AN ABSTRACT OF THE THESIS OF

Mary Josephine Levenspiel for the degree Doctor of Philosophy
(Name) (Degree)

in EDUCATION presented on JANUARY 23, 1975
(Major Department) (Date)

Title: A STUDY OF THE RELATIONSHIPS BETWEEN SELECTED PERCEPTUAL-MOTOR BEHAVIORS AND: ACHIEVEMENT IN READING; ACHIEVEMENT IN MATHEMATICS; CLASSROOM BEHAVIOR; ACADEMIC SELF-CONCEPT; AND ACADEMIC MOTIVATION FOR FIRST AND THIRD GRADE BOYS AND GIRLS

Abstract approved: Redacted for privacy
Anna R. Meeks

This study investigated the relationships between selected perceptual-motor behaviors and the following: achievement in reading, achievement in mathematics, academic self-concept, academic motivation and classroom behavior. This investigation was designed to explore the suggestion of Newell Kephart that there is a relationship between perceptual-motor behavior and school success, and to provide useful information for future research projects which could lead to the development of training programs.

The subjects for this study consisted of 84 students, 49 girls and 35 boys, from the first and third grades at Lincoln School, Corvallis, Oregon. The following tests were administered to all subjects: the Metropolitan Achievement Test, to assess achievement in reading and mathematics, the Self-Concept and Motivation Inventory, to assess academic self-concept and academic motivation,

the Devereux Elementary Behavior Rating Scale, to assess classroom behavior, and six sub-tests from the Purdue Perceptual-Motor Survey, to assess the perceptual-motor behaviors of balance, jumping, angels-in-the-snow, obstacle course, chalkboard and identification of body parts.

The data from this study were analysed in the following manner: Using the Pearson product moment coefficient of correlation, "r" values were determined showing the relationship between the scores obtained on the six sub-tests of the Purdue Perceptual-Motor Survey and the scores obtained on the other tests administered; t-tests were run to determine the differences in the "r" values obtained for boys and girls and first and third grade subjects; and tests of significance were run for each correlation coefficient obtained. The t-test analysis revealed no significant difference between the "r" values for boys and the "r" values for girls in any of the comparisons. A significant difference was found between the "r" values for first and third grade subjects in the correlation between perceptual-motor behavior and academic motivation. Comparisons were not made between first and third grade subjects in mathematics and reading correlations because different test batteries were administered and were not comparable.

Correlation coefficients were found between first grade reading scores and the following perceptual-motor scores: the total perceptual-motor behavior score $p < .001$, angels-in-the-snow $p < .001$, jumping $p < .001$, balance $p < .001$, identification of body parts $p < .05$, and chalkboard $p < .10$.

Correlation coefficients were found between first grade mathematics scores and the following perceptual-motor scores: the total perceptual-motor score $p < .001$, jumping $p < .001$, balance $p < .001$, angels-in-the-snow $p < .001$ and chalkboard $p < .10$.

Correlation coefficients were found between third grade reading scores and the following perceptual-motor scores: the total

perceptual-motor score $p < .01$, balance $p < .05$, jumping $p < .01$, identification of body parts $p < .01$, obstacle course $p < .10$ and chalkboard $p < .10$.

Correlation coefficients were found between third grade mathematics scores and the following perceptual-motor scores: the total perceptual-motor score $p < .001$, balance $p < .01$, jumping $p < .01$, identification of body parts $p < .01$, obstacle course $p < .05$ and chalkboard $p < .05$.

Correlation coefficients were found between classroom behavior and the following perceptual-motor scores: the total perceptual-motor score $p < .01$, balance $p < .05$, jumping $p < .10$, identification of body parts $p < .001$, obstacle course $p < .10$ and chalkboard $p < .05$.

None of the correlation coefficients between perceptual-motor behavior and academic self concept were found to be significant at the significance levels of .10, .05, .01 and .001. The findings for the relationship between academic motivation and perceptual-motor behavior were inconclusive.

This study has identified perceptual-motor behaviors which are definitely related to achievement in reading, achievement in mathematics and classroom behavior. These findings are consistent with Kephart's suggestion that perceptual-motor development is related to school success. By identifying the specific perceptual-motor behaviors which are related to school success the findings of this study have provided useful data for the design of experimental research projects and the development of perceptual-motor training programs. Further research is indicated to explore the relationships between self-concept, motivation and perceptual-motor behaviors.

A Study of the Relationships between Selected Perceptual-Motor Behaviors and: Achievement in Reading; Achievement in Mathematics; Classroom Behavior; Academic Self-Concept; and Academic Motivation for First and Third Grade Boys and Girls

by

Mary Josephine Levenspiel

A THESIS

submitted to

Oregon State University

in partial fulfillment of
the requirements for the
degree of

Doctor of Philosophy

Completed January 1975

Commencement June 1975

APPROVED:

Redacted for privacy

Professor Emeritus of Education
in charge of major

Redacted for privacy

Dean of School of Education

Redacted for privacy

Dean of Graduate School

Date thesis is presented January 23, 1975

Typed by Mary Jo Stratton for Mary Josephine Levenspiel

ACKNOWLEDGEMENTS

I wish to express my deepest appreciation to Dr. Anna Meeks for her unfailing encouragement, support and inspiration throughout my graduate studies.

Grateful and heartfelt thanks are also expressed:

to Dr. Mary Jane Wall and Dr. Elizabeth Hoyser and Margaret Orsi for their friendship, counsel and help in the preparation of this thesis.

to Pam McCoomas and Gail Meyer for their assistance in collecting the data for this study.

to the principal, teachers and students of Lincoln School for their cooperative participation in this thesis.

to my committee members Drs. Robert Krahmer, Glenn Clark, Edwin Anderson and Richard Connelly for their assistance throughout my graduate program.

to my husband, Octave and my children, Rebecca, Barney and Morris for their loving patience and cooperation in all of my educational endeavors.

TABLE OF CONTENTS

LIST OF TABLES

A STUDY OF THE RELATIONSHIPS BETWEEN SELECTED PERCEPTUAL-MOTOR BEHAVIORS AND: ACHIEVEMENT IN READING; ACHIEVEMENT IN MATHEMATICS; CLASSROOM BEHAVIOR; ACADEMIC SELF-CONCEPT; AND ACADEMIC MOTIVATION FOR FIRST AND THIRD GRADE BOYS AND GIRLS

I. INTRODUCTION

When a child enters school, an assumption is made that he will have developed certain skills which will enable him to begin mastery of the materials to be studied. For most children, this assumption is correct; however, there are a number of children, estimated at 10% to 30% of the school population (Wall, 1974), who have no serious genetic, physical or mental handicap, who seem unable to profit from the school experience. Helping these children realize their learning potential is an ever-present challenge to the classroom teacher and the education specialist.

Professionals in education, psychology and medicine have devoted years of research and study to the problem of learning disorders in children. This has resulted in greater understanding of educationally handicapped children and has given direction to instructional programs for the mentally deficient and physically handicapped. However, there are other children, known to every teacher, who "never seem quite able to learn what others are learning easily and readily" (Kephart, 1960). Barsch (1968) describes these children as follows:

> It is this group of children who have virtually become a limbo group floating between the mainstream of education and the specialized units. This group indicates an adequate intelligence when measured by currently available instruments, demonstrates no gross sensory impairment, appears to be culturally advantaged, and while perhaps exhibiting some signs of emotional problems is not seriously disturbed They cannot truly be classified in any of the existing Special Education categories and yet they do not learn at the pace and with the same efficiency as the mainstream demands

Kephart suggested that the learning problems of these children may be due to deficiencies in the child's perceptual-motor process, deficiencies caused by lack of experiences and practice, which can be remediated by perceptual-motor training. In 1960, Kephart put forth the premise that perceptual-motor behavior is positively related to school success. Using Kephart's premise as a theoretical base, this study will focus on the relationship between school success and perceptual-motor behavior with the intention of furthering the understanding of learning problems in school.

Need for the Study

Adopting the premise that there is a relationship between perceptual-motor behavior and school success, school districts throughout the country have developed numerous training programs designed to improve a child's perceptual-motor behaviors. The justification for these programs has usually been based on intuition and logic rather than empirical data obtained through research.

This has often led to poorly conceived and poorly executed programs resulting in disappointment and doubt as to the effectiveness of perceptual-motor training in promoting school success. This study recognizes the need for research, a need expressed by teachers and education specialists, to examine Kephart's premise that perceptual-motor behavior is related to school success. By identifying the strength, direction and significance of the relationships, if any, between perceptual-motor behavior and achievement in mathematics and reading, academic self-concept and academic motivation and classroom behavior, this study will provide the basic information upon which perceptual-motor training programs and empirical research may be designed.

If Kephart's premise is substantiated through research, there will be implications for the classroom teacher, parent education, special education programs and early childhood education.

Purpose of the Study

The purpose of this study is to investigate the relationships between selected perceptual-motor behaviors and the following: achievement in reading and mathematics; academic self-concept and academic motivation; and the classroom behavior for first and third grade boys and girls. Because there may be a sex difference in the perceptual-motor behavior of boys and girls and because there may

be a grade factor in perceptual-motor behavior, differences between boys and girls and first and third grade students in the above relationships will also be examined.

Theoretical Background

The perceptual-motor process involves receiving information through the senses, storing it and integrating it with previously stored information to create meaning and converting that meaning into action through muscle activity. The hyphen between the words "perceptual" and "motor" was first used by Kephart to indicate a continuous process. "We cannot think of perceptual activities and motor activities as two different items; we must think of the hyphenated term perceptual-motor" (Kephart, 1960). Barsch suggests that the hyphen be a two-way arrow ($\leftrightarrow$) because

> . . . the learner perceives in order to construct a meaningful world for himself. As he constructs he acts. He moves to find meaning. Each new acquisition excites further movements. He moves to perceive and perceives to guide his movements (Barsch, 1968).

Beginning at birth with the simple sensory-motor responses of the infant, the perceptual-motor process is developed through continuous experimentation in matching sensory information to the correct motor response. This requires many and varied experiences which are usually provided in the normal activities of childhood. Through his motor responses the child develops the basic movement

patterns of balance, posture and locomotion, and an awareness of his body in space. He learns to differentiate and control the two sides of his body, thus developing laterality, an inner awareness of right and left. He then learns directionality, the ability to project these directional concepts into external space (Kephart, 1960). The awareness of up-down, in-out, forward-backward, over-under, near-far, fast-slow, sequence and rhythm develops through the child's motor explorations. Thus it is through movement that the child gains knowledge about himself and his environment. According to Kephart, this knowledge is the foundation for further learning and is a basic readiness skill for reading and arithmetic. He says, ". . .there is evidence that the efficiency of the higher thought process can be no better than the basic motor abilities upon which they rest" (Kephart, 1960).

Perceptual-Motor Development and the Affective Domain

Kephart's premise is primarily focused on the relationship between perceptual-motor development and academic achievement. However, since educators are concerned with the child's feelings and behavior as well as his academic achievement, it is important to seek understanding of the factors which promote adequacy in the affective areas of learning as well as the cognitive (Bloom, 1964).

Classroom observations of children who have poor perceptual-motor skills describe their behavior as "not task oriented, trying to look busy without actually working and dependent upon others for direction and control" (Byron and Wheeler, 1972). They are distractable, hyperactive" (McCarthy, 1969) and "forgetful, inconsistent, aggressive, untidy, noisy and unable to sit still" (Cruickshank, 1970). According to Giffen (1968) these children

> . . . initially accept themselves as dumb. In addition to their self-concept of being stupid, slow, lazy or stubborn, the fundamental feelings of these children is probably that of anxious, unfocused confusion.

Cratty (1970) noted that without exception the child who has difficulty managing his body has a poor view of himself. Cruickshank (1961) states that ". . . if a child has a healthy body, but one that will not do what he wants it to, it just seems to him that he is always wrong." A child with low self-esteem and continuous failure in school may just give up. He may lose interest and motivation and withdraw from the learning situation.

The interrelatedness of the cognitive and affective domains of learning suggests the possibility of common, underlying factors which may promote adequacy in both areas. Piaget and Inhelder (1969) noted that intellectual development and emotional development are but two sides of the same coin, each having roots in the sensory-motor process. It may be that the development of an efficient

perceptual-motor process is one underlying factor important to the achievement of one's learning potential.

In summary, a relationship has been suggested, by Kephart and others, between school success and perceptual-motor development. This study was designed to explore that suggestion by examining the relationship between academic self-concept, academic motivation, classroom behavior, achievement in reading and mathematics and selected perceptual-motor behaviors.

Definition of Terms

Academic Self-concept. For this study, academic self-concept is the way the child views his role as a learner in school. It is the student's sum of experiences, perceptions, attitudes and feelings about school and school work, as measured by the Self-Concept and Motivation Inventory, described on p. 37-40.

Academic Motivation. Academic motivation refers to the expressed need of a child to achieve a goal and to avoid failure in school. For this study it will be measured by the Self-Concept and Motivation Inventory, described on p. 37-40.

Achievement in Reading. For this study, the total reading score obtained on the Metropolitan Achievement Test will reflect achievement in reading. The total reading score is made up of word knowledge, word analysis, reading, language and spelling. The Metropolitan Achievement Test is described in detail on p. 31-33.

Achievement in Mathematics. For this study the total mathematics score obtained on the Metropolitan Achievement Test will reflect mathematics achievement. The total mathematics score is made up of math concepts, math computation and problem solving.

Classroom Behavior. For this study, classroom behavior will be the overt behavior of the child in the classroom, observed by the teacher and assessed by the Devereux Elementary Behavior Rating Scale, described in detail on p. 33-37.

Perceptual-Motor Process. An orderly procedure which involves input, integration, output and feedback. One receives information through various sensory pathways, stores and indexes that information for future use, integrates that information with previously stored information to form meaning and translates that meaning into action through muscle activity. Sensory response to that activity is fed back into the system as new input, thus creating a closed system of control.

Perceptual-Motor Behavior. For this study perceptual-motor behavior refers to the child's performance on six selected sub-tests of the Purdue Perceptual-Motor Survey, described on p. 26-30.

Sensory-Motor. That stage in a child's development when language is absent and when information received by the child comes from simple reflexes and spontaneous movements progressing to complex sensory stimuli and controlled muscle activity.

Cognitive Domain. The area of learning which is primarily concerned with intellectual abilities and skills used in the acquirement of knowledge and problem solving.

Affective Domain. The area of learning dealing with attitudes, emotions, values, feelings and social behaviors.

Limitations of the Study

The sample selected for this study will only allow generalizations to be made with populations of similar composition.

The standardization statistics for the SCAMIN are, for the most part, unreported and unavailable, which will limit the interpretation of the results of this study.

The scoring criteria for the Purdue Perceptual-Motor Survey is based on observations of behavior, which, at times, is subjective. This will limit the generalization of the results of this study to other populations.

This study is not experimental but is descriptive in design and is limited to obtaining pertinent information about the direction, size and significance of existing relationships and not to showing proof of causation.

II. REVIEW OF LITERATURE

The review of the literature will include a brief discussion of five contemporary perceptual-motor programs which share areas of commonality with Kephart's premise that there is a relationship between perceptual-motor behavior and school success. It will also include a review of the research studies which are relevant to the purposes of this study.

Related Perceptual-Motor Programs

During the 1960's, a wave of perceptual-motor programs appeared within the educational community. Perhaps the most influential of these, in terms of emulation, is Kephart's; however, several others have served as models in creating perceptual-motor programs in private clinics and the public schools. They will be reviewed briefly to provide an indication of the similarity and diversity which exists in the various approaches to perceptual-motor training as it relates to school success.

Kephart (1960) developed the Purdue Perceptual-Motor Survey to identify those children with inadequate perceptual-motor behaviors. He also designed a training program to remediate identified perceptual-motor deficiencies. The training consists of activities to develop the perceptual-motor behaviors of form perception, ocular

control, perceptual-motor matching, balance, rhythm and body differentiation. He recommends use of the trampoline, balance board, walking beam, chalkboard and various stunts and games. Kephart stresses that no training technique should be a goal in itself. The purpose of the activity is to teach the child generalized skills; therefore, the performance on the walking board is not to teach a child how to walk a rail but to teach body balance and laterality. Emphasis is placed on frequent variations of a specific motor task to promote motor generalization.

Frostig (1964) developed the Marianne Frostig Developmental Test of Visual Perception and its companion, the Frostig Visual Perceptual Training Program, which are designed to predict, diagnose and provide remedial assistance in reading problems. The basis for Frostig's ideas is the assumption that reading ability depends upon adequate visual-perceptual skills. Her research and materials have focused primarily on the assessment and remediation techniques in the area of visual-perception. However, Frostig's recent book, Movement Education: Theory and Practice (1970), advocates gross motor activity similar to Kephart's program, as part of a training program. Her test is a paper and pencil test and her training program, designed for use in the classroom, covers five areas: eye-motor, figure-ground, constancy of shape, position in space and spatial relationships.

Getman (1964) developed a program of visual-motor activities based on the premise that visual perceptions evolve from actions of the entire body and that 85% to 90% of the child's learning is acquired through the visual process. His views are derived chiefly from a consideration of ocular mechanisms and visual perception; however, like Kephart, Getman proposes that movement is the basis of intellectual development. He has developed a five level model of visual-perceptual development which serves as a guideline for mind-body training. The levels are the innate response system, the general motor system, the special motor system, the speech motor system and the visualization systems. Getman stresses the importance of understanding all physiological action systems of the child in order to better understand how learning takes place.

According to Barsch (1968), movement efficiency is a fundamental principle underlining human functioning. Barsch's comprehensive Movigenic theory evolved from his attempts to find ways to improve learning efficiency of children. Movigenics is "an effort to view man as a totality in everything he does and to account for all components of that totality in any of his performances" (Barsch, 1968). Barsch, like Kephart, accepts the view that variations in experiences and opportunities to learn affect the motor bases for achievement and could account for learning difficulties in children. He has devised the Movigenic curriculum which promotes training in the

areas of muscular strength, dynamic balance, body awareness, spatial awareness, temporal awareness, the modalities of learning (gustatory, olfactory, tactual, kinesthetic, auditory and visual), rhythm, flexibility and motor planning.

Cratty (1972), in numerous books and articles, has outlined several models attempting to explain what he conceives to be the relationship between movement and intellectual activities. He generally rejects the ideas of those, like Kephart, who advance the theory that early movement attributes are the basis of intellectual development. He suggests a complex four-channel theory of development in which motor, verbal, perceptual and intellectual functioning are interwoven throughout human development. He contends that over-use of abilities in one channel (motor) may tend to blunt the emergence of abilities in other channels.

Perhaps the most controversial of all perceptual-motor training programs is that of Delacato (1959). His training procedures are designed according to a theory of "neurological organization" and are based on the belief that the full capacity of the brain is achieved by stimulation. The training emphasizes the importance of the motor patterns of infancy and advocates active or passive manipulation (patterning) of the body in prescribed movements in order to stimulate undeveloped parts of the brain. Incomplete or bilateral cerebral dominance is viewed by Delacato as the cause of speech and reading

disorders, thus the need for training to establish asymmetry in cerebral function. Both Kephart and Delacato advocate the remediation of omissions in development due to lack of experiences; however, Kephart differs significantly with Delacato in his emphasis on the development of generalized rather than specific motor skills.

Related Research

It is only in recent years that research based on Kephart's premise has been conducted. This is primarily due to the lack of standardized tests which reliably measure perceptual-motor behavior. Previous to the publication of the Purdue Perceptual-Motor Survey, investigators had to develop their own measurements of perceptual-motor behaviors or use tests developed for use in physical education research, which were usually tests of strength, speed and growth and had little to do with perceptual-motor behavior.

The research reviewed for this study includes three correlation studies which are directly related to the purpose of this study and five experimental studies which are related to the expressed need for this study. The experimental studies are based on Kephart's suggestion that the development of adequate perceptual-motor behaviors will improve school success. Two surveys of the research in the area of perceptual-motor training programs are also reviewed.

Perceptual-Motor Behavior and Academic Achievement

Correlation Studies

For a series of studies done in 1965, Ismail and Gruber (1967) developed 36 test items designed to measure perceptual-motor performance in activities using rhythm, balance and coordination. They then studied the relationship between these 36 items and the intellectual performance of 211 fifth and sixth grade children, 122 boys and 89 girls. The Otis Short Form Tests of Mental Ability and the Stanford Academic Achievement Test were administered to assess intellectual performance. The results from the study indicated a statistically significant correlation at the .01 level, between coordination test items and the Stanford Achievement Test. Significant correlations were also reported between balance test items and the Stanford Achievement Test and the Otis I.Q. test, and coordination test items and the Otis I.Q. Test. The correlations obtained seldom exceeded .30 to .40 which accounts for 9% and 16% of the common variance.

Little (1970) investigated the relationship between perceptual-motor efficiency, intelligence and academic achievement in normal third grade children. The sample consisted of 91 children, 44 boys and 47 girls. Perceptual-motor proficiency was determined by the

scores obtained on the Purdue Perceptual-Motor Survey. Intelligence and academic achievement were assessed by the Lorge-Thorndike Intelligence Test and the Iowa Tests of Basic Skills. Results of the study showed a statistically significant relationship between perceptual-motor proficiency and intellectual ability and a statistically significant relationship between perceptual-motor proficiency and academic achievement. However, perceptual-motor scores were not found to be more efficient predictors of academic achievement when combined with intelligence scores than intelligence scores were alone. Analysis of the sub-tests of the Purdue Perceptual-Motor Survey revealed that two sub-tests, Identification of Body Parts and Chalkboard activities, were consistently the best predictors of intelligence and academic achievement. Additional findings revealed that girls' perceptual-motor scores were significant predictors of intelligence and academic performance, whereas boys' perceptual-motor scores were not significant predictors.

Plack (1970) made an evaluation of the Purdue Perceptual-Motor Survey as a predictor of academic and motor skills. The sample consisted of 120 fourth grade students. Academic skills were measured by the Stanford Achievement Test and motor skills were assessed by the ability to skip forward, run in a zig-zag pattern and

throw and catch a ball. The following conclusions were reported:

1. A significant correlation between the Purdue Perceptual-Motor Survey and academic achievement was found.
2. The components of the Purdue Perceptual-Motor Survey do predict achievement in academic skills.
3. The components of the Purdue Perceptual-Motor Survey do predict achievement in motor skills.
4. Sex differences did appear in the prediction of both academic and motor skills.

Experimental Studies

Lipton (1968) randomly divided 92 first grade subjects into control and experimental groups, equated in terms of height, weight, age and sex. The subjects met for two sessions (30 min.) each week for 12 weeks. The experimental group received a perceptual-motor activity program as suggested by Kephart and the control group received a regular first grade physical education curriculum. The Purdue Perceptual-Motor Survey, the Developmental Test of Visual Perception and the Metropolitan Readiness Test were administered prior to and immediately following the research program. The F ratios for the three variables tested, perceptual-motor development, visual perception and reading readiness, were all significant beyond the .01 level in support of the perceptual-motor program.

Falik (1969) reported that a perceptual-motor training program as part of the kindergarten curriculum had little effect on reading readiness. The Anton Brenner Developmental Gestalt Test of School Readiness was administered to 90 entering kindergarten children. Their scores were ranked and the top third were removed. The remaining two-thirds were randomly divided into experimental (n = 20) and control (n = 22) groups. The experimental group received a perceptual-motor curriculum based on Kephart's training procedures. The control group received the regular kindergarten curriculum. All children were pre and post tested on the Brenner and post tested on the Metropolitan Readiness Test. The results of the study indicated no significant differences between the two groups at the end of the kindergarten year on the Brenner and Metropolitan tests. One and one-half years later, when the subjects were in the second grade, the Metropolitan Achievement Test, reading section, was administered to those subjects still present in the school. There was no difference in reading achievement between the experimental and control subjects.

In another study, using kindergarten children, Rutherford (1964) randomly assigned 64 subjects into experimental and control groups with 14 girls and 18 boys in each group. The experimental groups received 30 minutes of Kephart's perceptual-motor activities every day for 11 weeks. The control group spent the equivalent time in

outdoor play. All subjects were pre and post tested on the Metropolitan Readiness Test. The results showed greater gains at the .001 level on the readiness test in favor of the experimental group. Rutherford concluded that perceptual-motor training was highly effective in a kindergarten curriculum.

Turner and Fisher (1970) investigated the effect of a perceptual-motor training program on the readiness and perceptual development of disadvantaged kindergarten children. Seventy-six children were divided into experimental and control groups. For seven months the experimental group participated in a perceptual-motor program derived from Kephart for half the school day. The control group participated in a conventional kindergarten program. All children were pre and post tested on the Slossen I.Q. test. They were also post tested on the Metropolitan Readiness Test, Frostig's Developmental Test of Visual Perception and the Purdue Perceptual-Motor Survey. The results of the study show no significant gain score on the Slossen I.Q. Test, the Purdue Perceptual-Motor Survey and the Frostig Test of Visual Perception. There was a significant difference on the Metropolitan Readiness scores, favoring the experimental group.

Haring and Stables (1966) conducted a training program with educable mentally retarded children using Kephart's perceptual-motor training program. They found marked improvement in visual and

perceptual skills and eye-hand coordination in the 12 children who received the training as compared to the 12 children who did not. They concluded that Kephart's program effects in a positive way the child's development in fine motor areas which in turn have a direct effect on learning capabilities.

Research Surveys

On the basis of two surveys of the literature, one by Klesius (1973) and the other by Seefeldt (1973), it would seem that perceptual-motor programs are in a state of controversy. Klesius reviewed 28 studies which used a variety of perceptual-motor approaches. Twelve studies found statistically significant differences in reading readiness and achievement for subjects receiving perceptual-motor experiences compared with those who did not but 16 of the studies found no differences between experimental and control groups. The general conclusions made by Klesius (1973) were as follows:

1. The effectiveness of perceptual-motor programs in improving reading ability can neither be confirmed nor denied.

2. In general, perceptual-motor development programs, employing a wide variety of experiences, appear to show promise with underachieving, intermediate grade students and pre-school children. The effectiveness of the Delacato and Frostig type programs when used independently of other perceptual-motor activities, is doubtful.

Concluding a literature survey in 1972, Seefeldt made the following comment:

> A paradox which surrounds perceptual-motor systems is that there is abundant testimony and opinion in support of these programs but scientific experimental corroboration of their effectiveness is hard to find.

His conclusions were:

1. The quality of research is sorely lacking.
2. The nature of assessment instruments is not refined to the extent of unquestionable measurement.
3. The contradictory and inconclusive results of the research reviewed do not allow a clear conclusion to be drawn to either confirm or deny the effectiveness of perceptual-motor training in contribution to academic achievement.

Perceptual-Motor Behavior and Academic Self-Concept

Subjective observations by those who work with children having poor perceptual-motor development indicate that a poor self-image is frequently seen in these children (Cratty, 1970; Fine, 1970; Moustakas, 1959). Cruickshank (1970) writes that ego development and the formation of a positive self-concept are related to the recognition of a well conceived body image. However, the child who has poor motor coordination, who does not know how to control his arms, legs and body, or whose perceptions of himself and others is

distorted, has little chance for a strong ego to develop. He becomes the child who "cannot" and when

> . . . all reminds him that he is not what he should be, how can he develop the internal strength which will permit him to meet the daily challenges of his society? (Cruickshank, 1970)

Theoretical discussions about the self-concept of children with perceptual-motor deficiencies appear throughout the literature; however, the term self-concept is generally used in the broad sense, as the child's image of himself in all of life's roles, which includes, but is not limited to, his role as student, i.e., his academic self-concept.

A review of the literature revealed only two studies relating self-concept (one physical self-concept, the other academic self-concept) to perceptual-motor behavior. There is an obvious need for research in this area.

Armbruster (1972) investigated the effect of a perceptual-motor training program on the academic self-concept of 292 kindergarten children. Dividing the subjects into experimental (n = 141) and control (n = 151) groups, he gave the experimental group perceptual-motor training daily while the control group had the regular on-going kindergarten program. The subjects were pre and post tested on the

SCAMIN, the Metropolitan Readiness Test and the Developmental Test of Visual-Motor Integration. The results of the study indicated no significant differences between groups on any of the tests used.

Cratty et al. (1972) investigated the comparison of self-concept scores of normal children to those of children with perceptual-motor deficiencies. The sample consisted of 133 children with no perceptual-motor deficiencies and 133 with diagnosed perceptual-motor deficiencies. The two groups were matched for age and sex. There were 111 boys and 22 girls in each group. The self-concept measure used was taken from the Piers-Harris Scale, using those statements which related to the child's feelings about his physical ability and appearance, i.e., "Do you like the way you look?" The results of the study showed significant differences between the two groups in the boys' scores but not in the girls' scores. The boys with perceptual-motor deficiencies evidenced lower self-concepts. In discussing the results, the authors suggest that due to the difference in cultural emphasis, physical ability may not contribute as much to a girl's feelings about herself as it does to a boy's feelings about himself.

Perceptual-Motor Behavior and Classroom Behavior

A search of Dissertation Abstracts, ERIC, various books and journals revealed no research studies relevant to the purpose of this

study; however, virtually every authority reviewed for this study has noted behavioral problems in children with inadequate perceptual-motor development (Barsch, 1968; Hart and Jones, 1968; Johnson and Myklebust, 1967; Wall, 1963). There is a clear need for research in this area.

Perceptual-Motor Performance and Academic Motivation

No research has been done relating academic motivation to perceptual-motor development and there was very little discussion of academic motivation by the theorists and authorities in the field of perceptual-motor development. Kephart (1960) pointed out that the slow learning child loses interest in school achievement, due to repeated failures, and withdraws from the learning situation. He becomes the child who "can't" and he has little motivation to try. The need for research in this area is evident.

Summary

The review of the literature presented a brief discussion of the perceptual-motor programs of Kephart, Frostig, Getman, Barsch, Cratty and Delacato. These approaches serve as models for perceptual-motor training in clinics and schools throughout the country. It is not unusual to see an eclectic approach in the schools with elements of several programs incorporated into one design.

The three correlation studies reviewed indicated a positive relationship between academic achievement and perceptual-motor behavior and were directly related to the purpose of this study. The five experimental studies, based on Kephart's premise, and the reports of two literature surveys indicated that the effectiveness of perceptual-motor training in improving school success can neither be confirmed or denied because of contradictory results of research. This indication supports the need for this study--the need to first identify the relationships, if any, between perceptual-motor behaviors before conducting training programs and experimental research.

The lack of research in the area of perceptual-motor development as it relates to academic self-concept, academic motivation and classroom behavior lends support to the need for this study.

III. METHODOLOGY

Chapter III will discuss the procedures used for the collection and treatment of the data obtained for this study. This will include a description of the following: the instruments used to collect the needed data; the locale in which the study was conducted; the subjects comprising the sample; the methods used to collect the data and the statistical procedures used in the treatment of the data.

Instruments

The Purdue Perceptual-Motor Survey

The Purdue Perceptual-Motor Survey (Roach and Kephart, 1966) is published and distributed by the Charles E. Merrill Publishing Co., Columbus, Ohio. The sub-tests used for this study are included in Appendix A.

The Purdue Perceptual-Motor Survey is an individually administered test designed to detect errors in perceptual-motor performance. This test was chosen for this study because it is "explicitly based on Dr. Newell Kephart's well-developed, if unique, perceptual-motor theory" (Landis, 1972). There are 22 scorable items divided into 11 sub-tests, which are designed to be used with children ages 6 to 10 years. The test is scored on a 1 to 4 scale, with 4 being the highest score.

The normative data consisted of scores from 50 students in each of grades one through four. The total normative sample consisted of 200 normal children from a school located in a city-county fringe area, serving children from both rural and urban environments. Means and standard deviations are given for each test item for each grade level.

The test manual reports the intercorrelations between test items and between sub-tests, correlations between teacher scores of achievement and the total survey scores, item validation between achievers and non-achievers and test-retest correlations.

The intercorrelations for each item on the survey, with the exception of the Ocular Pursuit Items, can essentially be considered low and indicate a small but definite relationship. The high intercorrelations on the Ocular Pursuit Items indicate that this sub-test should probably be broken down into fewer overall rated performances.

The intercorrelations of sub-test scores, with the exception of the Chalkboard and Rhythmic Writing, were .40 or below. The low correlations indicate that there is very little overlap in the areas of perceptual-motor behavior being measured. The Chalkboard and Rhythmic Writing sub-tests were developed to examine many of the same constructs which explains their higher coefficient.

Item validation was determined by computing chi-squares on each item. Except for Developmental Drawing, the chi-squares were

all statistically significant at the .05 level, indicating that each item successfully discriminated between groups of achievers and non-achievers. The manual suggests that the Developmental Drawing scoring criteria will need revision when used with children who have been exposed to script writing.

Test-retest scores yielded a coefficient of stability of .946 which not only represents the stability of the scoring criteria but also the stability between examiners, since no examiner tested the same child on both the test and retest situations. The time interval between test-retest was one week.

The concurrent validity coefficient was .654. This was derived from a correlation between total scores obtained on the Perceptual-Motor Survey and teacher ratings of achievement. This coefficient is not applicable to this study because a total score for 11 subtests was not obtained.

Of the 11 sub-tests, six were selected for this study. The five sub-tests not selected were: Kraus-Weber, Rhythmic Writing, Ocular Pursuits, Developmental Drawing and Imitation of Movements. The specifications for the inclusion of the sub-tests for this study were:

1. The sub-test must have a scoring criteria simple enough and clear enough that a minimum amount of training would be necessary for administration and scoring.
2. The sub-test must be easy to administer and require a minimum amount of time.

3. The sub-test must tap some area of perceptual-motor performance which is representative of behavior familiar to all children.

The six sub-tests selected for this study and the performance they assess are as follows.

Sub-test	Assesses
Balance (Walking Board)	Performance in balance and postural flexibility. The child walks across a balance beam (2 x 4 board, 8-10 ft long, 6 in. off floor) in forward, backward and sideways directions.
Jumping	Performance in rhythm, coordination and laterality (inner awareness of right and left). The child is asked to jump with both feet together, jump forward on the right foot, jump forward on the left foot, skip around the room, hop (for about 30 sec) once on the right foot, once on the left foot, twice on each foot, twice on right, once on left and twice on right, once on right.
Identification of Body Parts	Performance demonstrating knowledge of different parts of the body. The child is asked to touch his shoulders, hips, head, ankles, ears, feet, eyes, elbows, and mouth.
Obstacle Course	Performance in how a child judges his body

movements with respect to objects in space. The child is asked to step over a stick at knee height, walk under a stick at shoulder height and walk between two chairs 8-10 in. apart without touching.

Angels-in-the-Snow — Performance in muscle differentiation and laterality. Using the basic angel-in-the-snow movement, the child is asked to: move just the right arm, left arm, right leg, left leg, both arms, both legs, right arm-right leg together, left arm-left leg together, right arm-left leg together, left arm-right leg together. The examiner gives directions by pointing to the parts to be moved.

Chalkboard — Performance in perceptual-motor match (matching visual clues to motor acts), laterality and directionality (the projection of directions right-left, up-down). The child is asked to: draw a single circle; draw two circles at the same time; draw a straight lateral line from one point to another; draw two straight vertical lines simultaneously.

The equipment needed for the Purdue Perceptual-Motor Survey consisted of one balance beam, one mat, a blackboard with chalk and eraser, two chairs and one yardstick.

The Metropolitan Achievement Test

The Metropolitan Achievement Test is published and distributed by Harcourt Brace Jovanovich, 757 Third Avenue, New York, N.Y. The authors are W. Durost, H. Bixler, W. Weightstone, G. Prescott and I. Balow (1970).

The Metropolitan Achievement Test is a standardized achievement test used for grades kindergarten through eight.

> Due to its intensive developmental research, its comprehensive scoring service and its up to date (1970) content, the Metropolitan Achievement Test is considered to be the most superior academic achievement test on the market (Brown, 1974).

It was chosen for this study because it measures achievement in reading and mathematics and because it is given to the Lincoln School students as part of the school district's regular testing program.

A national standardization for the Metropolitan Achievement Tests was conducted to obtain norms and supporting data for the tests. The sample of pupils tested was selected to represent the national population in terms of geographic region, size of city, socio-economic status and public vs. non-public schools. A set of norms which accurately reflected national levels of achievement was obtained for the fall and spring of the school year 1969-1970.

The validity of an achievement test is defined primarily in terms of content validity. A test has content validity if the test items adequately cover the curricular areas that the test is supposed to

evaluate. Since each school district has its own curriculum, the content validity of the test must be evaluated by each school. The authors and publisher have prepared content outlines for the test and have described the procedures used in developing the test content. The concurrent validity coefficient of the Metropolitan was determined by means of correlations with the Otis Lennon Mental Ability Tests.

The correlations coefficients between the Metropolitan Achievement Tests and the Otis-Lennon Mental Ability tests are:

Grade one	Reading	.57
	Mathematics	.66
Grade three	Reading	.66
	Mathematics	.68

The reliability data for the Metropolitan is given separately by grade, for fall and spring standardization groups, in terms of split-half estimates and Saupe's estimate of Kuder Richardson Formula 20. The coefficients for the spring standardization group are:

Total Reading	Primary 1 Battery	.96
Total Mathematics	Primary 1 Battery	.94
Total Reading	Elementary Battery	.96
Total Mathematics	Elementary Battery	.96

The total reading and total mathematics scores from the Primary Battery 1 and the Elementary Battery will be used for this study to measure achievement in reading and mathematics.

The total reading score for Primary Battery 1 consists of word knowledge, word analysis and reading. The total reading score for the Elementary Battery consists of word knowledge, reading, language and spelling. The total mathematics score for Primary 1 Battery consists of mathematical concepts and mathematical computation. The total mathematics score for the Elementary Battery consists of mathematical computation, math concepts and problem solving.

Devereux Elementary School Behavior Rating Scale

The Devereux Elementary School Behavior Rating Scale was developed by George Spivack and Marshall Swift in 1967. It is published and distributed by the Devereux Foundation, Devon, Pa. (see Appendix B).

The Devereux Scale was considered appropriate for use in this study because "it is designed to be used as a research device for those who wish a reliable measure of behaviors that appear in the classroom setting and are related to learning" (Spivack and Swift, 1967).

The normative data for the scale were obtained from 13 elementary schools in a small city public school system. Thirty-two kindergarten through sixth grade teachers made ratings of the classroom behaviors of 809 children. Means and standard deviations for behavior at each grade level are given in the manual.

The reliability coefficient was obtained from test-retest correlations. One hundred twenty-eight children were rated a second time, approximately one week after the initial ratings to obtain a reliability coefficient of .87. A test-retest correlation for each item of the scale was also determined. The median correlation coefficient was .76.

The authors of the Devereux Behavior Rating Scale have published all of the research that has gone into the development of the rating scale. This includes five studies dealing with the selection of behaviors to be rated, the factor analysis of rated behaviors and the relationship between individual behaviors and age, sex, I.Q., academic subject, grade level, sex of teacher-raters, age and educational level of parents and sibling status of the child.

The Devereux Rating Scale measures 47 classroom behaviors which define 11 behavior factors and three additional items. The 11 behavior factors are:

1. Classroom Disturbance. The extent to which a child teases, torments, interferes with the work of others, is disruptive, needs to be reprimanded or controlled.
2. Impatience. The extent to which a child starts work too quickly, is sloppy, hasty in performance and is unwilling to review his work.
3. Disrespect-Defiance. The extent to which the child speaks

disrespectfully to the teacher, resists doing what is asked, belittles the work being done.

4. External Blame. The extent to which the child says the teacher does not help him, never calls on him, work is too hard or blames external circumstances when things go badly for him.

5. Achievement Anxiety. Extent to which the child gets upset about test scores, worries about knowing the "right" answers, and is sensitive to criticism or correction.

6. External Reliance. The extent to which a child looks to others for directions, relies on teacher for directions and has difficulty making his own decisions.

7. Comprehension. The extent to which the child gets the point of what is going on in class, knows material and seems able to apply what he has learned.

8. Inattentive-Withdrawn. The extent to which the child does not pay attention, is preoccupied, difficult to reach and seems oblivious to classroom activities.

9. Irrelevant Responsiveness. The extent to which the child tells exaggerated stories, gives irrelevant answers, interrupts, and makes inappropriate comments.

10. Creative Initiative. The extent to which the child brings things to class that relate to current topics, initiates classroom discussion, and introduces personal experiences into the classroom.

11. Need for Closeness to Teacher. The extent to which the child seeks out the teacher before or after class, offers to do things for the teacher and likes to be physically close.

The three non-behavior factor additional items on the scale are included separately because they are not a part of a common behavior factor, nor of any of the previous factors described, yet they are related negatively to successful achievement.

1. Unable to change from one task to another when asked to do so.
2. Likely to quit or give up when something is difficult or demands more than usual effort.
3. Slow to complete work (has to be prodded, takes excessive time).

The overt behavior of each student is rated by the teacher on a five-point scale for items 1-26 and a seven-point scale for items 27-47. The ratings are very frequently (5), often (4), occasionally (3), rarely (2) and never (1), and extremely (7), distinctly (6), quite a bit (5), moderately (4), a little (3), very slightly (2) and never (1).

The raw scores of each behavior factor and the three additional items are converted into standard score units which represent the average score on each factor of the normative sample. Except for factors 7, 10, and 11, a score above one standard deviation of the average normative sample score is indicative of behavior which

differs significantly from the norm. For factors 7, 10 and 11, a score of minus one standard deviation is indicative of behavior differing from the norm. The degree of aberration in classroom behavior is determined by the total number of factors on which the child scored, either minus one standard deviation from the normative group's score (for factors 7, 10 and 11) or, for the remaining factors, plus one standard deviation from the normative score (Spivack, Swift and Prewitt, 1971).

The Self-Concept and Motivation Inventory

The SCAMIN (Milchus, Farrah and Reitz, 1968) is published and distributed by Person-o-Metrics, 20204 Williamsburg Road, Dearborn Heights, Mich. (see Appendix C).

The SCAMIN assesses two main factors: Academic Self-Concept and Academic Motivation. The manual defines these two factors as:

1. Academic Self-Concept is how a child views his role as a learner in school. It is the student's sum of experiences, perceptions, attitude and feelings about school and school work. The Academic Self-Concept is made up of Role Expectations and Self Adequacy.

   a. Role Expectations is the positive acceptance of the goals

and demands that the student thinks significant others (parents, teachers, siblings, peers) expect of him.

b. Self Adequacy is the positive regard with which a student views his present and future probabilities of success.

The combination of scores received on role expectation test items and self adequacy test items makes up the Academic Self-Concept score.

2. Academic Motivation is the expressed need of a child to achieve a goal in school and the avoidance of the child toward failure in school. Academic Motivation is made up of Goal and Achievement Needs and Failure Avoidance.

a. Goal and Achievement Needs is the positive regard with which a student perceives the intrinsic and extrinsic rewards of learning and performing in school.

b. Failure Avoidance is the awareness and concern toward shunning the embarrassment and sanctions which are associated with failure in school.

The combination of scores received on Goal and Achievement Needs test items and Failure Avoidance test items makes up the Academic Motivation score.

Four forms of the SCAMIN have been constructed and published. The Early Elementary Form, for grades one to three, will be used for

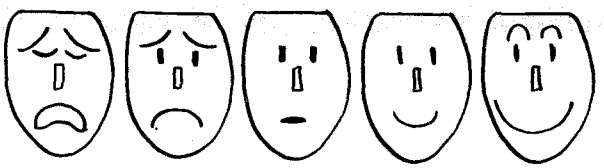
this study. A Spearman-Brown split-half reliability coefficient of .77 is reported for the Early Elementary Form.

Raw score norms are provided by the authors for goal achievement needs, failure avoidance, role expectations and self adequacy for grades one, two and three. The norm table also provides a ranking score of high, medium and low and stanine scores from the raw score.

The sample used in the norming procedures was drawn from in and around the Detroit, Michigan area but no statistical information is available as to its size or selection. Little statistical information is provided by the authors or publishers; however, tests administered to children in the Corvallis School District through the Oregon State University Department of Guidance and Counseling have evidenced a high degree of face validity. Administration of the SCAMIN to over 200 public school children throughout the mid-Willamette Valley through the Oregon College of Education, Guidance and Counseling Unit substantiates the judgment that the instrument does have a high degree of face validity (House, 1974). Use of the SCAMIN in experimental research studies resulted in the researchers also judging the instrument to possess a seemingly high degree of face validity (Burke, 1968; House, 1972; Hoyser, 1972; Nagel, 1969; Wall, 1973).

Because the SCAMIN is a group test that requires no special training to administer and score, takes a small amount of time to administer, measures self-concept and motivation as they relate to school and has a high degree of face validity, it was judged appropriate for this study.

The Early Elementary Form of the SCAMIN consists of 24 questions which are read orally to the entire class in one 25-minute session. Each child receives a separate answer sheet. The child responds to each question by marking one of the noses in a series of five faces, ranging from very sad to very happy, which illustrates his feelings in response to the questions, i.e., "What face would you wear if you had to ask a teacher for help with your arithmetic?"



A numerical value (1, 2, 3, 4 or 5) is established for each face. Each response sheet is divided into upper and lower quadrants. The upper quadrant on p.1 represents Goal Achievement Needs, the lower quadrant on p. 1 represents Failure Avoidance. The upper quadrant on p. 2 represents Role Expectations and the lower quadrant represents Self Adequacy. This organization of test items enables one to score the test quite easily.

Locale

The subjects who participated in this study were from the first and third grade classes in Lincoln Elementary School, Corvallis, Oregon. Corvallis, with a population of 39, 750, is the county seat of Benton County and the home of Oregon State University. The University is the largest employer in the town, accounting for 50% of the payroll. Corvallis has 14 elementary schools, three junior high schools and two high schools. Lincoln Elementary School, enrollment 316, serves low to middle income families from rural and urban neighborhoods.

Sample

Forty-three first and 41 third grade students were the subjects for this study. There were 49 girls (23 first grade and 26 third grade) and 35 boys (20 first grade and 15 third grade). All together, there were 84 subjects. No subjects were known to have any physical or mental disability and all were participating in the regular classroom activities.

Procedure

All of the tests required for this study were administered and scored during the spring of 1974. The school principal and the

classroom teachers gave full support and cooperation to the entire project.

The six sub-tests of the Purdue Perceptual-Motor Survey were administered individually to each subject. The children were excused from class for the testing by the classroom teacher. The testing took approximately 15 minutes per child and was conducted on the stage of the school gymnasium.

The Perceptual-Motor Survey was administered by a doctoral student in reading, a master's student in counseling, and a Ph. D. candidate in guidance and counseling. All were familiar with the theory and content of the Survey. Consistency in the wording of directions, demonstration techniques, sequence of test items and time allowed for each item was achieved through a small pilot testing program with 10 children from the primary behavior problems class at Roosevelt School, Corvallis. To insure consistency in scoring, all of the perceptual-motor tests administered for this study were scored by this investigator.

The SCAMIN was administered to the entire third grade as a group by a Ph. D. candidate in guidance and counseling, taking approximately 30 minutes. A master's student in elementary counseling administered the SCAMIN to the first grade subjects.

The Metropolitan Achievement Tests were administered to the third grade subjects by the classroom teacher and to the first grade

subjects by a doctoral candidate in guidance and counseling, with the assistance of the classroom teacher.

The Devereux Behavior Rating Scales were completed for each subject by his or her classroom teacher. To insure a uniform approach, a meeting was held prior to the ratings, with the five teachers involved, to explain the rating procedure and to answer questions about the scales.

As a result of the testing program for this study, a behavior profile, achievement profile, self-concept profile and a perceptual-motor rating for each subject were made available to the classroom teacher.

Treatment of Data

The data were analyzed as follows:

Step I: Determining Relationships

Scattergrams obtained from the regression data indicated a linear analysis could be used (see Appendix D); thus the Pearson Product-Moment Coefficient of Correlation, "r", was the statistic used to determine the relationship between the scores obtained on each of the six selected sub-tests and the overall score of the six selected sub-tests of the Purdue Perceptual-Motor Survey and (1) the academic self-concept score as measured by the SCAMIN; (2) the academic

motivation score as measured by the SCAMIN; (3) the total reading score as measured by the Metropolitan Achievement Tests; (4) the total mathematics score as measured by the Metropolitan Achievement Tests; and (5) the classroom behavior score as measured by the Devereux Elementary Behavior Rating Scale.

The "r" values obtained were for boys, for girls, for first grade subjects and for third grade subjects.

Step II: Sex Effect

To see whether the "r" values obtained in Step I differed for boys and for girls, the correlation coefficients between the overall score for the six selected sub-tests of the Purdue Perceptual-Motor Survey and each of the five other tests were compared for sex effect. The null hypotheses (seven) were of the form:

H_0: There is no significant difference between the correlation coefficients for boys and for girls.

A significance level of .05 was chosen as the critical value. There were seven null hypotheses because different batteries of the Metropolitan Achievement Test were administered to the first and third grade subjects. Thus, they were treated separately.

The statistical test used to compare correlation coefficients transformed the "r" statistic to the corresponding Z value in the following manner (Snedecor, 1956):

$$Z = 1/2 [\log_e (1 + r) - \log_e (1 - r)]$$

A test was then made for the significance of the difference in Z values (Downey and Heath, 1970):

$$t = \frac{Z_1 - Z_2}{S_{D_z}}$$

where

$$S_{D_z} = \frac{1}{N_1 - 3} + \frac{1}{N_2 - 3}$$

and N_1 and N_2 indicate the number of subjects in the groups being compared.

Step III: Grade Effect

The next step in the analysis was to see whether the "r" values obtained differed for first grade and third grade subjects. The correlation coefficients between the overall score of the six sub-tests of the Purdue Perceptual-Motor Survey and three of the five other tests administered were compared for grade effect, using the same statistical tests as for sex effect. Reading and mathematics achievement were not used for grade effect comparison because different batteries of the Metropolitan Achievement Test were used for first and third grade subjects. The null hypotheses (three) were of the form:

H_0: There is no significant difference between the correlation coefficients for first grade subjects and third grade subjects.

A significance level of .05 was chosen as the critical value.

Step IV: Tests of Significance of "r" Values

With the sex and grade effect accounted for, and with the consequent proper grouping of subjects, the significance of the "r" values obtained between the scores on each of the six selected sub-tests of the Perceptual-Motor Survey and the scores obtained on the five other tests was examined. This required 56 tests of significance which were conducted to determine if the "r" values obtained for this study were statistically different from zero, i. e., do they represent a definite correlation or merely a chance deviation from a population R of zero. In each case the null hypothesis was formed as follows:

$$H_0: R = 0$$

The customary significance levels of .10, .05, .01 and .001 were selected as a basis for discussion of the results and implications of Step IV.

Summary

The sample of this study consisted of 43 first grade subjects and 41 third grade subjects, making a total of 84 subjects. Six selected sub-tests of the Purdue Perceptual-Motor Survey, the

Self-Concept and Motivation Inventory and the Metropolitan Achievement Tests were administered to each subject. The Devereux Elementary Behavior Rating Scale was completed for each subject by the classroom teacher. The Pearson Product-Moment Coefficient of Correlation was used to determine the relationship between the six selected sub-tests of the Purdue Perceptual-Motor Survey and the other tests administered. Sex effect and grade effect were accounted for and the significance of the correlation coefficients was determined. The results of the analysis of the data are presented in the following chapter.

IV. REPORT OF FINDINGS

The purpose of this study was to investigate, for first and third grade boys and girls, the relationships between six perceptual-motor behaviors and the following: achievement in reading, achievement in mathematics, academic self-concept, academic motivation, and classroom behavior. These relationships were also examined for sex and grade differences between boys and girls and first and third grade subjects. The results of the investigation are presented under the following headings: sex effect, grade effect, and tests of significance of the "r" values obtained in this study.

The various "r" and t statistics for this study were calculated from the raw data, using the Statistical Interactive Programming System (SIPS) program, by the Oregon State University Computer Center and are presented in the tables which follow.

Sex Effect

The "r" values representing the relationships between the total score on the six tests of perceptual-motor behavior and the self-concept, motivation, classroom behavior, first and third grade reading and first and third grade mathematics scores were compared to see if there was any difference between the "r" values for girls and the "r" values for boys. The hypotheses (seven) were of the form:

H_0: There is no significant difference between the correlation coefficients for boys and for girls.

A significance level of .05 was selected as the critical value. The "r" values and calculated t values are shown in Table 1.

No significant difference between the "r" values for girls and the "r" values for boys was found in any of the comparisons; thus, the data for boys and girls were combined for further analysis and the seven null hypotheses were retained.

Table 1. Comparison of "r" values for boys and girls.

	Total Score for Perceptual-Motor Behaviors		Comparison of "r" Values	
	Boys	Girls		
Self-Concept	r = 0.2090 (n = 35)	r = 0.0429 (n = 49)	t = 0.7350	df = ∞
Motivation	r = 0.0112 (n = 35)	r =-0.2455 (n = 49)	t = 1.1582	df = ∞
Classroom Behavior	r =-0.3882 (n = 35)	r =-0.3085 (n = 49)	t = -0.3964	df = ∞
Reading 1st grade	r = 0.7242 (n = 20)	r = 0.5123 (n = 23)	t = 1.0627	df = ∞
Reading 3rd grade	r = 0.6653 (n = 15)	r = 0.3737 (n = 26)	t = 1.1501	df = ∞
Mathematics 1st grade	r = 0.7284 (n = 20)	r = 0.4320 (n = 23)	t = 1.4034	df = ∞
Mathematics 3rd grade	r = 0.5920 (n = 15)	r = 0.5953 (n = 26)	t = -0.0143	df = ∞

$t_{.05} = 1.96$ for df = ∞ .

Grade Effect

The "r" values representing the relationships between the total score on the six tests of perceptual-motor behavior and the self-concept, motivation and classroom behavior scores were compared to see if there was any difference between the "r" values for third grade subjects and for first grade subjects. The "r" values obtained for reading and mathematics achievement vs. perceptual-motor behavior were not comparable because different batteries of achievement tests were administered to the first and third grade subjects. The null hypotheses (three) were of the form:

H_0: There is no significant difference between the correlation coefficients for first grade subjects and third grade subjects.

A significance level of .05 was selected as the critical value. The "r" values and the calculated t values are shown in Table 2.

The results of the comparison indicated no significant difference between the "r" values for first and third grade subjects between the total score on the six tests of perceptual-motor behavior and self-concept, and between the total score on the six tests of perceptual-motor behavior and classroom behavior.

A significant difference was found between the "r" values for first and third grade subjects, between the total score on the six tests

of perceptual-motor behavior and motivation. This determined that the "r" values for first and third grade subjects between motivation and perceptual-motor behaviors would be treated separately in further analysis of the data.

Two of the null hypotheses were retained and one was rejected. With the exception of a significant difference in the "r" values for first and third grade subjects between perceptual-motor behavior and motivation, no grade effect was found; therefore, the first and third grade data for self-concept and classroom behavior were combined for further analysis.

Table 2. Comparison of "r" values for first and third grade subjects.

	Total Score for Perceptual-Motor Behaviors		Comparison of "r" Values	
	First (n = 43)	Third (n = 41)		
Self-Concept	r = -0.1373	r = 0.1445	t = -1.2640	df = ∞
Motivation	r = 0.2307	r = -0.2418	t = 2.3807**	df = ∞
Classroom Behavior	r = -0.3881	r = -0.3131	t = -0.4028	df = ∞

**Significant at .05 level.

$t_{.05} = 1.96$ for df = ∞.

Tests of Significance of "r" Values Obtained in This Study

With the grade effect and sex effect accounted for and the data properly combined, tests of significance (56) were conducted to determine if the "r" values obtained in this study were statistically different from zero. The "r" values obtained were between the scores earned on the following:

1. Each of the six selected sub-tests of perceptual-motor behavior, i.e., balance, jumping, angels-in-the-snow, obstacle course, chalkboard and identification of body parts and tests of: (1) academic self-concept, (2) classroom behavior, (3) first grade motivation, (4) third grade motivation, (5) first grade reading, (6) third grade reading, (7) first grade mathematics, and (8) third grade mathematics.
2. The total score obtained on the six selected tests of perceptual-motor behavior and tests of : (1) academic self-concept, (2) classroom behavior, (3) first grade motivation, (4) third grade motivation, (5) first grade reading, (6) third grade reading, (7) first grade mathematics, and (8) third grade mathematics.

The hypotheses (56 were of the form:

$$H_0: \ R = 0$$

Table 3 reports the obtained "r" values and indicates the level of significance for each value.

Table 3. "r" Values and their significance.

	Total Perceptual-Motor	Balance	Jumping	Angels-in-the-snow	Identification of Body Parts	Obstacle Course	Chalkboard
Self-concept (n = 84)	0.0830	0.0414	-0.1358	0.1210	-0.0434	0.1095	0.1144
Classroom Behavior (n = 84)	-0.3521***	-0.2211**	-0.1854*	-0.1792	-0.3579****	-0.1995*	-0.2277**
Motivation, 1st grade (n = 43)	0.2307	0.0389	0.0573	0.0996	0.3756**	0.0210	0.2672*
Motivation, 3rd grade (n = 41)	-0.2418	-0.1693	0.0111	0.0183	-0.0704	-0.3691**	-0.1947
Reading, 1st grade (n = 43)	0.6240****	0.5550****	0.5753****	0.6884****	0.3217**	0.1392	0.2611*
Reading, 3rd grade (n = 41)	0.4741***	0.3281**	0.4032***	0.0673	0.4094***	0.3069*	0.2699*
Mathematics, 1st grade (n = 43)	0.5747****	0.5900****	0.5509****	0.5291****	0.1771	0.1034	0.2680*
Mathematics, 3rd grade (n = 41)	0.5688****	0.4130***	0.4678***	0.0711	0.4740***	0.3877**	0.3197**

**** $p < .001$

*** $p < .01$

** $p < .05$

* $p < .10$

Acamdemic Self-Concept and Perceptual-Motor Behavior

No significant "r" value was found between the total perceptual-motor score and self-concept.

No significant "r" values were found between each of the six tests of perceptual-motor behavior and self-concept (Table 4).

Motivation and Perceptual-Motor Behavior

A significant "r" value was found between first grade motivation scores and the following perceptual-motor scores: identification of the body parts ($p < .05$), and chalkboard ($p < .10$).

A significant "r" value was found between the third grade motivation scores and obstacle course ($p < .05$).

No significant "r" values were noted between first and third grade motivation scores and the total perceptual-motor score (Table 5).

Classroom Behavior and Perceptual-Motor Behavior

A significant "r" value was found ($p < .01$) between classroom behavior and the total score on the six tests of perceptual-motor behavior.

Table 4. Academic self-concept and perceptual-motor behavior.

	Total Perceptual-Motor	Balance	Jumping	Angels-in-the-snow	Identification of Body Parts	Obstacle Course	Chalkboard
Self-concept (n = 84)	0.0830	0.0414	-0.1358	0.1210	-0.0434	0.1095	0.1144

Table 5. Academic motivation and perceptual-motor behavior.

	Total Perceptual-Motor	Balance	Jumping	Angels-in-the-snow	Identification of Body Parts	Obstacle Course	Chalkboard
Motivation, 1st grade (n = 43)	0.2307	0.0389	0.0573	0.0996	0.3756**	0.0210	0.2672*
Motivation, 3rd grade (n = 41)	-0.2418	-0.1693	0.0111	0.0183	-0.0704	-0.3691**	-0.1947

** $p < .05$

* $p < .10$

A significant "r" value was found between classroom behavior and the following tests of perceptual-motor behavior: identification of body parts ($p < .001$); balance ($p < .05$); chalkboard ($p < .05$); jumping ($p < .10$); and obstacle course ($p < .10$).

No significant "r" value was found between classroom behavior and angels-in-the-snow (Table 6).

Achievement in Reading and Perceptual-Motor Behavior

A significant "r" value was found ($p < .001$) between reading achievement and the total score on the six tests of perceptual-motor behavior for first grade subjects.

A significant "r" value was found between first grade reading achievement and the following perceptual-motor behaviors: balance ($p < .001$); jumping ($p < .001$); angels-in-the-snow ($p < .001$); identification of body parts ($p < .05$); and chalkboard ($p < .10$).

There was no significant "r" value between obstacle course and reading for first grade subjects (Table 7).

A significant "r" value was found ($p < .01$) between reading achievement and the total score on the six tests of perceptual-motor behavior for third grade subjects.

A significant "r" value was found between third grade reading achievement and the following tests of perceptual-motor behavior:

Table 6. Classroom behavior and perceptual-motor behavior.

	Total Perceptual-Motor	Balance	Jumping	Angels-in-the-snow	Identification of Body Parts	Obstacle Course	Chalkboard
Classroom Behavior (n = 84)	-0.3521***	-0.2211**	-0.1854*	-0.1792	-0.3579****	-0.1995*	-0.2277**

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

*** $p < .01$ * $p < .10$

Table 7. Achievement in reading and perceptual-motor behavior.

	Total Perceptual-Motor	Balance	Jumping	Angels-in-the-snow	Identification of Body Parts	Obstacle Course	Chalkboard
Reading, 1st grade (n = 43)	0.6240****	0.5550****	0.5753****	0.6884****	0.3217**	0.1392	0.2611*
Reading, 3rd grade (n = 41)	0.4741***	0.3281**	0.4032***	0.0673	0.4094***	0.3069*	0.2699*

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

*** $p < .01$ * $p < .10$

identification of body parts ($p < .01$); jumping ($p < .01$); balance ($p < .05$); obstacle course ($p < .10$); and chalkboard ($p < .10$).

No significant "r" value was found between reading and angels-in-the-snow for third grade subjects (Table 7).

Achievement in Mathematics and Perceptual-Motor Behavior

A significant "r" value was found ($p < .001$) between mathematics achievement and the total score on the six tests of perceptual-motor behavior for first grade subjects.

A significant "r" value was found between first grade achievement in mathematics and the following perceptual-motor behaviors: balance ($p < .001$); jumping ($p < .001$); angels-in-the-snow ($p < .001$); and chalkboard ($p < .10$).

No significant "r" value was found between first grade mathematics achievement and obstacle course and identification of body parts (Table 8).

A significant "r" value was found ($p < .001$) between third grade mathematics achievement and the total score on the six tests of perceptual-motor behavior.

A significant "r" value was found between third grade mathematics achievement and the following perceptual-motor behaviors: balance ($p < .01$); jumping ($p < .01$); identification of body parts ($p < .01$); obstacle course ($p < .05$); and chalkboard ($p < .05$).

Table 8. Achievement in mathematics and perceptual-motor behavior.

	Total Perceptual-Motor	Balance	Jumping	Angels-in-the-snow	Identification of Body Parts	Obstacle Course	Chalkboard
Mathematics, 1st grade (n = 43)	0.5747****	0.5900****	0.5509****	0.5291****	0.1771	0.1034	0.2680*
Mathematics, 3rd grade (n = 41)	0.5688****	0.4130***	0.4678***	0.0711	0.4740***	0.3877**	0.3197**

**** $p < .001$

*** $p < .01$

** $p < .05$

* $p < .10$

No significant "r" value was found between third grade mathematics achievement and angels-in-the-snow (Table 8).

Summary

The report of the findings for this study was organized around three headings: sex effect, grade effect and tests of significance of the "r" values obtained in this study. The analysis of the data resulted in the following findings.

Sex Effect

The "r" values for boys and the "r" values for girls were compared. No significant difference was found, therefore the data for boys and girls were combined and further analysis of the data was sex blind. Table 1 shows the sex effect statistics.

Grade Effect

The "r" values for first grade subjects and for third grade subjects were compared. No grade effect was found between perceptual-motor behavior and the following: self-concept and classroom behavior. A grade effect was found between perceptual-motor behavior and motivation; therefore, first and third grade motivation scores were treated separately and the scores for self-concept and classroom behavior were combined for further analysis. Table 2 shows the grade effect statistics.

The reading and mathematics achievement scores were treated separately throughout the analysis of the data because different achievement batteries were administered to first and third grade subjects and the scores were not comparable.

Tests of Significance of "r" Values

Table 3 reports the 56 obtained "r" values and indicates the level of significance for each value. No "r" values significantly different from zero were found for the relationship between academic self-concept and perceptual-motor behaviors (Table 4) and except for three significant "r" values the relationship between academic motivation and perceptual-motor behaviors was negligible (Table 5). Significant "r" values were found in the majority of instances between perceptual-motor behaviors and classroom behavior (Table 6), reading achievement (Table 7), and mathematics achievement (Table 8) for first and third grade boys and girls.

V. SUMMARY, DISCUSSION, AND CONCLUSIONS

Summary

The purpose of this study evolved from the need to explore the suggestion proposed by Kephart that perceptual-motor behavior is related to school success and to provide useful information for future experimental studies and perceptual-motor training programs.

In the early 1960's Kephart hypothesized that perceptual-motor development is an important underlying factor associated with achievement in school. He maintained that for some children difficulties in learning are related to the perceptual-motor attributes of balance, laterality, directionality, body awareness in space, perceptual-motor matching, rhythm, and body differentiation. The logic of Kephart's thinking appealed to many educators and perceptual-motor training became a part of the general curriculum in many elementary schools. Because of the varying degrees of success of these programs and the conflicting results of experimental research focusing on Kephart's premise, it seemed important to first identify those perceptual-motor behaviors which definitely relate to school achievement and to then use that information in developing training programs and experimental research studies.

This study, using 84 first and third grade boys and girls, examined the relationship between six perceptual-motor behaviors

defined by Kephart, and achievement in mathematics and achievement in reading. Because achievement in school involves the affective as well as the cognitive areas of learning, the relationship between perceptual-motor behaviors and academic self-concept, academic motivation and classroom behavior was also examined. The findings of this study strongly support Kephart's view that perceptual-motor behavior is related to academic achievement in reading and mathematics and to classroom behavior, but no evidence was found to support the view that it is related to academic self-concept. The findings for the relationship between academic motivation and perceptual-motor behavior were inconclusive.

Discussion

The following discussion will consider the strength, direction, significance and percentage of commonality (r^2) of the "r" values obtained for this study. The percentage of commonality indicates the percentage of common variance between the two sets of scores being considered. An example would be the percentage of the factors involved in reading achievement which are associated with perceptual-motor behavior. The strength of the "r" values will be described according to the Table of Correlation Values by Guilford (1965) in which he describes correlation values in the following manner: less than .20 = slight, almost negligible; .20 to .40 = low but definite;

.40 to .70 = moderate, substantial; .70 to .90 = high; .90 to 1.00 = very high.

Academic Self-Concept and Perceptual-Motor Behavior

The correlation coefficients obtained between academic self-concept and perceptual-motor behavior were negligible, some were positive and some were negative and none were significant. This finding indicates that for this study a child's feelings about school, schoolwork and himself as a student are not related to his perceptual-motor behavior. This does not support the opinions and observations of the theorists and practitioners reported in Chapter II, but it does correspond to the Armbruster study, reported in the literature survey, which found no change in academic self-concept in kindergarten children after receiving daily perceptual-motor training as part of the kindergarten curriculum. The validity statistics for the SCAMIN, the instrument used to measure academic self-concept for this study and the Armbruster study, were unreported and unavailable; therefore, it is possible that the SCAMIN was not a valid instrument for the purposes of this study. Further research is indicated to resolve the conflict between opinion and theory and the results of this study.

Academic Motivation and
Perceptual-Motor Behavior

A significant difference in the "r" values for first and third grade children, between academic motivation and perceptual-motor behavior, was found; therefore, the data for these groups were treated separately. However, since this was the only variable to show a grade effect it was questionable whether such a difference was a real difference or was a result of chance.

The "r" values obtained for first grade subjects were mostly slight, positive and significant only for the "r" value obtained between Identification of Body Parts and Academic Motivation, with a common variance of 14%, and Chalkboard and Academic Motivation, a common variance of 7%.

The "r" values for third grade subjects were slight, some were positive and some were negative. A significant, negative coefficient was found between obstacle course and academic motivation, "r" = -.37, which accounted for 14% of the common variance.

The low coefficients, differing directions and lack of significant "r" values would seem to indicate an almost negligible relationship between academic motivation and perceptual-motor behavior. Also, on the basis of Kephart's theory, there seemed to be no objective, reasonable explanation for the significant "r" values reported. It is possible that the SCAMIN, the instrument used to measure

academic motivation, was not a valid instrument for the purposes of this study. The inconclusive findings of this study indicate a need for further research to define the relationship between academic motivation and perceptual-motor behavior.

Classroom Behavior and Perceptual-Motor Behavior

Significant, low but definite, negative correlation coefficients were found between classroom behavior and perceptual-motor behavior. The negative directions of the "r" values indicate that undesirable classroom behavior (high scores on the Devereux Behavior Rating Scale) are related to inadequate perceptual-motor behavior (low scores on the Purdue Perceptual-Motor Survey). Significant "r" values were found for all but one (angels-in-the-snow vs. classroom behavior) of the relationships examined. The findings support the observations reported in Chapter I, that children with perceptual-motor difficulties are observed to have behavior problems.

Reading and Perceptual-Motor Behavior

The first grade "r" values indicate a significant, substantial, positive relationship between reading and perceptual-motor behavior. The "r" values obtained between the total score, balance, jumping, and angels-in-the-snow and reading achievement were all highly

significant ($p < .001$). The coefficients ranged from .58 to .69 which accounts for 34% to 48% of the common variance.

The third grade "r" values indicated a significant, substantial, positive relationship between reading and perceptual-motor behavior. The "r" values between the total score, jumping, identification of body parts and reading were significant ($p < .01$). The significant coefficients ranged from .41 to .47 which accounts for 17% to 22% of the common variance.

The first grade "r" values between reading and angels-in-the-snow were highly significant ($p < .001$) while the third grade "r" values between angels-in-the-snow and reading were negligible. This may be explained by the fact that performance of the angels-in-the-snow activity could have become, for the third grade subjects, a splinter skill. Kephart describes a splinter skill as a restricted motor approach in relation to a specific problem which is not generalizable to other motor activity. The relationship between angels-in-the-snow and all of the variables tested, except first grade reading and first grade mathematics, was negligible. This would support the explanation that for the third grade subjects in this study, angels-in-the-snow had become a splinter skill and was no longer a good discriminator of perceptual-motor performance.

Mathematics and Perceptual-Motor Behavior

The "r" values obtained between mathematics and perceptual-motor behavior for first grade subjects were positive, substantial and significant. The "r" values obtained between the total score, balance, jumping and agels-in-the-snow and mathematics achievement were significant ($p < .001$). The "r" values ranged from .52 to .59 which accounted for 27% and 35% of the common variance.

The "r" values obtained between mathematics and perceptual-motor behavior for third grade subjects were positive, substantial and significant. The significant coefficients ranged from .31 to .57 which accounted for 10% to 32% of the common variance.

The relationships between identification of body parts and mathematics and obstacle course and mathematics were almost negligible for first grade subjects but were substantial and significant for third grade subjects. This grade difference may be explained by the importance of spatial concepts to mathematics. Identification of body parts and obstacle course are tests of body awareness in space and, according to Kephart, children who do poorly on these sub-tests have not yet developed a stable world of space and it is probable that they would do poorly in mathematics where spatial knowledge is at a premium. The third grade mathematics curriculum, as compared to the first grade, demands increasing competency in the use of space

generalizations and abstractions; therefore, the grade difference in "r" values might be expected.

Conclusions

This study has identified perceptual-motor behaviors which are definitely related to achievement in reading and achievement in mathematics and to classroom behavior. The findings support Kephart's hypothesis that perceptual-motor development is related to school success. The low to moderate coefficients obtained in this study indicate that perceptual-motor abilities are but a part of all the variables associated with school achievement.

While this study focused on the relationship between perceptual-motor development and school success, Kephart's theory further hypothesizes that some learning problems are caused by deficiencies in perceptual-motor development and he recommended perceptual-motor training to correct these deficiencies. Experimental research is needed to show the cause and effect, in a controlled situation, between perceptual-motor training and school achievement. By identifying specific perceptual-motor behaviors which are definitely related to school success the findings of this study have provided useful data for the design of future research projects and the development of training programs.

Recommendations

The following recommendations are based on the information gained by the implementation of this study.

1. Using the perceptual-motor behaviors identified by this study to be related to school success, experimental research is now needed to show the cause and effect relationship, in a controlled situation, between perceptual-motor training and academic achievement and between perceptual-motor training and social behavior.
2. The discrepancy between opinions and observations and the findings of this study in the relationship between academic self-concept and perceptual-motor behaviors indicates a need for further research in this area.
3. A longitudinal study should be made to investigate the following:
   a. the ways in which children compensate for poor perceptual-motor development; and
   b. the long-range effect of inadequate perceptual-motor behaviors on school success.
4. In order to make replication studies more meaningful, the scoring procedures of the Purdue Perceptual-Motor Survey need further clarification and refinement.

5. Research is needed in the area of early childhood education to determine the effect of perceptual-motor training on school readiness.

6. Based upon the data obtained for this study careful screening procedures are recommended before any perceptual-motor training program is implemented because:

   a. all school children do not need perceptual-motor training; and

   b. the children who do need training do not always need the same activity; for instance, one child may need help with balance, another with space awareness. Screening will determine specific needs for which training can be designed.

BIBLIOGRAPHY

Armbruster, R.A. 1972. Perceptual-motor, gross motor and sensory motor skills training: the effect upon school readiness and self-concept development of kindergarten children. Doctoral leaves. (Abstracted in Dissertation Abstracts 31:2014)

Barsch, R. 1968. Achieving perceptual-motor efficiency. Seattle, Special Child Publications. 365 p.

Bloom, B., D. Krathwohl and B. Masia. 1964. Taxonomy of educational objectives. New York, David McKay Co. 196 p.

Brown, R. 1974. Psychometrist, Corvallis School District. Personal communication. Corvallis, Oregon. March 21, 1974.

Burke, B.P. 1968. An exploratory study of the relationships among third grade negro children's self-concept, creativity and intelligence and teacher's perceptions of those relationships. Doctoral dissertation. Detroit, Wayne State University. 178 numb. leaves. (Abstracted in Dissertation Abstracts 30:1327A)

Byron, T. and R. Wheeler. 1972. Perception of learning disabled children: the eye of the observer. Journal of Learning Disabilities 8(5):38-41.

Cratty, B. et al. 1970. Movement activities, motor ability and the education of children. Springfield, Charles C. Thomas. 170 p.

Cratty, B. 1972. Physical expression of intelligence. Englewood Cliffs, Prentice-Hall, Inc. 271 p.

Cruickshank, W.M. (ed.). 1961. A teaching method for brain-injured and hyperactive children. New York, Syracuse University Press. 576 p.

_____. 1970. The brain-injured child in home, school, and community. New York, Syracuse University Press. 288 p.

_____. 1971. Psychology of exceptional children and youth. Englewood Cliffs, New Jersey, Prentice Hall. 624 p.

Delacato, C.H. 1959. Treatment and prevention of reading problems. Springfield, Illinois, Charles C. Thomas. 122 p.

Downey, N. M. and R. W. Heath. 1970. Basic statistical methods. 3rd ed. New York, Harper and Row. 356 p.

Durost, W. et al. 1970. The metropolitan achievement test. New York, Harcourt Brace Jovanovich, Inc.

Falick, L. H. 1969. The effects of special perceptual-motor training in kindergarten on reading readiness and on second reading grade performance. Journal of Learning Disabilities 2:395-402.

Farrah, G., N. Milchus and W. Reitz. 1968. The self-concept and motivation inventory. Dearborn Heights, Person-O-Metrics, Inc.

Fine, L. 1970. Considerations in educating children with cerebral dysfunction. Journal of Learning Disabilities 3:132-142.

Fisher, M. S. and R. V. Turner. 1970. The effect of a perceptual-motor training program upon the readiness and perceptual development of culturally disadvantaged kindergarten children. Proceedings of the Annual Convention of the American Psychological Association 5:648-650.

Frostig, M. 1970. Movement education: theory and practice. Chicago, Follett Educational Corp. 239 p.

Frostig, M. and D. Horne. 1964. The Frostig program for the development of visual perception; teacher's guide. Chicago, Follett Publishing Co. 168 p.

Getman, G. N. and E. D. Kane. 1964. The physiology of readiness, an action program for the development of perception for children. Minneapolis, P. A. S. S., Inc.

Giffen, M. 1968. The role of child psychiatry in learning disabilities. In: Progress in learning disabilities, Vol. 1, ed. by Helmer Myklebust. New York, Grune and Stratton. Chapter 4.

Guilford, J. P. 1965. Fundamental statistics in psychology and education. 4th ed. New York, McGraw-Hill Book Co. 605 p.

Haring, N. G. and J. M. Staples. 1966. Visual perception and eye-hand coordination. Journal of American Physical Therapy Association 36:129-135.

Hart, J. and B. Jones. 1968. Where's Hannah? New York, Hart Publishing Co. 272 p.

House, R.M. 1971. The effects of nondirective play therapy upon the sociometric status and self-concept of selected second grade children. Doctoral dissertation. Corvallis, Oregon State University. 57 numb. leaves.

_____. 1974. Assistant Professor of Education-Psychology, Department of Guidance and Counseling. Personal communication. Oregon College of Education, Monmouth, Oregon. March, 1974.

Hoyser, E.E. 1971. Therapeutic non-directive play with low-achievers in reading. Doctoral dissertation. Corvallis, Oregon State University. 105 numb. leaves.

Ismail, A.H. and J.J. Gruber. 1967. Motor aptitude and intellectual performance. Columbus, Charles E. Merrill Books, Inc. 199 p.

Klesius, S. 1973. Research findings regarding perceptual-motor development and academic performance. In: Perceptual-Motor Symposium Proceedings, 1973. Jackson, Mississippi. p. 32-45. (Microfische Ed 081755)

Kephart, N. 1960. The slow learner in the classroom. Columbus, Charles E. Merrill Books, Inc. 292 p.

Landis, S. 1972. Review in: The 7th mental measurements yearbook. Vol 2, ed. by O. Buros. Highland Park, The Gryphon Press. p. 1285.

Lipton, E.D. 1968. A perceptual-motor development program's effect on visual perception and reading readiness of first-grade children. The Research Quarterly 41(3):402-405.

Little, S.J. 1970. An investigation of the relationships between perceptual-motor proficiency, intelligence and academic achievement in a population of normal third-grade children. Doctoral dissertation. College Park, University of Maryland. 148 numb. leaves.(Abstracted in Dissertation Abstracts 31:6441A)

McCarthy, J.J. and J.F. McCarthy. 1969. Learning disabilities. Boston, Allyn and Bacon, Inc. 138 p.

Moustakas, C. 1959. Psychotherapy with children: the living relationship. New York, Harper and Row. 324 p.

Myklebust, H.R. and D.J. Johnson. 1967. Learning disabilities. New York, Grune and Stratton. 350 p.

Nagel, T.S. 1969. A descriptive study of cognitive and affective variables associated with achievement in a computer-assisted instruction learning situation. Doctoral dissertation. East Lansing, Michigan State University. 91 numb. leaves. (Abstracted in Dissertation Abstracts 30:5295A)

Piaget, J. and B. Inhelder. 1969. The psychology of the child. New York, Basic Books, Inc. 173 p.

Plack, J.J. 1970. An evaluation of the Purdue Perceptual-Motor Survey as a predictor of academic and motor skills. Doctoral dissertation. Minneapolis, University of Minnesota. 117 numb. leaves. (Abstracted in Dissertation Abstracts 31:5184)

Roach, E. and N. Kephart. 1966. The Purdue Perceptual-Motor Survey. Columbus, Charles E. Merrill Publishing Co.

Rutherford, W.L. 1964. The effect of a perceptual-motor training program on the performance of kindergarten pupils on metropolitan readiness tests. Doctoral dissertation. Denton, North Texas State University. 108 numb. leaves. (Abstracted in Dissertation Abstracts 25:4583)

Seefeldt, V. 1973. A summary of reported research in perceptual-motor programs. Perceptual-Motor Symposium Proceedings, 1973. Jackson, Mississippi. (Microfische ED081755)

Snedecor, G.W. 1956. Statistical methods applied to experiments in agriculture and biology. Ames, Iowa State College Press, 5th ed. 534 p.

Spivack, G. and M. Swift. 1967. The Devereux Elementary School Behavior Rating Scale manual. Devon, Pennsylvania, The Devereux Foundation Press.

_____. 1973. The classroom behavior of children: a critical review of teacher-administered rating scales. Journal of Special Education 1(7):55-89.

Spivack, G., M. Swift and J. Prewitt. 1971. Syndromes of disturbed classroom behavior: a behavior diagnostic system for elementary schools. Journal of Special Education 5(3):269-292.

Wall, M.J. 1973. The effectiveness of therapeutic self-directed play in self-concept of educationally handicapped children in Saratoga, California elementary schools. Doctoral dissertation. Corvallis, Oregon State University. 101 numb. leaves.

_____. 1974. Associate Professor, Oregon State University. Personal communication. Corvallis, Oregon. October, 1974.

APPENDICES

APPENDIX A

SIX SUB-TESTS OF THE PURDUE PERCEPTUAL-MOTOR SURVEY

SIX SUB-TESTS OF THE PURDUE PERCEPTUAL-MOTOR SURVEY

Name _____ Date of Birth _____

Teacher _____ Date of Exam _____

Grade _____ Sex _____ Examiner _____

1. WALKING BOARD

Forward

Steps off board _____ Comments

Pauses frequently _____

Uses one side of body more consistently than other _____

Avoids balance:
- Runs _____
- Long steps _____
- Feet crosswise of board _____

Maintains inflexible posture _____ Score _____

Backward

Steps off board _____ Comments

Pauses frequently _____

Uses one side of body more consistently than other _____

Avoids balance:
- Runs _____
- Long steps _____
- Feet crosswise of board _____

Twists body to see where he is going _____

Must look at feet _____

Maintains inflexible posture _____ Score _____

Sidewise

Unable to shift weight from one foot to the other _____ Comments

Confusing or hesitation in shifting weight _____

Crosses one foot over the other _____

Steps off board _____

Performs more easily in one direction than the other:
- Right lead _____
- Left lead _____

Score _____

---

2. JUMPING

Both feet

Cannot keep both feet together _____

Uses one side of body only _____

"Ties" one side of both to the other _____

Comments

One foot

Postural shift not smooth _____

Cannot keep opposite foot off the floor _____

Performance better on one foot than other:
- Right _____
- Left _____

Comments

Skip

Movement not free _____

Hesitates after each step to determine which side to use _____

Comments

Hop

Cannot remain in one spot while performing _____

Cannot shift easily from side to side _____

Movements jerky and lack rhythm:
- All patterns _____
- Asymetrical patterns only _____

Comments

Score _____

3. IDENTIFICATION OF BODY PARTS

Show hesitancy in one or more responses	_____	Comments
Does not touch both members of paired parts	_____	
Must "feel around" to find parts	_____	
Makes more than one error in identification	_____	Score _____

4. OBSTACLE COURSE

Going over

Overestimates (steps too high)	_____	Comments
Catches foot on bar	_____	
Cannot correct on one repetition	_____	

Going under

Knocks bar off	_____	Comments
Bends too low to clear bar	_____	
Cannot correct on one repetition	_____	

Going between

Does not turn body	_____	Comments
		Score _____

5. ANGELS-IN-THE-SNOW

Must look from one limb to the other to identify	_____	Comments
Cannot identify by visual data alone	_____	
Requires tactual information to identify limbs	_____	
Taps or moves limb on floor to identify	_____	
Abortive movements to get started	_____	
Hesitation at beginning of movement	_____	

Movements are hesitant and jerky _____

Overflow into other limbs than those called for _____

Movements do not reach maximum extension _____

Requests repetition of instructions _____

Cannot correct response on one repetition _____ Score _____

---

6. CHALKBOARD

Circle

Does not reach proper size _____ Comments

Direction incorrect for hand used _____

Drawing not directly in front of child _____

Does not cross midline _____

Shape of circle not accurate _____

Must stop to "think out" next move during performance _____

Wrist is stiff and difficult to control _____

Still shows difficulty after 3 or 4 attempts _____ Score _____

Double circle

Does not reach proper size _____ Comments

First attempts are small and far apart _____

Circles overlap _____

One circle larger than the other _____

One more accurate than the other _____

Circles drawn one on top of the other _____

Direction incorrect:
Hands parallel _____
Opposite but wrong direction _____

Circles flat toward inside _____

Inaccuracies which are not parallel in both circles _____

Visual attention directed to one hand _____

Movement of two arms not synchronized _____ Score _____

Lateral lines

"Walks" across the board _____ Comments

Draws left half with left hand, right half with right hand _____

Pivots body to avoid crossing midline _____

Difficulty when hand is on opposite side of midline _____

False starts _____

Pauses and confusion _____

Inaccuracies _____ Score _____

Vertical lines

Lines bow:
Slightly _____ Comments
Markedly _____

Visual attention to one hand only _____

One hand ceases to function during performance _____

Hands move alternately, not simultaneously _____ Score _____

APPENDIX B

THE DEVEREUX ELEMENTARY SCHOOL BEHAVIOR RATING SCALE

DEVEREUX ELEMENTARY SCHOOL BEHAVIOR RATING SCALE *

George Spivack, Ph.D. and Marshall Swift, Ph.D.
Devereux Foundation Institute for Research and Training

DESB PROFILE

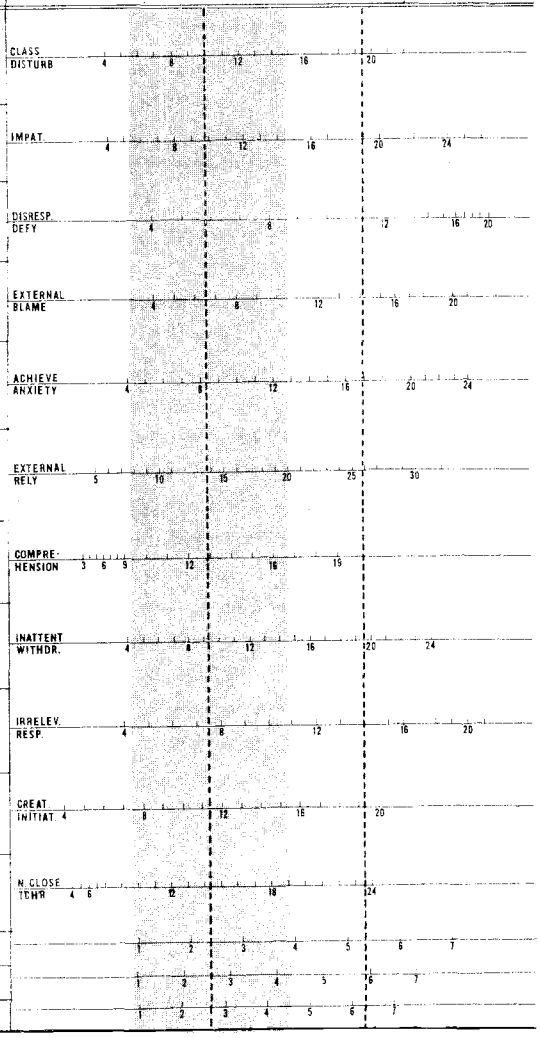
Student's Name _____ Teacher's Name _____

Student's Sex _____ Age _____ Academic Subject _____

Grade _____ School _____ Date of Rating _____

Behavior Factor	Factor Item Raw Scores	Tot'l Raw Sc.
1. Classroom Disturbance	needs control 11 ___ 13 ___ interfere teases 12 ___ 30 ___ drown in	
2. Impatience	starts 1 ___ 44 ___ go back sloppy 36 ___ 47 ___ rushes	
3. Disrespect-Defiance	disrespect 5 ___ 9 ___ subject defy t'ch'r. 7 ___ 16 ___ rules	
4. External Blame	t'ch'r. help 2 ___ 34 ___ blames called on 25 ___ 38 ___ too hard	
5. Achievement Anxiety	test scores 22 ___ 31 ___ testing right answ. 23 ___ 33 ___ sensitive	
6. External Reliance	see others 24 ___ 42 ___ swayed rely t'ch'r. 29 ___ directions 32 ___ 46 ___ choices	
7. Comprehension	understands 10 ___ 37 ___ recites applies 35 ___	
8. Inattentive - Withdrawn	lose attn. 18 ___ 28 ___ oblivious not attnd. 20 ___ 43 ___ reachable	
9. Irrelevant - Responsiveness	exagg. story 14 ___ 17 ___ interrupt answers 15 ___ 26 ___ irrel. talk	
10. Creative Initiative	brings in 3 ___ 6 ___ start disc. act. imag. 4 ___ 21 ___ talk exper.	
11. Need Closeness to Teacher	seeks t'ch'r. 8 ___ 39 ___ friendly helps 19 ___ 45 ___ phys. close	
Additional Items	27 Unable change 40 Quits 41 Slow Work	

Raw Score in Standard Score Units



YOU ARE GOING TO RATE THE OVERT BEHAVIOR OF A STUDENT. FOR ITEMS 1-26 USE THE RATING SCALE BELOW. WRITE YOUR RATING (NUMBER) FOR EACH ITEM IN THE BOX TO THE LEFT OF THE ITEM NUMBER.

Very frequently	Often	Occasionally	Rarely	Never
5	4	3	2	1

COMPARED WITH THE AVERAGE CHILD IN THE NORMAL CLASSROOM SITUATION, HOW OFTEN DOES THE CHILD...

Rating	Item
☐	1. Start working on something before getting the directions straight?
☐	2. Say that the teacher doesn't help him enough (i.e., won't show him how to do things, or answer his questions)?
☐	3. Bring things to class that relate to current topic (e.g., exhibits, collections, articles, etc.)?
☐	4. Tell stories or describe things in an interesting and colorful fashion (e.g., has an active imagination, etc.)?
☐	5. Speak disrespectfully to teacher (e.g., call teacher names, treat teacher as an equal, etc.)?
☐	6. Initiate classroom discussion?
☐	7. Act defiant (i.e., will not do what he is asked to do, says: "I won't do it")?
☐	8. Seek out the teacher before or after class to talk about school or personal matters?
☐	9. Belittle or make derogatory remarks about the subject being taught (e.g., "spelling is stupid")?
☐	10. Get the point of what he reads or hears in class?
☐	11. Have to be reprimanded or controlled by the teacher because of his behavior in class?
☐	12. Poke, torment, or tease classmates?
☐	13. Annoy or interfere with the work of his peers in class?
☐	14. Tell stories which are exaggerated and untruthful?
☐	15. Give an answer that has nothing to do with a question being asked?
☐	16. Break classroom rules (e.g., throw things, mark up desk or books, etc.)?
☐	17. Interrupt when the teacher is talking?
☐	18. Quickly lose attention when teacher explains something to him (e.g., becomes fidgety, looks away, etc.)?
☐	19. Offer to do things for the teacher (e.g., erase the board, empty the pencil sharpener, open the door, get the mail, etc.)?
☐	20. Makes you doubt whether he is paying attention to what you are doing or saying (e.g., looks elsewhere, has blank stare or faraway look, etc.)?
☐	21. Introduce into class discussion personal experiences or things he has heard which relate to what is going on in class?
☐	22. Get openly disturbed about scores on a test (e.g., may cry, get emotionally upset, etc.)?
☐	23. Show worry or get anxious about knowing the "right" answers?
☐	24. Look to see how others are doing something before he does it (e.g., when teacher gives a direction, etc.)?
☐	25. Complain teacher never calls on him (e.g., that teacher calls on others first, etc.)?
☐	26. Make irrelevant remarks during a classroom discussion?

FOR ITEMS 27-47 USE THE RATING SCALE BELOW:

Extremely	Distinctly	Quite a bit	Moderately	A little	Very slightly	Not at all
7	6	5	4	3	2	1

COMPARED WITH THE AVERAGE CHILD IN THE NORMAL CLASSROOM SITUATION, TO WHAT DEGREE IS THE CHILD...

Rating	Item
☐	27. Unable to change from one task to another when asked to do so (e.g., has difficulty beginning a new task, may get upset or disorganized, etc.)?
☐	28. Oblivious to what is going on in class (i.e., not "with it," seems to be in own "private" closed world)?
☐	29. Reliant upon the teacher for directions and to be told how to do things or proceed in class?
☐	30. Quickly drawn into the talking or noise-making of others (i.e., stops work to listen or join in)?
☐	31. Outwardly nervous when a test is given?
☐	32. Unable to follow directions given in class (i.e., need precise directions before he can proceed successfully)?
☐	33. Sensitive to criticism or correction about his school work (e.g., gets angry, sulks, seems "defeated", etc.)?
☐	34. Prone to blame the teacher, the test, or external circumstances when things don't go well?
☐	35. Able to apply what he has learned to a new situation?
☐	36. Sloppy in his work (e.g., his products are dirty or marked up, wrinkled, etc.)?
☐	37. Likely to know the material when called upon to recite in class?
☐	38. Quick to say work assigned is too hard (e.g., "you expect too much," "I can't get it," etc.)?
☐	39. Responsive or friendly in his relationship with the teacher in class (vs. being cool, detached or distant)?
☐	40. Likely to quit or give up when something is difficult or demands more than usual effort?
☐	41. Slow to complete his work (i.e., has to be prodded, takes excessive time)?
☐	42. Swayed by the opinion of his peers?
☐	43. Difficult to reach (e.g., seems preoccupied with his own thoughts, may have to call him by name to bring him out of himself)?
☐	44. Unwilling to go back over his work?

COMPARED WITH THE AVERAGE CHILD IN THE NORMAL CLASSROOM SITUATION, TO WHAT DEGREE DOES THE CHILD...

☐	45. Like to be close to the teacher (e.g., hug or touch the teacher, sit or stand next to teacher, etc.)?
☐	46. Have difficulty deciding what to do when given a choice between two or more things?
☐	47. Rush through his work and therefore make unnecessary mistakes?

APPENDIX C

THE SELF-CONCEPT AND MOTIVATION INVENTORY

THE SELF-CONCEPT AND MOTIVATION INVENTORY (SCAMIN): WHAT FACE WOULD YOU WEAR? --EARLY ELEMENTARY FORM

Manual of Directions

This form is intended for first, second, and third grade students. Many third and almost all fourth grade students should be given the longer Later Elementary Form of the SCAMIN when the teacher feels that the class can sustain interest for 48 questions.

Preparations

Read the Inventory to yourself before giving it.

Primary grade teachers usually prefer to write the student's last name and first initial on the sheets. Abbreviations and initials are desirable time-savers on the remainder of the heading. Older students may often be employed for this.

When forms are machine-scored or used in research, please mark the semester, sex, and grade spaces on the back. (R is for reading readiness classes, and S is for special education rooms.) Other Information spaces are used at the discretion of the principal or researcher.

Pupils will need a pencil. Easily seen colored pencils may be used only when forms are hand-scored. Markers (ruler-shaped pieces of cardboard or folded paper) are desirable for keeping students on the right row.

Allow at least 25 minutes for reading the Inventory. Repeat each item. Inspect the finished response sheets and repeat any missed items to the individual pupils. Have the students cross out unwanted responses so that you can find and erase them later.

Draw the five faces on the black board.

Read the questions aloud to the pupils without emphasizing any particular word or using any special facial expression. Discourage class clowns quickly.

Introduction

Distribute the response sheets and markers. If you are having the students fill in the inventory heading, copy the heading on the black board, and use your own appropriate style of directions.

After students are alerted to have their pencils ready, read the following:

> Don't use your pencil for anything until I tell you what to do.
>
> This is almost like a game. It's called What Face Would You Wear?
>
> You know that boys and girls put on masks to look like other people. Sometimes clowns paint their faces to look happy or sad. And you change your face a few times every day. If someone gave you a piece of candy, you might wear a smile on your face. . . like this. . . (Point to the small smile.)
>
> If you thought you were going to like the candy very much, you might wear a real big smile. . . like this. . . (Point to the big smile.)
>
> But, if you fell down on the sidewalk, you would probably wear a sad face. . . like this one. . . (Point to the frown.)
>
> If it hurt badly enough, you would feel almost like crying. (Draw the crying face.)
>
> Now, what about this face? (Point to the uncommitted face in the middle.) This face isn't happy, and it isn't sad. It's between glad and sad.
>
> (Point to the faces as you go along.) Everyone look at the row of faces at the top of your sheet. Put your finger on the small smile. Now put your finger on the big smile. Put your fingers on the two sad faces. Which is the saddest one? Which face is between glad and sad?
>
> Put your marker under this top row of shaded faces. What face would you wear if you found a strange dog? Take your pencil. Put a nose on that face.

(If machine-scored, say): Darken in one of the noses like this--real dark! Only one nose.

(If hand-scored say): Draw in a nose. Only one nose.

What face would you wear if you found a stronge dog? If you think of a growling dog, you might wear one of the unhappy faces. If you think of a friendly dog, you might wear one of the happy faces. Or, you might pick the face in the middle. Any face you pick is right if it is the way you would feel.

Questions

Now that we've finished the practice row, let's find row one. Put your marker under the row of faces numbered "one". I want you to put a nose on the one face that you would wear if you could make a teacher happy with your arithmetic.

(If machine-scored, say): Darken in the little nose on the face you pick.

(If hand-scored, say): Draw a nose on the face you pick.

#1 (Repeating #1): What face would you wear if you could make teacher happy with your arithmetic? Put a nose on it. (Scan the room and say): That's fine! (while you correct any wrong-doers.)

Only one face! You can only wear one face at a time. Now move your marker down one row to the row numbered "two". Which one of these faces would you wear if you were reading a story that you had written for your parents?

#2 (Repeating #2): What face would you wear if you were reading a story that you had written for your parents? Mark the nose.

Remember that the faces that you wear are different from the ones that anyone else wears, so don't pay any attention to what the people near you are marking. Answer every question. Don't leave any rows without a nose on one of the faces.

#3 Row Three: What face would you wear if you could tell a friend a word that he needed to know? (Repeat the last question.) Now down to row four.

I'll say every question two times. Raise your hand if I go too fast for you.

#4 Row Four: What face would you wear if you had to tell your parents that you had lost your coat? (Repeat.)

#5 Row Five: What face would you wear if you had to ask a teacher for help with your arithmetic? (Repeat.)

#6 The Bottom Row--Row Six: What face would you wear if you made a mistake in front of the whole class? (Repeat.)

#7 Now back up to the top of the page and Row Seven: What face would you wear if you could read like a grown-up? (Repeat.)

#8 Move your marker under Row Eight: What face would you wear when you are learning to read some words that you might use someday? (Repeat.)

#9 Row Nine: What face would you wear when you think of going to school to learn of new ideas? (Repeat.)

#10 Row Ten: What face would you wear if you had done something that would get you a spanking? (Repeat.)

#11 Row Eleven: What face would you wear if you couldn't answer an easy question? (Repeat.)

#12 Row Twelve is the last row of the page: What face would you wear if you had to go back and start your grade all over again? (Repeat.)

#13 Everyone turn your sheet over to the back. Start at the top. Put your marker under Row Thirteen: What face would you wear when your parents tell you how good your school work will be? (Repeat.)

#14 Row Fourteen: What face would you wear when a teacher tells you how much you should be reading next year? (Repeat.)

#15 Row Fifteen: What face would you wear if the boys and girls had to pick the best readers in your reading group? (Repeat.)

#16 Row Sixteen: What face would you wear when one of your parents has a talk with one of your teachers? (Repeat.)

#17 Row Seventeen: What face would you wear when a teacher tells everyone to do their very best work? (Repeat.) Now down to the bottom row.

#18 Row Eighteen: What face would you wear if the smartest children could go-out-'n-play? (Repeat.) Let's all move our markers up to the top of the page.

#19 Row Nineteen: What face would you wear thinking of the best schoolwork you would like to do? (Repeat.) Down one row.

#20 Row Twenty: What face would you wear if you had some hard arithmetic problems to do? (Repeat.)

#21 Row Twenty-One: What face would you wear if someone was telling you what your class will be like next year? (Repeat.) Only three more to go.

#22 Row Twenty-Two: What face would you wear when you think of how good you're doing in reading? (Repeat.)

#23 Row Twenty-Three: What face would you wear if you started to study something new with numbers? (Repeat.) Now the last row.

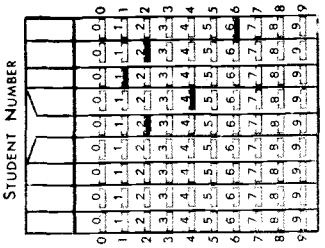
#24 Row Twenty-Four: What face would you wear when you think of all the children in class who like you? (Repeat.)

Let's all go back to the front of our sheet and check to see that there is one nose--and only one nose--in every row. Raise your hand if you missed a row or want a question repeated. Thank you for listening so well. (Collect the response sheets in your usual manner.)

Print name: _____ Date: _____

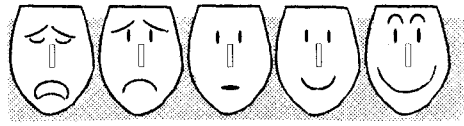
School: _____ Teacher: _____ Grade: _____

STUDENT NUMBER

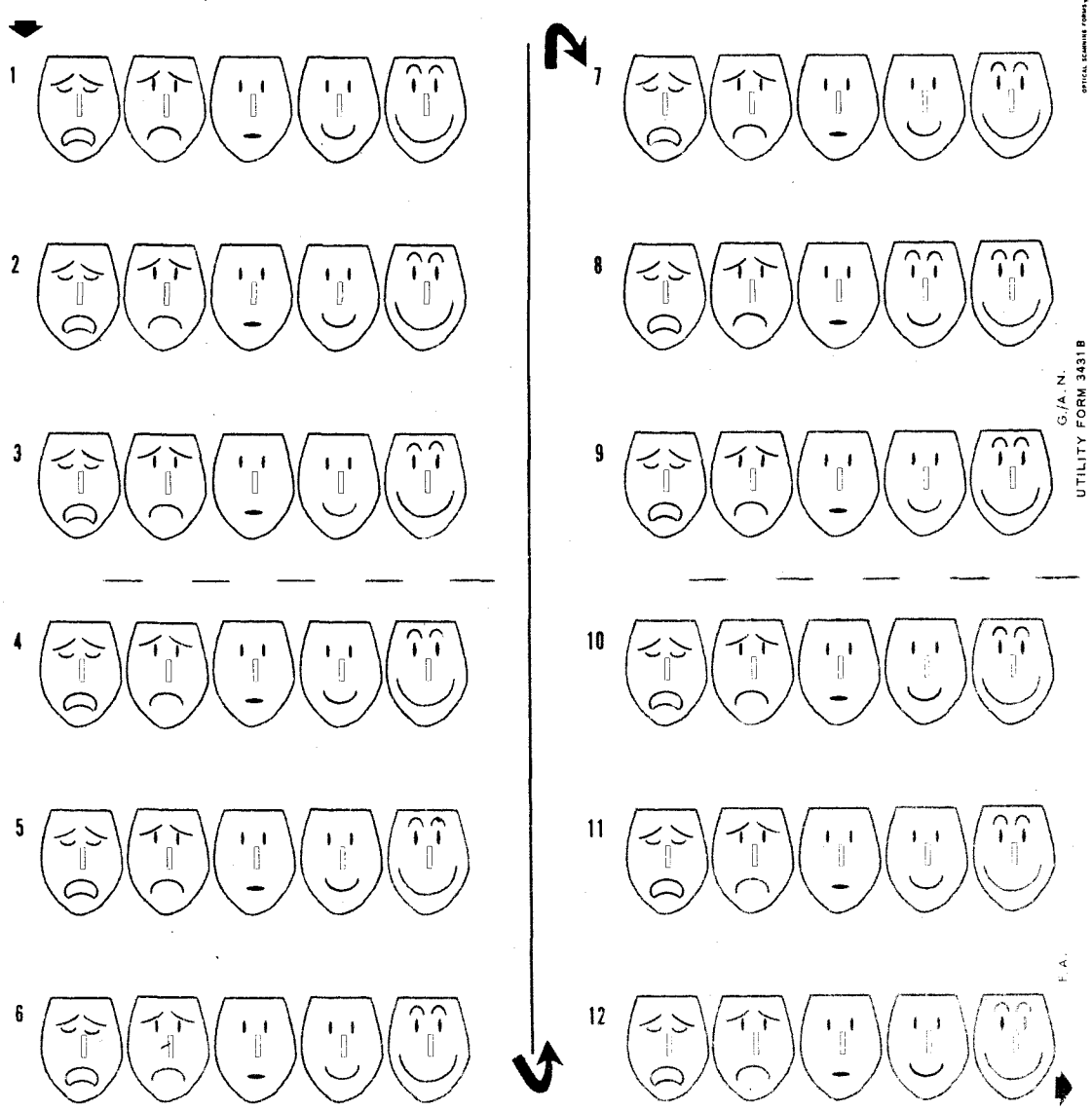


What Face Would You Wear?

Sample



Darken the nose with pencil.



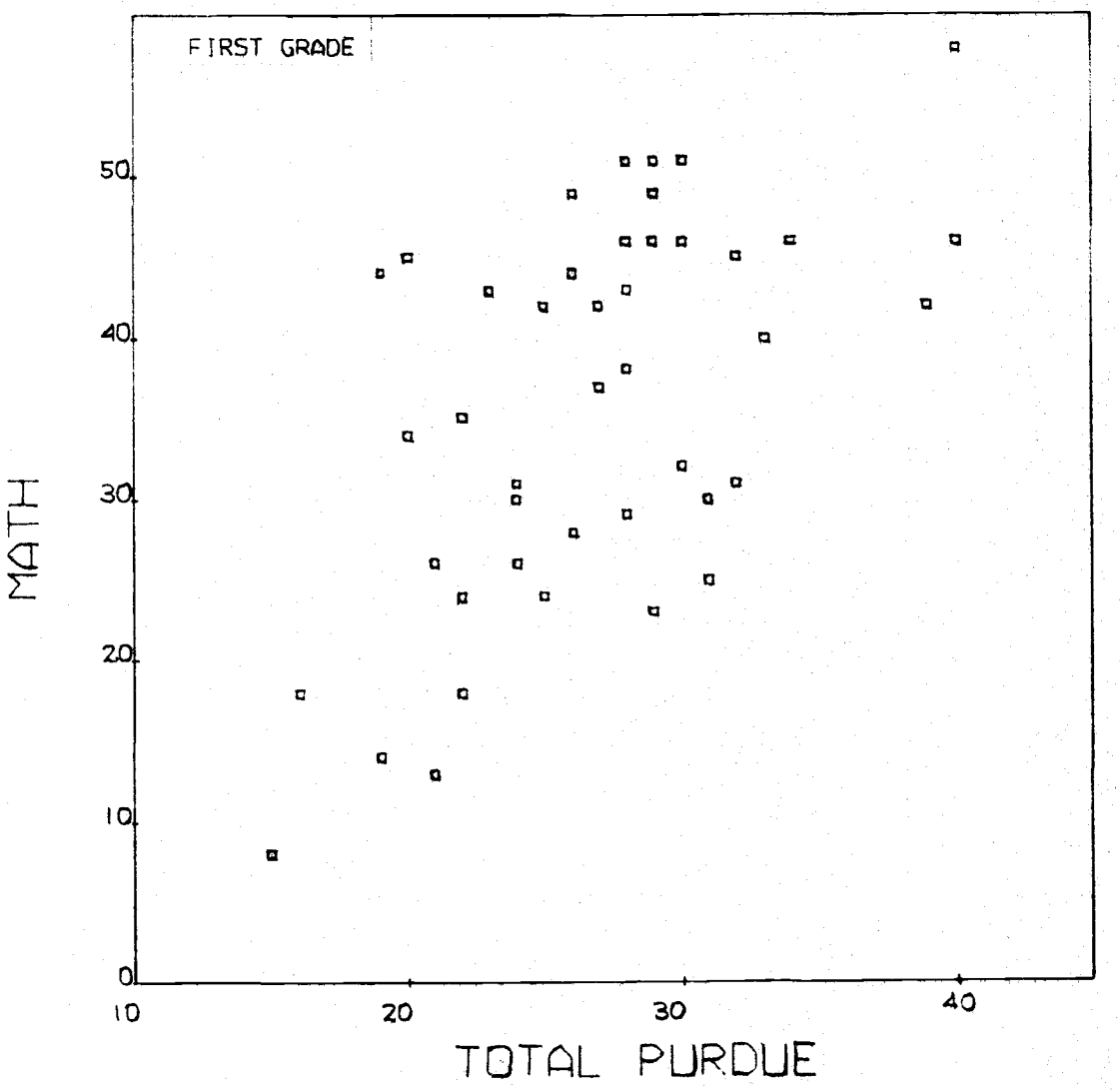
OPTICAL SCANNING FORMS by OPTICAL SCANNING CORPORATION © WARREN, PA. 16365

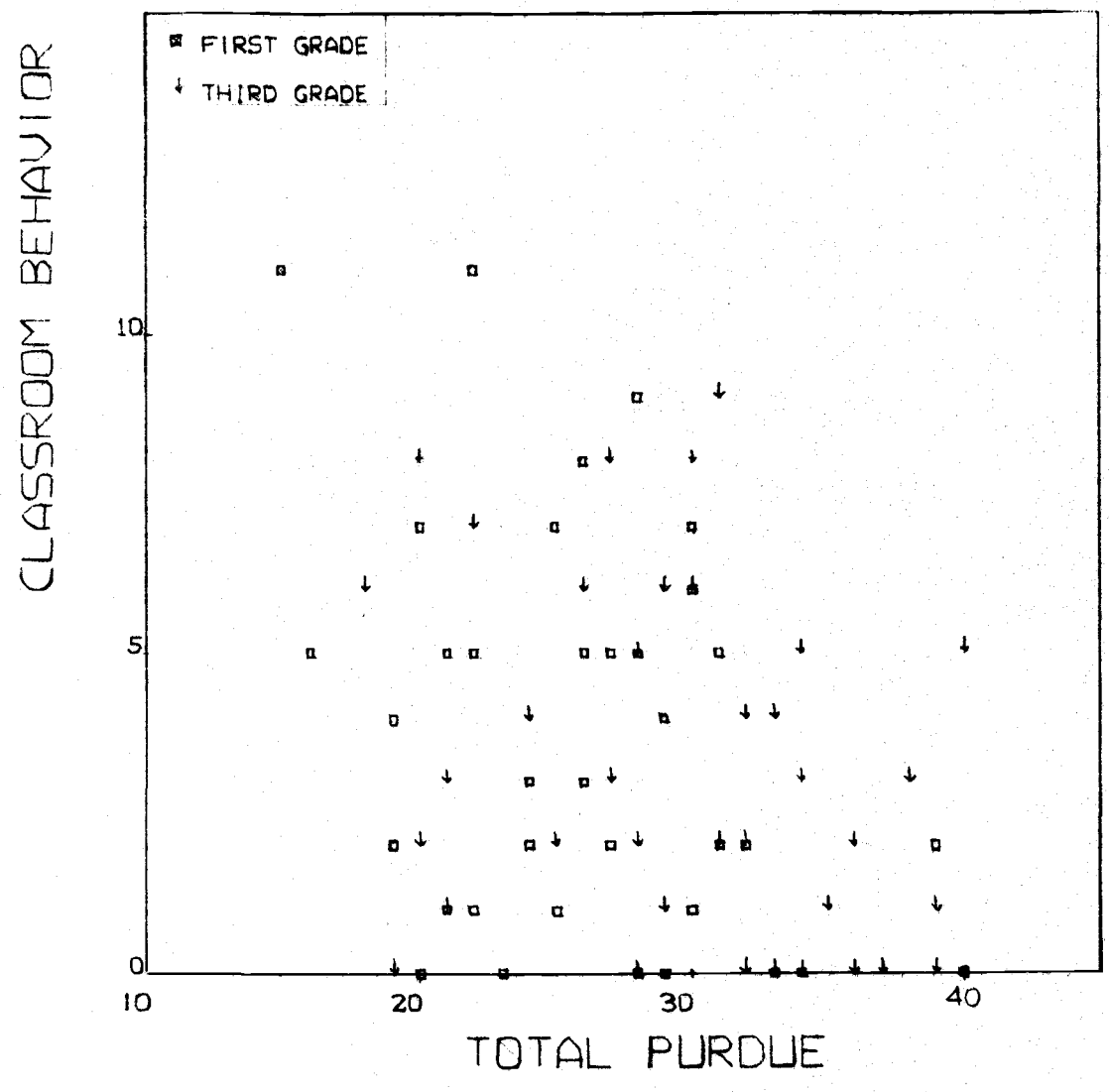
G.A.N.
UTILITY FORM 3431 B

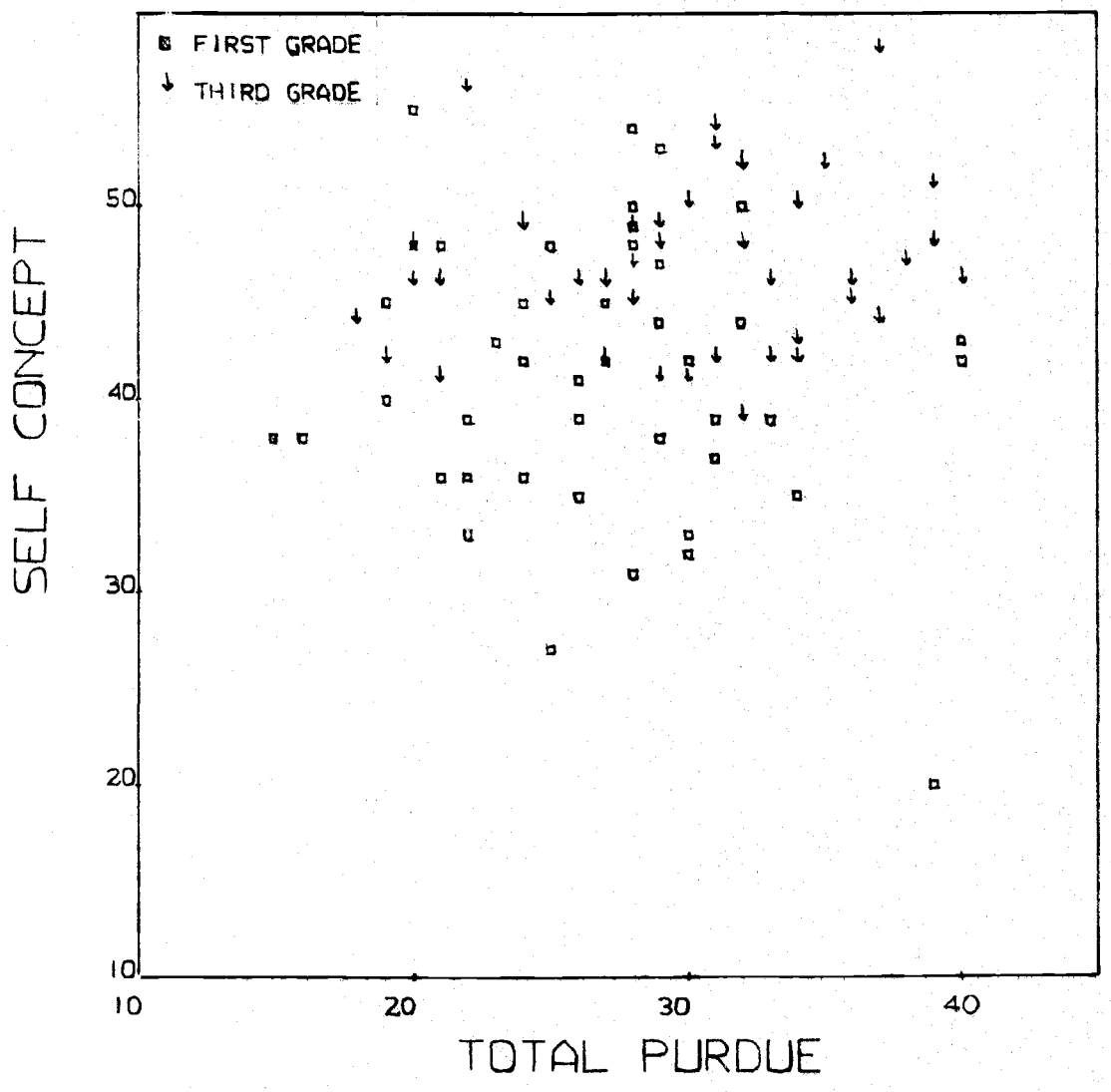
F.A.

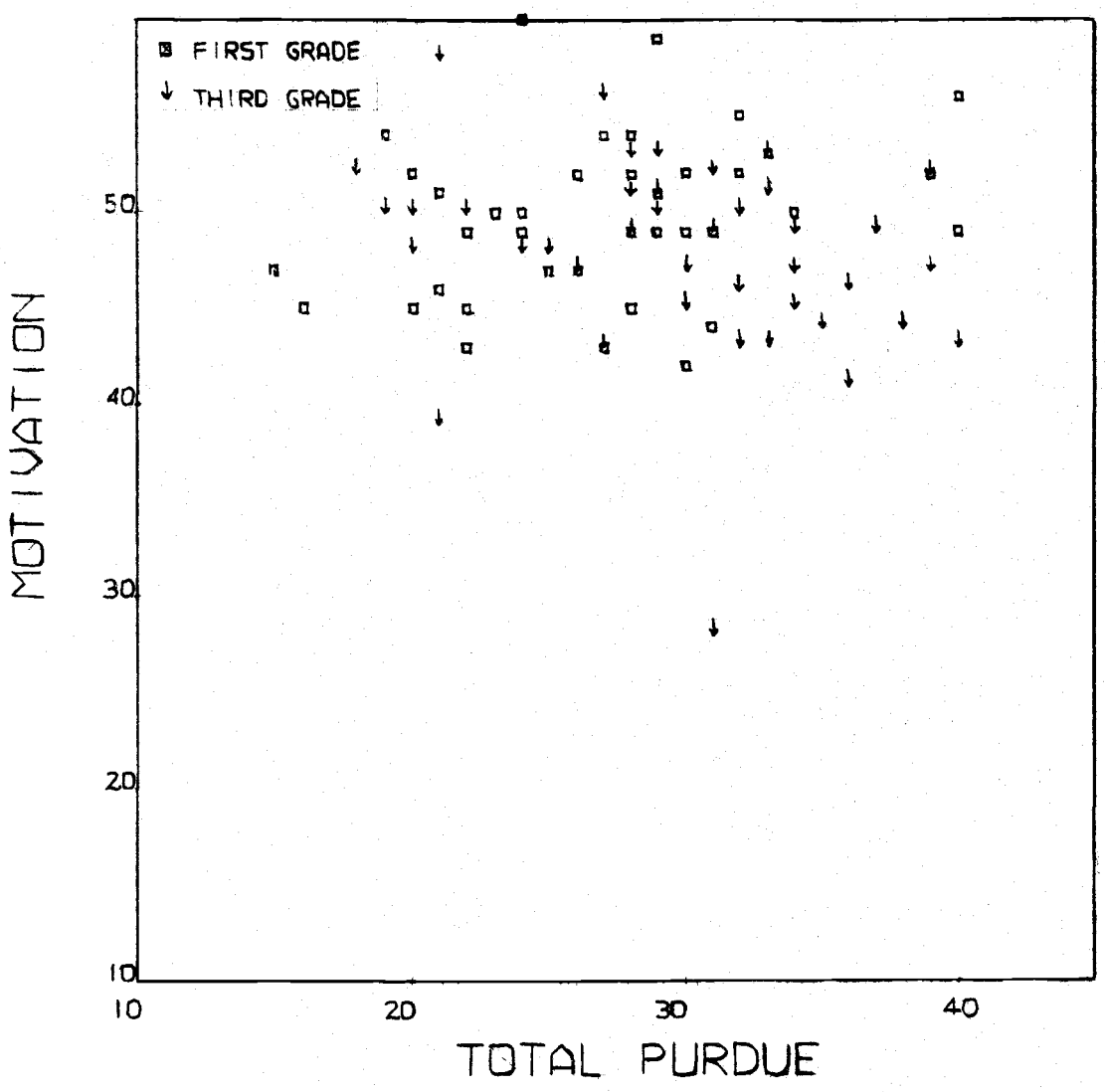
APPENDIX D

SCATTERGRAMS


FIRST GRADE
MATH
50
40
30
20
10
0
10
20
30
40
TOTAL PURDUE


FIRST GRADE
THIRD GRADE
CLASSROOM BEHAVIOR
10
5
0
10
20
30
40
TOTAL PURDUE


FIRST GRADE
THIRD GRADE
SELF CONCEPT
50
40
30
20
10
10
20
30
40
TOTAL PURDUE


FIRST GRADE
THIRD GRADE
MOTIVATION
50
40
30
20
10
10
20
30
40
TOTAL PURDUE