moving out of the county.

Descriptive statistics for the eighty-two students remaining are presented by treatment group in Table 3-1. The differences among the groups on the dependent variables were analyzed by use of analysis of variance. The small differences among groups were not reliable for the major variables: IQ, perceptual quotient,

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[5]Tate, op. cit., p. 524.

[6]1 psychotic child; 1 brain damaged child; 2 severely handicapped children.

TABLE 3-1

STATISTICAL DESCRIPTION OF EXPERIMENTAL GROUPS AND CONTROL GROUPS ON THE DEPENDENT VARIABLES.*

Variable		Experimental Group (Teacher Specialist) N = 24	Experimental Group (Classroom Teacher) N = 25	Control Group N = 33	F Probability
IQ	$\bar{x}$	72.62	73.60	73.64	.901
	s.d.	10.30	7.63	8.91	
Perceptual	$\bar{x}$	69.54	74.20	71.06	.354
Quotient	s.d.	10.51	11.27	12.43	
Language	$\bar{x}$	61.96	58.80	59.24	.319
Quotient	s.d.	9.22	7.01	7.58	
Lee	$\bar{x}$	73.88	76.60	76.15	.219
Clark	s.d.	6.29	5.85	5.53	

*Standard Scores are reported unless otherwise noted.

TABLE 3-1 Continued.*

Variable		Experimental Group (Teacher Specialist) N = 24	Experimental Group (Classroom Teacher) N = 25	Control Group N = 33	F Probability
WRAT	$\bar{x}$	71.17	76.00	75.27	.074
Reading	s.d.	7.95	9.00	7.00	
WRAT	$\bar{x}$	73.08	76.12	74.00	.355
Spelling	s.d.	7.09	8.52	7.17	
WRAT	$\bar{x}$	71.21	73.64	76.33	.114
Arithmetic	$\bar{x}$	9.20	8.86	9.20	
Chrono-logical	$\bar{x}$	103.95	105.08	104.82	.959
Age	s.d.	18.89	13.83	10.13	

*Standard Scores are reported unless otherwise noted.

language quotient, academic ability and chronological age. There were reliable differences, however, for some of the variables defined by the subtests of the ITPA, DTVP and WRAT.

All students were administered the following tests:[7]

(1) Illinois Test of Psycholinguistic Abilities.

(2) Frostig Developmental Test of Visual. Perception

(3) Wechsler Intelligence Scale for Children or Stanford-Binet.

(4) Lee-Clark Reading Readiness Test.

(5) Wide Range Achievement Test (1965 revision).

During the six weeks ending October 14, 1966, before the beginning of training, both experimental and control subjects were administered the above tests with one exception. Stanford-Binet or WISC results less than nine-months old were considered as current for the pretest purposes. All subjects were post-tested with the WISC.

All pretesting and post-testing was done by five qualified school diagnosticians including the investigator.[8] All pretesting and post-testing with the ITPA was performed by the investigator and one of the

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[7] Test descriptions, reliability and validity data are reported in Appendix D.

[8] Ingham Intermediate School District School Diagnosticians: Ray Gillham, William Rice, John Wallen, Robert Wells and Kenneth Woodring.

diagnosticians. The remaining tests were administered by the other diagnosticians, each of whom were assigned an equal number of subjects. Each subject was pretested and post-tested by the same examiner. Post-testing was completed during the six weeks ending June 9, 1967.

Procedure

All subjects were pretested and post-tested on each of the dependent variables, as previously detailed in this chapter. During the period of pretesting, the purpose of the research and the classroom assignments were explained to the school superintendents concerned for their approval. Interest in the study and cooperation was unanimously given. Subsequently, meetings were held with the building principals, classroom teachers and teacher specialists concerned to explain the study and their roles. Extended meetings were held with the experimental teachers to explain not only the treatment programs but also the models and educational assumptions relevant to the treatment programs. Also, during this period all of the necessary materials were acquired and placed in the hands of the teachers. In this way, the teachers were familiar with the materials and instructional procedures in advance of introducing the treatment to their students. Throughout the treatment period the investigator was available on a consultant basis to the

teachers administering the treatment. By October 17, 1966 the pretesting was completed, the experimental teachers were familiar with the treatment materials, the treatment instructional procedures were integrated into daily lesson plans and treatment was initiated with the experimental students.

The specific educational therapy treatment consisted of the Peabody Language Development Kit, Level 1 (PLDK), and the Frostig Program for the Development of Visual Perception (FPDVP). The PLDK was used for about thirty minutes every day. The FPDVP was used for about thirty minutes three times a week. For the experimental-specialist-teacher group the PLDK was administered by a qualified speech therapist and the FPDVP by a qualified teacher counselor for the physically handicapped. Both the PLDK and the FPDVP were administered by the classroom teacher for the experimental-classroom-teacher group. There was no intervention in the classroom procedures of the control group. Post-testing was initiated on May 1, 1967 and completed by the week of May 29.

The Peabody Language Development Kit, Level 1. (PLDK)

The PLDK was initially developed by J. O. Smith who designed, taught and tested the effectiveness of thirty-three language development lessons with eight to

ten year old EMR children.[9] The lessons were developed according to the Osgood model (described under ITPA) with the three-fold purpose of: (A) stimulating overall language facility of the disadvantaged and retarded; (B) developing verbal intelligence through training and ultimately (C) enchancing school progress.[10] The original lessons were developed further by others and expanded and put into kit form by the staff at the Institute on Mental Retardation and Intellectual Development at George Peabody College in 1964. In addition to planning activities for stimulating the psycholinguistic abilities assessed by the subtests of the ITPA, activities for stimulating productive thinking and memory were developed. From a pool of some 1000 activities, those judged most appropriate were put in groups of from three to five to form 200 daily lesson plans. These lesson plans were then organized to control for difficulty and to provide for sequential development of the various language abilities. This experimental kit was field tested by over 100 teachers during the 1946-65 school year. The final kit as used in

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[9]James O. Smith, "Effects of a Group Language Development Program Upon the Psycholinguistic Abilities of Educable Mental Retardates." Peabody College Special Education Research Monograph Series, No. 1. George Peabody College for Teachers, Nashville Tennessee, 1962.

[10]Lloyd M. Dunn and James O. Smith, "Peabody Language Development Kits Manual for Level #1, Minneapolis: American Guidance Service, inc., 1965, p. xv.

this study was developed and published in 1965.[11] Level #1 is designed for children who are intellectually between four and one-half and six and one-half years of age. In addition to EMR and grade one disadvantaged children, the material is also appropriate for stimulating normal kindergarten students and slower pupils in first grade.[12]

The PLDK Level #1 contains the following materials. (1) a manual with 180 lesson plans, (2) 430 picture cards, (3) ten 11" x 18" picture cards, (4) 350 plastic color chips, thirty-five of each of ten different colors, which interlock to allow sequencing (5) two soft hand puppets, "Peabo" and "Telsie," (6) a tape recording containing six favorite fairy tales and songs and music for introducing and concluding "Language Time." The lesson plans include activities in vocabulary development, describing items, following directions, productive thinking, memory and listening. The activities are systematically presented in a sequential order with numerous opportunities for repetition and review to provide for overlearning. The manual includes detailed instruction for presentation, organization and use of all materials.[13]

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[11] Ibid., pp. xvi-xvii.

[12] Ibid., p. iv.

[13] Ibid., pp. vii-ix.

The Frostig Program for the Development of Visual Perception (FPDVP)

The development of the materials for training visual perception was based on findings made with the help of the DTVP. The Frostig test provided information on which the present specific program for training visual perception is based. The organization, instructional materials and methods were clinically derived by the staff of The Marianne Frostig Center for Educational Therapy. The present FPDVP includes "workbook" exercises for visual perceptual training in each of five visual perceptual areas and a program of physical exercises for gross and fine muscle coordination, training eye movements and enhancing body image and concept.[14] The physical exercises are in every case meant to precede the workbook exercises. Detailed explanations and illustrations are provided for each visual perceptual area. The "workbook" exercises provide pencil-and-paper training having the following general objectives:

A. Motor Coordination: These exercises help to develop printing, writing and drawing from point to point, completing patterns and duplicating patterns and figures. Visual and kinesthetic methods are employed

[14] Marianne Frostig and David Horne, "The Frostig Program for the Development of Visual Perception - Teacher's Guide", Chicago: Follett Publishing Company, 1964.

and eye-hand coordination is significant.[15]

B. Figure-Ground Perception: Isolation and identification of overlapping, intercepting, or hidden figures help to develop the child's ability to correctly identify a word or letter on a printed page. The object of these exercises is to develop the child's facility in reading without running words together, or seeing words distinctly without confusing them with other words around them. This skill is important in such activities as using a dictionary or finding specific items in a table of contents or an index, as well as reading.[16]

C. Perceptual Constancy: Exercises in this category develop the child's perception and identification of forms, regardless of differences in color, size, texture, position, background or angle of viewing. In other words, these exercises develop the child's ability to generalize with regard to visual material--for example to recognize a word if if occurs in an unfamiliar context or type

[15] Ibid., pp. 17-28.

[16] Ibid., pp. 31-33.

face, or if it is printed entirely in capital letters, or to recognize that 5 means essentially the same as 5+3 = 8.[17]

D. Perception of Position in Space: These exercises are designed to develop the child's recognition of the formation and directionality of figures and characters. This ability relates to reading and writing skills in such areas as distinguishing "3" from "E", "p" from "q" or "on" from "no" and "saw" from "was."[18]

E. Perception of Spatial Relationships: The object of these exercises is to develop the child's ability to perceive positional relationships between various objects or points of reference--for example, the order of letters in a word or of digits in a number, or the arrangement of material on a page. This ability has a direct bearing on the child's performance in reading, especially with longer words and in computations since he must remember the arrangement of numbers.[19]

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[17] Ibid., pp. 36-39.

[18] Ibid., pp. 43-73.

[19] Ibid., pp. 76-83.

The FPDVP is generally intended for children who are in the stage of maximum perceptual development, ages three and one-half to seven and one-half years.[20] More specifically, the program is thought to be of benefit to (1) all children in kindergarten and first grade, (2) children of any grade level whose visual perceptual development has been impaired, (3) children of culturally deprived backgrounds, (4) deaf and blind children and (5) mentally retarded children. In regard to this latter category Frostig writes:

> For these children (EMR), perceptual training is most important with regard to their later social and vocational adjustment, since employment opportunities can be open to them if they are perceptually proficient. There are many occupations that require perceptual skills but little in the way of higher intellectual functions, such as abstract thinking. Progress with the work sheets is slower, however, with these children than with children who are not mentally retarded.[21]

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[20] Ibid., p. 15

[21] Ibid., pp. 13-15.

CHAPTER IV

ANALYSIS OF RESULTS

Because of the lack of independence between pretest and post-test scores and the need to introduce statistical control of the data by making allowance for initial differences among the groups, an analysis of covariance design is used. As pointed out by Tate,[1] analysis of covariance is appropriate in any situation where it is reasonable to consider controlling a variable experimentally by equalizing groups on the basis of that variable. It ordinarily leads to more precise results. This design allows significant mean differences to be attributed to experimental treatment rather than to initial differences or sampling fluctuations. McNemar[2] also comments on the use of analysis of covariance. He advocates this design whenever it seems desirable to correct a difference on a dependent variable for a known difference on another variable which could not be controlled by matching or random sampling procedures. In fact, it is McNemer's position that:

The use of covariance adjustment technique is far

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[1]Merle W. Tate, Statistics in Education, New York: The Macmillan Co., 1955, p. 522.

[2]Quinn McNemar, Psychological Statistics, New York: John Wiley and Sons, Inc., 1955, p. 344, p. 354.

> superior to attempts at pairing individuals from the intact groups on the basis of one or more uncontrolled variables, a procedure which inevitably leads to a reduction of sample size and also runs astride a regression difficulty.

In order to establish that the data was appropriate for analysis of covariance, a test for heterogenity of regression of each post-test on its pretest was performed. With the exception of variable 9 (Reading subtest of the WRAT) all dependent variables were within the allowable limits. (see Appendix A)

A further consideration in the choice of design resulted because an over-all analysis of covariance and F test would give only an indication of the existence of any systematic effects. In this study, however, there is interest only in the particular differences among population means corresponding to answers to the two following questions:

(1) Do the experimental groups as a whole tend to differ from the control group?

(2) Is the effect of the specialist-teacher presentation different from the effect of the classroom-teacher presentation?

According to Hays, [3] in this circumstance the evidence relevant to each question results from combining the sample means in a special way. The evidence for

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[3] William L. Hays, Statistics for Psychologists, New York: Holt Rinehart and Winston, 1963, pp. 461-62.

question 1 involves the difference between the mean for group 3 and the average of the means for groups 1 and 2: $2M_3 - (M_1 + M_2) = 0$. Question 2 evidence comes from the difference between the means for groups 1 and 2: $M_1 - M_2 = 0$. This "Planned Comparison" modification of the analysis of covariance model is employed in this study because the interest is in answering the two specific questions posed rather than in the over-all existence of treatment effects.

The questions have been stated symbolically for both the null hypotheses and alternate hypotheses in Chapter III. The null hypotheses for each dependent variable have been stated verbally in Chapter I. The data relevant to each variable under the null hypotheses are presented in summary form under Table 4-0.

To study the effects of specific-educational-therapy on language ability, each of the nine subtests and the summary score (language quotient) of the ITPA were evaluated independently for both research questions. The relevant data and F ratios are tabled under the Analysis of Planned Comparisons. The adjusted post-test group mean scores for each variable are also tabled to indicate trend. Tables 4-1, 4-2, 4-3, 4-4, 4-5, 4-6, 4-7, 4-8, 4-9 and 4-10 present the summaries of the analysis for hypotheses Ho:1, Ho:2, Ho:1a, Ho:2a, Ho:1b, Ho:2b, Ho:1c, Ho:2c, Ho:1d, Ho:2d, Ho:1e, Ho:2e, Ho:1f, Ho:2f, Ho:1g, Ho:2g, Ho:1h, Ho:2h, and Ho:1j, Ho:2j

TABLE 4-O

SUMMARY OF DATA FOR ALL VARIABLES[+]

Variables		Ho:	F Values E x C	F Values E x E	Adjusted Post-test Means Specialist	Classroom	Control
ITPA	Language Quotient	1,2	26**	5*	79	72	62
	Auditory-Vocal Automatic	1a,2a	4*	6*	84	73	72
	Visual Decoding	1b,2b	1	0	93	90	87
	Motor Encoding	1c,2c	9**	4*	93	86	82
	Auditory-Vocal Assn.	1d,2d	26**	1	85	88	74
	Visual-Motor Sequencing	1e,2e	15**	6*	89	82	77
	Vocal Encoding	1f,2f	36**	0	94	93	79
	Auditory-Vocal Sequencing	1g,2g	9**	3	85	80	76
	Visual-Motor Assn.	1h,2h	2	0	86	85	81
	Auditory Decoding	1j,2j	4*	4*	93	86	84
DTVP	Perceptual Quotient	3,4	1	0	73	74	76
	Eye-Motor	3a,4a	4*	0	68	68	75
	Figure-Ground	3b,4b	0	0	75	77	78
	Shape Constancy	3c,4c	1	5*	67	78	70
	Position in Space	3d,4d	2	1	80	76	73
	Spatial Relations	3e,4e	6*	1	78	75	83
WISC	Intelligence Quotient	5,6	0	2	74	78	77
LCRRT	Reading Readiness	7,8	1	0	74	74	75
WRAT	Spelling	11,12	0	0	75	76	75
	Arithmetic	13,14	1	2	74	77	77

*Significant at .05 Level **Signficant at .01 Level

[+]All figures rounded to nearest whole number

TABLE 4-1

LANGUAGE QUOTIENT

Analysis of Planned Comparisons

Source	SS	df	MS	F
Between Groups adjusted	3991.39	2		
Comparison: 1	3402.16	1	3402.16	27.57
2	589.23	1	589.23	4.78
Covariate	5282.92	1		
Error within groups	9625.07	78	123.40	
Totals	18899.38	81		

$F.95_{1,78} = 3.98$ $F.99_{1,78} = 7.01$

TABLE 4-1.1

LANGUAGE QUOTIENT

Post-test Group Means Adjusted for Pretest Differences

Experimental (Specialist-Teacher)	79.18
Experimental (Classroom-Teacher)	72.24
Control	62.39

TABLE 4-2

AUDITORY-VOCAL AUTOMATIC

Analysis of Planned Comparisons

Source	SS	df	MS	F
Between Groups adjusted	2193.38	2		
Comparison: 1	848.30	1	848.30	4.07
2	1345.08	1	1345.08	6.46
Covariate	6391.10	1		
Error within groups	16251.00	78	208.35	
Totals	24835.48	81		

$F.95_{1,78} = 3.98$ $F.99_{1,78} = 7.01$

TABLE 4-2.1

AUDITORY-VOCAL AUTOMATIC

Post-test Group Means Adjusted for Pretest Differences

Experimental (Specialist-Teacher)	85.35
Experimental (Classroom-Teacher)	88.09
Control	73.50

TABLE 4-3

VISUAL DECODING

Analysis of Planned Comparisons

Source	SS	df	MS	F
Between Groups adjusted	378.13	2		
Comparison: 1	292.29	1	292.29	1.35
2	85.84	1	85.84	.40
Covariate	2778.37	1		
Error within groups	16951.55	78	217.33	
Totals	20108.05	81		
$F.95_{1,78} = 3.98$			$F.99_{1,78} = 7.01$	

TABLE 4-3.1

VISUAL DECODING

Post-test Group Means Adjusted for Pretest Differences

Experimental (Specialist-Teacher)	92.68
Experimental (Classroom-Teacher)	90.04
Control	87.47

TABLE 4-4

MOTOR ENCODING

Analysis of Planned Comparisons

Source	SS	df	MS	F
Between Groups adjusted	1606.17	2		
Comparison: 1	1077.76	1	1077.76	8.92
2	528.41	1	528.41	4.37
Covariate	8336.68	1		
Error within groups	9425.18	78	120.84	
Totals	19368.03	81		

$F.95_{1,78} = 3.98$ $F.99_{1,78} = 7.01$

TABLE 4-4.1

MOTOR ENCODING

Post-test Group Means Adjusted for Pretest Differences

Experimental (Specialist-Teacher)	92.99
Experimental (Classroom-Teacher)	86.42
Control	81.70

TABLE 4-5

AUDITORY-VOCAL ASSOCIATION

Analysis of Planned Comparisons

Source	SS	df	MS	F
Between Groups adjusted	3442.29	2		
Comparison: 1	3350.73	1	3350.73	25.73
2	91.56	1	91.56	.70
Covariate	9438.82	1		
Error within groups	10158.79	78	130.24	
Totals	23039.90	81		

$F.95_{1,78} = 3.98$ $F.99_{1,78} = 7.01$

TABLE 4-5.1

AUDITORY-VOCAL ASSOCIATION

Post-test Group Means Adjusted for Pretest Differences

Experimental (Specialist-Teacher)	85.35
Experimental (Classroom-Teacher)	88.09
Control	73.50

TABLE 4-6

VISUAL-MOTOR SEQUENCING

Analysis of Planned Comparisons

Source	SS	df	MS	F
Between Groups adjusted	2026.55	2		
Comparison: 1	1437.48	1	1437.48	15.44
2	589.07	1	589.07	6.33
Covariate	2839.58	1		
Error within groups	7264.41	78	93.13	
Totals	12130.54	81		

$F.95_{1,78} = 3.98$ $F.99_{1,78} = 7.01$

TABLE 4-6.1

VISUAL-MOTOR SEQUENCING

Post-test Group Means Adjusted for Pretest Differences

Experimental (Specialist-Teacher)	88.74
Experimental (Classroom-Teacher)	81.80
Control	76.55

TABLE 4-7

VOCAL ENCODING

Analysis of Planned Comparisons

Source	SS	df	MS	F
Between Groups adjusted	4069.34	2		
Comparison: 1	4041.75	1	4041.75	36.47
2	27.59	1	27.59	.25
Covariate	6445.51	1		
Error within groups	8643.45	78	110.81	
Totals	19158.30	81		

$F.95_{1,78} = 3.98$ $F.99_{1,78} = 7.01$

TABLE 4-7.1

VOCAL ENCODING

Post-test Group Means Adjusted for Pretest Differences

Experimental (Specialist-Teacher)	94.24
Experimental (Classroom-Teacher)	92.74
Control	78.75

TABLE 4-8

AUDITORY-VOCAL SEQUENCING

Analysis of Planned Comparisons

Source	SS	df	MS	F
Between Groups adjusted	1153.16	2		
Comparison: 1	879.70	1	879.70	8.88
2	273.46	1	273.46	2.76
Covariate	16989.83	1		
Error within groups	7725.51	78	99.04	
Totals	25868.50	81		

$F.95_{1,78} = 3.98$ $F.99_{1,78} = 7.01$

TABLE 4-8.1

AUDITORY-VOCAL SEQUENCING

Post-test Group Means Adjusted for Pretest Differences

Experimental (Specialist-Teacher)	84.60
Experimental (Classroom-Teacher)	79.87
Control	75.51

TABLE 4-9

VISUAL-MOTOR ASSOCIATION

Analysis of Planned Comparisons

Source	SS	df	MS	F
Between Groups adjusted	380.02	2		
Comparison: 1	379.25	1	379.25	1.87
2	.77	1	.77	.00
Covariate	5139.29	1		
Error within groups	15818.79	78	202.80	
Totals	21338.10	81		

$F.95_{1,78} = 3.98$ $F.99_{1,78} = 7.01$

TABLE 4-9.1

VISUAL-MOTOR ASSOCIATION

Post-test Group Means Adjusted for Pretest Differences

Experimental (Specialist-Teacher)	85.66
Experimental (Classroom-Teacher)	85.41
Control	81.05

TABLE 4-10

AUDITORY DECODING

Analysis of Planned Comparisons

Source	SS	df	MS	F
Between Groups adjusted	1325.06	2		
Comparison: 1	655.99	1	655.99	4.12
2	699.07	1	669.07	4.20
Covariate	1513.00	1		
Error within groups	12422.72	78	159.27	
Totals	15260.78	81		

$F.95_{1,78} = 3.98$ $F.99_{1,78} = 7.01$

TABLE 4-10.1

AUDITORY DECODING

Post-test Group Means Adjusted for Pretest Differences

Experimental (Specialist-Teacher)	93.25
Experimental (Classroom-Teacher)	85.85
Control	83.63

respectively.

Inspection of these tables reveals that F values reached the .05 signficance level for eight of the ten subtests under question 1 and for five of the ten subtests under question 2. On the basis of the decision strategy stated in Chapter III, null hypotheses are rejected for all ITPA hypotheses except Ho:1b, Ho:2b, Ho:2d, Ho:2f, Ho:2g and Ho:1h, Ho:2h. The adjusted post-test group means reveal that with but one exception the means follow the trend of: Experimental-Specialist-Teacher > Experimental-Classroom-Teacher > Control.

To study the effects of specific-educational-therapy on visual perception ability each of the five subtests and the summary score (perceptual quotient) of the DTVP were evaluated independently for both research questions. Tables 4-11, 4-12, 4-13, 4-14, 4-15, and 4-16 present the summaries of the analysis for hypotheses Ho:3, Ho:4, Ho:3a, Ho:4a, Ho:3b, Ho:4b, Ho:3c Ho:4c, Ho:3d, Ho:4d and Ho:3e, Ho:4e respectively.

Inspection of these tables reveals that F values reached the .05 significance level for two of the six subtests under question 1 and for one of the six subtests under question 2. On the basis of the decision strategy then, null hypotheses cannot be rejected for any DTVP hypotheses except Ho:3a, Ho:4c and Ho:3e.

The effects of specific-educational-therapy on

TABLE 4-11

PERCEPTUAL QUOTIENT

Analysis of Planned Comparisons

Source	SS	df	MS	F
Between Groups adjusted	128.33	2		
Comparison: 1	102.73	1	102.73	1.36
2	25.60	1	25.60	.34
Covariate	9061.61	1		
Error within groups	5874.45	78	75.31	
Totals	15064.39	81		

$F.95_{1,78} = 3.98$ $F.99_{1,78} = 7.01$

TABLE 4-11.1

PERCEPTUAL QUOTIENT

Post-test Group Means Adjusted for Pretest Differences

Experimental (Specialist-Teacher)	72.81
Experimental (Classroom-Teacher)	74.25
Control	75.83

TABLE 4-12

EYE-MOTOR

Analysis of Planned Comparisons

Source	SS	df	MS	F
Between Groups adjusted	1064.74	2		
Comparison: 1	1057.17	1	1057.17	4.38
2	7.57	1	7.57	.03
Covariate	2160.60	1		
Error within groups	18809.64	78	241.15	
Totals	22034.98	81		

$F.95_{1,78} = 3.98$ $F.99_{1,78} = 7.01$

TABLE 4-12.1

EYE-MOTOR

Post-test Group Means Adjusted for Pretest Differences

Experimental (Specialist-Teacher)	67.60
Experimental (Classroom-Teacher)	68.38
Control	75.49

TABLE 4-13

FIGURE-GROUND

Analysis of Planned Comparisons

Source	SS	df	MS	F
Between Groups adjusted	114.33	2		
Comparison: 1	93.74	1	93.74	.33
2	20.59	1	20.59	.07
Covariate	8470.95	1		
Error within groups	22428.33	78	287.54	
Totals	31013.61	81		

$F.95_{1,78} = 3.98$ $F.99_{1,78} = 7.01$

TABLE 4-13.1

FIGURE-GROUND

Post-test Group Means Adjusted for Pretest Differences

Experimental (Specialist-Teacher)	75.02
Experimental (Classroom-Teacher)	77.31
Control	77.78

TABLE 4-14

SHAPE CONSTANCY

Analysis of Planned Comparisons

Source	SS	df	MS	F
Between Groups adjusted	1665.66	2		
Comparison: 1	202.47	1	202.47	.72
2	1463.19	1	1463.19	5.17
Covariate	5860.08	1		
Error within groups	22096.54	78	283.29	
Totals	29622.28	81		

$F.95_{1,78} = 3.98$ $F.99_{1,78} = 7.01$

TABLE 4-14.1

SHAPE CONSTANCY

Post-test Group Means Adjusted for Pretest Differences

Experimental (Specialist-Teacher)	67.48
Experimental (Classroom-Teacher)	78.41
Control	69.70

TABLE 4-15

POSITION IN SPACE

Analysis of Planned Comparisons

Source	SS	df	MS	F
Between Groups adjusted	599.18	2		
Comparison: 1	436.66	1	436.66	1.76
2	162.52	1	162.52	.65
Covariate	4128.07	1		
Error within groups	19382.71	78	248.50	
Totals	24109.96	81		

$F.95_{1,78} = 3.98$ $F.99_{1,78} = 7.01$

TABLE 4-15.1

POSITION IN SPACE

Post-test Group Means Adjusted for Pretest Differences

Experimental (Specialist-Teacher)	79.83
Experimental (Classroom-Teacher)	76.19
Control	73.01

TABLE 4-16

SPATIAL RELATIONS

Analysis of Planned Comparisons

Source	SS	df	MS	F
Between Groups adjusted	972.75	2		
Comparison: 1	824.15	1	824.15	5.61
2	148.60	1	148.60	1.01
Covariate	12658.49	1		
Error within groups	11453.73	78	146.84	
Totals	25084.97	81		
$F.95_{1,78} = 3.98$			$F.99_{1,78} = 7.01$	

TABLE 4-16.1

SPATIAL RELATIONS

Post-test Group Means Adjusted for Pretest Differences

Experimental (Specialist-Teacher)	78.45
Experimental (Classroom-Teacher)	74.96
Control	83.19

intellectual functioning was assessed by the Full Scale intelligence quotient of the WISC. The effects on academic ability were assessed by the LCRRT and the Reading, Spelling and Arithmetic scores of the WRAT. Tables 4-17, 4-18, 4-19 and 4-20 present the summaries of the analysis for hypotheses Ho:5, Ho:6, Ho:9, Ho:10 and Ho:11, Ho:12 respectively. As noted earlier, the data from the reading subtest of the WRAT were not appropriate for analysis of covariance and significance tests were not computed. However, inspection of the data suggests only random changes in individual pretest to post-test scores. Additionally the unadjusted group pretest and post-test means were nearly equal.

Inspection of the tables reveals that the F values for treatment effects on intellectual functioning and academic ability did not reach the .05 significance level under either question 1 or question 2. On the basis of the decision strategy, the null hypotheses cannot be rejected for either intellectual functioning or academic ability.

Summary of the Results

The significant results of this study are summarized as follows:

1. There is considerable evidence supporting the alternative hypotheses that treatment effects

TABLE 4-17

INTELLIGENCE QUOTIENT

Analysis of Planned Comparison

Source	SS	df	MS	F
Between Groups adjusted	200.25	2		
Comparison:				
1	12.72	1	12.72	.14
2	187.53	1	187.53	2.03
Covariate	5093.27	1		
Error within groups	7212.54	78	92.47	
Totals	12506.06	81		

$F.95_{1,78} = 3.98$ $F.99_{1,78} = 7.01$

TABLE 4-17.1

INTELLIGENCE QUOTIENT

Post-test Group Means Adjusted for Pretest Differences

Experimental (Specialist-Teacher)	74.25
Experimental (Classroom-Teacher)	78.16
Control	77.06

TABLE 4-18

READING READINESS

Analysis of Planned Comparisons

Source	SS	df	MS	F
Between Groups adjusted	16.62	2		
Comparison: 1	16.51	1	16.51	.75
2	.11	1	.11	.01
Covariate	1348.00	1		
Error within groups	1723.44	78	22.10	
Totals	3088.06	81		

$F.95_{1,78} = 3.98$ $F.99_{1,78} = 7.01$

TABLE 4-18.1

READING READINESS

Post-test Group Means Adjusted for Pretest Differences

Experimental (Specialist-Teacher)	74.15
Experimental (Classroom-Teacher)	74.25
Control	75.12

TABLE 4-19

SPELLING

Analysis of Planned Comparisons

Source	SS	df	MS	F
Between Groups adjusted	13.10	2		
Comparison: 1	1.13	1	1.13	.03
2	11.97	1	11.97	.33
Covariate	1291.64	1		
Error within groups	2795.21	78	35.84	
Totals	4099.95	81		

$F.95_{1,78} = 3.98$ $F.99_{1,78} = 7.01$

TABLE 4-19.1

SPELLING

Post-test Group Means Adjusted for Pretest Differences

Experimental (Specialist-Teacher)	74.63
Experimental (Classroom-Teacher)	75.62
Control	74.86

TABLE 4-20

ARITHMETIC

Analysis of Planned Comparisons

Source	SS	df	MS	F
Between Groups adjusted	112.47	2		
Comparison: 1	28.17	1	28.17	.53
2	84.30	1	84.30	1.60
Covariate	2490.94	1		
Error within groups	4112.15	78	52.72	
Totals	6715.56	81		

$F.95_{1,78} = 3.98$ $F.99_{1,78} = 7.01$

TABLE 4-20.1

ARITHMETIC

Post-test Group Means Adjusted for Pretest Differences

Experimental (Specialist-Teacher)	74.07
Experimental (Classroom-Teacher)	76.69
Control	76.70

do exist between experimental and control groups on the dependent variables associated with language ability. Inspection of adjusted group means reveals that this difference invariably favors the experimental group.

2. There is some evidence supporting the alternative hypotheses that treatment effects do exist between experimental-specialist and experimental-classroom-teacher groups on the dependent variables associated with language ability. Inspection of thses adjusted group means reveals that this difference favors the experimental-specialist-teacher group in every case but one.
3. There is very little evidence supporting the hypotheses that treatment effects exist between experimental and control groups on the dependent variables associated with visual perception ability. Inspection of adjusted group means reveals that where differences do exist they favor the control group.
4. There is even less evidence supporting the hypotheses that treatment effects exist between experimental-specialist and experimental-

classroom teacher groups on the dependent variables associated with visual perception ability.

5. There is no evidence supporting the hypotheses that treatment effects exist between any of the groups on the dependent variables associated with intellectual functioning and academic ability.

CHAPTER V

SUMMARY

The primary purposes of this study were to investigate the effects of a classroom-organized program for the specific educational training of mental functions of educable mentally retarded students placed in public school special classes. Effects were measured in four areas: (1) Language Ability, (2) Visual Perception Ability, (3) Intellectual Functioning and (4) Academic Ability. The specific-educational-therapy (SET) used in this study consisted of two commercially available programs for classroom use: (1) The Peabody Language Development Kit, Level 1 and (2) The Frostig Program for the Development of Visual Perception. SET was presented in two instructional modes: (1) using specialist-teachers and (2) using classroom-teachers.

Previous research concerning both language development and visual perception development programs has indicated that accelerated improvement in deficient mental functions is frequently associated with participation in various specific educational therapy programs. Additionally, significant gains in both academic ability and intellectual functioning have occasionally been

reported. This research has involved children of broad age ranges who have been educationally placed in clinics, regular classrooms as well as classrooms for the educable mentally retarded. Therapy used in treatment has included clinically-derived programs and programs in their experimental forms. The instruction has variously been given by specialists in the schools, classroom teachers and clinical specialists. None of the studies, however, have investigated the effects of commercially available materials used as a part of classroom activities on the entire class enrollment. None of the studies have utilized both language development and visual perception development materials; nor have the studies directly compared the relative effects of using teacher-specialists and classroom teachers as instructors.

Eighty-two educable mentally retarded students placed in ten primary and early elementary classrooms were divided into two experimental groups and one control group. For the first experimental group SET was taught by teacher-specialists, for the second experimental group SET was taught by classroom teachers and SET was not used with the control group. The therapy program spanned a six and one-half month period. The three groups were statistically matched on twenty-one variables operationally defining the four areas investigated. These variables were derived from the subtests and summary scores of

five psychological tests:

(1) Illinois Test of Psycholinguistic Ability (ITPA).

(2) The Frostig Developmental Test of Visual Perception (DTVP).

(3) Wechsler Intelligence Scale for Children (WISC).

(4) Lee-Clark Reading Readiness Test (LCRRT).

(5) Wide Range Achievement Test (WRAT).

For each of the twenty-one variables, the following two independent hypotheses were evaluated on the basis of an analysis of covariance, planned comparison technique.

Ho:1 There will be no difference in the post-test (dependent variable score) between the combined experimental groups and the control groups after means are adjusted for initial variance as measured by pretest scores.

Or symbolically: $(M_1 + M_2) = 2\ M_c$.

Ho:2 There will be no difference in the post-test (dependent variable score) between the experimental-specialist-teacher and experimental classroom-teacher groups after means are adjusted for initial variance as measured by pretest scores.

Or symbolically: $(M_1 = M_2)$.

The first ten variables were associated with language ability as measured by the summary score (language quotient) and nine subtests of the ITPA: null hypotheses Ho:1, Ho:2 . . . Ho:1j, Ho:2j. F values exceeded the .05 significance level for eight of the ten variables under the first null hypotheses (combined-experimental x control), and for five of the ten variables under the second null hypotheses (experimental 1 x experimental 2). Additionally, adjusted post-test group means revealed that with but one exception the means fell into the pattern: experimental-specialist-teacher > experimental-classroom-teacher > control.

The next six variables were associated with visual perception ability as measured by the summary score (perceptual quotient) and five subtests of the DTVP: null hypotheses Ho:3, Ho:4 . . . Ho:3e, Ho:4e. F values exceeded the .05 significance level for two of the six variables under the first null hypotheses (combined-experimental x control), and for only one of the six variables under the second (experimental 1 x experimental 2). Adjusted post-test group means revealed that, generally, the means tended to follow the pattern: control > experimental-classroom-teacher > experimental-specialist-teacher.

The next four variables were associated with intellectual functioning and academic ability as measured

by the WISC, LCRRT and WRAT: null hypotheses Ho:5, Ho:6 . . . Ho:13, Ho:14. F values failed to reach the .05 significance level for any of these variables. The adjusted post-test group means were so similar that no trend was evidenced. The significant results of this study are briefly summarized:

1. When the combined-experimental and control groups were compared on post-test measures of language ability there was considerable evidence of differences found favoring the combined-experimental groups.

1.1 When the two experimental groups were compared on post-test measures of language ability there was some evidence of differences found favoring the specialist-teacher group as compared to the classroom-teacher group.

2. There was very little evidence of differences on post-test measures of visual perception ability between either the combined-experimental and control groups or between the two experimental groups. Those differences that were found favored the control group in the first comparison and the classroom-teacher group in the second.

3. There was no evidence of differences between any of the groups found on post-test measures of intellectual functioning and academic ability.

Discussion of Results

Hypotheses: 1 . . . 1j are associated with the dependent variables that operationally defined language ability, i.e., the summary and nine subtest scores of the ITPA. This group of hypotheses compared the combined-experimental groups with the control group on each of these ten dependent variables.

As shown in Table 5-1, null hypotheses were rejected on eight of the ten variables. This means that when the post-test means of the three groups were adjusted for individual differences in pretest scores, the difference between the mean scores of students who had received SET and the mean scores of those who had not received such therapy was so large that it undoubtedly was not caused by a sampling accident. Presumably, for these eight variables, the differences can be attributed to the presence or absence of SET in the classroom curriculum. Inspection of the adjusted post-test means revealed that those students who had received SET were

TABLE 5-1

COMBINED-EXPERIMENTAL x CONTROL GROUP
COMPARISONS ON ITPA VARIABLES

Variable	Null Hypothesis	Rejected	Not Rejected
Language Quotient	Ho:1	X	
Auditory-Vocal Automatic	Ho:1a	X	
Visual Decoding	Ho:1b		X
Motor Encoding	Ho:1c	X	
Auditory-Vocal Association	Ho:1d	X	
Visual-Motor Sequencing	Ho:1e	X	
Vocal Encoding	Ho:1f	X	
Auditory-Vocal Sequencing	Ho:1g	X	
Visual-Motor Association	Ho:1h		X
Auditory Decoding	Ho:1j	X	

favored. Hence it can be concluded that insofar as language development is a function of improved ITPA scores, language development was a function of SET in this investigation. As observed from Table 5-1, it seems noteworthy that the only two subtests on which differences were not found involved visual skills primarily, rather than auditory skills.

McCarthy[1] (1964) has reported consistently significant correlations between language ability and mental age for school-age children. He has speculated about a possible causal relationship such that an increase in linguistic ability may produce an increase in intellectual ability.

[1]James J. McCarthy. "The Importance of Linguistic Ability in the Mentally Retarded." Mental Retardation, 2 (April, 1964) 90-96.

The results of this study do not support a "causal relationship hypothesis." Inspection of group means, however, does suggest that SET resulted in reduced disparity between language ability and intellectual functioning. This information is presented in Table 5-2. It can be observed that the difference between these variables dropped from 13 to 0 for the experimental groups but remained constant at 15 for the control group.

TABLE 5-2

PRETEST POST-TEST COMPARISONS OF INTELLIGENCE QUOTIENT AND LANGUAGE QUOTIENT

Variable	Experimental		Control	
	Pretest	Post-test	Pretest	Post-test
Intelligence Quotient	73	76	74	77
Language Quotient	60	76	59	62
Difference	13	0	15	15

The results of this study support, in part, the findings of Dunn and Mueller reported by Dunn and Smith in the manual for the PLDK. The results also support Ensminger's (1966) hypotheses, but not his findings. The Forgnone (in preparation) study reported significant gains in visual perceptual skills but not in language

ability following training. These results are just the opposite of the data of this study although apparently significance tests were based on pretest-post-test gain scores. The preschool project at Indiana University employed an Analysis of Variance design and their interim results are supported in part and particularly the substudy reported by Stearns (1966).

Hypotheses: 2 . . . 2j compared the specialist-teacher experimental group with the classroom-teacher experimental group on the ten variables that operationally defined language ability, i.e., the post-test summary and nine subtest scores of the ITPA.

TABLE 5-3

EXPERIMENTAL 1 x EXPERIMENTAL 2
COMPARISONS ON ITPA VARIABLES

Variable	Null Hypotheses	Rejected	Not Rejected
Language Quotient	Ho:2	X	
Auditory-Vocal Automatic	Ho:2a	X	
Visual Decoding	Ho:2b		X
Motor Encoding	Ho:2c	X	
Auditory-Vocal Association	Ho:2d		X
Visual-Motor Sequencing	Ho:2e	X	
Vocal Encoding	Ho:2f		X
Auditory-Vocal Sequencing	Ho:2g		X
Visual-Motor Association	Ho:2h		X
Auditory Decoding	Ho:2j	X	

As shown in Table 5-3, null hypotheses were rejected on five of the ten variables. Presumably, for these five variables the differences can be attributed to the presence or absence of a teacher-specialist in the presentation of SET materials and lessons. Inspection of the adjusted post-test means revealed that the teacher-specialist group was favored. Hence it can be concluded that there is some evidence that teacher-specialist presentations of SET materials was more effective than classroom-teacher presentations.

Hypotheses: 3 . . . 3e are associated with the dependent variables that operationally defined visual perception ability, i.e., the summary and five subtests scores of the DTVP. This group of hypotheses compared the combined-experimental groups with the control group on each of these six dependent variables.

TABLE 5-4

COMBINED-EXPERIMENTAL x CONTROL GROUP COMPARISONS ON DTVP VARIABLES

Variable	Null Hypotheses	Rejected	Not Rejected
Perceptual Quotient	Ho:3		X
Eye-Motor	Ho:3a	X	
Figure-Ground	Ho:3b		X
Size Constancy	Ho:3c		X
Position in Space	Ho:3d		X
Spatial Relations	Ho:3e	X	

Hypotheses: 4 . . . 4e compared the specialist-teacher experimental group with the classroom-teacher experimental group on the ten variables that operationally defined visual perception ability, i.e., the summary and five subtest scores of the DTVP.

TABLE 5-5

EXPERIMENTAL 1 x EXPERIMENTAL 2
COMPARISONS ON DTVP VARIABLES

Variable	Null Hypotheses	Rejected	Not Rejected
Perceptual Quotient	Ho:4		X
Eye-Motor	Ho:4a		X
Figure-Ground	Ho:4b		X
Size Constancy	Ho:4c	X	
Position in Space	Ho:4d		X
Spatial Relations	Ho:4e		X

As shown in Tables 5-4 and 5-5, null hypotheses were rejected in only three instances out of a possible twelve. Where differences were found they favored the control group on the one set of comparisons and the classroom-teacher group on the second set of comparisons. No differences were found between the Perceptual Quotient means on either comparison.

In discussing such minimal evidence as this, one

possibility is to attribute the significant findings to random events that are a function of the number of significance tests computed. Supporting this possibility is the further evidence that while all three F values exceeded the .05 level of significance, none of them reached the .01 level. On this bases it is concluded that there is more evidence of random maturational effects on visual perception development than of systematic effects attributable to either the absence of SET or the mode of its presentation. The results of this study than have not supported the findings of Allen[2] (1966) and Painter[3] but have supported in part the findings of Rosen[4] (1966).

These results also suggest the need to give serious consideration to the effects of normal developmental maturation on perceptual abilities. This appears particularly necessary when dealing with extreme scores where both regression and maturation can elevate post-test

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[2]Robert M. Allen, Isadore Dickman and Thomas D. Haupt. "A pilot Study of the Immediate Effectiveness of the Frostig-Horne Training Program with Educable Retardates," Exceptional Children 33: 41-42, September 1966.

[3]Genevieve Painter, "The Effect of a Rhythmic and Sensory Motor Activity Program on Perceptual Motor Spatial Abilities of Kindergarten Children," Exceptional Children, 33: 113-116, October 1966.

[4]Carl L. Rosen, "An Experimental Study of Visual Perceptual Training and Reading Achievement in First Grade," Perceptual and Motor Skills, 22: 979-86, 1966.

scores even without treatment intervention. In their studies, both Allen and Painter based their significance tests on the gain scores of small samples of EMR students which may have confounded the data on which they based their conclusions.

Hypotheses: 5, 7, 9, 11 and 13 compared the combined-experimental and control groups on the dependent variables that operationally defined intellectual functioning and academic ability, i.e., the LCRRT, WRAT and WISC.

TABLE 5-6

COMBINED EXPERIMENTAL x CONTROL GROUP COMPARISONS ON LCRRT, WRAT, WISC

Variable	Null Hypotheses	Rejected	Not Rejected
Intelligence Quotient	5		X
Reading Readiness	7		X
Reading	9		X
Spelling	11		X
Arithmetic	13		X

Hypotheses: 6, 8, 10, 12 and 14 compared the specialist-teacher and classroom-teacher experimental groups on the five variables operationally defining intellectual functioning and academic ability.

TABLE 5-7

EXPERIMENTAL 1 x EXPERIMENTAL 2
COMPARISONS ON LCRRT, WRAT, WISC

Variable	Null Hypotheses	Rejected	Not Rejected
Intelligence Quotient	6		X
Reading Readiness	8		X
Reading	10		X
Spelling	12		X
Arithmetic	14		X

As shown in Tables 5-6 and 5-7, none of the null hypotheses were rejected for any of these comparisons. Hence, it is concluded that SET has not had a measurable effect on either intellectual functioning or academic ability as defined in this study. This finding is consistent with the mainstream of experimental evidence with classroom groups of EMR students.[5] With occasional exceptions, such studies have reported that training of specific mental functions is slow to generalize to intellectual or achievement measures.

The findings of this study then do not support allegations that children with remedial developmental deficits are frequently placed in EMR classes by the public schools. In particular the results do not support

[5]Leonard S. Blackman and Paul Heintz, "The Mentally Retarded," Review of Educational Research, 36: 5-36, February 1966.

speculation that specific educational therapy programs will significantly raise intellectual functioning levels or even academic achievement levels of these students over a single school-year training period.

Conclusions

Within the limitations imposed by the nature of the sample and the procedures used in this investigation, it was concluded from the data gathered that:

1. A specific educational therapy program as taught by either teacher-specialists or classroom teachers to educable mentally retarded classes can result in significant improvement of the classes' language ability.
2. The relative effectiveness of a teacher-specialist's as compared to a classroom teacher's presentation of a specific educational therapy program was supported.
3. That a specific educational therapy program effects visual perception development, intellectual functioning or academic ability cannot be supported or denied by the evidence of this study.
4. A specific educational therapy program tends to reduce disparity between language ability and intellectual functioning of educable mentally retarded classes.

Implications for Education

Specific educational therapy as used in the classroom was shown to be more effective than traditional materials for language development and probably as effective as traditional approaches for visual perception development. Insofar as instruction of classroom programs is concerned, specialist-teachers were observed to be somewhat more effective than classroom teachers and consequently warrant first choice whenever their services qre available.

As a group this population of eighty-two EMR students were initially more handicapped in language ability than in either intellectual functioning or visual perception ability (language quotient: 60; intelligence quotient: 73: perceptual quotient: 72). Even within the subtests of the ITPA, the group scored higher on the visual-motor channel tests than on the auditory-vocal channel tests. This relationship is consistent with retarded children who in general function below intellectual expectations in language ability. A similar relationship has been observed in the behavior of culturally deprived children. It would seem possible that intelligence tests are not so much "notoriously misleading" with language handicapped children as they are accurate in predicting slow academic progress. Of importance to education then is that this investigation has demonstrated

that the rate of language development can be increased within the classroom curriculum for language handicapped students.

Another way of looking at the effects of specific educational therapy is to focus on the gains made by the experimental groups. The learning potential of language handicapped students in general and EMR students in particular has frequently been considered negligible by the schools. Where this expectation has not been voiced, the school's treatment of such students has generally made the attitude explicit. The learning response of the students to SET, however, implys a need to modify the educational concept of EMR pupil's learning potential.

The results of this study have demonstrated that much can be accomplished within the classroom with a well organized specialized program for the entire class. This in no way denys that more intensive work out-of-class and with small groups may produce even better results. It does, however, provide an educational alternative. Within this context it would not appear necessary to radically modify the role of the School Diagnostician to include more refined individual psycho-educational descriptions. The demonstrated homogenity of eighty-two students across twenty psychological variables supports the integrity of present procedures for the educational placement of EMR students as practiced in

Ingham County.

Tool subjects and content studies assume minimal linguistic adequacy. EMR and other language handicapped students have consistently been reported among the lowest achievers in school. The students in the present study made no measurable academic gains. Speidel[6] has suggested that language training would lead to the development of deficient language skills and cumulatively provide a base for developing competence in the tool subjects. If Speidel is correct, then academic gains should perhaps be looked for in the future rather than within the time limits of this study. On this basis it is also reasonable to speculate that research on the efficiency of EMR classes has been consistently disappointing because of the consistent omission of specific educational training of functions from the curriculum of students who, of necessity, are academically limited without it.

Limitations of the Study

A major limitation of this study has been the time limitation. This is particularly true when dealing with children whose rate of learning has been historically slow and who are handicapped in basic processes and where training effects are measured with academic measures.

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[6]E. B. Speidel, "Language Achievements of Mentally Retarded Children," Dissertation Abstracts, 19: 3180, 1958.

A longitudinal study that continued the training of these children over a three-year period would provide a more reasonable measure of the educational and psychological effects of SET.

The results of this study must also be considered in the context of the sample. In this study the entire population constituted the sample and cannot be considered representative of EMR students in general.

A further limitation is that the dependent variables have been defined in terms of test scores. Interpretation of results then is limited by the extent to which the tests are valid measures of the dependent variables to which they have been associated. The test scores themselves lack exactitude and are limited additionally by their own reliability characteristics.

Implications for Further Research

Previous studies have demonstrated that psycholinguistic abilities of EMR students can be improved through utilization of individual diagnostic profiles to direct remediation of specific linguistic disabilities. This study has provided evidence that a classroom oriented program has effects across a broad spectrum of psycholinguistic disabilities without utilizing individual diagnostic profiles.

No answer has been found to the question of whether

a classroom oriented program for EMR students can have measurable effects on visual perception disabilities. Similar investigations should be conducted then to determine if the current results can be replicated in those areas of weakness.

Language ability has been philosophically and statistically associated with intellectual functioning on theoretical and test-construction levels. The present study joins a growing body of studies that have not produced empirical support for this association. Further investigation of the relationship between these two variables is needed, particularly where longer periods of time can be devoted to training efforts. There has been similar and perhaps more crucial speculation concerning the relationship between language ability and academic achievement. The present data lends some support to the validity of language ability as a predictor of scholastic achievement. Left unanswered are questions concerning whether or not language ability is a prerequisite for scholastic functioning and, if so to what extent. Additional investigations are needed then to consider the relationships of these factors. Again, of prime importance is the need for studies spanning more than one academic school year.

The extremely positive effects of SET on language

ability of EMR students raises questions concerning the effects on other language handicapped groups such as: culturally deprived kindergarten and nursery-age children; central city children; trainable mentally retarded and older EMR children and "slow learners." Studies investigating the effects of SET in their curriculum is of particular current interest. Such studies would not only help establish the need for and priority of such training in the curriculum but also serve as a guide in the development of additional classroom programs.

The present study with EMR students produced differential effects on language ability and visual perception ability. The particular strength of SET was in the language area. Additional research is needed to investigage the effects of SET on other populations of children. Of particular interest, in the present central city crises, is the effects of SET on culturally deprived populations. Such students have been observed to have ITPA profiles similar to the profiles of the students in the current investigation. It would be both informative and timely then to study the effects of SET with this group.

BIBLIOGRAPHY

Allen, Robert M., Dickman, Isadore and Haupt, Thomas D. "A Pilot Study of the Immediate Effectiveness of the Frostig-Horne Training Program with Educable Retardates," Exceptional Children 33: (September, 1966), 41-42.

Ammons, Robert B., Arnold, Paul R. and Herrman, Robert S. "The Full-Range Picture Vocabulary Test: IV. Results for a White School Population," Journal of Clinical Psychology, 6 (April, 1950) 164-69.

Anastasi, Anne. Psychological Testing, Second Edition New York: The Macmillian Co., 1961, pp. 315-20.

Anderson, James M. and Austin, Mary C. The Sixth Mental Measurement Year Book. Edited by Oscar K. Buros. New Jersey: The Gryphon Press, 1965, 855-57.

Barsch, Ray H. "Evaluating the Organic Child: The Functional Organization Scale," The Journal of the Genetic Psychology, 100: (1962), 345-44.

Bateman, Barbara. "Learning Disorders," Review of Educational Research, 36: (February, 1966) 93-119.

Blackman, Leonard S. "The Brave New World of Special Education." Paper presented at the 90th annual meeting of the American Association on Mental Deficiency, Chicago, Illinois, May 10-14, 1966.

Blackman, Leonard S. and Heintz, Paul. "The Mentally Retarded," Review of Educational Research, 36: (February 1966) 5-36.

Blessing, K. R. "An Investigation of a Psycholinguistic Deficit in Educable Mentally Retarded Children: Detection, Remediation, and Related Variables." Unpublished doctoral dissertation, University of Wisconsin, 1964.

Buros, Oscar K. The Sixth Mental Measurements Yearbook. New Jersey: The Gryphon Press, 1965, 846.

Dunn, Lloyd M. Manual, Peabody Picture Vocabulary Test. American Guidance Service, Inc., Minneapolis, 1959.

Dunn, Lloyd M. and Smith, James O. Peabody Language Development Kits, Level 1. American Guidance Services, Inc., Minneapolis, 1965.

Dunn, Lloyd M. and Smith, James O. Peabody Language Development Kits Manual for Level 1. American Guidance Service, Inc., 1965, xv.

Ensminger, Everett E. "The Effects of a Classroom Language Development Program on Psycholinguistic Abilities and Intellectual Functioning of Slow Learning and Borderline Retarded Children." Unpublished Ed.D. dissertation, University of Kansas, 1966.

Fine, Marvin J. "Security Patterns of Educable Mentally Retarded Boys in Relation to Special Class Placement." Paper read at Annual AAMD Convention, Chicago, May, 1966.

Feldt, Leonard S. "A Comparison of the Precision of Three Experimental Designs Employing a Concomitant Variable," Psychometrika, 23:4 (December, 1958).

Frostig, Marianne and Horne, David. The Frostig Program for the Development of Visual Perception. Chicago: Follett Publishing Company, 1964.

Frostig, Marianne and Horne, David. The Frostig Program for the Development of Visual Perception - Teacher's Guide. Chicago: Follett Publishing Company, 1964.

Frostig, Marianne, Lefever, D. E. and Whittlesey, J. R. B. The Marianne Frostig Developmental Test of Visual Perception. Palo Alto: Consulting Psychologist Press, 1964.

Frostig, Marianne, Maslow, Phyliss, Lefever, D. Welty and Whittlesey, J. R. B. "The Marianne Frostig Developmental Test of Visual Perception 1963 Standardization," Perceptual and Motor Skills, 19: Monograph Supplement 2-V19 (1964), 464.

Gesell, A. and Ames, L. B. "The Development of Directionality in Drawing." Journal of Genetic Psychology, 68: (1946), 45-61.

Getman, G. N. "The Visumotor Complex in the Acquisition of Learning Skills," Learning Disorders, Vol. 1. Edited by Jerome Hellmuth. Seattle: Special Child Publication, (1965), 49-76.

Goldstein, Herbert, Moss, James W. and Jordan, Laura J. The Efficacy of Special Class Training on the Development of Mentally Retarded Children, U.S. Department of Health, Education and Welfare, Office of Education, Cooperative Research Project No. 619. Urbana: Institute for Research on Exceptional Children, University of Illinois, 1965.

Halgren, M. R. "Opus in See Sharp," Education, 81 (February, 1961) 369-71.

Hardesty, H. H. et al., "Eye Exercises," The Collected Letters of the International Correspondence Society of Ophthalmologists and Otolaryngologists, Series 4 (November, 1966).

Hart, N. W. M. "The Differential Diagnosis of the Psycholinguistic Abilities of the Cerebral Palsied Child and Effective Remedial Procedures," Special Schools Bulletin, No. 2, Brisbane, Australia (1963).

Hays, William L. Statistics for Psychologists. New York: Holt, Rinehart and Winston, 1963. 475-82.

Hirsch, Ester. "Another Approach to Homogeneity in the Mentally Retarded." New Frontiers in Special Education, Selected Papers from the 43rd Annual CEC Convention, Portland, Oregon, April 20-24, 1965. (Washington, D.C., Council for Exceptional Children), 57-60.

Hobson, James R. "Lee-Clark Reading Readiness Test," The Fifth Mental Measurements Yearbook. New Jersey: The Gryphon Press, 1959, 777-78.

Jastak, J. F. and Jastak, S. R. The Wide Range Achievement Test. Wilmington: Guidance Associates, 1965.

Jastak, J. F. and Jastak, S. R. "The WRAT Manual." Wilmington: Guidance Associates, 1965, 1.

Johnson, Orville G. "Special Education for the Mentally Retarded-A Paradox," Exceptional Children, 29: (October, 1962) 62-69.

Kaplan, Marvis S. "An Investigation of the Anxiety Levels of Mentally Handicapped Children with Special Consideration of the Effects of Special Education Classes." Unpublished Ph.D. dissertation, Michigan State University, 1961.

Kelly, C. R. "Visual Screening and Child Development." N. Carolina: North Carolina State College, 1957. (mimeographed.)

Kephart, Newell C. The Slow Learner in the Classroom. Columbus: Charles E. Merrill Books, Inc., 1960. 17.

Kephart, Newell C. "Visual Skills and their Relation to School Achievement," American Journal of Opthalmology, 36: (1953) 794-99.

Kern, William H. and Pfaeffle, Heinz. "A Comparison of Social Adjustment of Mentally Retarded Children in Various Educational Settings," American Journal of Mental Deficiency, 67: (November, 1962) 407-13.

Kirk, Samuel. "Statement before the Senate Subcommittee on Education." A. C. L. D. Special Report on Legislation and Learning Disabilities, 1966.

Krippner, Stanley. "Evaluating Pre-Readiness Approaches to Reading," Education, 87: (September, 1966) 12-20.

Lampert, Morris H. "Diagnosis of Retardation Said to be Often Wrong," Medical Tribune. Report on an address given before the section on neurology and psychiatry at the Annual Meeting of the Southern Medical Association. December 1, 1965.

Lee, Murray and Clark, Willis W. Lee-Clark Reading Readiness Test (1962 Revision). Monterey: California Test Bureau, 1960.

Lee, Murray and Clark, Willis W. Lee-Clark Reading Readiness Test Manual. Monterey: California Test Bureau, 1962. 2-3.

Llorens, Lela and others. "Training in Cognitive-Perceptual-Motor Functions," American Journal of Occupational Therapy, 19 (1964).

Lyons, C. V. and Lyons, E. B. "The Power of Visual Training as Measured in Factors of Intelligence," Journal of the American Optometric Association, (December, 1954), 256-62.

McCarthy, James J. and Kirk, Samuel A. The Illinois Test of Psycholinguistic Abilities (Experimental Edition). Urbana: The University of Illinois Press, 1961.

McCarthy, James J. and Kirk, Samuel A. The Illinois Test of Psycholinguistic Abilities, Examiners Manual,(Experimental Edition). Urbana: University of Illinois Press, 1961.

McCarthy, James J. and Kirk, Samuel A. The Construction, Standardization and Statistical Characteristics of the Illinois Test of Psycholinguistic Abilities. Madison, Wisconsin: Photo Press, Inc., 1963. 42.

McCarthy, James J. and Olson, James L. Validity Studies on the Illinois Test of Psycholinguistic Abilities. Urbana: University of Illinois Press, 1964.

McCarthy, James J. and Scheerenburger, Richard C. "A Decade of Research on the Education of the Mentally Retarded," Mental Retardation Abstracts, 3: (October-December, 1966), 481.

McKee, G. W., et.al. "The Physiology of Readiness," Minneapplis: P. A. S. S., 1964.

McNemar, Quinn. Psychological Statistics. New York: John Wiley and Sons, Inc., 1955. 344, 354.

Myklebust, Helmer R. and Boshes, Benjamin. "Psycho-neurological Learning Disorders in Children," Archives of Pediatrics. New York: (June, 1960).

Olson, Arthur V. "Relation of Achievement Test Scores and Specific Reading Abilities to the Frostig Developmental Test of Visual Perception," Perceptual and Motor Skills, 22: (1966) 179-84.

Osgood, Charles, E. "Motivational Dynamics of Language Behavior," Nebraska Symposium on Motivation. Lincoln: University of Nebraska Press, 1957.

Patterson, P. L. "The Normality of Exceptional Children," Rehabilitation in Canada, 12: Fall-Winter (1965-1966) 9-14.

Painter, Genevieve. "The Effect of a Rhythmic and Sensory Motor Activity Program on Perceptual Motor Spatial Abilities of Kindergarten Children," Exceptional Children, 33: (October, 1966) 113-16.

Rice, William E. and Suit, Donald T. "Perceptual Training and Word Recognition." Unpublished Pilot Study, 1964.

Rosen, Carl L. "An Experimental Study of Visual Perceptual Training and Reading Achievement in First Grade," Perceptual and Motor Skills, 22: (1966) 979-86.

Rutherford, W. L. "Perceptual-Motor Training and Readiness," Paper read at the annual meeting of the International Reading Association, Detroit, 1965.

Sievers, Dorothy J. "Development and Standardization of a Test of Psycholinguistic Growth in Preschool Children," Selected Studies on the Illinois Test of Psycholinguistic Abilities. Madison, Wisconsin: Photo Press, Inc., (1963) 1-26.

Simches, Gabriel and Bohn, Raymond J. "Issues in Curriculum: Research and Responsibility," Mental Retardation, 1: (1963) 84-87, 115-17.

Smith, James O. "Effects of a Group Language Development Program upon the Psycholinguistic Abilities of Educable Mental Retardates," Peabody College Special Education Research Monograph Series, No. 1. Nashville, Tennessee: Peabody College for Teachers, 1962.

Sparks, H. L. and Blackman, L. S. "What is Special about Special Education Revisited: The Mentally Retarded," Exceptional Children, 31: (January, 1965) 242-47.

Speidel, E. B. "Language Achievements of Mentally Retarded Children," Dissertation Abstracts, 19: 3180, 1958.

Spicker, Howard H, Hodges, Walter L. and McCandless, Boyd R. "A Diagnostically based Curriculum for Psychosocially Deprived, Preschool, Mentally Retarded Children: Interim Report," Exceptional Children, 33: (December, 1966) 215-20.

Stearns, K. E. "Experimental Group Language Development for Psychosocially Deprived Preschool Children." Unpublished doctoral dissertation, Indiana University, 1966.

Stevens, Godfrey D. "An Analysis of the Objectives for the Education of Children with Retarded Mental Development," American Journal of Mental Deficiency, 63: No. 2. (September, 1958).

Stiskin, Hershel M. "The Slow Learner and the Yeshiva," Jewish Parent, 17: (October, 1965) 8-10.

Tate, Merle W. Statistics in Education. New York: The Macmillan Co., 1955, 522.

Wechsler, David. Wechsler Intelligence Scale for Children. New York: Psychological Corporation, 1949.

Wechsler, David. WISC Manual. New York: The Psychological Corporation, 1949. 1-6.

Winter Haven Lions Club. Procedure Guide to Perceptual Forms, (Clinical Edition), Winter Haven, Florida: Publication Committee, 1962.

APPENDIX A

HETEROGENITY OF REGRESSION

(post-test on pretest)

HETEROGENITY OF REGRESSION
(post-test on Pretest)

Variable	F	Probability
Language Quotient	.30	.74
Auditory-Vocal Automatic	1.53	.22
Visual Decoding	.10	.90
Motor Encoding	1.31	.28
Auditory-Vocal Association	.49	.61
Visual-Motor Sequencing	2.60	.08
Vocal Encoding	1.51	.23
Auditory-Vocal Sequencing	1.62	.21
Visual-Motor Association	.32	.73
Auditory Decoding	.33	.72
Perceptual Quotient	.63	.53
Eye-Motor	.12	.89
Figure-Ground	1.95	.15
Shape Constancy	.81	.45
Position in Space	.58	.56
Spatial Relations	1.89	.16
Intelligence Quotient	1.57	.21
Reading Readiness	1.19	.31
Reading	13.88	.00
Spelling	.95	.39
Arithmetic	1.28	.28
Mental Age	1.32	.27
Chronological Age	.83	.44

APPENDIX B

MICHIGAN PLACEMENT RECOMMENDATIONS FOR EDUCABLE MENTALLY RETARDED

MICHIGAN PLACEMENT RECOMMENDATIONS FOR EMR

1. Diagnostic

   Educational programs providing for all types of mentally handicapped children must be based on a sound diagnostic study. Each child, to be eligible for a specific program placement, must be diagnosed as being educable mentally handicapped or trainable mentally handicapped by an approved school diagnostician.

2. Educational

   (a) Once diagnosed as mentally handicapped, placement in a particular program must be determined by a screening committee within the district of the child's residence. This committee should be composed of the diagnostician, the child's principal and teacher, the special classroom teacher and other appropriate professional or school personnel.

   (b) Rule 1. A pupil shall be considered enrolled as a member of the program under this Act, as determined through adequate diagnostic study, if (a) he is mentally handicapped and potentially socially competent, (b) he is mentally handicapped but prognosis is such that he may appear neither academically educable nor potentially socially competent but who may with training become at least partially self-supporting.

   (Page 240 of the 1956 Annual Supplement to the 1954 Administrative Code)

   (c) Rule 2. Qualifications of persons providing diagnostic services under this Act must be approved by the Superintendent of Public Instruction.

   (d) Rule. Qualification of persons providing consultant service under this Act must be approved by the Superintendent of Public Instruction.

APPENDIX C

SCHOOL DISTRICTS

TREATMENT GROUP	SCHOOL DISTRICT
Experimental-Specialist-Teacher	Holt
Experimental-Classroom-Teacher	East Lansing Waverly
Control	Haslett Leslie Mason
Excluded	Stockbridge Williamston

APPENDIX D

INSTRUMENTATION

INSTRUMENTATION

The Illinois Test of Psycholinguistic Abilities (ITPA)

The effects of the specific educational therapy on language development was measured by the Illinois Test of Psycholinguistic Abilities (ITPA). The ITPA was developed by McCarthy and Kirk[1] to assess psycholinguistic abilities and disabilities in children between two and one-half and nine years of age. This instrument was developed on the basis of a theoretical communication model by Osgood.[2] The ITPA and the Osgood model have been reviewed by Ensminger[3] from whom the following discussion is taken with appropriate changes. Osgood's theoretical model provides for channels of communication, levels of organization and processes of acquisition and usage. The channels of communication refer to the various modes of stimulus input and response output. In the original model there were three major types of input (auditory,

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[1]James J. McCarthy and Samuel A. Kirk. Illinois Test of Psycholinguistic Abilities, Examiners Manual, Experimental Edition, University of Illinois Press, Urbana, 1961.

[2]Charles E. Osgood. "Motivational Dynamics of Language Behavior," Nebraska Symposium on Motivation. University of Nebraska Press, Lincoln, 1957.

[3]Everett E. Ensminger. "The Effects of a Classroom Language Development Program on Psycholinguistic Abilities and Intellectual Functioning of Slow Learning and Borderline Retarded Children". (Unpublished Ed.D. Dissertation, University of Kansas, 1966).

visual and tactual) and two major types of output (vocal and motor). Since channels refer to combinations of input and output, the channels were auditory-vocal, auditory-motor, visual-vocal, visual-motor, tactual-vocal and tactual-motor.[4]

Three levels of organization are described. These three levels include a representational level, integration level and a projection level. The representational level is considered the highest level of language functioning which involves the mediation of linguistic symbols or the attaching of meaning and significance to these symbols. Automatic aspects of language or the more habitual activities of response chains and prediction of future events from past events are included at the integration level of linguistic abilities. The final level or organization in the Osgood model is the projection level which deals with innate physiological processes. This level could not be altered by learning and was not considered in the development of the ITPA.[5]

Processes of language organization and usage include decoding, encoding and association. Decoding is

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[4]James J. McCarthy and Samuel A. Kirk. The Construction, Standardization and Statistical Characteristics of the Illinois Test of Psycholinguistic Abilities. Photo Press, Inc., Madison, Wisconsin, 1963, p. 1.

[5]Ibid.

considered the sum total of those abilities needed to acquire meaning from auditory or visual stimuli or the understanding of what is seen or heard. Encoding on the other hand is the sum total of those abilities necessary to express one's ideas or thoughts or the ability to communicate meaning to others. The association process is essentially the sum total of those abilities required to manipulate linguistic symbols or the ability to gather meaningful relationships between various linguistic symbols.[6]

The Osgood Model of communication has three levels (representational, integration and projection) with the integration level divided into two sublevels (automatic and sequential), six channels of communication (auditory-vocal, auditory-motor, visual-vocal, visual-motor, tactual-vocal and tactual-motor), and three processes (decoding, encoding and association). With the test authors' definition of a psycholinguistic ability as ". . . a given process at a given level via a given channel,"[7] the model provides for seventy-two psycholinguistic abilities or seventy-two possible tests. By dropping the projection level and four channels (tactual-vocal, tactual-motor, auditory-motor and visual-vocal) a

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[6] Ibid. p. 2

[7] Ibid.

total of eighteen possible tests still remained. A further reduction in tests was still desired and the final model includes six tests at the representational level involving two channels and three processes and two tests each at the automatic and sequential sublevels of the integration level.

Efforts to include processes (decoding, encoding and association) at the integration level were abandoned in favor of "whole tests" because of an inability to distinguish the processes psychometrically at this level. Attempts to develop a test involving the visual-motor channel at the automatic level failed, reducing the number of tests at the integrative level to three --- one test at the automatic level and two tests at the sequential level. Because of a departure from the model in developing tests at the integrative level, this level is referred to as the automatic-sequential level in the final battery.[8] The final clinical model of the ITPA is presented in Figure 1.

The development of the tests covered a period of approximately ten years. The earliest version of the ITPA, the DLFT, was standardized on young children two to six years of age. Standardization and development

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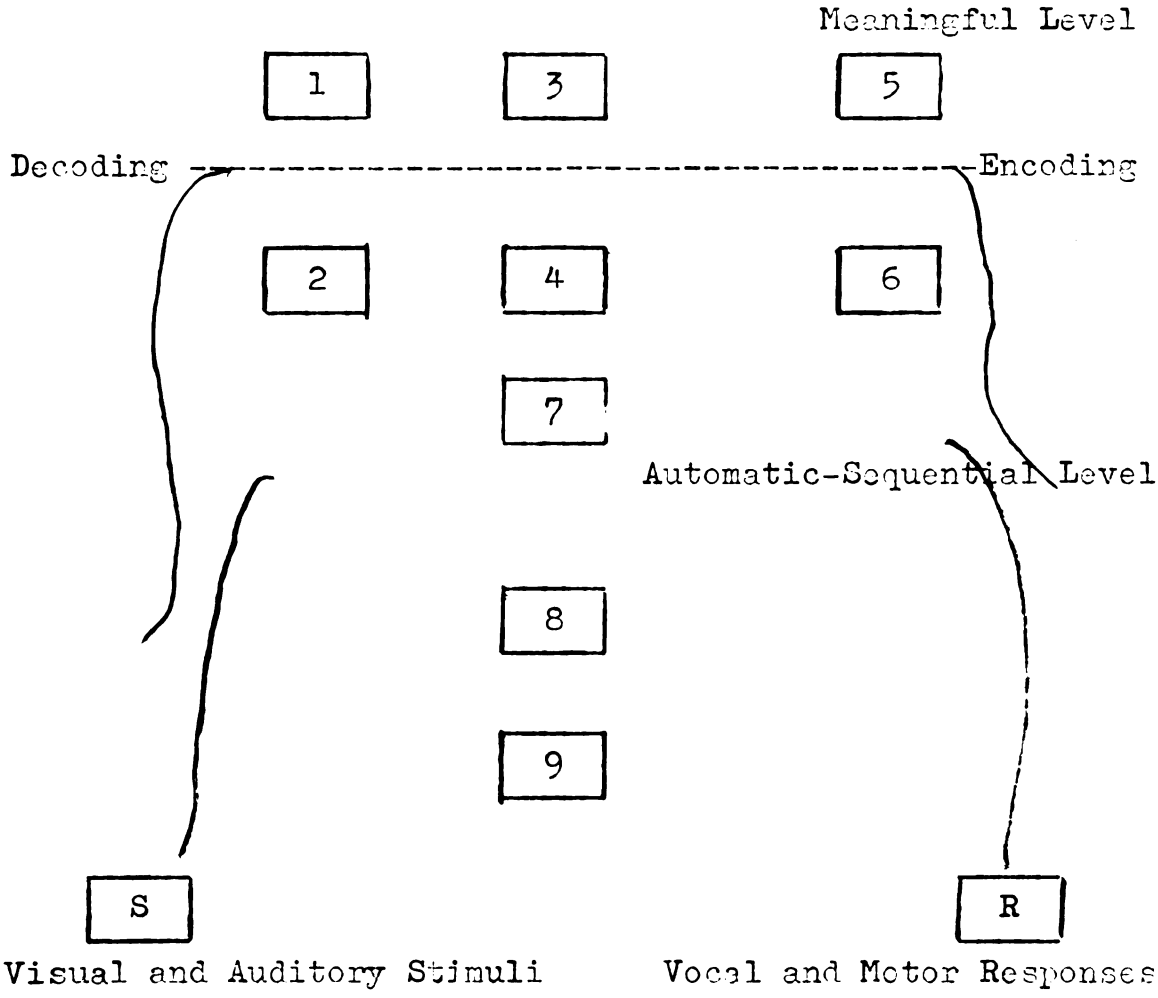
[8] Ibid.

FIGURE 1

THE CLINICAL MODEL FOR THE ILLINOIS TEST OF PSYCHOLINGUISTIC ABILITIES[9]



Meaningful Level	Automatic-Sequential Level
1. Auditory Decoding	7. Auditory-Vocal Automatic
2. Visual Decoding	8. Auditory-Vocal Sequential
3. Auditory-Vocal Association	9. Visual-Motor Sequential
4. Visual-Motor Association	
5. Vocal Encoding	
6. Motor Encoding	

[9] Ibid., p. 5.

of the DLFT was reported by Sievers[10] in 1955 as a doctoral dissertation. The present experimental version of the ITPA was designed for children between the ages of two and one-half and nine years of age. Prior to the standardization of the experimental version, the test was developed, field tested, analyzed statistically and revised three different times. Development of the final version covered four years of research.[11]

The standardization sample for the present ITPA battery included 700 children between two and one-half and nine years of age in the city of Decatur, Illinois. The standardization population was representative of the socio-economic level in the state of Illinois and the range of IQ was from 80 to 120 on the S-B. Children with severe physical or sensory defects and those of the Negro race were excluded from the standardization population.[12]

The numbers in Figure I refer to the nine subtests of the ITPA battery. In order to more adequately describe the various psycholinguistic abilities assessed by the ITPA, a brief discussion of each test follows. This

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[10] Dorothy J. Sievers. "Development and Standardization of a Test of Psycholinguistic Growth in Preschool Children." Selected Studies on the Illinois Test of Psycholinguistic Abilities, by Dorothy J. Sievers et al. Photo Press, Inc., Madison, Wisconsin, 1963, pp. 1-26.

[11] McCarthy and Kirk. op. cit., p. 6.

[12] Ibid., p. 14.

discussion is taken from McCarthy and Kirk with a few omissions and alterations.[13]

I. Tests at the Representational Level.

Tests at this level assess some aspect of the subject's ability to deal with linguistic symbols: To understand the meaning of symbols (decoding), to express ideas in symbols (encoding), or to relate symbols on the basis of their meaning. (association). There are six tests at this level which involve the use of two channels (auditory-vocal and visual-motor) and three processes (decoding, encoding and association).

A. The Decoding Tests

Decoding is the ability to comprehend auditory and visual symbols; that is the ability to comprehend spoken words, written words and pictures.

Test 1. Auditory Decoding is the ability to understand the spoken word. This ability is assessed by a "controlled vocabulary" test on which the subject is presented with a simple question, the answer to which depends upon his knowledge of the words involved more than upon the content (e.g., Do females slumber?).

[13] Ibid., pp. 6-13.

A simple "yes" or "no" response, or a gesture response, is required of the subject. Since expression (encoding) is kept to a minimum, it is assumed that failure is due to an inability to decode.

Test 2. Visual Decoding is the ability to comprehend pictures and written words. This ability is assessed by a picture test. The subject is shown a stimulus picture which is then removed. Next he is shown a set of four comparison pictures of which one is perceptually, rather than physically similar to the stimulus picture. His task is to select the perceptually-similar or comparison picture. By a simple pointing response, the subject must indicate that he comprehends or gets meaning from the picture.

B. The Association Tests.

Association is the ability to relate visual or auditory symbols (which stand for ideas) in a meaningful way.

Test 3. Auditory-Vocal Association is the ability to relate spoken words in a meaningful way. This ability is assessed with a version of the familiar "analogies" test in which the subject must complete the

test statement by supplying an analogous word (e.g., Soup is hot: ice cream is _____). An attempt was made to construct each item in the test so that decoding and encoding requirements were at least two years below the level for which a given analogy was designed.

Test 4. Visual-Motor Association is the ability to relate visual symbols in a meaningful way. In this test, the subject is required to relate pictures of common objects either on a transitional basis (sock goes with shoe) or on a substitutional basis (boys and girls are people). The subject must select from among four pictures the one "which goes with" a given stimulus picture. Decoding is kept simple by using familiar pictures and encoding is accomplished by simply having the subject answer by pointing.

C. The Encoding Tests.

Encoding is the ability to put ideas into words or gestures.

Test 5. Vocal Encoding is the ability to express ideas in spoken words. In this test, the subject is asked to describe a simple object such as a block or ball. His score depends on the number of unique and meaningful

ways in which he characterizes a given test object.

Test 6. Motor Encoding is the ability to express one's ideas in meaningful gestures. In this test, the subject is shown a picture of an object and asked to SHOW ME WHAT YOU SHOULD DO WITH THIS. A few actual objects are included as a concession to the youngest subjects. Pictures and objects were those which could be identified by the youngest subjects so that decoding would not be a possible cause of failure on this task.

II. Tests at the Automatic-Sequential Level

Tests at this level deal with the nonmeaningful use of symbols, principally their long-term retention and the short-term memory of symbol sequences.

A. The Automatic Test.

Our frequent use of a language with its abundant redundancies, leads to highly overlearned or automatic habits for handling its syntactical and inflectional aspects without conscious effort. We become so familiar with linguistic structure, that we come to expect or predict, among other things, the grammatical structure of what will be said or read from what has

already been heard or seen. These automatic habits permit one to give conscious attention to the content of a message while the words with which to express that message seem to come automatically.

Test 7. Auditory-Vocal Automatic ability permits prediction of future linguistic events from past experience. It is assessed by requiring the subject to complete a statement with an inflected word (e.g., HERE IS AN APPLE. HERE ARE TWO _____.) The nature of the inflection supplied will indicate the ability of the subject to predict what will be said. Pictures of meaningful and familiar objects are used as supporting visual stimuli in this test.

B. The Sequencing Tests.

Sequencing, as defined in these tests, is the ability to correctly reproduce a sequence of symbols; it is largely dependent upon visual and/or auditory memory and habits.

Test 8. Auditory-Vocal Sequencing is the ability to correctly repeat a sequence of symbols; it is a test of immediate auditory recall. This ability is assessed by the standard digit repetition test with the

following exception: 1) digits are uttered at the rate of two per second instead of the usual one per second; 2) a second presentation of the digits is permitted if the subject misses the first presentation.

Test 9. Visual-Motor Sequencing is the ability to reproduce a sequence of visual stimuli from memory. A set of small chips is used, each chip having a picture of geometric form. The examiner arranges the chips in a certain order, allows the subject to observe this order for five seconds, mixes the chips, and requires the subject to reproduce the sequence of chips exactly. This test was designed as a visual-motor counterpart to the Auditory-Vocal Sequencing test and also permits the second presentation of a sequence if the first is failed and the same geometric forms are often used twice in a given sequence.

Reliability data of the ITPA were reported by McCarthy and Kirk in 1963 in the same volume from which the above information was taken. The test authors have computed two forms of reliability; 1) internal consistency reliability for each subtest, and 2) stability reliability by means of test-retest and split-half reliability coefficients for each subtest and the total test.

Since each test was designed to measure a given psycholinguistic ability, internal consistency reliability was computed to determine if the items within each test were testing the same ability. For the 700 subjects in the standardization population, internal consistency coefficients of each test ranged from .89 on the Motor Encoding subtest to .95 on the Auditory-Vocal Association and the Auditory Decoding subtests.[14]

A test-retest stability coefficient of a three month interval or greater for a restricted age range from six to six and one-half years on the total ITPA was .70. An estimate of the full age range stability coefficient was .97. When split-half reliability coefficients were computed, a reliability coefficient of .99 was obtained on the full age range for the ITPA total.[15]

An extensive validity study of the ITPA was reported by McCarthy and Olson[16] in 1964. This study investigated the concurrent, predictive, content, construct and diagnostic validities of the ITPA.

Concurrent validity was determined by the degree

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[14] Ibid., p. 29.

[15] IBid., p. 14.

[16] James J. McCarthy and James L. Olson. Validity Studies on the Illinois Test of Psycholinguistic Abilities. University of Illinois Press, Urbana, 1964.

of correlation with criterion tests which were of a similar qualitative nature as the various subtests of the ITPA. These same criterion tests were readministered approximately three months later to determine the predictive validity of the ITPA battery and the separate subtests. In general, the correlations between the ITPA battery and the criterion tests were in the predicted direction and magnitude expected with the exception of data concerned with "mean-length of response" and "sentence complexity". The investigators were unable to explain the latter results. Concurrent validity correlations for all other criterion tests and the ITPA battery were from .34 to .50. The predictive validity of these same criterion tests three months later was found to be from .34 to .46.[17] These correlations were interpreted as minimal estimates since they were based on a rather homogeneous age group with chronological ages between seven years and eight-years-six-months. The total ITPA was thought to possess adequate concurrent and predictive validity on the bases of the evidence presented.[18]

When concurrent and predictive validity of the individual subtests were analyzed the subtests fell into three distinct categories of 1) adequate, 2) qualified

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[17] Ibid., p. 14.

[18] Ibid., p. 21.

and 3) questionable or doubtful validity. The tests which appeared to clearly possess adequate concurrent and predictive validity were Visual Decoding, Visual-Motor Association and Auditory-Vocal Sequencing. Another set of three subtests was considered to have questionable validity since they appeared to be measuring something in addition to what the test authors had intended. These three subtests were Auditory Decoding, Auditory-Vocal Association and Visual-Motor Sequencing. Subtests of questionable or doubtful validity were Vocal Encoding, Motor Encoding, and Auditory-Vocal Automatic.[19]

It must be emphasized that the criterion measures employed were those which McCarthy and Olson intuitively felt were assessing the same abilities as the tests upon which they were compared. Since the criterion tests were selected in much the same manner as the subtests and compounded with the almost impossible task of finding language abilities existing in their pure form, it appears that only tentative conclusions can be drawn from these studies at the present time.

Content validity studies indicate that the items within each subtest are measuring the same thing. These studies also support the contention that each of the subtests are measuring different abilities from the low correlations between the individual subtests. A "logical

[19] Ibid., pp. 21-22.

analysis", by the authors', of the single ability character of the subtests at the representational level indicated that: 1) some association ability contaminates the decoding tests, 2) decoding and encoding contaminate the association subtests although both these abilities are of much less difficulty than the association requirement and 3) the encoding tests are relatively free of decoding and association abilities but some contamination exists between each test (Motor Encoding and Vocal Encoding).[20]

The influence of various factors on the ITPA was investigated to determine construct validity. Mental age was found to be highly related with ITPA scores. Social class, birth order and number of siblings in the family were found to have small, but significant, negative correlations with ITPA scores. This finding applied to the total ITPA and to the subtests as well; however, the auditory-vocal channel was found to be affected most by these factors. Time as a factor involved in test-retest comparisons has not been found to greatly influence ITPA scores. This has been demonstrated by various studies on normal, mentally retarded and cerebral palsied children over test-retest periods of three days to nine months.[21]

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[20] Ibid., pp. 36-37.

[21] Ibid., p. 50.

An analysis of the subtests in each process, channel and level indicated that small but definite relationships do exist. This relationship was most evident between tests in the same channel and very slight between subtests with the same process.[22]

The final type of validity investigated was diagnostic validity---"the extent to which test results and clinical observations agree."[23] Two techniques were used to determine the diagnostic validity of the ITPA: 1) teachers ranked children according to their assumed language abilities, and these rankings were correlated with the obtained ITPA scores; 2) ITPA "experts" classified six different types of children by inspecting the ITPA profiles of sixty children. Because of a faulty research design, the correlations of the teachers' rankings with ITPA scores could not be interpreted. Experts were able to identify better than chance the profiles of six groups of children, with ten in each group from the following categories: normal, cerebral palsied, trainable mentally retarded, educable mentally retarded, deaf and speech defective. Although the four experts classified the sixty children in their respective categories on a better than chance basis, in no case were the classifications

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[22] Ibid., p. 51.

[23] Ibid., p. 52.

Perfect.[24]

In summarizing the results of these extensive validity studies on the ITPA, McCarthy and Olson wrote:

> It is difficult, indeed, to make an overall judgment about the validity of the ITPA battery and subtests, for the qualitative-quanitative studies reported herein are not subject to simple summation. Generally, the data suggest the concurrent, construct, and predictive validities to be adequate, followed by the content and diagnostic. The chief cautions to the test users would be these:
>
> . . . Our Data suggest that the Encoding subtests and especially, the Auditory-Vocal Automatic subtest, may deviate from the definition in the Examiner's Manual. It is particularly critical that, when a diagnosis or a prescription for remediation is based on the results of these subtests, ad hoc tests and clinical observation be used to confirm performance on them. Of the three, the Vocal Encoding subtest appears to be the most valid.
> . . . . . .
> if the above cautions are observed, the clinician will find the ITPA, to be an adequately valid test.[25]

The Frostig Developmental Test of Visual Perception (DTVP)

The effects of the specific educational therapy on visual perception development was measured by the DTVP. The DTVP was developed by Frostig in collaboration with Lefever and Whitlesey[26] to assess visual perceptual

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[24] Ibid., p. 62.

[25] Ibid., pp. 66-67.

[26] Marianne Frostig, D. Welty Lefever and John R. B. Whittlesey. The Marianne Frostig Developmental Test of Visual Perception. Consulting Psychologist Press, Palo Alto, 1964.

abilities and disabilities in normal children between four and eight years of age. This instrument was developed on the basis of clinical observation of children referred to the Marianne Frostig School of Educational Therapy because of learning difficulties.[27] It was observed that most of these children were found to have visual or auditory perceptual disturbances. Disturbances in visual perception, however, were most frequently observed and seemed to contribute to the learning difficulties in the following way:

A. Children handicapped by poor eye-motor coordination had difficulty with writing.

B. Children with disturbances in figure-ground perception could not recognize words.

C. Those thought to have poor form constancy had difficulty recognizing letters and words written in different sizes and words printed in upper-case when they were used to seeing them in lower-case.

D. Children having difficulty perceiving position in space produced letters or words in mirror writing.

E. Children having difficulty in analyzing

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[27]Marianne Frostig, Phyllis Maslow, D. Welty Lefever and John R. B. Whittlesey, "The Marianne Frostig Developmental Test of Visual Perception 1963 Standardization", Perceptual and Motor Skills, 19: 463-99, Monograph Supplement 2-V19, 1964, p. 464.

> spatial relationships tended to interchange the order of letters in a word and frequently were unable to read or spell longer words.[28]

Frostig believed that each of the above five abilities developed independantly of the others and that specific relationships should exist between them and the ability to learn. On this basis she constructed a test to explore these five specific areas of visual perception.

The development of these tests covered a period of about five years. A pilot study was made in 1959 and following the indicated changes, a second version of the test was prepared in 1960. The second edition was used on only a limited sample and led to further changes which were incorporated into the present version of the test. This present version was published in March 1961 and is referred to as the third edition.[29]

One of the major innovations of the present test was the introduction of the concepts of "perceptual age" and "perceptual quotient". Perceptual age level as used by Frostig, refers to a form of mental age defined in terms of the performance of the average child in the corresponding age group for the particular subtest.[30] Consequently, the perceptual age is an estimate of the

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[28] Ibid.

[29] Ibid.

[30] Ibid., p. 469.

developmental level of a child. Like mental age, however, perceptual age lacks a chronological age referent and does not estimate ability to profit from regular instruction in public school.

Perceptual quotient, as used by Frostig, is a deviation score obtained from summing the subtest scores after correcting for age variation. For each age group the perceptual quotient has a median of 100 and constant percentile points consistent with the IQ values of the WISC. The perceptual quotient is not defined as a ratio, but rather in terms of constant percentiles above and below the median. Its value derives from providing a basis for comparing a particular child's level of visual perceptual ability with that of his peers.[31]

Standardization of the Frostig test was done on 2116 unselected school children at the nursery, first, second and third grade levels. The sample used was deficient geographically as well as socio-economically because it was drawn from a restricted area and socio-economic data was not available. The present standardization sample is described as overwhelmingly middle class in nature excluding negro children.[32]

For purposes of discribing the five visual

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[31] Ibid., pp. 478-79.

[32] Ibid., pp. 467-68.

perceptual abilities assessed by the DTVP, a brief discussion of perception and each of the perceptual tests follows. This disucssion is taken from Frostig and Horne.[33]

Perception is the ability to recognize stimuli. This ability includes not only the reception of sensory impressions from the outside world and from one's own body, but the capacity to interpret and identify the sensory impressions by correlating them with previous experiences. This recognition and integration of stimuli is a process that occurs in the brain, not in the receiving organ, such as the ear or the eye.

Test 1. Eye-Motor Coordination is the ability to coordinate vision with movements of the body or with movements of a part or parts of the body. Whenever a sighted person reaches for something, his hands are guided by his vision. In this way the smooth accomplishment of many everyday activities depends upon adequate eye-motor coordination. This ability is assessed by a test of eye-hand coordination involving the drawing of continuous straight, curved and angled lines between boundaries of various width or from point to

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[33] Marianne Frostig and David Horne. The Frostig Program for the Development of Visual Perception. Follett Publishing Company, Chicago, 1964.

point without guide lines.

Test 2. Figure-Ground Perception is the ability to select from the mass of incoming stimuli a limited number of stimuli, which become the center of attention. These selected stimuli form the figure in the person's perceptual field, while the majority of stimuli form a dimly perceived ground. The figure is the center of the observer's attention and when his attention is shifted to something else, the new focus of attention becomes the figure and the previous figure recedes into the ground. This ability is assessed by a test involving shifts in perception of figures against increasingly complex grounds. Intersecting and imbedded geometric forms are additionally used.

Test 3. Perceptual Constancy is the ability to perceive an object as possessing invariant properties, such as shape or size, in spite of the variability of the sensory impression. For example, constancy of shape involves the ability to recognize two-and-three-dimensional forms as belonging to certain categories of shapes, irregardless of size, mode of presentation or the angle seen by the perceiver. Size constancy is the ability to perceive and recognize the

actual size of an object regardless of factors that may change its apparent size. This ability is assessed by a test involving the recognition of certain geometric figures presented in a variety of sizes, shadings, textures and positions in space and their discrimination from similar geometric figures. Circles, squares, rectangles, ellipses and parallelograms are used.

Test 4. Perception of Position in Space is the ability to perceive the relationship of an object to the observer. Spatially, at least, a person is always the center of his own world and perceives objects as being behind, before, above, below or to the side of himself. This ability is assessed by a test involving the discrimination of reversals and rotations of figures presented in series. Schematic drawings representing common objects are used.

Test 5. Perception of Spatial Relationships is the ability of an observer to perceive the position of two or more objects in relation to himself and in relation to each other. For example, a child stringing beads has to perceive the position of the bead and the string in relation to himself as well as the position of the bead and the string in relation to each other.

> Since different parts perceived in relation to each other are not actually perceived simultaneously but rather in temporal sequence, and since these successive observations are integrated step-by-step into a total picture, a sequential-integrating process is thereby involved. This ability is assessed by a test involving the analysis of simple forms and patterns. These consist of lines of various lengths and angles which the child is required to copy using dots as guide points.

Stability reliability of data of the DTVP is presented by Frostig in two forms: 1) test-retest reliability and 2) split-half reliability.[34] A test-retest stability coefficient of a two-week interval for two groups of thirty-five first graders and two groups of thirty-seven second graders was computed. The estimate for the entire sample was a .80 and subtest scale score test-retest correlations ranged from .42 (figure-ground) to .80 (form-constancy). An item analysis on all tests of children in the sample aged five years or older is reported. In general split-half reliability correlation coefficients for the total test decrease slightly with increasing age. Values range from a high at the five to six year age

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[34] Ibid., Frostig, Maslow, Lefever and Whittlesey, pp. 488-92.

group of .89 to a low at the eight to nine year age group of .78.

Validity has been studied through correlations between scaled scores (1961 standardization) and teacher ratings of classroom adjustment .44, motor coordination .50 and intellectual functioning .50. Product moment correlation coefficients were obtained between the perceptual quotient and the Goodenough IQ. These ranged from .32 to .46. A study reported by Appleton revealed the Frostig test to be "highly accurate" in identifying children who would not attempt to learn to read when exposed to reading material but not forced to use it.[35]

Olson investigated the predictive value of the Frostig test to general achievement in second grade and the relationships between Frostig test scores and estimates of specific reading abilities.[36] He reports that while the Frostig Test does not predict general achievement as well as some other tests, four of the subtests (excepting form constancy) showed significant relationships with specific reading abilities.

The Frostig test has been reviewed in Buros by

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[35] Ibid. pp. 492-97.

[36] Arthur V. Olson, Relation of Achievement Test Scores and Specific Reading Abilities to the Frostig Developmental Test of Visual Perception". Perceptual and Motor Skills, 22: 179-184, 1966.

Anderson and Austin.[37] Anderson describes the primary use of the test as predicting learning success and notes that it contains types of items used in reading readiness tests. He acknowledges that "The authors of this test have a real contribution to offer to educators and psychologists alike. . ." However he believes the test was offered prematurely. In general he likes the concepts of perceptual age and perceptual quotient. He reports that both reliability and validity studies are "promising and even exciting though they are done on inadequate samples and on varying age groups." Austin believes the Frostig test to be "significant" for screening early elementary and pre-school children and as a clinical tool for children beyond first grade.

Wechsler Intelligence Scale for Children (WISC)

The effects of the specific education therapy on intellectual functioning was measured by the WISC. The WISC is described as a downward extension of the adult-normed Wechsler-Bellevue. It consists of twelve subtests, two of which are designated as supplementary tests. The subtests are grouped into two scales designated as Verbal Scale and Performance Scale. Raw scores on each subtest are converted into normalized standard scores having a

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[37] James M. Anderson and Mary C. Austin, The Sixth Mental Measurement Year Book, Oscar K. Buros, editor, New Jersey: The Gryphon Press, 1965, pp. 855-57.

mean of 10 and a standard deviation of three points. These scaled subtest scores are added and converted into a deviation IQ with a mean of 100 and a standard deviation of 15. The test yields Verbal, Performance and Full Scale IQ's which are computed by this method.[38] The WISC was standardized on a total of 2200 cases and is evaluated as being more representative than any other sample employed for standardizing individual tests. Split-half reliability coefficients are reported for the three summary scores and they range from .86 to .96. Validity investigations of the WISC have found fairly high concurrent validity coefficients between WISC scores and achievement tests. Comparison of WISC and Stanford-Binet IQ's have yielded correlations ranging from .60 to the .90's.[39] The WISC has been reviewed in Buros on three occasions. (6:540), (5:416) and (4:363).[40] Burstein, the most recent reviewer states:

> In the nearly fifteen years since its introduction, it has not displaced the older Stanford-Binet, but has certainly come to rival its predecessor as an instrument of choice in the testing of school age children.

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[38]David Wechsler, WISC Manual, New York: The Psychological Corporation, 1949. pp. 1-6.

[39]Anne Anastasi, Psychological Testing, Second Edition (New York: The Macmillian Company, 1961) pp. 315-20.

[40]Buros, op. cit., pp. 843-45.

Lee-Clark Reading Readiness Test (LCRRT)

The effects of the specific educational therapy on academic ability was measured, in part, by the LCRRT. The 1962 revision of the LCRRT is identical to the previous editions published in 1943 and 1951 except for the format changes and, in the concepts subtest, revision of all art work and half of the items.[41] The test's primary objective is predicting the ability to learn to read. The test has four subtests which yield three part scores and, when combined, a total score. The subtests include: Test 1, a letter matching test; Test 2, a letter discrimination test; Test 3, an oral vocabulary test that also measures understanding of concepts, ability to follow instructions and knowledge of meanings; and Test 4, a similarities and differences test using letters and word formations as stimuli.[42] Reliability coefficients obtained on split-halves by the Spearman-Brown formula range from .83 to .94 on the subtests with .92 for the total score. Research data reported show coefficients of correlation between LCRRT scores and other reading tests ranging above the .40's. Where the criterion reading test was also correlated with either teachers' ratings or

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[41] Oscar K. Buros, The Sixth Mental Measurements Yearbook, New Jersey: the Gryphon Press, 1965, p. 846.

[42] J. Murray Lee and Willis W. Clark, LCRRT Manual, Monterey: California Test Bureau, 1962, pp. 2-3.

group intelligence tests, the LCRRT most frequently yielded the higher coefficient. The LCRRT has been reviewed in Buros, (5:678) and (3:517).[43] According to Hobson, the LCRRT is evaluated as "a superior screening test with surprising reliability and validity for its purpose, considering its brevity." He also cautions however that ". . . scores should not be interpreted too minutely and it should be followed up by additional diagnostic instruments."

The Wide Range Achievement Test (WRAT)

The effects of the specific educational therapy on academic ability was also measured, in part, by the WRAT. The WRAT is an instrument for the study of the basic school subjects of reading (word recognition and pronunciation), written spelling and arithmetic computation. The method of measuring the basic subjects was chosen to: (a) study the sensory-motor skills involved in learning to read, spell, write and figure; (b) to provide simple and homogeneous content; and (c) to avoid duplication with tests of comprehension. The WRAT has three independently scored subtests:[44]

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[43] James R. Hobson, "Lee-Clark Reading Readiness Test", The Fifth Mental Measurements Yearbook, New Jersey: The Gryphon Press, 1959, pp. 777-78.

[44] J. F. Jastak and S. R. Jastak, "The WRAT Manual", Wilmington: Guidance Associates, 1965, p. 1.

A. Reading is measured by recognizing and naming letters and pronouncing words.

B. Spelling is measured by copying marks resembling letters, writing the name and writing single words to dictation.

C. Arithmetic is measured by counting, reading number symbols, solving oral problems and performing written computations.

Split-half correlation coefficients are reported by age group and by subtest for a sample of 200 subjects in each classification. Of the forty-two coefficients reported, the lowest is .94.[45] A rather extensive discussion of validity is presented together with six different approaches to estimating the WRAT's validity.[46] In every category the WRAT is reported to perform well. For example, coefficients that range from .74 to .93 are reported for comparisions of the WRAT with seven other achievement tests.

The WRAT has not been reviewed in Buros, however, references are reported.

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[45] Ibid., p. 13.

[46] Ibid., pp. 15-19.