DIVERGENT PRODUCTION MEASURES AND SELF-CONCEPT AMONG THIRD, FOURTH, AND FIFTH GRADE STUDENTS IN OPEN AND TRADITIONAL CLASSROOMS

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CHAPTER I

PROBLEM DEFINITION

Introduction

Many creatively gifted children are never identified or even associated with outstanding ability because their skills are not compatible with the traditional school setting. Their teachers may be aware of something unique in these students' ideas but often lack the skills to facilitate such potential. One widely publicized critic found the learning environment itself suppressive,

> It is not possible to spend time visiting public school classrooms without being appalled at the mutilation visible everywhere, . . . mutilation of spontaneity, of joy of learning, of pleasure in creating, of sense of self (Silberman, 1970, p. 10).

Sawrey and Telford (1975) find the rewards for conformity and the relative absence of rewards for independent thinking and activity have been possible suppressants of individuality and deterrents to self-expression. The authors question if the school is a microcosm of a culture that is becoming less and less tolerant of independent or socially divergent behavior.

Yet, our rapidly advancing technological culture appears to be increasingly dependent on sophisticated ideational processes. "Unique ideas, and original problems and new ways of solving them, are the grist of an innovating society" (Telford and Sawrey, 1977, p. 192). Clark (1979) proposes that there is an interdependency between the

creative student and society. On one hand, the students need to develop their unique abilities and to find life work that will allow full use of their talents. On the other hand, society needs the contributions of the creative student. "The solutions to societal problems, services, and reconceptualizations that are required in a complex society can be offered by these students" (Clark, 1979, p. 235).

Traditionally, schools have insisted it is more economical to learn by authority, an approach which rewards academic achievement based on abilities such as recognition, memory, and logical reasoning. But research in the field of creativity suggests individuals learn better and prefer approaches such as exploring, experimenting, and testing (Torrance, 1977). Creative learning involves abilities such as flexibility, transformation of ideas, and divergent thinking processes (Guilford and Hoepfner, 1971).

One of the major contributors to an understanding of intellectual abilities and their differing patterns is J. P. Guilford (1950). His theory, the Structure of Intellect, originated in a multivariate concept of intelligence, which subsequently gave impetus to the study and assessment of creative potential. Guilford suggested that creativity and scholastic achievement depended on differing patterns of intellectual abilities.

An important consequence of research in creativity has been an expanded concept of the human mind and its functioning (Gowan and Torrance, 1971). For many years, academic ideas of the child's mind were influence by concepts embodied in intelligence tests. Curricula and methods of teaching were often designed to develop mental abilities measured by intelligence or aptitude tests (Torrance, 1963).

Such an approach tended to produce educational programs which were not sensitive to creative potential. In our schools, the freedom of expression often associated with creativity, is usually antithetical to the conformity typically required for students to learn subject matter (Meeker, 1978). An interesting analogy is offered by Cole (1969),

> If people were computers, schools are 'programming' to receive, store, retrieve, and reproduce information only. We must also 'program' other processes involved in the processing, organization, efficient utilization, and application of information (in Clark, 1979, p. 250).

Telford and Sawrey (1977) find that when children are allowed a wealth of experience with their environment, they develop competencies, interact successfully with their external world, develop confidence in themselves and thus have high self-esteem and are potentially creative. Maw and Maw (1970) found creativity, curiosity, and self-esteem positively related in children--that they develop simultaneously.

However creativity is defined, as a novel product, as a divergent fruitful process of thinking, or as an inspired experience, it is a behavior that must be nourished to attain its potential. Maxwell (in Meeker and Maxwell, 1973) believes most children arrive in the world highly curious and active. She finds (p. d) "spontaneity and freedom to satiate curiosity are harbingers of creative effort." If the home or school demand a more convenient conformity the child may learn to suppress spontaneity and exploration.

Many initially curious children do find exploration in novel situations differentially rewarding according to Telford and Sawrey, (1977). Children who are rewarded for curiosity will continue their experimenting; those who are punished will tend to limit the world of

experience, and to fail to develop those competencies that contribute to creativity and self-confidence.

It appears, that if educators desire to facilitate creative potential in students, they cannot rely on following traditional rules, practiced methods, or standard assessment techniques. Neither can behavior modification or shaping be expected to produce the responsive environment needed (Torrance, 1977). Emerging creativity appears likely to be fostered in direct proportion to the extent that parents, teachers and others working with children, respect curiosity, unusual questions and interests, recognize unusual skills and talents, provide for self initiated learning; and provide as rich and varied an atmosphere as possible (Torrance, 1966).

The importance of establishing an atmosphere of tolerance and acceptance for diversity is also stressed by Meeker (1978), and Telford and Sawrey (1977). Students need to have ego strength in the face of censure, risk-taking, and going against the status quo. Gowan and Torrance (1971) write that a vital aspect of the creative, responsive environment, is concern for optimal social and personal adjustment by those who propose to enhance creative potential.

A few educators, from the late 1950's and early 1960's on, have taken note of research findings, voicing their concerns, and advocating changes and modifications, Torrance (1977) concluded that many of the curriculum reforms during the past twenty years have moved education in the United States closer to a more "creative" kind of education. At least two trends in particular might appear to do so. These are open education and affective education.

In departing from traditional architectural structures and emphasizing curriculum flexibility, many objectives of open education seem compatible with the goals of creative learning and problem solving (Schuchat, 1972). The phrase open education is used variously in the literature to describe different combinations of the novel use of physical space, experiential learning methods, and positive acceptance of a wide range of individual differences in interests (Resnik, 1971).

Open education theory has many applications and interpretations, although some degree of curriculum structure is usually implicit. For example, typically, certain goals are predetermined and resource centers are provided. Yet, the learner is free to explore independently, motivated by developing interests and available resources (Glatthorn, 1975).

Open education philosophy shares many tenets of the second educational reform-type movement, affective education, which also appears compatible with a creative learning environment. The emphasis of affective education is on providing a more experiential and personally relevant approach to learning (Glatthorn, 1975). In such programs the goal is to relate the cognitive with the affective. For every concept developed, the teacher leads the student to examine personal feelings and values in relation to the topic at hand. The emphasis on self-understanding in affective education practices appears to facilitate creativity in children (Gowan and Torrance, 1971).

Gowan (1971) and earlier researchers such as Kris (1952) and Kubie (1958) agreed that innovative and creative work requires a high degree of mental health. There is a high anxiety in creative people that results from a sort of "divine discontent with his status or rate

of progress in comparison with his self-expectations or aspirations" (Telford and Sawyer, 1977, p. 198). The critical factor is not the presence of anxiety but the level of it and the individual's coping mechanisms. Thus, there is a need for a high degree of mental health in the creative individual's ability to manage anxiety in productive ways.

Recognizing this essential tension in the curiosity and search for truth that characterizes creative learning, Torrance (1972) pointed out the need in children for information about psychological processes so that they might optimally cope with both internal and external stresses. Rogers (1959) writes of psychological safety and psychological freedom as conditions favorable to creativity and as defenses in an intolerant society. In a nonthreatening social environment, the creative individual will have a tolerable level of anxiety. The principle sources of motivation will be the positive satisfactions of exploration and discovery rather than the reduction of anxiety. When a child feels psychologically safe, he or she can be divergent without being defensive, and nonconformist without suffering social disapproval.

The increased awareness of the cognitive and affective implications of different educational methods points to the need for appropriate assessment of these interrelationships so that growth facilitating environments will be better understood. However, when standard testing methods have failed to show the gains or advantages of open and affective education programs over traditional approaches, such testing itself has been criticized (Nyquist and Hawes, 1972). Chittendon and Bussis (1972) stress the need for evaluating, not only

the academic abilities, but the self-perceptions developed by children in the innovative classrooms and programs. It appears that with optimal teacher-learner interaction, the amount and manner in which a student translates academic information into meaning is relative to his or her intellectual ability and self-perceptions (Brophy and Good, 1970, 1972; Brown and Cleary, 1973; Combs and Snygg, 1959; Kagan, 1971; Rowe, 1969). Also, Chittendon and Bussis (1972) point out,

> . . . any definition of achievement which is appropriate to a modern informal program must include the self and the creative effort within that definition . . . and should assess whether children's accomplishments are marked by mindless application of poorly assimilated rules or by judgment and creative effort (pp. 369-70).

In 1977, Rivet addressed the need to develop as assessment approach which would offer educators an appropriate and validated method for studying these relationships. She sought empirical evidence relating intellectual abilities with the individual's self-perceptions. Her study involved 718 students, ages eight through twelve, in five elementary schools in three urban public school systems.

Rivet's research included the Piers-Harris Children's Self-Concept Scale (Piers and Harris, 1969) and the Structure of Intellect Learning Abilities Test (Meeker and Meeker, 1975). Rivet proposed that an analysis of the intellect relative to self-concept might serve to substantiate that intellectual functioning is influenced by self-concept. Twenty hypotheses were generated to answer three major questions: (1) Are there significant relationships between self-concept and abilities of the intellect? (2) Is there any one or combination of intellectual abilities as tested by the Structure of Intellect Learning Abilities Test which appear more closely related to self-concept?

(3) Are there significant age or sex differences noted within the correlations obtained?

Statistically significant correlations were found between the total self-concept scores yielded by the Piers-Harris Scale and the Structure of Intellect Test scores for the total of all subtest scores in the dimensions of Memory, Evaluation, Cognition, and Convergent Production. However, no significant relationship was found between total self-concept scores and Divergent Production scores.

Of the six Piers-Harris Scale cluster scores, five demonstrated higher correlations with Convergent Production than with the other intellectual factor scores. There were no significant differences found between boys and girls on measures of self-concept and intellect. In addition, the study reported no consistent upward or downward trends in the scores that would have supported earlier studies of decline in the third and fourth grades (Meeker, 1979; Torrance, 1962).

In discussing the results, Rivet (1977) found the low correlations between Divergent Production and self-concept scores seemed to be in contrast with what had been postulated in the past. She pointed out that Divergent Production can be conceived of as an operational definition of creativity, although it is not a complete description of creative ability. She suggested that to verify the lack of significant relationship between the Divergent Production scores and self-concept scores, further research be undertaken. Rivet further notes that by definition Divergent Production appears more unlike the other major abilities of the Structure of Intellect model; Divergent Production requires a differential quality of output rather than production from the store of existing knowledge.

However, in reviewing the development of the dimensions of the Structure of Intellect, Guilford (1967) pointed out that the five operation constructs, Cognition, Memory, Evaluation, Convergent Production, and Divergent Production, were established through factor analyses. Guilford describes both Convergent and Divergent Production as originating in the broader, more elusive category which he calls reasoning ability. From this explanation, it is not clear why the five operations are not all intellectual processes that would be equally receptive to the influence of self-concept in learners as Rivet proposed in her research hypotheses.

Statement of the Problem

It is proposed in this study that the difference between Divergent Production and the other four operations of the Structure of Intellect paradigm, Cognition, Memory, Evaluation, and Convergent Production, is not in distinctiveness among the operations themselves but in the differential manner in which they are elicited, developed, and reinforced by curricula, teachers, and other aspects of the learning environment.

If divergent production is not a valued objective in childrens' educational experience, there is less expectation for them to value this ability in themselves. Also, divergent production might reasonably be expected to have a significant correlation with self-concept in the kind of environment that values, nurtures, and rewards divergency.

While this environment does not appear to have been prevelant in our schools, nor perhaps, even prevelant in our society (Meeker, 1978; Moustakas, 1967a; Silberman, 1970; Telford and Sawyer, 1977;

Torrance, 1977), the innovations in education such as the open and affective programs may be moves in the direction of a more "creative" type of educational process as suggested by Torrance (1977).

This study investigated whether two types of educational experience, open and traditional, which are provided through the public schools, have a differential impact on the development of divergent production intellectual abilities and self-concept. There was also interest in the effect of these two school environments on upward and downward trends in the development of divergent production abilities and self-concept.

The following questions were of concern to this study:

1. Is there a difference in divergent production intellectual abilities between children in open and traditional school environments?

2. Is there a difference in self-concept between children in open and traditional school environments?

3. Is there a difference in divergent production intellectual abilities among children in grade levels three, four, and five?

4. Is there a difference in self-concept among children in grade levels three, four, and five?

5. Is there an interaction between open and traditional school environments and grade levels three, four, and five, for the divergent production intellectual abilities?

6. Is there an interaction between open and traditional school environments and grade levels three, four, and five, for self-concept?

The following are definitions and abbreviations necessary for understanding the materials and hypotheses presented in subsequent chapters.

Definition of Terms

Divergent Production Intellectual Abilities

The expansion of ideas and concepts to generate information which shows fluency, flexibility, and originality. The quality of output and creativeness are emphasized. For the purpose of this study, divergent production is defined as the scores on the three divergent production subtests from the Structure of Intellect Learning Abilities Test (SOI-LA, Meeker and Meeker, 1975), shown in Appendix A, pp. 122-23.

The Divergent Production of Figural Units, (DFU)

The ability to produce many figures conforming to simple specifications. The test is scored for (1) fluency, (2) set change, (3) transformation, and (4) originality.

DFU - Fluency. The number of figures produced.

DFU - Set Change. The number of different ideas in the drawings; a measure of flexibility.

DFU - Transformation. Conceptually breaking through the sets to produce a figure in two or more squares.

DFU - Originality. Uniqueness; drawings with writing for clarity; humor; third-dimension or perspective; personalization of inanimate objects, fantasy, or rarity (only two students in a class might produce one).

The Divergent Production of Semantic Units, (DMU)

The ability to use written language; the test is scored for (1) fluency, and (2) originality.

DMU - Fluency. A measure of how quickly students can write a story; a count of the words in the stody.

DMU - Originality. A measure of unique written ideas; it is based on rarity of response, humor, personification of inanimate objects, fantasy, or macabre ideas.

The Divergent Production of Symbolic Relations, (DSR)

The ability to be creative in symbolic problem-solving. The test provides three-by-three matrices, a rule for each matrix, and some "given" letters or numbers in the matrices. The test is scored for (1) fluency, (2) set change, and (3) originality.

DSR - Fluency. The number of squares filled-in and not given in each three-by-three matrix.

DSR - Set Change. The number of symbols used that are different from those given in the matrix and follow the rule for each matrix.

DSR - Originality. Imaginative, unique use of symbols to carry out the rule for each matrix, i.e., the use of mathematical signs, fractions, zeroes, and so on.

Open Education Environment

A type of educational program involving the novel use of physical

space, experiential learning methods, and a continuous progress curriculum. In this study, open education refers to the "Tulsa Design," a program begun in 1971 by the Tulsa, Oklahoma, Public Schools. The model was based on other programs already in existence, and is considered by the administration of the schools in that city to be an eclectic version of other open education programs.

The Tulsa Design was the result of several years of research into a wide spectrum of open education schools located in the Eastern part of the United States. In the late sixties, the open education movement caught the attention of a "dynamic superintendent who had far-reaching impact on the Tulsa school system" (Edmond, 1980). Under this superintendent's direction, the model was planned and constructed as an innovative approach to education.

Several committees were sent to review school systems in [illegible] New Jersey, Connecticut, and other eastern states which had initiated open education programs. The plan, which was ultimately adopted by the system, reflects modifications of most of the criteria descriptive of the open education concept. These modifications appear to be in the direction of a traditional education concept.

Specific modifications which are part of the model school in this study are centered around greater teacher and administrative direction in curriculum planning. Curriculum structure is provided within which individual choice and initiative may proceed. Teachers work in three teams with each team instructing pupils for one-third of the day. Each team is responsible for an instructional area: communication skills, humanities, and mathematics-science. Within this larger framework there remains substantial flexibility for student choices.

The communication-skills team instructs pupils in reading, language, spelling, and writing. The humanities team instructs pupils in social studies, art, music, speech, and drama. The mathematics science team instructs pupils in these two subjects. The curriculum for each of these areas was developed initially in a summer workshop in which the teachers wrote behavioral objectives, planned materials and related activities to elicit the students' progress. This same manner is used to continually evaluate and revise the curriculum.

The school uses a nongraded or continuous growth approach in lieu of the traditional, grade-level, promotion structure. The first three grades are grouped into a block of time with specific objectives. Most students spend three years accomplishing the objectives, other pupils require more or less time before they are ready for assignment to the upper level. The nongraded organization helps assure that a program of continuous progress and growth is provided, and flexibility in placement and assignment of pupils is maintained without reference to the calendar.

Within the nongraded curriculum, the school has emphasized importance of mastery of basic skills and concepts. Phonics and other basic reading and mathematical skills have remained an intrinsic part of the curriculum. Thus, the "back to basics" movement has not gained momentum in this school district in opposition to the open education concept (Edmond, 1980).

The model school is open in architectural design and there are few visible inside walls. Desks, both teacher and student, are arranged casually into groups. There are many large tables with displays of student activities and projects. In terms of appearance,

the school in this study is using many of the open education concepts. Responsibility, self-discipline, and consideration for others are modeled in the various interpersonal relationships in the school, administrative-teacher as well as teacher-student. The teacher has a noticeable amount of autonomy in decision-making, responsibility for modeling self-cirection, and for guiding the students' development.

The distinctions between this model school and the more traditional schools in this system are clearly perceived by the teachers, students, and community. Some of these perceptions focus on the increased attention which the school has received in terms of support for materials, equipment, furnishings, and construction, in addition to the commitment of time and money for extensive in-service training of personnel.

Self-Concept

This is a construct evolving from the self-evaluative attitudes of a person and is manifest in verbal and nonverbal expressions. These expressions promote or inhibit personal satisfaction and effective functioning of the individual. This term is used interchangeably with self-esteem. In this study self-concept is operationally defined as the scores on the Piers-Harris Children's Self-Concept Scale (Piers and Harris, 1969; Appendix B, p. 140). The test has six clusters; Behavior, School Status and Intelligence, Physical Appearance, Anxiety, Popularity, and Happiness and Satisfaction.

Purpose of the Study

There appears to be an urgency in futurists' predictions about the need for fully functioning people to meet the demands of a sophisticated, technological society with maximum competence and confidence. High achievement in hundreds of complex fields appears both possible and necessary for future survival. Success may depend not only on the traditionally recognized gifts of abstractiong and symbol manipulation, but on special qualities of originality, fluency with ideas, curiosity, independence of thought, and flexibility in forging new concepts.

At present, the educational system brings many contradictory experiences to the potentially creative student. These contradictions can be replaced with early identification of potential and the development of programs designed to enhance creativity in all students. This study's purpose is to investigate an integrated assessment approach based on theories of many notable contributors to education and psychology, who hold that all children are potentially creative.

Summary

This chapter included a definition of the research problem and a statement of that problem. Terms which are considered necessary for an understanding of subsequent chapters were included. The purpose of the study concludes the chapter.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

This chapter reviews the origin of divergent production intellectual abilities in the factor-analytic studies of J. P. Guilford, and hypotheses regarding the relationship of divergency, a cognitive ability, to creativity, a concept with a broad spectrum of definitions. Previous research that might now be considered an investigation of divergent production, was conducted and reported under various headings such as "cleverness," "fluency," "originality," "imagination," "associational fluency," and "expressional fluency." These studies provided the direction taken by Guilford and other researchers, in their work to define the components of creativity.

In one aspect the literature of the past twenty years breaks with previous theories; creativity is viewed as a potentiality in all humans rather than as a "stroke of genius" or "happy accident." Various approaches and methods originating in Guilford's theory of intelligence, to assess divergency are covered in the review.

The second part of the chapter covers material and research relevant to the development of self-concept. This is an area in child development study which presents many methodological problems (Gordon, 1969). However, investigators have endeavored to use various available

self-concept measure to study hypotheses related to emerging self-concepts in children, particularly in distinct learning and psychological environments.

In part three of the chapter studies are examined which have been undertaken to increase the understanding of what is now called open education. While there is general understanding within the educational community regarding this category of school environment, there are a plethora of definitions of openness and ways of evaluating such environments. Unequivocal statements about the effects of open education processes are considered in the light of this variety of criteria. The increasing attention being given to the use of methods of observation for systematically assessing the degree of openness in classrooms and their importance is considered.

Part four of the chapter reviews research and studies concerning the interrelationships among the three variables, divergent production, self-concept, and school environment. Many of these investigations reflect a developmental point of view emphasizing characteristics which appear to emerge at each age and grade level. Because this study investigated these variables in grades three, four, and five, literature relevant to elementary school students was emphasized.

Divergent Production

In the Aptitudes Research Project at the University of Southern California, Guilford (1959) conceptualized intelligence in a three dimensional model he called the Structure of Intellect. Guilford and his co-workers developed tests of great variety seeking to establish the existence of special kinds of abilities which were not measured by

traditional tests of intelligence. Each factorial ability was identified in terms of the test or set of tests that measured it. The kind of information involved, and the kind of operation that the subject was required to perform in doing the test.

Abilities were classified in three different ways, (1) differences in content such as, between visual forms, numbers, and meaningful objects involved, (2) differences in products such as, relations, classes, and other such mental structures, and (3) differences in operations such as understanding and memory. In graphic form the model was cube-shaped with three basic parameters, which were further divided into four kinds of content, five kinds of operations, and six kinds of products (Guilford, 1959).

The SI model is designed to provide for the full range of human abilities including those involved in creative endeavor. Of importance to an increased understanding of creativity, are the divergent production abilities which serve to determine the fluent generation and development of ideas. As they represented a new concept of intellectual resources, the divergent production abilities generated many questions. Of particular interest was how far these abilities went in accounting for variance in creative potential (Getzels and Jackson, 1962; Guilford, 1967; Mednick and Mednick, 1967; Meeker, 1969; Torrance, 1962; Wallach and Kogan, 1965).

In relating the events leading up to the emergence of the divergent production factors, Guilford (1971) wrote that hypotheses about abilities that should be of relevance for creative thinking led to the unprecedented systematic, comprehensive factor-analysis in that area. Earlier studies that indicated direction were Garnett's (1919)

study which identified a factor for "cleverness" in an analysis of ratings. In 1927, Hargreaves found factors which he identified as "fluency" and "originality" in an analysis of tests. Thurstone (1938) named the factor he analyzed "word fluency," to which Fruchter added a factor for "associational fluency" from a subsequent analysis of Thurstone's data. Carrol (1941) and C. W. Taylor (1947) independently reported a factor that could be called "expressional fluency," in their analyses of verbal expressive behavior.

In preparing their hypotheses, Guilford and his students also searched the literature for anecdotal accounts of creative episodes, taken from biographical material on productive geniuses of recognized creative talent. One of their important assumptions concerning creative potential was that whatever distinguishing qualities creative geniuses have, they are shared to a degree by the general population, that is, these qualities are normally distributed just as any other human ability. This appears to be an important change of assumptions regarding creative potential since, traditionally, the assumption was help that special talent or genius was necessary to produce new and valuable entities. However, the emphasis in hypotheses indicated by Guilford is reiterated with increasing frequency in subsequent studies assuming the potential for creativity exists in every human (Bull, 1978; Rothenberg and Hausman, 1976; Taylor and Getzels, 1975).

The concept of creative potential as a normally distributed trait is discussed in detail by Nicholls (1972). Roe (1963) proposed that the creative process is not unique to a few individuals possessing a limited number of specific capacities. Roe finds, "creativity appears to be one of the ways in which humans interact with their environment,

. . . perhaps the most intricate /way/ of all" (p. 166). She concludes that creativity is a form of behavior of which all humans are capable to some degree.

In distinguishing between "special talent creativeness and self-actualizing creativeness," Maslow (1968, p. 137) argues for the broader base of the latter. He describes self-actualizing creativeness as springing more directly from the personality and showing itself widely in the ordinary affairs of life. Maslow concludes,

> We are dealing with a fundamental characteristic inherent in human nature, a potentiality given to all or most human beings at birth, which most often is lost or buried or inhibited as the person gets acculturated (p. 137).

Torrance (1962) has pioneered much of the research on creativity in education, developing divergent production tests for children based on Guilford's tests related to the SI model. The emphasis in Torrance's work is the investigation of creativity from a developmental viewpoint as a perogative of all children. From his studies, Torrance (1967) concludes that divergent ability as defined by test performance can both be taught and nurtured by certain internal and external conditions. According to Torrance (1962),

> Creative abilities are inherited to the extent that a person inherits his sense organs, a peripheral nervous system, and a brain. How these abilities develop and function, however, is strongly influenced by the way the environment responds to a person's curiosity and creative needs (p. 13).

There appears to be strong agreement in the literature indicating the divergent production abilities, like other intellectual abilities are normally distributed in the population, as proposed by Guilford, rather than an incidental occurrence. Based on this assumption, much

of the research discussed in this chapter has sampled the general population of school-age children in a variety of public and private settings. In addition to the identification of creative potential in children many of the studies cited here are concerned with identifying conditons which enhance or inhibit creative activity.

Research Related to Divergent Production Abilities

Guilford's research with the divergent production abilities can be studied in depth in his major works (1967, 1971, 1977). The studies may be summarized in Guilford's (1967) observation that the "correlations between divergent production test scores and various criteria of creativity from childhood through adolescence have not been outstanding" (p. 163). There are enough significant correlations however, to indicate that the tests lie in the same general direction as the criteria, and are successful enough to encourage further investigation.

Bennett (1973) observed that tests of divergent thinking have tended to become synonyous with tests of creativity in research literature. However, only one in ten of the studies using the tests, and accepting their validity, attempted an empirical validation against creative criteria, and few have met with any success (Nuttall, 1972). Anastasi (1968), Cronbach (1970), and McNemar (1964), concur in the criticism that there is a lack of research on the divergent production tests and that their criterion-related validity has not been proved.

MacKinnon (1962, cited by Vernon, 1973) claims the divergent production tests are low in predictive value after comparing groups of persons rated high in creativity by their peers with control groups of

of the same professions. When the criterion has been teachers' nominations of creative students, the correlations have generally been low also (Merrifield, Gardner, and Cox, 1964; Torrance, 1962; Wallach, 1970). Howieson (1976) found mixed results in his longitudinal study using teachers' nominations, commenting,

> Perhaps where the criteria of current creative behavior are carefully delineated and explained, teachers can select subjects who currently perform well on measures of divergent thinking, though not on measures of later real-life creative achievement (p. 131).

Subsequent studies have shown correlations of divergent production tests with creative criteria have been higher when the criterion was based upon a standardized performance such as poetry, musical scores, and generating solutions to problems (Bass et al., 1962; Bennett, 1973; Jones, 1960). Jones (1960) using children as subjects, found correlations between successful performance on figural and semantic divergent production tests and successful creative writing and artwork. In a study by Bennett (1973), highly divergent children obtained better scores on the creative attainment criterion than did high convergers.

Many of the studies using divergent production tests have concentrated on the figural and semantic dimensions within the SI model (Mednick and Mednick, 1967; Torrance, 1962, 1966, 1972; Wallach, and Kogan, 1965). In addition, in 1976, Zegas used symbolic dimension tests in a criterion validation study. Using three figural, four semantic and three symbolic divergent production tests with college students, the criterion was demonstrated successful performance in a "creative" major field of study. Taking Guilford's (1959) suggestion that successful writing abilities are in the semantic divergent block

of the SI model, Zegas hypothesized that creative artwork abilities are in the figural block and musical abilities are in the symbolic block.

The results of Zegas' study supported his original hypotheses: each group tested performed statistically better than the general population on the part of the test most closely allied with the major field of creative study chosen by those in that group. It was concluded that three content categories of the divergent production plane: figural, semantic, and symbolic, are valid constructs representing three specifically independent types of mental operations, as determined by the criterion of successful performance in a field generally classified into one of those categories.

Zegas (1976, p. 176) concluded that the divergent production tests do measure creativity in a general sense, "although it must be reiterated that divergent production is only one factor in creativity." He found his study contradicted Vernon (in Zegas, 1976, p. 176) who said the tests are trivial, ". . . . nothing like the agony, intense drive, and concentrated application of the creative person."

The Structure of Intellect Learning Abilities Test (SOI-LA, Meeker and Meeker, 1975) is also derived from the Guilford model and reflects the diagnostic approach of its authors. In early studies Meeker (1963) developed templates to use with existing intelligence tests, interpolating the tests in terms of the intellectual abilities in Guilford's theory and reporting on differing patterns of abilities.

The SOI-LA has three subtests of divergent production abilities among the 24 subtests of learning abilities. These three subtests measure divergency across the figural, semantic, and symbolic content areas of the SI model. Except for the Zegas' study, the divergent

production test in the symbolic dimension is unusual among instruments evolving from Guilford's theoretical approach.

Meeker (1979) theorizes that high divergent scores in the symbolic dimension may predict future discoverers in mathematics, design, and the sciences. She also has found the symbolic divergency measures appear to tap divergency in culturally different minorities with unequal verbal skills. This is supported by studies summarized in the Technical Data Manual, SOI-LA Test (1981). These studies have identified cultural and linguistic differences in divergent production tasks for over 2,000 subjects, including gifted, specially educated, learning disabled, Black, Navajo, and Mexican-American students.

The results of studies with the divergent production tests appear to ask as many questions as they answer. Of continuing concern is the need for additional longitudinal studies to determine the long-range predictive value of these tests (Zegas, 1976). Because of the importance of being able to identify creative potential early in life and the still inconclusive nature of available data on the discrepancy between prediction and achievement of creativity, continued efforts to follow creative children (as measured by divergent production tests) into adulthood are considered essential (Howieson, 1976; Meeker, 1978; Torrance, 1977).

In addition to the search for predictive validity of a general nature, there is interest in the specific components hypothesized as necessary, but insufficient parts, of divergency. Investigations are suggested to determine whether the divergent production tests could be adapted for use as screening instruments for such traits as enjoyment of variety and flexibility of thought (Zegas, 1976).

Self-Concept

Historically man has sought increased understanding of the self-concept in a metaphysical sense (Rivet, 1977). However, during the past few decades, research has sought to define the self through empirical verification of this nebulous concept. When working with inferred variables, theorists must deal with problems of definition of terms, such as this, in addition to establishing appropriate observable indices for their constructs (Wylie, 1974).

The concept of self has been established in a central position in psychological and educational concerns through the work of such theorists as Allport (1955); Aspy (1969); Brookover (1964); Combs and Snygg, (1959); Coopersmith (1967); Harris (1967); Jersild (1952); Maslow (1954, 1959, 1962, 1968, 1971); May (1953, 1959, 1969); Purkey (1966, 1969, 1970a); Rogers (1959, 1969); to name only a partial list of contributors. Despite a variety of theoretical approaches in the study and research, it is clearly indicated that the view one holds of him- or herself not only is an important determiner of achievement, but enhances or limits the development of a person's potential (Maslow, 1962, 1968; Rogers, 1959, 1969).

The self may be defined as a complex and dynamic system of beliefs about oneself which an individual holds to be true. The concept of self is organized and can be modified (Purkey, 1970a). Self-concept results from one's perceptions of the world, of other people, and from the imagined perceptions others have of them. Personal reality is constructed from these beliefs of self and others (Combs and Snygg, 1959; May, 1967; Rogers, 1969). Growth of a healthy self-concept makes the self-actualizing, integrated person possible (Maslow, 1971).

The rapidity and significance of self-concept development in the early years of childhood is widely accepted (Samuels, 1977). Early self-concept appears to be grounded in adult affirmation of worth and in mastery of early developmental tasks (Coleman, 1972; Jersild, 1952; Piers and Harris, 1964; Wylie, 1974). The core concepts that lie closest to the center of the personality are formed earliest and the self tends to maintain the direction and characteristics developed in infancy and childhood (Sullivan, 1953; Symonds, 1951).

The question of stability of self-concept as received considerable attention, but Samuels (1977) finds that, while some stability seems evident, longitudinal research has yet to substantiate this premise. Bloom (1964) summarized his studies on stability and change in personality, noting that 40 percent of self-concept development is reached by about age seven. And, the belief persists that social forces and experiences which people have with important others effect the development of their self-concepts (Wylie, 1974).

A wide variety of instruments have been devised to measure various aspects of the self-concept (Wylie, 1974). Self-report techniques have been widely developed to tap the phenomenological self-concept and projective techniques have been used to infer unconscious self-feelings. Observation has been frequently employed to find a relationship between people's views of themselves and others' views of them (Gordon, 1966).

In summarizing and evaluating the literature resulting from interest in the self, Wylie (1974) concluded that in many respects, the instrumentation leaves much to be desired, particularly in the area of validity. In briefer reports other investigators have also reviewed the different instruments and problems in self-concept research

(Crowne and Stephens, 1961; McNelly, 1972; Strong and Feder, 1961; They conclude that self-concept is a phenomenon of such complexity that researchers using different techniques have obtained scores that are unrelated (Akert, 1959; Viney, 1966).

Although the reliability of self-report techniques has been questioned, investigators studying elementary school children found a high correlation between observation and self-report (Coopersmith, 1959; Ozehosky and Clark, 1971). Hilgard (1949) pointed out that defense mechanisms may bolster self-esteem unrealistically. Combs and Soper (1957) listed several factors that may influence self-report resulting in inaccurate responses, (1) personal awareness, (2) adequate expressive language, (3) cooperation, (4) personal adequacy, and (5) freedom from threat.

Wylie (1974) in reviewing available instruments for assessing children's self-concepts, concluded that the Piers-Harris Children's Self-Concept Scale (Piers and Harris, 1969), is one of the more promising research tools available. Wylie gave the following reasons for that statement, (1) the rationale for item choice is fully explained (2) there are more studies relevant to construct validity and, (3) it has been factor-analyzed. Wylie (1974) also recommended (1) evaluation of the possibility that unreliable random responding is confounded with low self-regard, (2) use of multitrait-multimethod techniques to explore convergent and discriminant validity and, (3) replication of factor analysis of the cluster scoring used in the instrument.

Theoretical issues remain, yet have not diminished the belief that one hope for developing more effective adults lies in developing positive self-concepts in children. The large body of contemporary

research pointing to the relationship between mental health and feelings of self-worth (Coopersmith, 1967; Fitts, 1971; Harris, 1967; Purkey, 1970a; Rogers, 1969; Satir, 1972; Torrance and Strom, 1965; Wylie, 1974) strongly suggests that self-concept effects realization of each child's unique potential. Knowledge of a child's self perceptions are requisite to helping and evaluating his or her abilities.

Open Education

Open education appears to be stabilized in the basic premises and understanding of how human beings, especially children, develop and learn. From developmental theory children seem to naturally acquire powers of thought and logic through their own actions, through self initiated exploration and personal interest inspired by the environment (Combs and Snygg, 1959; Erikson, 1968; Maslow, 1971; Piaget, 1967).

For Barth (1972) open education is characterized by the belief that knowledge is unique to each individual and comes from direct personal exploration of one's environment. Hence, learning is a function of the interaction between the student and the real world, whether that real world is an idea, another person, or an animate or inanimate object.

The education environments evolving from these tenets appear to have no one orthodox or ideal form. No two open learning environments may look or operate the same, yet the atmosphere is perceived by most observers as distinct from that associated with a traditional school program (Kruger, 1972). Open education appears to be more recognizable by what is happening in the classroom between the teacher and the students than by any particular title (Barth, 1972; Brown, 1979).

The environment is child-centered rather than teacher-centered. The teacher in the open classroom organizes, not to produce optimal conditions for transmission of knowledge, but to enlarge the scope of possibilities students can explore (Barth, 1972). Optimally, the teacher knows each child personally and guides his or her development as a unique and whole individual. The teacher is seen as a facilitator of learning; helping, suggesting, questioning, observing, commenting, evaluating, encouraging, and reassuring. Ideally in this environment freedom, responsibility, self-discipline, and consideration for others are concerns cooperatively shared by administrators, teachers, and students alike.

Theoretically, the open education environment accomodates the full range of individuals to the extent that age and grade levels are of little importance. The nongraded aspect of the open environment followed from the belief that learning is a dynamic on-going process. The absence of traditional grade levels was a way of bringing the teacher, the child, and the materials together in a class at a time when results can be optimal. In this manner open education endeavored to deal with individual differences and needs, and the continuous, successful mastery of tasks believed requisite for meeting full cognitive and affective growth in children.

Research Related to Open Education

From numerous disciplines, Martin (1975) has abstracted and summarized several hundred studies which provide information regarding the effects of open education processes. She finds that children directing their own learning achieve as well as those taught in

teacher-directed lessons (Reel, 1973). Additional studies also deny that discipline problems increase when teachers reduce control over children's choices of activities (Goldupp, n.d.; Ross and Zimiles,1973).

A number of studies have attempted to shed light on the value of discovery learning, particularly for the critical issue of transfer or generalization of learning. Findings point to valuable gains, not only in achievement but in concept development and ability to transfer, reapply, and retain what has been learned (Bring, 1971; Cook, 1968; Olander and Robertson, 1973; Simmons and Esler, 1972; Vance and Kieran, 1972). The open classroom in its acceptance and encouragement of this learning style, would presumably benefit learners as described in these research results.

Martin (1975) reported that despite skepticism regarding academic skills development in open classrooms, there are positive findings of either equal or superior achievement in the open classroom as compared to the traditional classroom as measured by standardized tests of achievement (Case, 1971; Godde, 1973; Greener, 1973; New Orleans, 1968; Philadelphia, 1973; Rosner, 1973; Scheiner, 1969; Williams, 1970). These findings are considered notable in view of the fact that the tests used were designed specifically for traditional classrooms, and contain many negative biases for open classroom children (Martin, 1975).

Overall, there are indications of advantages for vertical, cross age, or family-grouping resulting from the greater extent to which children can learn from each other and successfully vary in abilities and talents (Martin, 1975). Grouping by ability has been found to increase competition among students (Morse, 1972) and to decrease motivation (Zweibelson, 1967) whereas, random grouping of students

across abilities and ages seems to have specific advantages, such as improved attitudes toward school and schoolwork (Junell, 1971; Mycock, 1967). The random or vertical grouping method apparently exposes students to a wider variety of learning possibilities and styles, and thus presents less pressure to conform to a specified ability level.

Horwitz (1976, 1979) has reviewed nearly 200 studies that compared educational outcomes of open classroom teaching with traditional teaching. While, recognizing the ambiguity in definition of openness, he relies on general understanding that it refers to a style of teaching, flexibility in design and use of space, student choice of activity, richness of learning materials, integration of curriculum areas, and more individual or small-group than large-group instruction.

The "Overview of Results" summarized by the Horwitz (1979) review appears in Appendix C, p. 149. Horwitz, in considering these results, finds the evidence shows,

> . . . compared to traditional education, the open classroom sometimes has measurable advantages for children and it sometimes appears to make no measurable difference, but it rarely appears to produce evidence of measurable harm (p. 80).

Horwitz's review answered in part the results of a study by Bennett (1976) which showed open education detrimental to achievement outcomes in students, and thus received wide-spread attention, both favorable and unfavorable. Another response to Bennett came from Shore (1981) who proposed that results more favorable to open education programs might emerge in a different research design. Shore measured openness against specific criteria, i.e. the Walberg-Thomas Classroom Observation Rating Scale (Walberg and Thomas, 1971), which assess pupil-centered activity in the classroom, and selected outcome

variables in the affective rather than the cognitive domain. He concluded that the children "certainly did not appear to be overall systematically ill-served" (p. 119).

This finding was also corroborated by Hayes and Day (1980) who used the Walberg-Thomas Scale in assessing several outcome variables with 1,648 third-grade pupils. His results showed pupils in more open classrooms master the basic skills just as well as pupils in more traditional classrooms. Hayes pointed out that, given the multi-dimensional nature of open education, research should direct itself to analyses of which characteristics or combinations of characteristics are closely related to various student outcomes such as, basic skills.

The approach advocated by Hayes is also proposed by Marshall (1981), in his review of the usefulness of the term open education. He believes that many previous studies in this area were flawed by failing to consider the degree to which, and the areas in which, teachers have implemented the construct of openness. By setting aside the term open education itself, he contends the focus could more aptly be placed on particular components and dimensions of the classroom and their relationships to specific outcome variables. Such "meta-analysis" would be more likely to result in clear-cut answers.

While noting the importance of assessing the degree of pedagogical and architectural openness, Fraser and Rentoul (1980) proposed a person-environment fit framework in which student preferences for classroom openness are considered simultaneously with actual classroom openness. Such an approach was taken by Rich and Bush (1978) who used a person-environment interactive perspective to study three variables. For their purposes, the environment was defined by a

teacher-style dimension based on Flander's (1970). The finding, that actual environment was less important than person-environment fit in predicting learning outcomes, also emerged in studies reported by Domino (1971), Pervin (1967), Solomon and Kendall (1976), Ward and Barcher (1975), and Winne (1977).

Using the Individualized Classroom Environment Questionaire (ICEQ, n.d.) Fraser and Rentoul, its authors, were able to consider classroom openness as a continuous variable. Student's perceptions of their preferred environment were measured on the same dimensions. The findings, with 7th and 8th graders, suggest that actual preferred person-environment interaction, rather than actual openness of the classroom environment, per se, was important in predicting cognitive outcomes in students.

Peterson (1979), in reviewing the studies cited by Horwitz (1979) and also studies reporting on students' locus of control (Arlin, 1975; Janicki, 1979; Wright and DuCette, 1976), appeared in agreement with the importance of students' preferences. She emphasized the teacher's role, holding that effective teaching, that is, positive learning outcomes, involves the appropriate selection of teaching approach to attain the desired educational outcome with a particular type of learner. In her review, Peterson concluded that teacher thinking and decision-making is the process which most effects the successful matching of the person with the environment.

Each of the thousands of classrooms across this country is located somewhere on a continuum ranging from open to traditional. Any number of variables may determine where each classroom is actually located. These variables also efffect how appropriately this position

coincides with the students who are there and their perceived preferences. Finally, with the degree of classroom openness and these students' preferences, must be considered, the teacher's resourcefulness in selecting the most congruous variables to effect the most beneficial outcomes, and the degree of persuasiveness of input from continuing research in education and psychology.

Interrelationships Among Three Variables: Divergent Production, Self-Concept, and Open Education, considered with Developmental Theory

Divergent Production and Open Education

Torrance (1962) concluded from his studies that children have a natural tendency to learn by questioning, guessing, exploring, and experimenting, which he termed creative learning. On the other hand, the schools have been seen as over-concerned with conformity and authority (Moustakas, 1967a). Silberman (1970) found most classrooms he visited devoid of joy in learning and pleasure in creating. Each of these writers in his own way have had great impact upon the traditional educational system of 20 or 30 years ago.

Moustakas (1967a) directed his criticism at the philosophical tenets of education; Silberman (1970) understood how to apply public and political pressure. Torrance (1962), the practitioner, pointed to his interventions in the educational system and drew the attention of many educators themselves. These men drew on the work of Guilford, (1950, 1956); Maslow (1954); Rogers (1959); and the earlier

"Progressive Era" studies such as Baker et al, (1941); Gardner (1942, 1950, 1966); Leonard and Eurich (1942); Minuchin et al, (1969); and Wrightstone (1938). In turn, Moustakas, Silberman, and Torrance conducted their own empirical investigations, providing additional groundwork for research into the development of aspects of creativity within the educational system.

Using divergent production measures based on the Guilford model, Torrance (1962) found self-confidence, curiosity, and independent decision-making were among the behavioral traits identifying the creative person. Moustakas (1967a, p. 176) wrote that these traits were clearly not the objectives of the mass educational system, in fact, knowingly or unknowingly, the system "restrained, stifled, and almost totally ignored creative energy." The results, he concluded, were uniformity, docility, and conformity.

As the solution to our educational inadequacies, Silberman (1970) pointed to the informal education being used in the British primary or infant schools. Proponents of this approach maintained that, in contrast to the preconceived, set patterns provided for the child in the traditional self-contained classroom, the informal system was open, flexible, and child-oriented (Featherstone, 1967). These very differences in educational experiences lead to hypotheses that children in informal, or open, classrooms might vary on educational outcomes and even in personality traits, from those in the more traditional classrooms. The assumed differences in favor of open classroom students appeared strikingly similar to qualities Torrance (1962) wanted to nurture in potentially creative children.

In studying the growth and development of divergent production

thinking abilities, Torrance (1962) observes a general pattern in relation to school experience. Evidence from cross-sectional and longitudinal studies suggested many children repressed their creative needs and activities; for some children this occurred soon after entering kindergarten. Torrance (1962) summarized these findings,

> The general pattern of the developmental curve of most of the creative thinking abilities we have assessed is as follows: there is a steady increase from first through third grade. There is a sharp decrease between the third and fourth grades followed by some recovery during the fifth and sixth grades. Another drop occurs between sixth and seventh grades, after which there are some gains until near the end of high school years when another drop occurs (p. 95).

These results were consistent with findings from prior research effort, e. g. Barkan, 1960; Colvin and Meyer, 1906; Kirkpatrick, 1900; Lally and La Brant, 1957; Ligon, 1957; Mearns, 1931; Simpson, 1922; Sullivan, 1953; Vernon, 1948; and Wilt, 1959; who were cited by Torrance (1962). In other studies Torrance (1964) showed deliberate attempts to keep creative growth alive, averted the fourth-grade slump. Noting that studies of the development of creative abilities in cultures outside the United States did not show similar drops, Torrance (1977) concluded that the drops were a societal rather than a biological phenomenon.

Possible explanations were suggested in the studies of Sullivan (1953): the socialization process induces a strong dependence on concensus which reduces original and different responses in children. Erikson (1968) proposed that physiological changes necessitated concommitant psychological adjustments. The declines were also seen as reactive to new stresses at transitional stages in the educational system (Torrance, 1977).

Torrance delineated the conditions most favorable for averting drops in divergent production abilities including assessment and identification (1962, 1968, 1972), teacher-pupil interaction (1972, 1977), classroom environment (1972, 1977), and curriculum and instructional materials (1963, 1965, 1972). In general, he advocated an environment which was more child-centered, less authority or teacher-centered and more open to the needs of the individual students in most aspects of classroom environment. These suggestions coincided with many, if not most, of the tenets of open education.

Since many of the descriptions of open classrooms suggest that more creative activity occurs in them than is normally the case in more traditional classrooms, hypotheses that children in open classes will perform better on tests of creative thinking have been of much interest to researchers (Horwitz, 1979). Martin (1975) pointed to comparative studies of open and traditional classrooms which found significant differences in creativity favoring the open classroom, and that these differences increased with time spent in the open program (Wilson, 1972; Shapiro, 1972). From her summaries of hundreds of studies from numerous disciplines, Martin (1975, p. 91) concludes, "it would appear that the open classroom provides an environment more consistent with the development of creativity in children than a traditional one."

While recognizing inadequacies of definition and measurement, Horwitz (1979) has summarized 33 studies relating creativity to open education (Appendix C, p.149). There were 12 studies indicating children in the open classes were more creative, while 10 studies showed mixed results. The remaining 11 studies found no significant

differences. However, no studies were located which favored the traditional classroom in the development of creative thinking ability.

The studies located by Horwitz were used by Peterson (1979) to investigate the size of the effect of open, as opposed to, more direct or traditional approaches. She concluded that the traditionally taught students did slightly worse on tests of abstract thinking, such as creativity and problem-solving, while with open teaching, students did somewhat better on creativity and problem-solving. Furthermore, she found the open approaches are better than the direct, traditional approaches in improving students' attitudes toward the school and the teacher, and in increasing students' independence and curiosity. However, in all these cases under review, the effects were small (Peterson, 1979).

Both Horwitz and Peterson advocate additional research on individual differences in children's responses to open education, as do Fraser and Rentoul (1980). Horwitz further delineates the need for more descriptive analyses of teacher-pupil interactions and to provide closer study of the ways in which key concepts such as structure, freedom, and authority are actualized in open as compared to more traditional classes. Horwitz also calls for clarification of the role of the open classroom teacher.

Marshall (1981), following the reviews of Horwitz and Peterson, contended that global constructs like open education, obscure distinct features of openness. A focus on the components of classroom environment and outcome variables, such as creativity, might produce more conclusive results in research studies.

Marshall's observation can be logically extended to the concept of creativity, which also appears to be a global one, whose definitiveness continues to be debated in the literature (Crockenberg, 1972). Examining the various components of creativity, operationally defined as the various measures of divergency, such as, flexibility, fluency, originality, and transformation (Zegas, 1976), together with the degree of openness, as recommended by Marshall (1981), might produce the specific answers which have eluded researchers. Still, it may be inferred from the research that divergent, creative, thinking and learning are enhanced sufficiently by more open, flexible, classrooms, to provide a rationale for continued interest in these types of learning environments, and to encourage further research in this area.

Self-Concept and Open Education

Research in psychology (Maslow, 1954; Rogers, 1959) on the frontier of the human potential movement, drew attention to the nonacademic aspects of children's growth in school. Apparently, there were some innovators in the field of education who were interested in the need for addressing the psychological growth of students. Their objectives included the enhancement of positive self-concept and self-awareness, increasing achievement motivation, promoting creative thinking and behavior, clarifying values and, promoting more rewarding human relationships. Canfield and Phillips (1975) believe that instrinsic to all of the above objectives was the goal of increasing students' self-awareness and enabling students to relate that self more effectively to others.

The classroom approaches to deal with the emotional growth of students continue to increase (Canfield, 1975). These approaches include activities ranging from improving teacher's skills in developing sophisticated and complex psychological curricula, to methods of reshaping the classroom climate, and the origanizational structures of our schools.

Three typical approaches, reported by Canfield and Phillips (1975) include such recent innovations as "Psychological Curriculum," in which the subject matter becomes the student's psychological concerns over identity, being developed in a project directed by Gerald Weinstein. "Confluent Education" is described as the integration or flowing together of the affective and cognitive elements in education, by George I. Brown, Director of this program's development and implementation. The third innovation is called "Process Education", and emphasizes teaching students the processes needed for them to continue to direct their own personal growth and development. Process Education has been developed by Terry Borton and Norman Newberg.

Clark (1979) prefers to use the term cooperative learning environment to describe programs which support optimal, integrated human growth. The hallmarks of the cooperative learning environment are the open, mutually respectful and cooperative relationships among teachers, students, and parents in provisioning the learning experience. Cognitive, affective, physical, and intuitive activity are all valued parts of this model (Clark, 1979).

Martin (1975) examined some of the affective outcomes in education, including motivation, attitudes, learning styles, social skills, self-awareness, and even happiness and quality of life. She

observed that the exploration of these facets of learning in the affective domain have generally concentrated on the affective factors of self-concept and attitude, for which there are fairly reliable and valid scales. Martin found results from studies of open classrooms indicate the hypothesized advantages in the affective domain are present. On self-concept and self-esteem measures, the open classroom children far surpass the traditional classroom children in many comparative studies. In addition, it appears that with increases in age and grade level, the differences become even more pronounced (Krenkel, 1973; Wilson, 1972; Purkey, 1970).

Martin (1975) speculated that the decreased competition and comparison that takes place in the open classroom may account for many affective advantages for children. Attitudinal scales have also been administered, showing significantly more positive attitudes toward teachers, schools, and the curriculum in the open classrooms (Shapiro, 1972; Tuckman et al., 1973; Weiss, 1972; Wilson, 1972).

One of the most important findings, Martin noted, has been the advantage for underachieving children, particularly boys. The studies appear to indicate that underachievement in boys may be reversible (Jones, 1972). Improvements in the children in this study were attributed to higher self-concept development, lower self-criticism level, decreased pressure to achieve, and less comparative evaluation by teachers. Martin (1975) concludes,

> It may be inferred from the research that, . . . there may be compelling reasons to allow children more freedom in their approach to learning in school. Furthermore, the affective advantages found in the open classroom for increased self-concept and positive attitudes toward school serve to further enhance learning in this setting (p. 89).

The summary study from Horwitz (1979, Appendix C, p. 149), categorizes self-concept as the second most popular area of research (after academic achievement) on the open classroom. The results of the 61 studies which were reviewed by Horwitz showed that 15 favored open schools, two favored traditional schools, 15 showed mixed results, and 29 revealed no significant differences between the two school environments. Horwitz noted that it is not readily apparent, whether the inconclusive pattern of results is related to measurement problems or whether it shows a genuinely uneven impact of open schooling on self-concept development.

An additional problem which Horwitz (1979) identifies as critical in studies of self-concept, is that most of the studies present self-concept as a unitary, linear entity. That is, children either have high self-concepts, medium ones, or low ones. Despite the reality that such a notion lends itself to easily quantifiable data, the idea of self-concept as a single-factor variable is "probably inadequate for dealing with the complex questions that the studies purport to ask (Horwitz, 1979, p. 76).

As discussed earlier in this chapter (p. 32), Horwitz (1979) cautioned that conclusions must be qualified by the variations in definitions of openness and other differences between studies which were not analyzed in his review. Since no systematic analysis was made of the design and measurement factors which might be contributing to the varying correlations between openness and particular outcome variables (Jackson, 1980), the inconsistencies between the results from different studies remain unexplained.

Marshall (1981) stated that Peterson's (1979) review moves beyond

that of Horwitz in two respects. First, Peterson calculated the "effect size" (Glass, 1976) in order to integrate results. While finding "small effect size" (p. 182), on such outcome variables as achievement, creativity, problem-solving, independence, and school attitude; she found little or no differences for self-concept and locus of control. Her second effort, based on a box score approach, also produced no definitive results.

Peterson (1979), reviewing studies beyond those in Horwitz's review (Arlin, 1975; Janicki, 1979; Wright and DuCette, 1976), concluded that the effectiveness of direct instruction (characteristic of traditional teaching) depends on the students' sense of personal control, on the students' ability, and on the educational objective the teacher wants to attain. For example, indirect teaching (more characteristic of open classroom teaching) appears more effective than direct, when teaching inquiry skills, or when teaching high ability students, or when teaching students with a strong internal locus of control.

The following studies reviewed in this section, have attempted to overcome either the problem of operationally defining the open classroom environment or that of considering self-concept as a single, unitary concept, or both of these cited flaws in the past research designs (Horwitz, 1979). In 1977, Day and Brice reported on the academic achievement, self-concept, and behavior patterns of six-year old children in open classrooms operationally defined by the Walberg and Thomas (1972) scale. Among classroom settings varying in openness and grouping patterns with 54 girls and 46 boys, using the Piers-Harris Children's Self-Concept Scale (1969), no differences in self-concept

development were found between boys and girls across low, middle, or high scoioeconomic groups or among the four settings. Although, the sample mean score for low-achieving pupils in team teaching, multi-age classrooms was slightly higher than the sample mean score for low achieving pupils in self-contained first grade classrooms, the difference was not significant. Differences in sample mean scores for high achievers in all groups also fell below the .05 level of significance. The authors suggested further study to determine if the differences in sample mean scores would intensify over time.

Klass and Hodge (1978) also conclude that discrepancies in claims and findings may be due, in part, to differences in (1) the characteristics of the open environments under study, (2) the type of affective behavior being measured, or (3) the experimental design and data analysis. The research reported by Klass and Hodge (1978) is an effort to avert these discrepancies. As such, they used the Walberg-Thomas Rating Scale to operationally define classroom openness, while making several confounding variables (scoioeconomic status, IQ, sibling position, and sex) factors, to further isolate the relationship between openness and self-esteem operationally defined by the Coopersmith Self-Esteem Inventory (Coopersmith, 1967). In this study no main or interaction effects were found between the mean scores of children in an open school setting and mean scores of those who had been in the traditional school setting, for self-esteem and any of the above variables except for sex. Girls had higher self-esteem scores than boys in this group of 350 seventh-graders. The authors conclude that before the question of advantage or disadvantage of the open school format can be resolved, additional data are needed.

In 1980, Hayes and Day studied basic skills, self-perceptions, and attendance for 1,648 third-grade pupils in public schools. Again, the degree of classroom openness was operationally defined by the Walberg-Thomas Scale, while self-perceptions were measured by the Primary Level of the Self-Observation Scale (Hayes and Day, 1980). This instrument included self-reports on five dimensions of affective behavior; motivation for achievement, self-acceptance, self-security, social maturity, and school affiliation. The results of the five dimensions of self-perceptions were the same for pupils in both types of school environment. This did not vary with differences in pupils' sex, race, kindergarten experience, family income or educational level of either parent; teacher's age or race, teacher's scores on the National Teacher Examination, or number of years of teaching experience; classroom adult-child ration, number of teachers working daily with one class, or class grouping (single grade or multi-grade); school enrollment, or expenditures per pupil. In fact, there was a complete absence of significant first-order interactions between classroom openness, and any of the other independent variables or any of the self-perception dimensions.

Day and Brice (1977) made recommendations for further revision of the Walberg-Thomas Scale in the direction of sensitiveness to degree of openness, and regression analyses with individual characteristics, including the dependent measures and independent measures such as basic skills and self-perceptions, for different groups of pupils, teachers, classes, and schools, and thus prove highly valuable to educators.

It appears that the multi-dimensional nature of classroom openness together with the inadequacy of measuring self-concept as a single

factor variable, limit the generalization of the research results and their possible practical application in education (Day and Brice, 1977; Hayes and Day, 1980; Horwitz, 1979; Klass and Hodge, 1978; Marshall, 1981; Peterson, 1979). There also appears to be agreement in the literature cited above that measures of open as compared to traditional classroom environments should address themselves equally to outcomes in both the cognitive and the affective domains. While the promise of conclusive evidence appears in question, Horwitz (1979) points out that evaluation research can continue to play a formative role in education, by improving the quality of on-going open classroom programs, and a summative role, in delineating the strengths and weaknesses of both open and traditional approaches.

Divergent Production and Self-Concept

Rogers (1959) listed conditions closely associated with the creative functioning of individuals. These conditions are (1) the use of inner strengths, and (2) the perception of these strengths; which lead in turn to the expansion of self-feelings or self-concept. If the self is valued, and believed capable, a person is freer to venture toward new goals, is more open to experience and thus, in interactive fashion, discovers new strengths and potentials within the self, including creative expression, according to Rogers' theory (1959).

It seems that Rogers' basic ideas of self-concept and its import for the realization of inner strengths for creativity, appear to echo the educational goals which aim at helping the individual become the best possible version of him or herself as a human being; what he or she might become under optimum conditions.

The relationship between self-concept and creative expression was of interest to Allport (1955) who concluded that a child's positive self-concept is partially dependent upon a relationship of trust within the child's environment. Once established, this trust allows the child to reach his inner potential.

There is a large body of contemporary research pointing to the relationship between creative functioning, feelings of self-worth, and mental health (Coopersmith, 1967; Fitts, 1971; Harris, 1967; Maslow, 1965; Purkey, 1970; Rogers, 1959, 1969; Satir, 1972; Torrance, 1967; Torrance and Strom, 1965; Wylie, 1974). Torrance (1962) expresses this realtionship as,

> Without exploratory activities practiced apart from evaluation, children cannot know their abilities and potentialities, and fail to develop realistic self-concepts. A distortion of natural learning tendencies results in lost potential, psychological conflict, and an unrealistic or uncertain self-concept (p. 163).

Maslow's (1954) conceptualization of the relationship between higher needs of the self and the emergency of creative expression are particularly relevant. Maslow characterized self-actualizing creativity as a perogative of all persons, and as germane to mental health. He found that healthy, developing, and "becoming" individuals had efficient perceptions of reality, a strong acceptance of self and others, spontaneity, and autonomy. These individuals moved forward to gain the highest hierarchical position theorized by Maslow, self-actualizing creativity. He took issue with earlier, more negative views of child development in this area. In 1968 (p. 23) Maslow wrote, "healthy, happy, secure children enjoy growing, moving forward, gaining new skills, capacities and powers."

Gowan and Torrance (1971) following views of Maslow, held that creativity is an emergent characteristic of the escalation of developmental processes, when requisite degrees of mental health, mental ability and environmental stimulation are present. Creativity, according to Gowan's view is, in able children, an indication of good mental health and continued developmental progress leading to self-actualization.

A study reported by Murphy et al. (1976) attempted to understand and define the relationship between creativity and self-actualization. These researchers used two instruments to measure self-actualization, the Personal Orientation Inventory (POI, Shostrom, 1964), and the Lifestyle Checklist (Lafferty, 1973); and two instruments to measure aspects of creativity, the Torrance Tests of Creative Thinking (TTCT, Torrance, 1966) and the Similes Preference Inventory (SPI, Pearson and Maddi, 1966). Strong positive correlations ($p < .005$) resulted between both creativity tests and both self-actualization tests. However, no strong relationships were found, as hypothesized, between creativity and self-actualization. The authors concluded the results suggested highly creative people may be more self-actualized and that highly self-actualized people may be creative but neither hypothesis was adequately tested in this sample. Murphy et al. (1967) reason their instrumentation may have measured, not highly self-actualized people in Maslow's optimum sense of the term, but rather ordinary people who have good, positive mental health.

Working in a primary prevention mental health project for public schools, Williams (1976, p. 15) "rediscovered a fourth-grade slump" in pre-testing children's self-concept. The design of this study was based on research pointing the relationship between mental health and

and feelings of self-worth (p. 48). In lower grades, the modified Coopersmith Self-Concept Inventory was used, and in upper grades, the Piers-Harris Self-Concept Scale was used. In addition, the Self-Concept and Motivation Inventory (SCAMIN, n.d.), was used to measure attitudes and dispositions towards school. Pre-testing with over 1,000 first through sixth-grade children showed a significant drop at the fourth grade level for both school motivation and school self-concept. Williams (1976, p. 23) concluded, fourth grade pupils showed disillusionment with school but continued to feel good about their nonacademic lives. Treatment based on enhancing self-concept through various strategies leading to the "humanization of the classroom," followed by post-testing showed the slump in the fourth-grade was avoided. In fact, feelings about school at all grade levels improved. Williams summarized his findings by relating them to earlier studies which Torrance had done,

> . . . about the fourth grade . . . they are expected to be rather well-regimented into a certain academic mold imposed by teacher, peer, and parent pressure for school success. School begins to take positive qualities out of pupils unless preventive measures are purposely, not haphazardly, placed in the education programs, to further nurture, both creative functioning and temperamental and dispositional variables that lead to feeling good about learning (p. 25).

Williams (1976) pointed to the implications of his study for education, stressing that, even under conditions of deprivation, children appear to have the inner resources to overcome stress in their personal lives unless placed in failure situations in school. Teachers should set realistic and attainable goals, recognize children in a positive way, and strengthen students' confidence with school tasks.

Williams (1976) further contended that his study showed the

importance of multidimensional assessment based upon two of the most appropriate continuums traditionally recognized as important in education: cognitive-affective domains and covergent-divergent processes. He proposed a two-continuum classification system in which cognitive-convergent assessment is obtained by the usual school administered tests of academic achievement and intelligence; creativity tests which measure divergent thinking factors from Guilford's SI model to assess the cognitive-divergent area; objectively-scored self-concept scales to assess the affective-convergent domain; and for the affective-divergent area (the most lacking in instrumentation), diagnostic observational methods by trained personnel using affective situations.

A comprehensive study by Rivet (1977) also sought to establish an integrated method for assessing children's self-concepts and their intellectual processes. Rivet hypothesized the value that such a diagnostic approach might have, for increased understanding of the talents, abilities and feelings which children bring to any learning task. Self-concept was operationally defined as the scores on the Piers-Harris Children's Self-Concept Scale, while factors of the intellect were defined by the Structure of Intellect Learning Abilities Test, based on the SI model.

The results of Rivet's study found that while self-concept had a significant relationship with four of the five SI operations (Memory, Cognition, Convergent Production and Evaluation), there was no significant relationship with the Divergent Production operation. There were some correlations at the .05 level of significance within the factors of each subtest which are summarized below,

(1) Behavior (Cluster I) with Divergent Production of Figural Units (DFU).
(2) Behavior (Cluster I) with Divergent Production of Semantic Units (DMU).
(3) Intellectual and School Status (Cluster II) with Divergent Production of Figural Units (DFU).
(4) Happiness and Satisfaction (Cluster VI) with Divergent Production of Semantic Units (DMU).

Rivet (1977) concluded that the low correlations obtained between self-concept and Divergent Production scores was in contrast with past postulations, although she noted that Divergent Production defines a differential quality of output rather than production from accumulated knowledge. Rivet suggested further study to clarify her finding.

The present study hypothesizes that the lack of correlation between self-concept and Divergent Production (Rivet, 1977) may result from the manner in which these two variables are elicited, and valued, in different types of school environment. In this study, the general format of the Rivet study was used to determine if aspects of the self-concept and of the divergent thinking processes, have different outcomes in open, as compared to, traditional schools.

Summary

This chapter has reviewed the relevant research and literature concerning divergent production, self-concept, open education, and the relationships among these three variables. Attention was concentrated on studies of elementary school children, and on the developmental processes which have been delineated as essential to an understanding of the emergence, and at times, the decline of both divergent thinking processes and feelings of self-worth.

CHAPTER III

METHODOLOGY

Introduction

This study was designed to investigate whether the types of educational experience (open or traditional) which our society provides in the public school systems, have a differential impact on children's development of divergent production intellectual abilities and self-concept. A description of the research design is presented below; questions to be answered are stated; discussions relative to subjects, instrumentation, investigation, and analysis are presented.

School Environments

One of the schools which was selected for participation in this study was designed and built in 1971, as a model of an open school program. A description of the school's degree of openness appears on pages 12 - 15 of this study. The school is of contemporary architectural design with large open interior areas.

The traditional school selected for participation in this study was built in the early 1930's, in a formal architectural style, resembling a ranch-style residence. The classrooms in this building are contained within individual walls; furnishings within each room are arranged symmetrically with the teachers' desks facing the rows of

students' desks. This school's curriculum is considered to be a modification of a traditional approach described by this school system as semi-departmentalized. Within this semi-departmentalized concept, the pupils above grade two spend one-half day with the homeroom teacher working in the fundamental skill or homeroom subjects, such as reading, writing, language, spelling, arithmetic, social studies, geography and health. The other half-day is spent with special teachers in enrichment subjects including art, music, physical education, speech, and science (Education Service Center, Tulsa Public Schools, 1979-80).

Subjects

The subjects in this study were students in an open and a traditional school in a metropolitan area in Oklahoma, attending the third, fourth, and fifth grades. The schools are approximately the same in population size (open, 417; traditional, 427); each school housing grades kindergarten through six. Both school's students are from the contiguous neighborhood, which is predominantly white, middle socioeconomic background.

A total of 95 students participated in the study in the open school; 33 from the third grade, 35 from the fourth, and 27 from the fifth grade. Of the 95 participants, there were 50 students who had spent all previous grades in the open education environment; 18 in the third grade, 16 in the fourth grade and 16 in the fifth grade. In the traditional school, 99 students participated in the study; 37 from the third grade, 26 from the fourth grade, and 36 from the fifth grade. Of the 99 participants, 83 were identified as having been in a

traditional school environment in all previous grades; 29 in the third grade, 25 in the fourth grade, and 29 in the fifth grade. Only the test protocols of the students whose entire school experience had been in distinct environments were included in the analyses of data.

Preliminary Study

A modified version of the Flanders Classroom Interaction Analyses (FCIA, Amidon and Hough, 1967; also in Appendix D, p. 151), was prepared by the author to use in a preliminary study to determine if a difference existed between the two selected school environments in the variable of teacher=pupil interaction. The modifications which were made in the FCIA were designed to help measure aspects of teacher-pupil interaction which Torrance (1977) and Meeker (1978) suggested to facilitate the development of a classroom environment in which students appear to be creative. This advantage for creativity was measured by the Torrance Tests of Creativity (TTCT) and the Structure of Intellect Learning Abilities Test (SOI-LA).

A graduate student, recommended as capable and reliable, and who was familiar with the classroom interaction analysis procedure, administered the modified version to pupils in both schools. The procedure, which includes recording tallies every five seconds in categories, was used to study the three classrooms in the traditional school, corresponding to grades three, four, and five, and the two classrooms in the open school corresponding to grades three and four, (Beta) and grades five and six (Gamma). Two sessions of 180 tallies, of 15 minutes each were recorded for each of the five classrooms.

The scoring system recommended by the Flanders system is a method of recording the sequence of events in the classroom in such a way that certain facts are readily apparent (Amidon and Hough, 1967). This method consists of entering a sequence of numbers into a 12-row by 12-column table, or matrix. Tabulations are made in the matrix to represent pairs of numbers, beginning with the first two numbers tallied. The particular cell in which tabulation of the number pair is made, is determined by using the first number in the pair to indicate the row, and the second number in the pair to indicate the column. The next pair is made up of the second and third tallies, and so on, with each pair of numbers overlapping with the next pair. Finally the row and column totals are tabulated.

Three ratios were studied for significance (1) the ratio of indirect teacher-talk to direct teacher-talk, (2) the ratio of teacher to student-talk, and (3) the ratio of divergent and evaluative questions to teacher-talk. Indirect teacher-talk is a total of tallies in the matrix area from one through five; direct teacher-talk is a total of tallies in the matrix area from six through eight. Teacher talk is a total of tallies in the matrix area from one through eight or the sum of tallies in both teacher indirect and teacher direct talk. Student-talk is the total number of tallies in the matrix area from nine through ten, while divergent and evaluative questions are the tallies in the matrix area four and five.

The results obtained from the matrices are summarized in Appendix D, p. 152). It was predetermined that a .10 level of confidence would indicate a difference between the two schools for the purpose of this study. A one-tailed t-test for differences in

proportions (ratios) was utilized to test for differences. For categories (1) the ratio of indirect teacher-talk to direct teacher talk, and (3) the ratio of divergent and evaluative questions to teacher-talk, differences were found at the .10 level of significance. No difference was seen for category (2) the ratio of teacher to student talk. Based upon this preliminary study, which met two out of three of the predetermined criteria, a difference was assumed to exist between the two selected schools' classrooms.

Instrumentation

The operational measure of divergent production in this study was the nine scoring criteria for the three divergent production tests from the Structure of Intellect Learning Abilities Test; the Divergent Production of Figural Units (DFU), the Divergent Production of Semantic Units (DMU), and the Divergent Production of Symbolic Relations (DSR). (Appendix A, p. 122-23). The Structure of Intellect Learning Abilities Test (SOI-LA), is based on Guilford's Structure of Intellect (SI) theory of intelligence and was publised in 1975, after twelve years of research by Meeker and Meeker (1975).

The SOI-LA is designed to measure individual strengths and weaknesses in a profile of 24 abilities which appear to have the closest relationship to school learning tasks (Meeker, 1972). The battery was designed to be administered to class-size groups of children in grades one through eleven (average adult level is the same as 11th grade for scoring norms). The tests may be administered with or without time limits depending on the test administration objective. If comparison among class members or to expected grade norms is

intended, time limits are indicated. For individual diagnosis, time limits are not imposed. The battery may be administered in whole or in parts; order of presentation does not effect test results.

The SOI-LA was re-normed in the fourth quarter of 1980 (SOI-LA Technical Data Manual, 1981). The testing design of the re-norming study involved both test/retest and alternate-forms components. At each of six testing sites, four groups were created at grade levels two through six and for males and females. At each site half of the students were tested on Form-A and half, Form-B; retesting occured within two to four weeks. Half of those initially tested with Form-A were retested with Form-A and half with Form-B; similarly of those first tested with Form-B, half received Form-B and half, Form-A.

Across the test/retest groups, the reliability coefficients ranged from $r = .28$ to $r = .68$ for grades two through six, on Divergent Production of Figural Units (DFU). On the Divergent Production of Semantic Units (DMU), for grades two through six, the coefficients ranged from $r = .27$ to $r = .78$; and on the Divergent Production of Symbolic Relations (DSR), the coefficients ranged from $r = .08$ to $r = .65$, for those same grades. In the groups receiving alternate forms of the test, the reliability coefficients ranged from $r = .35$ to $r = .63$, on DFU; from $r = .42$ to $r = .64$, on DMU; and from $r = .17$ to $r = .56$, on DSR. Intercorrelation coefficients for the three divergent production tests were given for each grade (all participants) as follows; for DFU with DMU, the correlations ranged from $r = .17$ to $r = .35$; for DFU with DSR, the range was from $r = -.02$ to $r = .16$; for DMU with DSR, the range was from $r = -.02$ to $r = .05$. Re-norming data and correlations appear in Appendix A, pp. 134-38.

The three SOI-LA subtests which measure divergent production abilities across the figural (DFU), semantic (DMU), and symbolic (DSR), contents of the SI paradigm were administered in this study (Appendix A, pp. 122-23). These subtests together with their related scoring criteria (Appendix A, pp. 124-33), are defined earlier in this study (pp. 11-12). For the Divergent Production of Figural Units there are four scoring criteria; fluency (F), set change (S), transformation (T), originality (O). The Divergent Production of Semantic Units is scored for fluency (F), and originality (O); the Divergent Production of Symbolic Relations is scored for fluency (F), set change (S), and originality (O). Form-A of the SOI-LA was administered.

Meeker (1979) has stated that the divergent measures on the SOI-LA test have scoring criteria which are more objective than previous tests of similar abilities (Guilford, 1971; Torrance, 1966). The scoring criteria in effect constitute nine separate measures of divergent production ability and are weighted differently in each subtest based upon the rarity of the type of response (Meeker and Meeker, 1975). The originality measure of the Divergent Production of Figural Units is scored four points for each occurrence, as compared to the originality measure of the Divergent Production of Semantic Units where each occurrence is scored ten points. In all three subtests the measures of originality and transformation are weighted approximately four to ten points over fluency and set change scores based on their comparative rarity.

Attention has been given to various approaches which propose to relate measures of divergency and creative potential (Guilford, 1967, 1971; Meeker, 1978; Torrance, 1962, 1965; Zegas, 1976). It appears

that this potential relationship is neither an act of faith nor is it the precise implication that satisfies research questions. Therefore, due to the ambiguity in establishing a pure relationship between divergent production and creative potential, no assumptions were taken with this terminology. Since the divergent production subtests on the SOI-LA are defined in terms of the scoring criteria resulting in nine aspects of divergent production, the operational definition of divergency for the purpose of this study were these nine measures in separate analyses. They were not totaled so that the nine aspects might be studied as entities and the unique contribution of each might be considered.

The operational measure of self-concept was the six cluster scores on the Piers-Harris Children's Self-Concept Scale (Appendix B, pp. 140) which consists of eighty self-referrent statements designed for children from third grade through high school. The scale takes approximately 15 minutes to administer to either an individual or to groups. While the Piers-Harris required a third grade reading level, it may be given orally or to younger children without changing the reliability or validity. The Piers-Harris Manual stresses the importance of an examiner's informal talk with students prior to test administration, in order to emphasize the value of completely honest responses rather than socially desirable ones.

The Piers-Harris is based on earlier work by Jersild (1952) who grouped children's statements about themselves into 11 categories. Jersild's work was used in an effort to build content validity into the Piers-Harris Scale, although during item analyses, non-discriminating items were dropped, so that the final scale no longer

covers each of the 11 categories to the same degree. Instead, the retained items reflect an emphasis on category 10, Just Me, Myself, and category 11, Personality, Character, Inner resources, Emotional tendencies (Piers and Harris, 1969).

Reliability data for the Piers-Harris resulted from the original standardization study. The Kuder-Richardson Formula 21 to test the homogeneity of the Scale resulted in coefficients from .78 to .93. The Spearman-Brown Formula resulted in coefficients of .90 and .87. Retesting after a four-month interval with one-half the standardization sample resulted in coefficients of .72, .71, and .72, considered satisfactory for this time period with a personality instrument in the experimental stage. Wing (1966) found reliability for the revised 80-item scale was somewhat higher,.77, in his study with 244 children.

Based on the above studies, the Piers-Harris has been judged to have good internal consistency and adequate temporal stability (Piers and Harris, 1969). Concurrent validites with Lipsitt Children's Self-Concept Scale, with "Health Problems, Big Problems" on the SRA Junior Inventory, teacher ratings, peer ratings, socially effective behavior, and superego strength, are presented in Appendix B, pp. 147).

The Structure of the Piers-Harris Scale was studied with multiple factor analysis resulting in the interpretation of the six clusters. Research has shown that these clusters add meaning to the Piers-Harris (Piers, 1977). In connection with the PASS Model Project, Smith et al., (1974) reported the correlation of each of the clusters with the total scores on the scale and with each other. These intercorrelations show each cluster score contributes substantially to the total score, but are not fully independent (Piers, 1977).

Revised cluster scores identified in a study by Michael, Smith, and Michael (1975), are used in the analysis of data gathered for this study. The revised clusters are as follows, Cluster I, Behavior; Cluster II, Intelligence and School Status; Cluster III, Physical Appearance; Cluster IV, Anxiety; Cluster V, Popularity, and Cluster VI, Happiness and Satisfaction.

Normative data for the Piers-Harris (Appendix B, p. 145) are based on 1,183 public school children ranging from grade four to grade twelve. Since no consistent sex and grade differences were found, the scores were pooled for normative purposes, although grade means for this sample are presented separately. The norms presented were based on data from one Pennsylvania small town, public school district and are therefore, generalizable only to similar populations. In order to show the variability of means and standard deviations, data from a variety of samples, many of which show slightly higher means, are presented along with the normative data (Appendix B, p. 146).

Piers and Harris (1969) point out that because of difficulties in reading, instructions and items should always be read aloud by the examiner in grades three and four. The authors also have found it desirable to read these aloud even with grades five and six, in order to keep the group being tested together and, from exchanging opinions. Piers and Harris (1969, p. 8) add, "It should be stressed that this is not a test, that there are no right or wrong answers, that results will not affect their school grades and will be kept confidential."

Hypotheses

Data were collected which would answer the following questions,

1. Is there a difference in the divergent production intellectual abilities between children in open and traditional school environments?

2. Is there a difference in self-concept between children in open and traditional school environments?

3. Is there a difference in divergent production intellectual abilities among children in grade levels three, four, and five?

4. Is there a difference in self-concept among children in grade levels three, four, and five?

5. Is there an interaction between open and traditional school environments and grade levels three, four, and five, for the divergent production intellectual abilities?

6. Is there an interaction between open and traditional school environments and grade levels three, four, and five, for self-concept?

From these questions the following hypotheses were generated:

Hypothesis 1: There is a difference in the fluency dimension of the Divergent Production of Figural Units (DFU-F) scores, between children in open and traditional school environments.

Hypothesis 2: There is a difference in DFU-F scores among children in grades three, four, and five.

Hypothesis 3: There is an interaction between type of school environment (open and traditional) and grade levels (three, four, and five) for DFU-F scores.

Hypothesis 4: There is a difference in the set change dimension of the Divergent Production of Figural Units (DFU-S) scores, between children in open and traditional school environments.

Hypothesis 5: There is a difference in the DFU-S scores among children in grades three, four, and five.

Hypothesis 6: There is an interaction between type of school environment (open and traditional) and grade levels (three, four, and five) for DFU-S scores.

Hypothesis 7: There is a difference in the transformation dimension of the Divergent Production of Figural Units (DFU-T) scores, between children in open and traditional school environments.

Hypothesis 8: There is a difference in DFU-T scores among children in grades three, four, and five.

Hypothesis 9: There is an interaction between type of school environment (open and traditional) and grade levels (three, four, and five) for DFU-T scores.

Hypothesis 10: There is a difference in the originality dimension of the Divergent Production of Figural Units (DFU-O) scores, between children in open and traditional school environments.

Hypothesis 11: There is a difference in DFU-O scores between children in grades three, four, and five.

Hypothesis 12: There is an interaction between type of school environment (open and traditional) and grade levels (three, four, and five) for DFU-O scores.

Hypothesis 13: There is a difference in the fluency dimension of the Divergent Production of Semantic Units (DMU-F) scores, between children in open and traditional school environments.

Hypothesis 14: There is a difference in DMU-F scores among children in grades three, four, and five.

Hypothesis 15: There is an interaction between type of school environment (open and traditional) and grade level (three, four, and five) for DMU-F scores.

Hypothesis 16: There is a difference in the originality dimension of the Divergent Production of Semantic Units (DMU-O) scores, between children in open and traditional school environments.

Hypothesis 17: There is a difference in DMU-O scores among children in grades three, four, and five.

Hypothesis 18: There is an interaction between type of school environment (open and traditional) and grade level (three, four, and five) for DMU-O.

Hypothesis 19: There is a difference in the fluency dimension of the Divergent Production of Symbolic Relations (DSR-F) scores, between children in open and traditional school environments.

Hypothesis 20: There is a difference in DSR-F scores among children in open and traditional school environments.

Hypothesis 21: There is an interaction between type of school environment (open and traditional) and grade level (three, four, and five) for DSR-F scores.

Hypothesis 22: There is a difference in the set change dimension of the Divergent Production of Symbolic Relations (DSR-S) scores, between children in open and traditional school environments.

Hypothesis 23: There is a difference in DSR-S scores among children in grades three, four, and five.

Hypothesis 24: There is an interaction between type of school environment (open and traditional) and grade level (three, four, and five) for DSR-S scores.

Hypothesis 25: There is a difference in the originality dimension of the Divergent Production of Symbolic Relations (DSR-O) scores, between children in open and traditional school environments.

Hypothesis 26: There is a difference in DSR-O scores among children in grades three, four, and five.

Hypothesis 27: There is an interaction between type of school environment (open and traditional) and grade level (three, four, and five) for DSR-O scores.

Hypothesis 28: There is a difference in the behavior dimension of self-concept (Cluster I) scores, between children in open and traditional school environments.

Hypothesis 29: There is a difference in Cluster I scores among children in grades three, four, and five.

Hypothesis 30: There is an interaction between type of school environment (open and traditional) and grade level (three, four, and five) for Cluster I scores.

Hypothesis 31: There is a difference in the intelligence and school status dimension of self-concept (Cluster II) scores, between children in open and traditional school environments.

Hypothesis 32: There is a difference in Cluster II scores among children in grades three, four, and five.

Hypothesis 33: There is an interaction between type of school environment (open and traditional) and grade level (three, four, and five) for Cluster II scores.

Hypothesis 34: There is a difference in the physical appearance dimension of self-concept (Cluster III) scores, between children in open and traditional school environments.

Hypothesis 35: There is a difference in Cluster III scores among children in grades three, four, and five.

Hypothesis 36: There is an interaction between type of school environment (open and traditional) and grade level (three, four, and five) for Cluster III scores.

Hypothesis 37: There is a difference in the anxiety dimension of self-concept (Cluster IV) scores between children in open and traditional school environments.

Hypothesis 38: There is a difference in Cluster IV scores among children in grades three, four, and five.

Hypothesis 39: There is an interaction between type of school environment (open and traditional) and grade level (three, four, and five) for Cluster IV scores.

Hypothesis 40: There is a difference in the popularity dimension of self-concept (Cluster V) scores between children in open and traditional school environments.

Hypothesis 41: There is a difference in Cluster V scores among children in grades three, four, and five.

Hypothesis 42: There is an interaction between type of school environment (open and traditional) and grade level (three, four, and five) for Cluster V scores.

Hypothesis 43: There is a difference in the happiness dimension of self-concept (Cluster VI) scores between children in open and traditional school environments.

Hypothesis 44: There is a difference in Cluster VI scores among children in grades three, four, and five.

Hypothesis 45: There is an interaction between type of school environment (open and traditional) and grade level (three, four, and five) for Cluster VI scores.

Procedure

Permission to conduct the research project was requested from the Director of Research and Information of the metropolitan school district targeted for this study. Then, each selected school's principal was contacted and a letter was approved to be sent to all parents of students in grades three, four, and five, requesting permission for their child's participation in the study (Appendix G). Only those children whose parents returned the letter of permission were included in the study.

With administrative and parental consent, the Piers-Harris Children's Self-Concept Scale and the three divergent production subtests from the Structure of Intellect Learning Abilities Test (SOI-LA) were administered to grades three, four, and five,; Beta and Gamma, in their regular class groups. Confidentiality was maintained with only group data being reported in the study. Results of the data were made available to teachers and administrators whose classes and schools were involved in the study upon completion and approval of research.

All testing was done by the author. This was accomplished in one and one-half days in each school within the same two-week period. Testing was done in class size groups and during the regularly scheduled class periods. The cooperation of administrators and staff enabled the process to proceed with minimum disruption of classes.

The Piers-Harris Children's Self-Concept Scale was administered first to each participating student, as a total class activity. As recommended by the authors of the Piers-Harris Scale, and in order to follow as closely as possible the procedure in the Rivet (1977) study, a formal set of instructions was read prior to administering the test. The scale was distributed to each student after which the examiner said,

> Listen carefully to what I have to say about the booklet that you have in front of you now. It is called the Piers-Harris Children's Self-Concept Scale, or another name for it is, The Way I Feel About Myself. It is very helpful to find out how students feel about themselves in order to help them in school. By answering the questions in this booklet, your teacher and I both hope to help you and other students become more successful in school. There are really no right or wrong answers to these questions. There are just answers that are right for you and how you feel about yourself in different situations. Naturally, no one but you, your teacher, and I can see your booklet, so try to answer the questions just like you feel. I will read each question aloud while you are reading it silently from your booklet. I will be happy to repeat the question if you don't hear it the first time. Are there any questions?

After the students had filled in the blanks on the first page of the test booklet with name, age, school, and date, they were instructed to list the name of the school which they attended from grade one through their present grade level. This information was later used to identify the students who had spent all, or nearly all, of their school time in either an open or a traditional school setting.

After the statements that appear in the test booklet were read aloud, the questions were read aloud with time for students' responses. The administration of the self-concept scale took approximately fifteen minutes. Following this portion of the testing, students were given a five minute break and were encouraged to stand and move around.

Then, the three divergent production subtests from the Structure

of Intellect Learning Abilities Test were administered. Again a set of prepared instructions based upon the directions given in the Examiner's Manual was read. These instructions were as follows:

> We are going to do some activities now that are a lot like games. The important thing that I would like for you to remember is that there are no right or wrong answers to any of these activities.
>
> (DFU) The first thing we are going to do is some drawing. As you can see there are many squares on this page. Now watch me. (using chalkboard) I am going to draw a line like this, and one like this, to make a roof, and put in a door and a window like this...and I have turned this square into a house. This is what I would like for you to do with these squares...you are to make something different with each square. Anything you want to draw is okay. It can be funny or pretty...whatever you want it to be is okay. Do as many as you can and try to work as quickly as you can. When I say "begin", take your pencil and by drawing, try to make the squares into something different. Are there any questions?
>
> (DMU) Now, you are going to write a story about one of the pictures you have drawn. Choose any of the drawings you want and write a short story about it. Any of the drawings you want to choose is fine. First, give the drawing a name, write the name at the top here (indicating on page). Then, write a story about the drawing. It can be funny, make-believe, or something real, anything you want to write about is okay. Are there any questions?
>
> (DSR) Here is another page with squares on it. This time I want you to fill in the squares so that it makes a pattern. But, you can decide what you want the pattern to be... that's up to you and anything you want is okay. Let's look at the sample, the square next to the box with the squiggle lines in it. The square has dark X's in the middle, two X's in the first box, three X's in the center box and four X's in the last box in the middle row. Suppose we wanted to make a "more" type pattern so that each box had more X's than the one in front of it. The dotted X's start a "more" pattern. Now trace over the dotted X's and fill in the empty box. Alright, you fill in the second set of squares, by the "dog" box, by yourself. It already has some X's and O's, so fill in the squares any way you want to make a pattern. (allow three minutes). Now try the squares with the letters. Fill in the squares to make whatever pattern you want (allow three minutes). Now, try the squares with the numbers. Each set has a rule to follow and some numbers filled in. You fill in the squares to make patterns according to the rules.

With the adaption of these testing instructions and only one examiner, it was possible to adhere to uniform testing procedures and maintain objectivity. After the test booklets were collected, time permitting, the examiner initiated an informal chat with the students. Students were asked to share their thoughts and feelings about the tests. This appeared to help students bridge the novelty of the testing session and the regular classroom activity.

Scoring

The scoring of the Piers-Harris Children's Self-Concept Scale was done by the author using a revised scoring key to obtain both total score and scores for the six cluster scores. The scoring of the three subtests of divergent production from the Structure of Intellect Learning Abilities Test was completed by the author and one other individual who was previously trained in the scoring procedure. Scoring Tips which are included in the SOI-LA materials are presented in Appendix A, p. 124-33.

Seven raw scores, representing total self-concept and the following six clusters, were received from the Piers-Harris Scale,

1. Behavior
2. Intellectual and School Status
3. Physical Appearance and Attitudes
4. Anxiety
5. Popularity
6. Happiness and Satisfaction

Nine raw scores were obtained from the three divergent production subtests of the SOI-LA as follows,

1. Divergent Production of Figural Units (DFU) Fluency (F)
2. Divergent Production of Figural Units (DFU) Set Change (S)
3. Divergent Production of Figural Units (DFU) Transformation (T)
4. Divergent Production of Figural Units (DFU) Originality (O)

5. Divergent Production of Semantic Units (DMU) Fluency (F)
6. Divergent Production of Semantic Units (DMU) Originality (O)
7. Divergent Production of Symbolic Relations (DSR) Fluency (F)
8. Divergent Production of Symbolic Relations (DSR) Set Change (S)
9. Divergent Production of Symbolic Relations (DSR) Originality (O)

Data Analysis

All data were analyzed in the Computer Center at Oklahoma State University, Stillwater, Oklahoma. The Statistical Analysis System (SAS) was used to compute means, standard deviations, one-way analysis of variance, two-way analysis of variance, t-tests, and correlations coefficients. The Statistical Package for the Social Sciences (SPSS) was used in a subsequent analysis to compute t-tests, one-way analysis of variance, and Tukey-B procedures on variables showing differences. Data were reported for the total sample in each school, the total sample at each grade level, the total sample in each school at each grade level, the total number of boys, and the total number of girls.

Summary

This chapter has presented the questions and hypothesis postulated by this study. The research design or methodology used is discussed, as well as information relative to the subjects, instrumentation, investigationg, and analysis procedures.

CHAPTER IV

RESULTS

Introduction

Chapter IV presents the results of the analysis of data on nine separate measures of divergent production abilities and six separate measures of self-concept relative to the hypotheses tendered in Chapter III. The original sample included 194 students from three grades in two distinct school environments. After excluding students who had not been in an open or traditional school environment for all of their school experience, there were 133 students remaining in the sample. The statistics utilized include two-way analysis of variance, one-way analysis of variance, and Tukey-B multiple range tests. Means and standard deviations for each group were also calculated and are reported in Appendix E.

The hypotheses dealt with separate measures of divergent production and self-concept scores relative to two school environments and three grade levels. The hypotheses were also concerned with the possible difference in impact of school environment and grade level on these measures of divergent production abilities and self-concept. Two-way analysis of variance were prepared for each of the nine measures of divergent production abilities and the six measures of self-concept. The two-way analysis of variance presented information

about the main effect of school environment, the main effect of grade level, and the interaction of two types of school environment (open and traditional) and three grade levels (three, four, and five).

In the presence of interaction between school environment and grade level, the simple main effects of one variable at each level of the other variable were studied with one-way analysis of variance. When these tests indicated statistical differences, they were followed by a Tukey-B multiple range test to determine which of the grade level means were different. These results contributed to greater understanding of differences within each hypothesis.

Analyses of Divergent Production Measures, School Environment, and Grade Levels

Hypotheses 1 through 27 dealt with the main effect of school environment, the main effect of grade level, and the interaction between school environment and grade level for nine separate measures of divergent production abilities. Tables of means for these nine measures appear in Appendix E. In the presence of an interaction, a graph of means and the accompanying analysis of variance summary table are included in the discussion of the measures. All remaining graphs and related analysis of variance summary tables are included in Appendix F.

Hypothesis 1 stated there is a difference in the fluency dimension of the Divergent Production of Figural Units (DFU-F) between children in open and traditional school environment.

Hypothesis 2 stated there is a difference in DFU-F scores among children in grades three, four, and five.

Hypothesis 3 stated there is an interaction between type of school environment (open or traditional) and grade levels (three, four, and five) for DFU-F scores.

The analysis of variance procedure to study these three hypotheses for DFU-F showed no interaction and no effect of school environment. This resulted in the rejection of Hypotheses 1 and 3. The effect of grade level was significant ($F = 4.69$, $df = 2, 127$, $p < .01$). A Tukey-B multiple range test showed the mean for grade four (11.37) is different (lower) than grade three mean (13.53) and grade five mean (12.22). This led to the acceptance of Hypothesis 2 (Appendix F, Table XIII, Figure 7).

Hypothesis 4 stated there is a difference in the set change dimension of the Divergent Production of Figural Units (DFU-S) scores, between children in open and traditional school environments.

Hypothesis 5 stated there is a difference in the DFU-S scores among children in grades three, four, and five.

Hypothesis 6 stated there is an interaction between type of school environment (open and traditional) and grade levels (three, four, and five) for DFU-S scores.

The two-way analysis of variance to test these three hypotheses showed an interaction at the .001 significance level ($F = 7.07$, $df = 2, 127$) (Table I, and Figure 1). A one-way analysis of variance showed a difference among the means of the three grade levels in the open model school ($F = 7.41$, $df = 2, 127$, $p < .001$). Further simple main effect analysis showed grade four mean (11.04) in the traditional school is different than the grade four mean (7.81) in the open model school ($F = 7.97$, $df = 1, 39$, $p. < .008$). Grade five mean (13.00) in

the open model school is different (higher) than grade five mean (10.59) in the traditional school ($F = 4.09$, $df = 1, 43$, $p < .049$). The main effects of school environment and grade level were not significant. These results led to the rejection of Hypotheses 4 and 5 and the acceptance of Hypothesis 6.

Hypothesis 7 stated there is a difference in the transformation dimension of the Divergent Production of Figural Units (DFU-T) scores, between children in open and traditional school environments.

Hypothesis 8 stated there is a difference in DFU-T scores among children in grades three, four, and five.

Hypothesis 9 stated there is an interaction between type of school environment (open and traditional) and grade levels (three, four, and five) for DFU-T scores.

The two-way analysis of variance to test Hypotheses 7, 8, and 9, showed no interaction between school environment and grade levels. There were no significant main effects of either school environment or grade level. Therefore, Hypotheses 7, 8, and 9, were not accepted (Appendix F, Table XIV, Figure 8).

Hypothesis 10 stated there is a difference in the originality dimension of the Divergent Production of Figural Units (DFU-O) scores, between children in open and traditional school environments.

Hypothesis 11 stated there is a difference in DFU-O scores between children in grades three, four, and five.

Hypothesis 12 stated there is an interaction between type of school environment (open and traditional) and grade levels (three, four, and five) for DFU-O scores.

TABLE I

ANALYSIS OF VARIANCE SUMMARY FOR SET CHANGE, DIVERGENT PRODUCTION OF FIGURAL UNITS

SOURCE OF VARIATION	DF	SS	MS	F
School	1	4.55	4.55	.33
Grade	2	60.61	30.31	2.23
School x Grade	2	192.03	96.02	7.07*
Error	127	1,732.71	13.59	
Total	132			

*$p < .001$

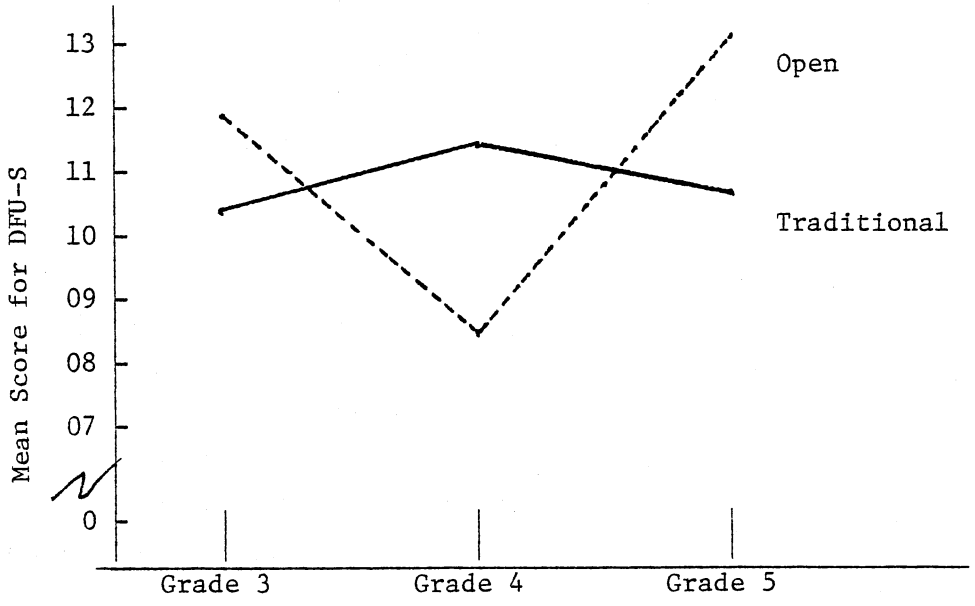


Figure 1. Graph of Interaction between School Environment and Grade Level for Set Change, Divergent Production of Figural Units.

The two-way analysis of variance to test Hypotheses 10, 11, and 12, showed there was no interaction between school environment and grade levels. The main effect of school environment was significant ($F = 15.89$, $df = 1, 127$, $p < .05$), resulting from higher means in the open model school (9.22) than in the traditional school (4.75). The main effect of grade level showed a difference also ($F = 4.71$, $df = 2, 127$, $p < .001$), which was followed by a Tukey-B multiple range test. This follow-up procedure showed grade four mean (8.70) was different (higher) than grade three mean (5.96) and grade five mean (4.84) at the .05 significance level. Therefore, Hypotheses 10 and 11 were accepted while Hypothesis 12 was not (Appendix F, Table XV, Figure 9).

Hypothesis 13 stated there is a difference in the fluency dimension of the Divergent Production of Semantic Units (DMU-F) scores between children in open and traditional school environments.

Hypothesis 14 stated there is a difference in DMU-F scores among children in grades three, four, and five.

Hypothesis 15 stated there is an interaction between type of school environment (open and traditional) and grade levels (three, four, and five) for DMU-F scores.

The analysis of variance procedure to examine Hypotheses 13, 14, and 15, showed no interaction for school environment and grade levels. The effect of school environment alone is significant ($F = 3.93$, $df = 1, 127$, $p < .05$). One-way analysis of variance testing showed a difference between school ($F = 7.82$, $df = 2, 133$, $p < .001$), with the traditional school mean (50.69) higher than the open model school mean (42.84). The main effect of grade level was also significant for

DMU-F ($F = 8.20$, $df = 2, 127$, $p < .0004$). A Tukey-B test showed grade four mean (55.55) and grade five mean (50.18) were different (higher) than grade three mean (38.85) but not different from each other at the .05 level of significance. The results of these analysis led to the acceptance of Hypotheses 13 and 14, while Hypothesis 15 was rejected (Appendix F, Table XVI, Figure 10).

Hypothesis 16 stated there is a difference in the originality dimension of the Divergent Production of Semantic Units (DMU-O) scores between children in open and traditional school environments.

Hypothesis 17 stated there is a difference in DMU-O scores among children in grades three, four, and five.

Hypothesis 18 stated there is an interaction between type of school environment (open and traditional) and grade level (three, four, and five) for DMU-O.

The two-way analysis of variance to test these hypotheses showed an interaction between school and grade level ($F = 3.31$, $df = 2, 127$, $p < .04$). A one-way analysis of variance showed a difference among grade levels in the open model school ($F = 6.40$, $df = 2, 127$, $p < .004$). In the open school, a Tukey-B multiple range test showed the mean for grade three (0.56) was different (lower) than the mean for grade four (4.38) and the mean for grade five (5.63). Means for grades four and five were not different. In the traditional school, the means among the three grades were not different therefore, the main effect of grade level resulted from differences in the open design school ($F = 3.11$, $df = 2, 127$, $p < .048$). Based on these results Hypothesis 16 was not accepted with Hypotheses 17 and 18 were accepted (See Table II Figure 2, page 80).

TABLE II

ANALYSIS OF VARIANCE SUMMARY FOR ORIGINALITY, DIVERGENT PRODUCTION OF SEMANTIC UNITS

SOURCE OF VARIATION	DF	SS	MS	F
School	1	2.23	2.23	.11
Grade	2	129.22	64.61	3.11*
School x Grade	2	137.76	68.88	3.31**
Error	127	2,640.57	20.79	
Total	132			

*p < .048
**p < .050

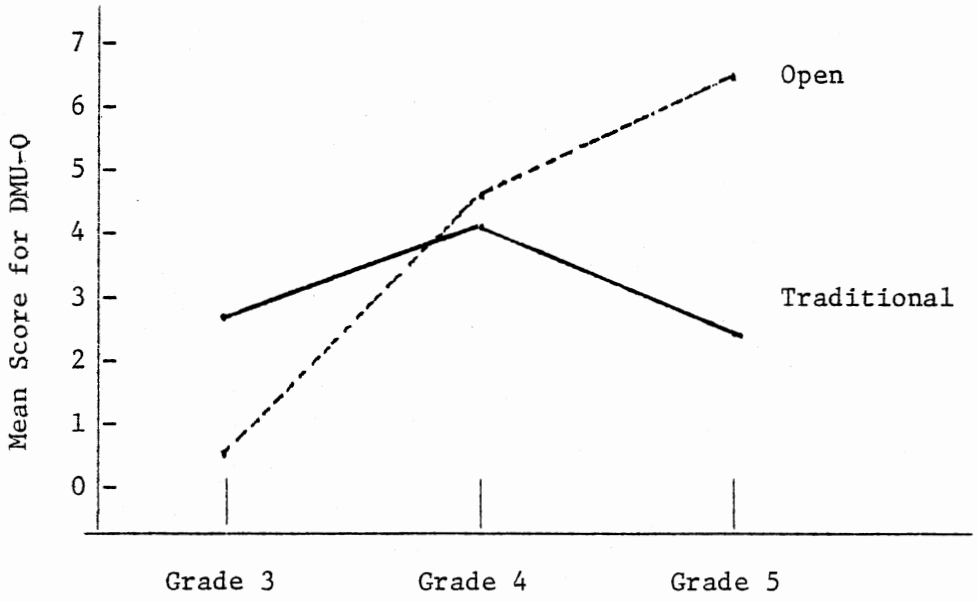


Figure 2. Graph of Interaction between School Environment and Grade Level for Originality, Divergent Production of Semantic Units.

Hypothesis 19 stated there is a difference in the fluency dimension of the Divergent Production of Symbolic Relations (DSR-F) scores, between children in open and traditional school environments.

Hypothesis 20 stated there is a difference in DSR-F scores among children in grades three, four, and five.

Hypothesis 21 stated there is an interaction between type of school environment (open and traditional) and grade levels (three, four, and five) for DSR-F scores.

The analysis of variance to test Hypotheses 19, 20, and 21 showed the presence of an interaction between open and traditional school environments and grade levels three, four, and five ($F = 8.09$, $df = 2, 127$, $p < .001$). Follow-up procedures show that in the traditional school the grade four mean (35.96) was higher than the grade three mean (28.86) and grade five mean (33.17) at the .05 level of significance. In the open model school, the difference among means for the three grades was also significant ($p < .005$). The analysis of differences between grade levels indicated the grade three mean (30.72) was higher than the grade four mean (21.13) and the grade five mean (24.75) at the .05 level of significance.

Analysis of differences within grade levels showed that at the fourth grade level, the traditional school mean (35.96) was higher than the open school mean (21.13), ($F = 24.68$, $df = 1, 39$, $p < .001$). At the fifth grade level the traditional school mean (33.17) was also higher than the open school mean (24.75). There was a main effect for school environment ($F = 15.53$, $df = 1, 127$, $p < .0001$) however, there was no main effect for grade level. Therefore, Hypotheses 19 and 21 were accepted while Hypothesis 20 was not.

TABLE III

ANALYSIS OF VARIANCE SUMMARY FOR FLUENCY, DIVERGENT PRODUCTION OF SYMBOLIC RELATIONS

SOURCE OF VARIATION	DF	SS	MS	F
School	1	1,428.25	1,428.25	15.53*
Grade	2	10.94	5.47	.06
School x Grade	2	1,488.52	744.26	8.09**
Error	127	11,682.91	91.99	
Total	132			

*p < .0001
**p < .001

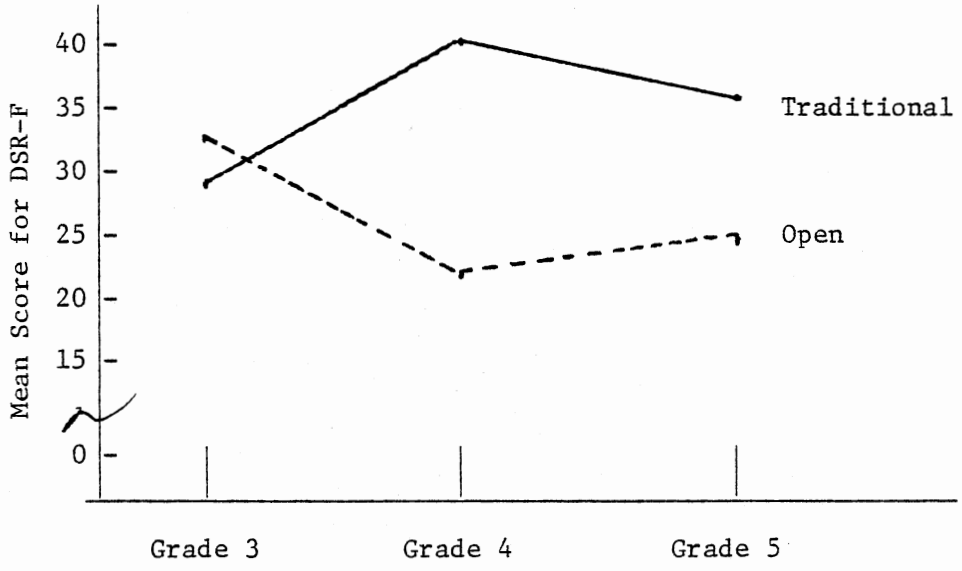


Figure 3. Graph of Interaction between School Environment and Grade Level for Fluency, Divergent Production of Symbolic Relations.

Hypothesis 22 stated there is a difference in the set change dimension of the Divergent Production of Symbolic Relations (DSR-S) scores, between children in open and traditional school environments.

Hypothesis 23 stated there is a difference in DSR-S scores among children in grades three, four, and five.

Hypothesis 24 stated there is an interaction between type of school environment (open and traditional) and grade levels (three, four, and five) for DSR-S scores.

The two-way analysis of variance to test Hypotheses 22, 23, and 24 showed the presence of an interaction between open and traditional school environments and grade levels three, four, and five ($F = 7.25$, $df = 2, 127$, $p < .001$). Grade means were different in the open model school ($F = 5.16$, $df = 2, 47$, $p < .009$), and this result was followed by a Tukey-B test which showed the grade three mean (28.00) was higher than the mean for grade four (13.19) and the grade five mean (15.00) at the .05 significance level.

In the traditional school, the grade means were also different ($F = 3.37$, $df = 2, 80$, $p < .039$), however, the pattern differed from the open model school. Follow-up procedures in the traditional school showed the grade four mean (38.12) was higher than either grade three mean (27.03) or grade five mean (29.17). An examination of grade level differences within school environments indicated that grade four mean (38.12) in the traditional school was higher than the grade four mean (13.19) in the open model school ($F = 19.10$, $df = 1, 39$, $p < .0001$). The fifth grade mean (31.12) in the traditional school was also higher than the fifth grade mean (19.10) in the open model school ($F = 4.09$, $df = 1, 43$, $p < .049$).

TABLE IV

ANALYSIS OF VARIANCE SUMMARY FOR SET CHANGE, DIVERGENT PRODUCTION OF SYMBOLIC RELATIONS

SOURCE OF VARIATION	DF	SS	MS	F
School	1	4,508.58	4,508.58	17.97*
Grade	2	435.60	217.80	.87
School x Grade	2	3,637.51	1,818.76	7.25**
Error	127	31,860.18	250.87	
Total	132			

*p .0001
**p .001

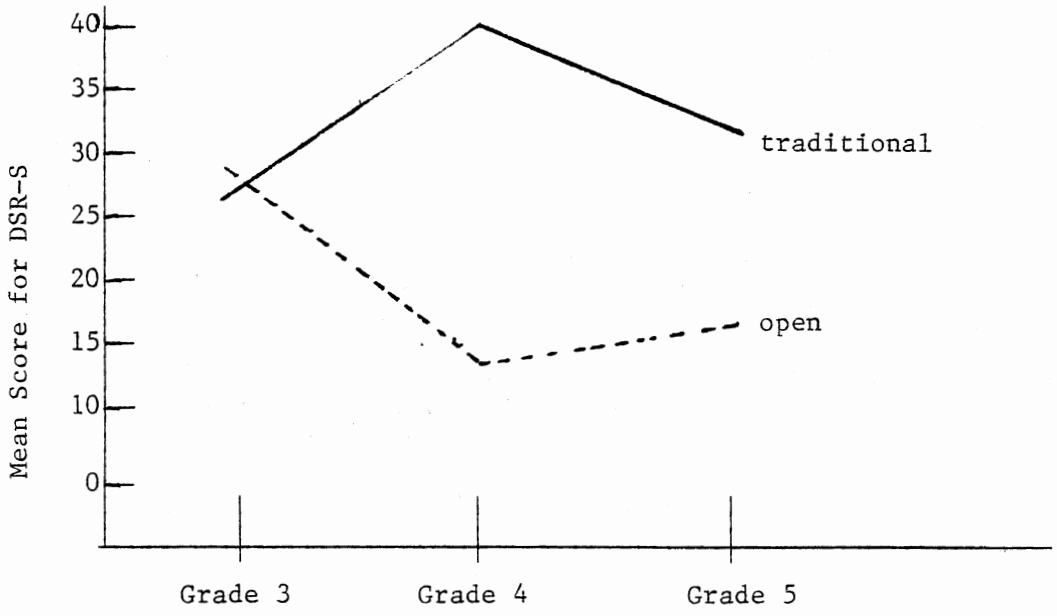


Figure 4. Graph of Interaction between School Environment and Grade Level for Set Change, Divergent Production of Symbolic Relations

There was a significant main effect for school environment ($F = 17.97$, $df = 1, 127$, $p < .0001$), but there was no grade level effect of significance. Therefore, Hypotheses 22 and 24 were accepted and Hypothesis 23 was rejected (Table IV, Figure 4, page 85).

Hypothesis 25 stated there is a difference in the originality dimension of the Divergent Production of Symbolic Relations (DSR-O) scores, between children in open and traditional school environments.

Hypothesis 26 stated there is a difference in DSR-O scores, between children in grades three, four, and five.

Hypothesis 27 stated there is an interaction between type of school environment (open and traditional) and grade levels (three, four, and five) for DSR-O scores.

The analysis of variance to test Hypotheses 25, 26, and 27 resulted in an interaction between open and traditional school environments and grade levels three, four, and five ($F = 7.00$, $df = 2, 127$, $p < .001$). There was a difference among grade means in the open model school ($F = 8.76$, $df = 2, 47$, $p < .001$). For the open model school, follow-up procedures with a Tukey-B test showed grade three mean (12.67) higher than the means for either grade four (2.50) or grade five (1.00) at the .05 level of significance. In the traditional school, there were no differences between the means.

An examination of grade differences between school environments indicated that in the traditional school the mean of grade four (13.13) was higher than the grade four mean (2.50) in the open model school ($F = 11.83$, $df = 1, 39$, $p < .001$). Grade five mean (9.11) in the traditional school was also higher than the grade five mean (5.36)

TABLE V

ANALYSIS OF VARIANCE SUMMARY FOR ORIGINALITY, DIVERGENT PRODUCTION OF SYMBOLIC RELATIONS

SOURCE OF VARIATION	DF	SS	MS	F
School	1	438.43	438.43	4.05*
Grade	2	612.13	306.07	2.83
School x Grade	2	1,515.39	757.70	7.00**
Error	127	13,742.02	108.20	
Total	132			

*p < .046
**p < .001

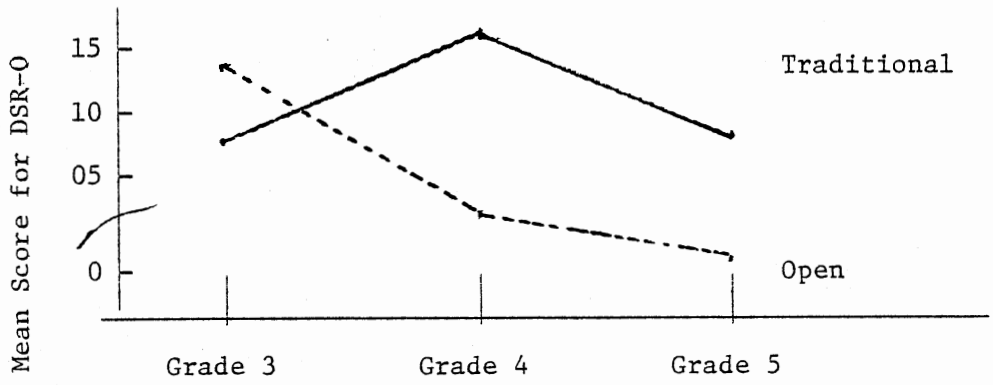


Figure 5. Graph of Interaction between School Environment and Grade Level for Originality, Divergent Production of Symbolic Relations.

in the open model school ($F = 9.601$, $df = 1, 43$, $p < .003$). The main effect of school environment was significant ($F = 4.05$, $df = 1, 127$, $p < .046$). The mean DSR-O score for the traditional school was higher (9.11) than the mean DSR-O score (5.36) for the open school. The main effect of grade level was not significant. Based on these findings, Hypotheses 25 and 27 were accepted and Hypothesis 26 was rejected (Table V, Figure 5, page 87).

Analyses of Self-Concept Measures, School Environment, and Grade Level

Hypotheses 28 through 45 dealt with the main effect of school environment, the main effect of grade level, and the interaction between school environment and grade level for six separate dimensions of self-concept. Means tables for these six test variables appear in Appendix E. In the presence of an interaction, an analysis of variance summary table and a graph of means are included with the discussion of the variable. The remaining analysis of variance summary tables and related graphs are included in Appendix F.

Hypothesis 28 stated there is a difference in the behavior dimension of self-concept (Cluster I) scores, between children in open and traditional school environments.

Hypothesis 29 stated there is a difference in Cluster I scores among children in grades three, four, and five.

Hypothesis 30 stated there is an interaction between type of school environment (open and traditional) and grade levels (three, four, and five) for Cluster I scores.

The analysis of variance procedure to study these three hypotheses for the behavior dimension in self-concept showed no interaction and no effect of school environment. The effect of grade level was significant ($F = 6.58$, $df = 2, 127$, $p < .002$). A Tukey-B test showed grade three mean (11.34) lower than the means for either grade four (13.37) or grade five (13.49) at the .05 level of significance. Means for grades four and five were not different from each other. These results led to the acceptance of Hypothesis 29 and to the rejection of Hypotheses 28 and 30 (Appendix F, Table XVII, Figure 11).

Hypothesis 31 stated there is a difference in the intelligence and school status dimension of self-concept (Cluster II) scores between children in open and traditional school environments.

Hypothesis 32 stated there is a difference in Cluster II scores among children in grades three, four, and five.

Hypothesis 33 stated there is an interaction between type of school environment (open and traditional) and grade levels (three, four, and five) for Cluster II.

The analysis of variance to study the three hypotheses related to Cluster II (intelligence and school status dimension) of self concept showed no interaction and no effect of school environment. The effect of grade level was significant ($F = 3.83$, $df = 2, 127$, $p < .024$). A Tukey-B follow-up procedure showed that grade five mean (14.00) was higher than the mean for grade three (12.15) and the mean for grade four (13.24) at the .05 significance level. Based on these results, Hypothesis 32 was accepted and Hypotheses 31 and 33 were rejected (Appendix F, Table XVII, Figure 12).

Hypothesis 34 stated there is a difference in the physical appearance dimension of self-concept (Cluster III) scores, between children in open and traditional school environments.

Hypothesis 35 stated there is a difference in Cluster III scores among children in grades three, four, and five.

Hypothesis 36 stated there is an interaction between type of school environment (open and traditional) and grade levels (three, four, and five) for Cluster III scores.

The analysis of variance procedure to study Hypotheses 34, 35, and 36, showed there was no interaction and no effect of school environment. The effect of grade level was significant ($F = 7.62$, $df = 2, 127$, $p < .001$). A Tukey-B procedure showed the mean for grade four (9.88) and the grade five mean (10.38) were different (higher) than the mean for grade three (8.30) at the .05 level of significance. The results of these tests led to the acceptance of Hypothesis 35 and to the rejection of Hypotheses 34 and 36. (Appendix F, Table XIX, Figure 13).

Hypothesis 37 stated there is a difference in the anxiety dimension of self-concept (Cluster IV) scores between children in open and traditional school environments.

Hypothesis 38 stated there is a difference in Cluster IV scores among children in grades three, four, and five.

Hypothesis 39 stated there is an interaction between type of school environment (open and traditional) and grade level (three, four, and five) for Cluster IV scores.

The analysis of variance procedure to study Hypotheses 37, 38, and 39 showed no interaction and no effect of school environment. The

effect of grade level was significan ($F = 9.82$, $df = 2, 127$, $p < .0001$). A Tukey-B test showed the mean of grade four (10.71) and the mean of grade five (11.27) were different (higher) than the mean for grade three (8.87) at the .05 level of significance. The means for grades four and five were not different from each other. Based on these results Hypothesis 38 was accepted. Hypotheses 37 and 39 were not accepted (Appendix F, Table XX, Figure 14).

Hypothesis 40 stated there is a difference in the popularity dimension of self-concept (Cluster V) scores between children in open and traditional school environments.

Hypothesis 41 stated there is a difference in Cluster V scores among children in grades three, four, and five.

Hypothesis 42 stated there is an interaction between type of school environment (open and traditional) and grade level (three, four, and five) for Cluster V scores.

The analysis of variance to study Hypotheses 40, 41, and 42, showed an interaction between school environment and grade level ($F = 3.26$, $df = 2, 127$, $p < .042$). One-way analysis of variance tests showed the mean of grade three (6.78) was lower than the mean for grade four (8.75) and for grade five (8.31) in the open model school environment (.05 significance level). In the traditional school, the grade five mean (8.38) was higher than the means for grade three (6.93) and grade four (6.88) at the .05 significance level. There was also a main effect for grade level ($F = 6.05$, $df = 2, 127$, $p < .003$). while the main effect of school environment was not significant. A Tukey-B procedure showed means for grade four (7.61) and grade five (8.36) were different (higher) than grade three mean

TABLE VI

ANALYSIS OF VARIANCE SUMMARY FOR POPULARITY (CLUSTER V) OF SELF-CONCEPT

SOURCE OF VARIATION	DF	SS	MS	F
School	1	7.14	7.14	1.71
Grade	2	50.58	25.29	6.05*
School x Grade	2	27.28	13.64	3.26**
Error	127	530.88	4.18	
Total	132			

*p< .003
**p <.042

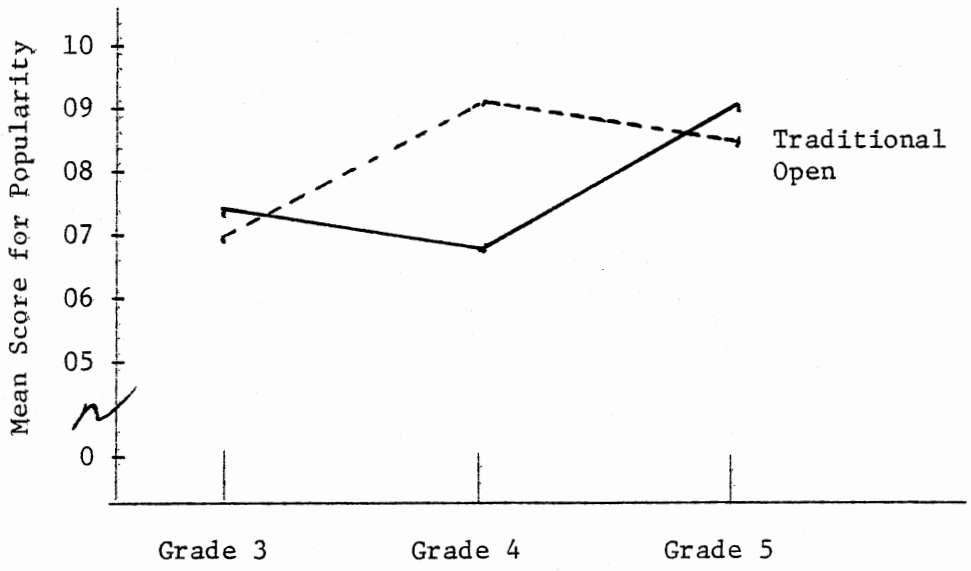


Figure 6. Graph of Interaction between School Environment and Grade Level for Popularity (Cluster V) of Self-Concept.

(6.87) at the .05 significance level. Based upon these results, Hypotheses 41 and 42 were accepted and Hypothesis 40 was rejected (Table VI, Figure 6, page 91).

Hypothesis 43 stated there is a difference in the happiness dimension of self-concept (Cluster VI) scores between children in open and traditional school environments.

Hypothesis 44 stated there is a difference in Cluster VI scores among children in grades three, four, and five.

Hypothesis 45 stated there is an interaction between type of school environment (open and traditional) and grade level (three, four, and five) for Cluster VI.

The analysis of variance procedure to study the three hypotheses related to Cluster VI showed no interaction and no effect of school environment. The effect of grade level was significant ($F = 6.20$, $df = 2, 127$, $p < .003$). A Tukey-B procedure showed the means of greade four (8.71) and grade five (9.00) were different (higher) than the mean for grade three (7.55) at the .05 significance level. These results led to the acceptance of Hypothesis 44, while Hypotheses 43 and 45 were not accepted (Appendix F, Table XXI, Figure 15).

Summary

The results of the factorial analysis of variance on nine measures of divergent production and six measures of self-concept measured in two distinct school environments, open and traditional, and across three grade levels, three, four, and five were described in this chapter. There were 45 alternative (non-null) hypotheses studied of which 21 were accepted and 24 were rejected.

There were fifteen analyses of variance prepared. Each analysis provided data which helped to answer three hypotheses. Follow-up procedures were prepared for each of the statistically significant initial two-way analyses of variance. These procedures included one-way analysis of variance and Tukey-B multiple range tests.

There were six school environment by grade level interactions amont the fifteen analysis of variance. Interactions were found for these dimensions: (1) Set change in the Divergent Production of Figural Units (DFU-S), (2) Originality in the Divergent Production of Semantic Units (DMU-O), (3) Fluency in the Divergent Production of Symbolic Relations (DSR-F), (4) Set change in the Divergent Production of Symbolic Relations (DSR-S), (5) Originality in the Divergent Production of Symbolic Relations (DSR-O), (6) Popularity (Cluster V) in self-concept. These results led to the acceptance of Hypotheses 3, 18, 21, 24, 27, and 42.

School environment was a statistically significant main effect for five of the fifteen measures. These were (1) Originality in the Divergent Production of Figural Units (DFU-O), Fluency in the Divergent Production of Semantic Units (DMU-F), Fluency in the Divergent Production of Symbolic Relations (DSR-F), Set change in the Divergent Production of Symbolic Relations (DSR-S), and Originality in the Divergent Production of Symbolic Relations (DSR-O). On the basis of these results, Hypotheses 10, 13, 19, 22, and 25 were accepted.

The main effect of grade level was significant for ten of the fifteen measures. These were (1) Fluency in the Divergent Production of Figural Units (DFU-F), (2) Originality in the Divergent Production of Figural Units (DFU-O), (3) Fluency in the Divergent Production of

Semantic Units (DMU-F), (4) Originality in the Divergent Production of Semantic Units (DMU-O), (5) Behavior (Cluster I) in self-concept. (6) Intelligence and school status (Cluster II) in self-concept, (7) Physical appearance (Cluster III) in self-concept, (8) Anxiety (Cluster IV) in self-concept, (9) Popularity (Cluster V) in self-concept, (10) Happiness and satisfaction (Cluster VI) in self-concept. On the basis of these results, Hypotheses 2, 11, 14, 17, 29, 32, 38, 41, and 44 were accepted as true statements.

A discussion of these research results follows in Chapter V. Also, included in Chapter V are conclusions that might be drawn from the data generated by this study, as well as implications for both education and psychology.

CHAPTER V

SUMMARY, DISCUSSION, AND CONCLUSIONS

Summary

The purpose of this study was to increase the understanding of relationships between divergent production abilities and self-concept in two types of school environments, open and traditional, and in grades three, four, and five. There were 45 alternative (non-null) hypotheses generated to study these relationships. Divergent production was defined as the nine scoring measures of the three divergent production subtests from the Structure of Intellect Learning Abilities Test. Self-concept was defined as the six cluster scores on the Piers-Harris Children's Self-Concept Scale. The classrooms in two pre-selected schools were studied for differences with a modified version of the Flanders Classroom Interaction Analysis.

The scores of 133 third, fourth, and fifth grade students in these two schools were analyzed on 15 measures. There were 15 two-way analyses of variance studied. Of these, there were six environment by grade level interactions, five for divergent production measures and one for self-concept cluster. These were,

1. Divergent Production of Figural Units - Set Change (DFU-S)
2. Divergent Production of Semantic Units - Originality (DMU-O)
3. Divergent Production of Symbolic Relations - Fluency (DSR-F)

4. Divergent Production of Symbolic Relations - Set Change (DSR-S)

5. Divergent Production of Symbolic Relations - Originality (DSR-O)

6. Self Concept of Popularity - Cluster V

These results led to the acceptance of Hypotheses 3, 18, 21, 24, and 42; while Hypotheses 6, 9, 12, 15, 27, 30, 33, 36, 39, 42, and 45 were not accepted as true statements.

The interaction between school environment and grade level for DFU-S, DSR-F, DSR-S, and DSR-O, appeared to result from increases in mean scores for the fourth grade in the traditional school and decreases in mean scores at the fourth grade level in the open model school environment. The interaction for DMU-O however, appeared to result from an increase in the fourth and fifth grade score means in the open model school, while the fifth grade mean in the traditional school indicated a leveling off. The interaction for Cluster V (Popularity) appears to result from an increase in the fourth grade score mean in the open model school and a subsequent increase in the fifth grade mean in the traditional school.

The main effect of school environment was found to be significant for five of the 15 measures analyzed. These were:

1. Divergent Production of Figural Units - Originality (DFU-O)

2. Divergent Production of Semantic Units - Fluency (DMU-F)

3. Divergent Production of Symbolic Relations - Fluency (DSR-F)

4. Divergent Production of Symbolic Relations - Set Change (DSR-S)

5. Divergent Production of Symbolic Relations - Originality (DSR-O)

These results led to the acceptance of Hypotheses 10, 13, 19, 22, and 25. Hypotheses 1, 4, 7, 16, 28, 31, 34, 37, 40, and 43 were rejected as being true statements.

The school environment effects appeared to result from increases in mean scores for all three grades in the open school for DFU-O, and an increase in fifth grade mean scores for DMU-F in the open school. While, the traditional school's mean scores in both the fourth and fifth grades appeared to show increases on all three measures of the DSR subtest, DSR-F, DSR-S, and DSR-O. There were no school environment effects of significance for any of the measures of self-concept.

The main effect of grade level was significant for ten of the 15 measures studied. These were:

1. Divergent Production of Figural Units - Fluency (DFU-F)
2. Divergent Production of Figural Units - Originality (DFU-O)
3. Divergent Production of Semantic Units - Fluency (DMU-F)
4. Divergent Production of Semantic Units - Originality (DMU-O)
5. Self-Concept of Behavior (Cluster I)
6. Self-Concept of Intellectual and School Status (Cluster II)
7. Self-Concept of Physical Appearance (Cluster III)
8. Self-Concept of Anxiety (Cluster IV)
9. Self-Concept of Popularity (Cluster V)
10. Self-Concept of Happiness and Satisfaction (Cluster VI)

These results led to the acceptance of Hypotheses 2, 11, 14, 17, 29, 32, 35, 38, 41, and 44; while Hypotheses 5, 8, 20, 23, and 26 were not accepted as true statements.

The main effect of grade level for DFU-F appeared to result from a decrease in the fourth grade mean, while for DFU-O the difference

appeared to result from an increase in the fourth grade mean. For both measures of DMU, Fluency and Originality, the effect resulted from increases in the fourth and fifth grade means, although the two mean scores were not different from each other. For all six measures of self-concept, the grade level effect was a result of increases in mean scores at the fourth grade level over lower mean scores in the third grade. With the exception of Cluster V (Popularity), the mean score patterns were similar for the measures of self-concept. These appeared to show significant gains in the four grade level which leveled or decreased slightly by the fifth grade. For Cluster V, the grade level effect resulted from increases in the fifth grade mean as well as the fourth, as seen in the other clusters.

Discussion

The fourth grade has been cited in some of the literature on divergent production ability (Torrance, 1962) as a year in which a drop of slump in test scores occurs, apparently as children make an effort to conform to school expectations and peer pressures. While, it was hypothesized the open school environment would effect this drop through the assumed greater advantages for the growth of divergency, a similar drop in the fourth grade mean was seen in the open school for five of the nine measures of divergent production. These were Fluency and Set Change in the Divergent Production of Figural Units (DFU-F and DFU-S), and the three measures, Fluency, Set Change, and Originality, in the Divergent Production of Symbolic Relations.

However, for four measures of divergent production, the fourth grade mean in the open school showed increases. These increases were seen for transformation and originality in the Divergent Production of Figural Units (DFU-T and DFU-O) where the fourth grade mean was higher than the third grade mean scores for either of the schools, or than the fourth grade mean for the traditional school. This difference in favor of the open school at the fourth grade level was also seen for originality in Divergent Production of Semantic Units (DMU-O). While the fluency measure of Divergent Production of Semantic Units (DMU-F) showed an increase in mean scores at the fourth grade level, in the open school, for the school's own third grade mean, this increase did not reach the mean scores for the traditional school at the fourth grade level on this measure.

These results appear to indicate that different patterns of abilities do emerge in different types of school environments, in the development of divergent production. The divergent abilities in the symbolic dimension show significant results in the traditional school, while the divergent abilities in the figural and semantic dimensions appear stronger in the open school.

In his study of self-concept development, Williams (1976) also noted a fourth grade drop or slump in school motivation and school self-concept, although personal self-concept was not affected in a similar manner. However, the six measures or clusters of self-concept analyzed in this study appeared to be effected positively in both school environments, as gains were seen in the fourth grade which were continued, or were at least maintained, in the fifth grade. It seems that the children in both these school environments, do not

experience differing patterns of self-concept growth. The one exception appears in the emergence of self-concept of popularity (Cluster V) where students in the traditional school do not show a rise in mean scores until the fifth grade level, while in the open school, mean scores are significantly higher in the fourth grade on this measure.

As suggested by Peterson (1979), it appears that children perhaps learn to prefer the school environment in which they have spent the most time. The cumulative effects of two school environments were studied by a comparison of fifth grade means in this study, since by predetermination, these means reflected at least four and one-half years continual experience in each environment. The results of this comparison showed that differing patterns of divergent production measures continued to exist, while the self-concept measures were similar for both schools.

In the open model school at the fifth grade level, fluency, set change, and originality in Divergent Production of Figural Units (DFU-F DFU-S, and DFU-O), as well as fluency and originality in Divergent Production of Semantic Units (DMU-F and DMU-O) were higher than in the traditional school although, this did not reach signficance level for each measure. In the traditional school, the fifth grade means were significantly higher for the three measures of Divergent Production of Symbolic Relations (DSR-F, DSR-S, and DSR-O), while the transformation measure of Divergent Production of Figural Units (DFU-T) was similar in the two school environments, where both fifth grade means showed a decrease from the fourth grade.

As can be observed in the patterns of nine measures of divergent production, the drop at the fourth grade level in the open school on more than half of the measures associated with divergency, is overcome by significant gains at the fifth grade level. While a comparison of fourth and fifth grade means in the traditional school of these same measures shows gains made at the fourth grade level are not maintained at the fifth grade level. It appears that not only do the two school environments have a differential impact on nine measures of divergent production, the pattern of development, or of gains and losses in these abilities differs across the grade levels also.

The developmental pattern for the six measures of self-concept appears to be similar in the two school environments studied, with the exception of self-concept of popularity (Cluster V) which emerges earlier in the open school environment. This measure of self-concept is often associated with sociometric status (Piers, 1977) and it would appear to be an indicator of positive social adjustment, in fourth grade students in the open school while it is manifested later in the fifth grade in the traditional school. This appears similar to the findings reported by Williams (1976) pre-study in which school environment was not a variable.

Perhaps the most clearly defined pattern noted is that the divergency in symbolic relations, or with rote-patterned numbers and letters was significantly higher in the traditional school than in the open school. This was seen in all three measures of symbolic relations fluency, set change and originality. On the other hand the measures which are significantly higher in the open school than in the traditional school, are associated with divergency in figural units,

or drawing, and divergency in semantic units, or writing stories. While the reasons for these differing patterns are not immediately apparent, the importance of measuring the various aspects or areas of divergency was strongly supported.

It may be recalled that divergency in the figural and semantic content areas of the SI model have been the most frequently measured divergent abilities, while the symbolic content dimension has little research data available that might give direction to the interpretation of these results. One interpretation that can be tendered involves a closer look at the subtest tasks themselves. While, the tasks administered in the figural and semantic areas impose no limitations upon the student being tested, the tasks in the symbolic area ask the student to find a "solution" within the imposed limits that "the test matrices add to" a specified number. This may be seen as eliciting different types, or perhaps styles, of divergent responses than either the figural or semantic divergency.

In support of this interpretation, the re-norming study (1981) for the SOI-LA reported subtest intercorrelations which suggest little or no correlation between either divergency in figural units and divergency in symbolic relations ($r = -.02$ to $r = .16$) or divergency in semantic units and divergency in symbolic relations ($r = -.02$ to $r = .05$). However, the correlation between divergency in figural units and in semantic units was higher ($r = .17$ to $r = .35$) indicating some communality between these two subtests. These interrelationships among the divergent production subtests suggest further study and analyses.

Another interpretation that might contribute understanding to the differing patterns of divergency, is the different expectations which

students may have regarding diverse responses with numbers. While elementary teachers, in drawing and writing, may often encourage divergent expression, typically, early experience with letters and numbers is strongly guided by structure and convergency. Within this explanation, it would appear that the open school environment is more successful with divergent expression in writing and drawing, while students in the traditional school are more comfortable solving rote-patterned tasks that rely more upon following the rules, even while diverging on solutions.

Conclusions

This study has addressed some of the cited flaws in earlier research regarding the effects of open educational practices on the growth of divergent production abilities and self-concept. The need to define both open education and the degree of its implementation in the classroom was partially met by using a modified version of the Flander's Classroom Interaction Analysis. This pre-study analysis resulted in the ability to operationally define one of the important variables in the actualization of open education, teacher-pupil verbal interaction. It further served to restrict the definition of openness to the specific classrooms involved in the data collection, rather than the more global one of open schools, or the more confusing one of architectural design.

By concentrating on 15 separate measures, nine for divergent production and six for self-concept, this study met objections in the literature (Marshall, 1981; Zegas, 1976), regarding the obscuring effect of using global concepts lacking clear definition. The measures

as they were defined and studied in this research, can be considered analogous to outcome variables in similar learning or educational tasks (Meeker, 1979). As such, they provide useful information for teachers and administrators in education.

This study would have benefited from the findings of research either concurrent or shortly preceding this study, the results of which are now appearing in the literature. Of particular interest are the studies based on psychological field theories, which point to the importance of a person-environment fit model in measuring outcomes in differing educational environments (Fraser and Rentoul, 1980; Peterson, 1979; Rich and Bush, 1978).

The addition of a measure of students' perceptions of their preferred school environment would have increased the understanding of results. Following from the evidence that the patterns of divergency which are measured in this study became increasingly more distinct as time spent in each school environment increased, it appears that some type of student perception and individual adjustment within each type of school environment should be evaluated.

The use of additional measures of classroom openness and its degree of implementation, such as the Walberg-Thomas Rating Scale, are strongly advocated (Horwitz, 1979; Marshall, 1981) and appear to be gaining importance and application (Day and Brice, 1977, Hayes and Day, 1980; Klass and Hodge, 1978; Shore, 1981). This study, while measuring an important aspect of classroom environment, would be enhanced by the use of more precise definition of such dimensions of openness as student responsibility for learning, classroom activity and grouping structure, richness of materials, time schedules,

implementation of individualized, small-group, multi-task instruction, and cooperative learning objectives.

The reliabilitiy of divergent production measures as it relates to the error variance of the statistical tests used for this and other research, needs to be considered. The Divergent Production Subtests, DFU, DMU, and DSR, used as measures of divergent production have acceptable reliability as subtests but, due to low intercorrelations (particularly those involving DSR) should not be summed to form a composite. Thus, to stabilize the statistical tests used in future research, it is suggested that the DFU, DMU, and DSR subtests be lengthened (perhaps by using alternate forms of these subtests) in an attempt to improve their reliability.

The results of this study offer encouragement for educators in both types of school environment in that children appear to have healthy concepts of themselves and are apparently well-adjusted to their particular setting. It might be argued from this research, that affective educational outcomes have been well internalized by many school, despite the differing emphasis in cognitive approaches. A clearer understanding of this indication could be the objective of further research in this area.

BIBLIOGRAPHY

Akert, R. U. Interrelations among various dimensions of the self-concept. Journal of Counseling Psychology, 1958, 6, 199-201.

Allen, D. I. Student performance, attitude and self-esteem in open area and self-contained classrooms. Alberta Journal of Educational Research, 1974, 20, 1-7.

Allport, G. W. Becoming. New Haven, Conn.: Yale University Press, 1955.

Amidon, E. J. and Hough, J. B. (Eds.). Interaction Analysis: Theory, Research, and Application. Reading, Mass: Addison Wesley Publishing Co., 1967.

Anastasi, A. Psychological Testing. London: MacMillan Co., 1968.

Arlin, M. The interaction of locus of control, classroom structure, and pupil satisfaction. Psychology in the Schools, 1975, 12, 279-86.

Aspy, D. N. The effect of teacher inferred self-concept upon student achievement. Paper presented at the annual meeting of the American Educational Research Association, Los Angeles, 1969.

Baker, G. D., et al. New Methods vs. Old in American Education: An Analysis and Summary of Recent Comparative Studies. New York: Teachers' College, Columbia University, 1941.

Barth, R. W. Open Education and the American School. New York: Agathon Press, 1972.

Bass, A.R., Halton, G. I., McHale, T. J., and Stolurow, L. M. Originality, Intelligence, and Performance on Problem-Solving Tasks, a Pilot Study of Their Relationship. Urbana, Illinois, University of Illinois Training Research Laboratory, Technical Report No. 2, 1962.

Bennett, S. N. Divergent thinking ability: a validation study. British Journal of Educational Psychology, 1973, 43, 1-7.

Bennett, S. N. Teaching Styles and Pupil Progress. London: Open Books 1976. (Reprinted by Harvard University Press, Cambridge, Mass, 1976).

Bloom, B. Stability and Change in Human Characteristics. New York: John Wiley and Sons, 1964.

Bring, C. R. Effects of Varying Concrete Activities on the Achievement of Objectives in Metric and Nonmetric Geometry by Students of Grades Five and Six. Unpublished doctoral dissertation. Greeley, Colo: University of Northern Colorado, 1971.

Brookover, W. B., Shailer, T., and Paterson, A. Self-concept of ability and school achievement. Sociology of Education, 1964, 37, 217-279.

Brophy, J. E., and Good, T. L. Teachers' communication of differential expectations for children's classroom performance: some behavioral data. Journal of Educational Psychology, 1970, 61, 365-374.

_____. Teacher expectations: beyond the pygmailon controversy. Phi Delta Kappan, 1972, 54, 276-278.

Brown, G. J. The open teacher. Journal of Children and Youth, Fall, 1979, 13-16.

Brown, J. A. and Cleary, M. A. The impact of teacher consultation on the self-perceptions of elementary school children. Education, 1973, 93, 339-345.

Bull, K. S. The development of scales for internal sensation-seeking, cusiosity, need for creative production, and privacy, to be used as predictor variables. Dissertation Abstracts International, 1978, 39, 5403-A. University Microfilms No. 78-22, 242.

Canfield, J. T., and Phillips, M. A guide to resources in humanistic and transpersonal education, in T. B. Roberts (Ed.), Four Psychologies Applied to Education. New York: Schenkman, 1975.

Carroll, J. B. A factor analysis of verbal abilities. Psychometrika, 1941, 6, 279-307.

Case, D. A. A comparative study of fifth graders in a new middle school with fifth graders in elementary self-contained classrooms. Dissertation Abstracts International, 1971, 32, 86-A.

Chittendon, E. A. and Bussis, A. M. Analysis of an Approach to Open Education. Princeton, N. J.: Educational Testing Service, 1970.

Chittendon, E. A. and Bussis, A. M. in E. B. Nyquist and G. R. Hawes (Eds.), Open Education. New York: Bantam Books Inc., 1972.

Clark, B. Growing Up Gifted. Columbus, Ohio: Charles E. Merrill Publishing Company, 1979.

Cole, H., Process curricula and creative development. Journal of Creative Behavior, 1969, 3, 243-259.

Coleman, J. S. Abnormal Psychology and Modern Life. Glenview, Ill.: Scott Foresman, 1972.

Combs, A. W. and Snygg, D. Individual Behavior: A Perceptual Approach to Behavior. New York: Harper and Row., 1959.

Combs, A. W. and Soper, D. W. The self, its derivate terms and research. Journal of Individual Psychology, 1957, 13, 135-145.

Cook, D. M. et al. Research and Development Activities in R and I Units of Two Elementary Schools of Janesville, Wisconsin, 1966-67. Report from Project Models, Research and Development Center for Cognitive Learning, University of Wisconsin, Madison, 1968. (ERIC Document Reproduction Service No. ED023175.)

Coopersmith, S. A method for determining types of self-esteem. Journal of Abnormal and Social Psychology, 1959, 58, 87-94.

Coopersmith, S. The Antecedents of Self-Esteem. San Francisco: W. H. Freeman, 1967.

Crockenberg, S. B. Creativity tests: a boon or boondoogle for education: Review of Educational Research, 1972, 42, 91-109.

Cronbach, L. J. Essentials of Psychological Testing. New York: Harper and Row, 1970.

Crowne, D. P., and Stephens, M. W. Self-acceptance and self-evaluative behavior. Psychological Bulletin, 1961, 58, 104-41.

Day, B. and Brice, R. Academic achievement, self-concept development, and behavior patterns of six-year-old children in open classrooms. Elementary School Journal, 1977, 78, 133-139.

Domino, G. Interactive effects of achievement orientation and teaching style on academic achievement. Journal of Educational Psychology, 1971, 62, 427-31.

Edmond, D. B. Telephone Interview. Tulsa, Oklahoma, June 17, 1980.

Erikson, E. H. Identity: Youth and Crisis. New York: Norton, 1968.

Featherstone, J. How children learn. New Republic, 1967, 165, 17-21.

Fitts, W. H. et al. The self-concept and self-actualization. Nashville, Tennessee: Dede Wallace Center Monograph, 1971, No. 3.

Flanders, N. A. Analyzing Teacher Behavior. Reading, Mass.: Addison Wesley, 1970.

Franks, D. D., Marolla, J. and Dillon, S. O. Intrinsic motivation and feelings of competency among students. Journal of Research and Development in Education, 1974, 8(1), 20-29.

Fraser, B. J. and Rentoul, A. J. Person-environment fit in open classrooms. Journal of Educational Research, 1980, 73(3), 159-167.

Fraser, B. J. and Rentoul, A. J. Individualized Classroom Environment Questionaire (ICEQ). North Ryde, N.S.W. 2113, Australia: School of Education, Macquarie University, n. d.

Fruchter, B. The nature of verbal fluency. Educational and Psychological Measurement, 1948, 8, 33-47.

Gardner, D. E. M. Testing Results in the Infant School. London: Methuen, 1942.

Gardner, D. E. M. Long Term Results of Infant School Methods. London: Methuen, 1950.

Gardner, D. E. M. Experiment and Tradition in Primary Schools. London: Methuen, 1966.

Garnett, J. C. M. General ability, cleverness, and purpose. British Journal of Psychology, 1919, 9, 345-366.

Getzels, J. W., and Jackson, P. W. Creativity and Intelligence: Exploration with Gifted Students. New York: Wiley, 1962.

Glatthorn, A. A. Alternatives in Education: Schools and Programs. New York: Dodd Mead, 1975.

Glass, G. V. Primary, secondary, meta-analysis of research. Educational Researcher, 1976, 5, 3-8.

Godde, J. A. A comparison of young children in achievement of general skills, adjustment, and attitudes, in an individual progression curriculum organization, with young children in a traditional curriculum organization. Dissertation Abstracts International 1973, 34, 2164-A.

Goldupp, O. An investigation of independent child behavior in the open classroom: The Classroom Attitude Observation Schedule (CAOS). (ERIC Document Reproduction Service, No. ED073828, n. d.)

Gordon, C. Self-conceptions methodologies. Journal of Nervous and Mental Disease, 1969, 148, 328-364.

Gordon, I. J. Studying the Child in the School. New York: Wiley, 1966.

Gowan, J. C. and Torrance, E. P. Educating the Ablest. Itasca, Illinois: F. E. Peacock, 1971.

Greener, T. S. The effects of open classroom techniques in primary school. Dissertation Abstracts International, 1973, 33, 6058-A.

Guilford, J. P. Creativity. American Psychologist, 1950, 5, 444-54.

_____. The structure of intellect. Psychological Bulletin, 1956, 53, 267-93.

_____. Revised structure of intellect. Psychology Laboratory Report No. 19. Los Angeles: University of Southern California, 1957.

_____. Three faces of intellect. American Psychologist, 1959, 14, 469-79.

_____. The Nature of Human Intelligence. New York: McGraw-Hill, 1967.

_____. Creativity Tests for Children. Orange, California: Sheridan Psychological Services, 1971.

_____. Way Beyond the IQ. New York: McGraw-Hill, 1977.

Guilford, J. P., and Hoepfner, R. The Analysis of Intelligence. New York: McGraw-Hill, 1971.

Hargreaves, H. L. The faculty of imagination. British Journal of Psychology Monographs, 1927 (Suppl. 10).

Harris, T. I'm OK; You're OK. New York: Harper and Row, 1969.

Hayes, R. K. Jr. and Day, B. D. Classroom openness and the basic skills, the self-perceptions, and the school attendance records of third grade pupils. The Elementary School Journal, 1980, 81(2), 87-96.

Hilgard, E. Human motives and the concept of self. American Psychologist, 1949, 4, 374-82.

Horwitz, R. W. Psychological Effects of Open Classroom Teaching on Primary School Children: A Review of the Research. Grand Forks, North Dakota: University of North Dakota Press, North Dakota Group on Evaluation Monograph Series, June, 1976.

_____. Psychological effects of the "open classroom." Review of Educational Research, 1979, 49, 71-86.

Howieson, N. A longitudinal study of creativity--1965-1975. Journal of Creative Behavior, 1976, 15(2), 117-134.

Jackson, G. B. Methods for integrative reviews. Review of Educational Research, 1980, 50, 438-60.

Janicki, T. C. Aptitude-Treatment Interaction Effects of Variations in Direct Instruction. Unpublished doctoral dissertation, University of Wisconsin-Madison, 1979.

Jersild, A. T. In Search of Self. New York: Teachers' College, Columbia University, 1952.

Jones, C. A. Some Relationships Between Creative Writing and Creative Drawings of Sixth Grade Children. Unpublished doctoral dissertation. Pennsylvania State University, 1960.

Jones, D. J. A study of variables related to the achievements of underachieving boys in an open education environment. Dissertation Abstracts International, 1972, 33, 2617-A.

Junell, J. S. An analysis of the effects of multi-grading on a number of noncognitive variables. Dissertation Abstracts International 1971, 32, 94-A.

Kagan, J. Understanding Children. New York: Harcourt, Brace, 1971.

Klass, W. H. and Hodge, S. E. Self-esteem in open and traditional classrooms. Journal of Educational Psychology, 1978, 70(5), 701-05.

Krenkel, N. The Assessment of Ethnic Group Self-Concept. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, Louisiana, 1973. (ERIC Document Reproduction Service No. ED076718.)

Kris, E. Psychoanalytic Exploration in Art. New York: International Universities Press, 1952.

Kruger, H. In The Open Classroom. Englewood, Colorado: Educational Consulting Associates, 1972.

Kubie, L. S. Neurotic Distortion of the Creative Process. Lawrence, Kansas: University of Kansas Press, 1958.

Lafferty, J. C. Evaluation Systems: Life Styles. Plymouth, MI: Human Synergistics, 1973.

Leonard, J. P. and Eurich, A. C. An Evaluation of Modern Education. A report sponsored by the Society for Curriculum Study. New York: Appleton-Century-Crofts, 1942.

McNelly, F. W., Jr. Development of the Self-Concept in Childhood. Washington, D. C.: U. S. Government Printing Office, 1972. (ERIC Document Reproduction Service No. ED086318.)

McNemar, Q. Lost: our intelligence. Why? American Psychologist, 1964, 19, 871-82.

Marshall, H. H. Open classrooms: Has the term outlived its usefulness? Review of Educational Research, 1981, 51(2), 181-92.

Martin, L. S. What does research say about open education? In U. R. Rogers and B. Church (Eds.) Open Education: Critique and Assessment. Washington, D. C.: Association for Supervision and Curriculum Development, 1975.

Martin, L. S. What Does Research Say About Open Education? New York: Agathon Press, 1976.

Maslow, A. H. Motivation and Personality. New York: Harper and Row, 1954.

_____. Creativity in self-actualizing people. In H. H. Anderson (Ed.), Creativity and Its Cultivation. New York: Harper, 1959.

_____. Some basic propositions of a growth and self-actualization psychology. In A. W. Combs (Ed.), Perceiving, Behaving, Becoming: A New Focus for Education. Washington, D.C.: Association for Supervision and Curriculum Development, 1962.

_____. Toward A Psychology of Being. (2nd ed.), Princeton, N. J.: Van Nostrand, 1968.

_____. Defense and growth. In R. H. Anderson and H. G. Shane (Eds.), As The Twig Is Bent. Boston: Houghton Mifflin, 1971.

Maw, W. H. and Maw, E. W. Self-concepts of high- and low-curiosity boys. Child Development, 1970, 41, 123-129.

May, R. Man's Search For Himself. New York: W. W. Norton, 1953.

May, R. The nature of creativity. In H. Anderson (Ed.), Creativity and Its Cultivation. New York: Harper and Row, 1959.

May, R. Love and will. Psychology Today, 1969, 3, 17-64.

Mednick, S., and Mednick, M. Examiner's Manual: Remote Associates Test. Boston: Houghton Mifflin, 1967.

Meeker, M. Differential Syndromes of Intelligence as Behavior Samples. Paper presented at the American Psychological Association Meeting, Philadelphia, 1963.

Meeker, M. Differential syndromes of giftedness and curriculum planning: a four-year follow-up. Journal of Special Education, 1968, 2(2), 185-94.

_____. The Structure of Intellect: Its Interpretation and Uses. Columbus, Ohio: Merrill Publishing Company, 1969.

Meeker, M. A Book of Collected Readings on Application of the Guilford Structure of Intellect to Educational Practice. El Segundo, California: Structure of Intellect Institute, 1972.

_____. Measuring creativity from the child's point of view. Journal of Creative Behavior, 1978, 12(1), 52-62.

_____. Using S.O.I. Test Results: A Teacher's Guide. El Segundo, California: Structure of Intellect Institute, 1979.

Meeker, M., and Maxwell, J. Divergent Production: Teaching Creative Problem Solving. El Segundo, California: Structure of Intellect Institute, 1976.

Meeker, M., and Meeker, R. Structure of Intellect Learning Abilities Test. El Segundo, California: Structure of Intellect Institute, 1975.

Meeker, M., Mestyanek, L., and Meeker, R. Structure of Intellect Learning Abilities Test Examiner's Manual. El Segundo, California: Structure of Intellect Institute, 1975.

Merrifield, P. R., Gardner, S. F., and Cox, A. B. Aptitudes and personality measures related to creativity in seventh-grade children. Reports from the Psychological Laboratory, No. 28. Los Angeles: University of Southern California, 1964.

Michael, W. B., Smith, R. A., and Michael, J. J. The factorial validity of the Piers-Harris Children's Self-Concept Scale for each of three samples of elementary, junior high, and senior high school students in a large metropolitan high school district. Educational and Psychological Measurement, 1975, 35(2), 405-14.

Minuchin, P., Biber, B., Shapiro, E., and Zimiles, H. The Psychological Impact of School Experience: A Comparative Study of Nine-Year-Old Children in Contrasting Schools. New York: Basic Books, 1969.

Morse, P. W. A Survey of Selected, Public Elementary Open Classrooms in New York State. Final Report. New York: Rochester University, Washington, D. C.: Center for Educational Research and Development, U. S. Department of Health, Education, and Welfare, 1972. (ERIC Document Reproduction Service, No. ED067747.)

Moustakas, C. E. Creativity and conformity in education. In R. L. Mooney and T. A. Razik (Eds.) Explorations in Creativity. New York: Harper and Row, 1967a, pp. 173-84.

_____. Creativity and Conformity. New York: Van Nostrand Reinhold, 1967b.

Murphy, J.P., Dauw, D. C., Horton, R.E., and Fredian, A. J. Self-actualization and creativity. Journal of Creative Behavior, 1967, 1, 39-44.

Mycock, M. A. A comparison of vertical grouping and horizontal grouping in the infant school. British Journal of Educational Psychology, 1967, 36, 133-36,

New Orleans Public Schools. How He Sees Himself. Follow-up Study. New Orleans, Louisiana: The Schools, 1968. (ERIC Document Reproduction Service No. ED040433.)

Nicholls, J. G. Creativity in the person who will never produce anything original and useful: the concept of creativity as a normally distributed trait. American Psychologist, 1972, 27, 717-27.

No Brag, Just Facts. Tulsa, Oklahoma: Education Service Center, Tulsa Public Schools, 1979-80.

Nuttall, D. L. Convergent and divergent thinking, in Butcher, H. J. and Pont, H. B. (Eds.) Educational Research in Britain, Vol 3, London: ULP, 1972.

Nyquist, E. B. and Hawes, G. R. (Eds.) Open Education: A Sourcebook for Parents and Teachers. New York: Bantam Books Inc., 1972.

Olander, H. T. and Robertson, H. C. The effectiveness of discovery and expository methods in the teaching of fourth-grade mathematics. Journal for Research in Mathematics Education, 1973, 4(1), 33-44.

Ozehosky, R. J. and Clark, E. T. Verbal and non-verbal measures of self-concept among kindergarten boys and girls. Psychological Reports, 1971, 28, 195-99.

Pearson, P. H. and Maddi, S. R. The similes preference inventory, Journal of Consulting Psychology, 1966, 30, 301-08.

Pervin, L. A. Satisfaction and perceived self-environment similarity: a semantic differential study of student college interaction. Journal of Personality, 1967, 35, 623-34.

Peterson, P. L. Direct instruction: effective for what and for whom? Educational Leadership, 1979, 37(1), 46-48.

Philadelphia Public Schools, District #6. Analysis of Achievement on Standardized Tests by Follow-Through Pupils in District Six. Philadelphia: District #6, 1973.

Piaget, J. Six Psychological Studies. New York: Vintage Books, 1967.

Piaget, J. and Inhelder, B. The Psychology of the Child. New York: Basic Books, 1969.

Piers, E. V., The Piers-Harris Children's Self-Concept Scale: Research Monograph No. 1. Nashville, Tenn.: Counselor Recordings and Tests, 1977.

Piers, E. V. The Manual for Piers-Harris Children's Self-Concept Scale. Nashville, Tennessee: Counselor Recordings and Tests, 1969.

Piers, E. V. and Harris, D. B. Age and other correlates of self-concept in children. Journal of Educational Psychology, 1964, 55, 91-95.

_____. The Piers-Harris Children's Self-Concept Scale. Nashville, Tennessee: Counselor Recordings and Tests, 1969.

Purkey, W. W. Measured and professed personality characteristics of gifted high school students and analysis of their congruence. The Journal of Educational Research, 1966, 3, 99-103.

_____. Project self-discovery: its effects on bright but underachieving high school students. The Gifted Child Quarterly, 1969, 13, 242-46.

_____. Self-Concept and School Achievements. Englewood Cliffs, New Jersey: Prentice-Hall, 1970.

Purkey, W. W. and Graves, W. Self-Perceptions of Students Enrolled in an Experimental Elementary School. Paper presented at the American Educational Research Association Convention, Minneapolis, Minnesota, March 2-6, 1970. (ERIC Document Reproduction Service No. ED037794.)

Reel, J. E. Some effects of self-directed learning in an open elementary classroom. Dissertation Abstracts International, 1973, 34, 5619-A

Resnik, H. S. The open classroom. Today's Education. 1971, 60, 16-17.

Rich, H. L., and Bush, A. J. The effect of congruent teacher-student characteristics on instructional outcomes. American Educational Research Journal, 1978, 15, 451-57.

Rivet, M. B. The Relationship Between Self-Concept and Factors of the Intellect of Children Ages Eight to Twelve. Unpublished doctoral dissertation. United States International University, 1977.

Roe, A., Psychological approaches to creativity in science. In Coler, M. A. and Hughes, H. K. (Eds) Essays on Creativity in the Sciences. New York: New York University Press, 1963.

Rogers, C. R. Toward a theory of creativity. In Anderson, H. H. (Ed.) Creativity and Its Cultivation. New York: Harper and Row, 1959.

Rogers, C. R. Freedom To Learn. Columbus, Ohio: Charles E. Merrill, 1969.

Rosner, J. Changes in First-Grade Achievement and the Predictive Validity of IQ Scores as a Function of an Adaptive Instructional Environment. University of Pittsburgh Learning Research and Development Center and National Institute of Education, U. S. Department of Health, Education, and Welfare. Washington, D. C.: U.S. Government Printing Office, 1973.

Ross, S. and Zimiles, H. The Differentiated Child Behavior Observation System. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, Louisiana, 1973.

Rothenberg, A., and Hausman, C. R. The Creativity Question. Durham, North Carolina: Duke University Press, 1976.

Rowe, M. B. Science, silence, and sanctions. Science and Children, 1969, 7, 11-13.

Ruedi, J. and West, C. K. Pupil self-concept in an "open" school and a "traditional" school. Psychology in the Schools, 1973, 10, 48-53. (ERIC Document Reproduction Service No. ED066217.)

Samuels, S. C. Enhancing Self-Concept in Early Childhood: Theory and Practice. New York: Human Sciences Press, 1977.

Satir, V. Peoplemaking. Palo Alto, California: Science and Behavior Books, 1972.

Sawrey, J. M. and Telford, C. W. Adjustment and Personality. Boston: Allyn and Bacon, 1975 4th ed.

SCAMIN. Dearborn Heights, Michigan: Person-O-Metric Evaluation Services for Education.

Scheiner, L. An Evaluation of a Pilot Project to Assess the Introduction of the Modern, English, Infant School Approach to Learning. Philadelphia: School District of Philadelphia, Office of Research and Evaluation, Field Research Services, 1969.

Schuchat, T. Informal Education: Open Classroom Provokes Change, Controversy. Arlington, VA: Education U.S. A. Special Report, 1972.

Shapiro, E. A Pilot Study of a Bank Street Follow-Through Program For First Grade Children in Three Geographic Regions. Final Report. Washington, D. C.: Office of Education, Follow-Through Programs, U. S. Department of Health, Education, and Welfare, 1971.

Shapiro, J. N. Creativity in the elementary school climate. Dissertation Abstracts International, 1972, 33, 124-A

Shore, B. M. Gifted children's feelings about school and themselves in open and open-area classes. Journal for the Education of the Gifted, 1981, 4(2), 112-21.

Shostrom, E. L. A test for the measurement of self-actualization. Educational and Psychological Measurement, 1964, 24, 207-18.

Silberman, C. E. Crisis in the Classroom. New York: Random House, 1970.

Simmons, J., and Esler, W. Investigation of the attitudes toward science fostered by the process approach program. School Science and Mathematics, 1972, 72(7), 633-36.

Smith, M. E. Preliminary unpublished data, PASS Model Project. Nashville, Tennessee: George Peabody College, 1974.

Solomon, C. and Kendall, A. J. Individual characteristics and children's performance in "open" and "traditional" classroom settings. Journal of Educational Psychology, 1976, 68, 613-25.

Strong, J. and Feder, D. D. Measurement of the self-concept: a critique of the literature. Journal of Counseling Psychology, 1961, 8, 170-78.

Sullivan. H. S. The Interpersonal Theory of Psychiatry. New York: Norton, 1953.

Symonds, P. M. The Ego and The Self. New York: Appleton-Century-Crofts, 1951.

Taylor, C. W. A factorial study of fluency in writing. Psychometrika, 1947, 12, 239-62.

Taylor, I. A. Psychological sources of creativity. Journal of Creative Behavior, 1976, 10, 193-202.

Taylor, I. A. and Getzels, J. W. Perspectives in Creativity. Chicago: Aldine Publishing Company, 1975.

Taylor, J., and Walford, R. Simulation in the Classroom. Baltimore: Penguin Books, 1972.

Technical Data Manual: Structure of Intellect Learning Abilities Test. El Segundo, Calif.: Structure of Intellect Institute, 1981.

Telford, C. W. and Sawrey, J. M. The Exceptional Individual. Englewood Cliffs, New Jersey: Prentice-Hall Inc., 1977.

Thurstone, L. L. Primary mental abilities. Psychometric Monographs, 1938, No. 1.

Torrance, E. P. Guiding Creative Talent. Englewood Cliffs, New Jersey: Prentice-Hall Inc., 1962.

_____. Education and the Creative Potential. Minneapolis: University of Minnesota Press, 1963.

Torrance, E. P. Rewarding Creative Behavior. Englewood Cliffs, New Jersey: Prentice-Hall Inc., 1965.

_____. Torrance Tests of Creative Thinking: Norms Technical Manual. Princeton, New Jersey: Personnel Press, 1966.

_____. Helping gifted children through mental health information and concepts. The Gifted Child Quarterly, 1967, 2, 3-7.

_____. Creativity and its educational implication for the gifted. The Gifted Child Quarterly, 1968, 12, 67-78.

_____. Can we teach children to think creatively? Journal of Creative Behavior, 1972, 6, 114-43.

_____. Creativity in the Classroom. Washington, D. C.: National Education Association, 1977.

Torrance, E. P., and Strom, R. D. (Eds.) Mental Health and Achievement. New York: Wiley, 1965.

Torrance, E. P., and Torrance, J. P. Is Creativity Teachable? Bloomington, Indiana: Phi Delta Kappa, 1973.

Tuckman, B. W., Cochran, D. W., and Travers, E. J. Evaluating the Open Classroom. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, Louisiana, 1973.

Vance, J. H. and Kieran, T. E. Mathematics laboratories--more than fun. School Science and Mathematics, 1972, 72(7), 617-23.

Vernon, P. E., Adamson, G., and Vernon, D. F. The Psychology and Education of Gifted Children. Boulder, Colo.: Westview Press, 1977.

Viney, L. L. Congruence of measures of self-regard. Psychological Record, 1966, 16, 487-93.

Walberg, H. J. and Thomas, S. C. Characteristics of Open Education: Toward an Operational Definition. Newton, Massachusetts: Educational Development Center, 1971.

_____. Open education: an operational definition and validation in Great Britain and the United States. American Educational Research Journal, 1972, 9, 197-207.

Wallach, M. A. Creativity. In Mussen, P. H. (Ed.) Carmichael's Manual of Child Psychology. Vol. 1, New York: Wiley, 1970.

Wallach, M. A. and Kogan, C. N. Modes of Thinking in Young Children New York: Holt, Rinehart, and Winston, 1965.

Wallach, M. A., and Kogan, C. N. Creativity and intelligence in children. In H. McV. Hunt (Ed.) Human Intelligence. New Brunswick, New Jersey: Transaction Books, 1972.

Ward, W. D., and Barcher, P. R. Reading achievement and creativity as related to open classroom experience. Journal of Educational Psychology, 1975, 14, 389-409..

Weiss, R. L. Openness of classroom climate, openness of teacher personality, and openness of pupil personality as determinants of pupils' feelings about learning and pupil achievement. Dissertation Abstracts International, 1972, 32, 6231-A

Williams, F. E. Rediscovering the fourth-grade slump in a study of children's self-concept. Journal of Creative Behavior, 1976, 10(1) 15-28.

Williams, R. A Comparison of Contrasting Programs in Early Childhood Education. Los Angeles: University of California Press, 1970. (ERIC Document Reproduction Service No. ED046509.)

Wilson, R. S. Are pupils in the open plan school different? Journal of Educational Research, 1972, 66(3), 115-18.

Wing, S. W. A Study of Children Whose Reported Self-Concept Differs From Classmates' Evaluation of Them. Unpublished doctoral dissertation, University of Oregon, 1966.

Winne, P. H. Aptitude-treatment interactions in an experiment on teacher effectiveness. American Educational Research Journal, 1977, 14, 389-498.

Wright, R. J. The affective and cognitive consequences of an open education elementary school. American Educational Research Journal, 1975, 12, 449-68.

Wright, R. J., and DuCette, J. P. Locus of control and academic achievement in traditional and nontraditional educational settings. Unpublished manuscript, Beaver College, 1976. (ERIC Document Reproduction Service No. ED123203.)

Wrightstone, J. W. Appraisal of Newer Elementary School Practices. New York: Teachers' College, Columbia University, 1938.

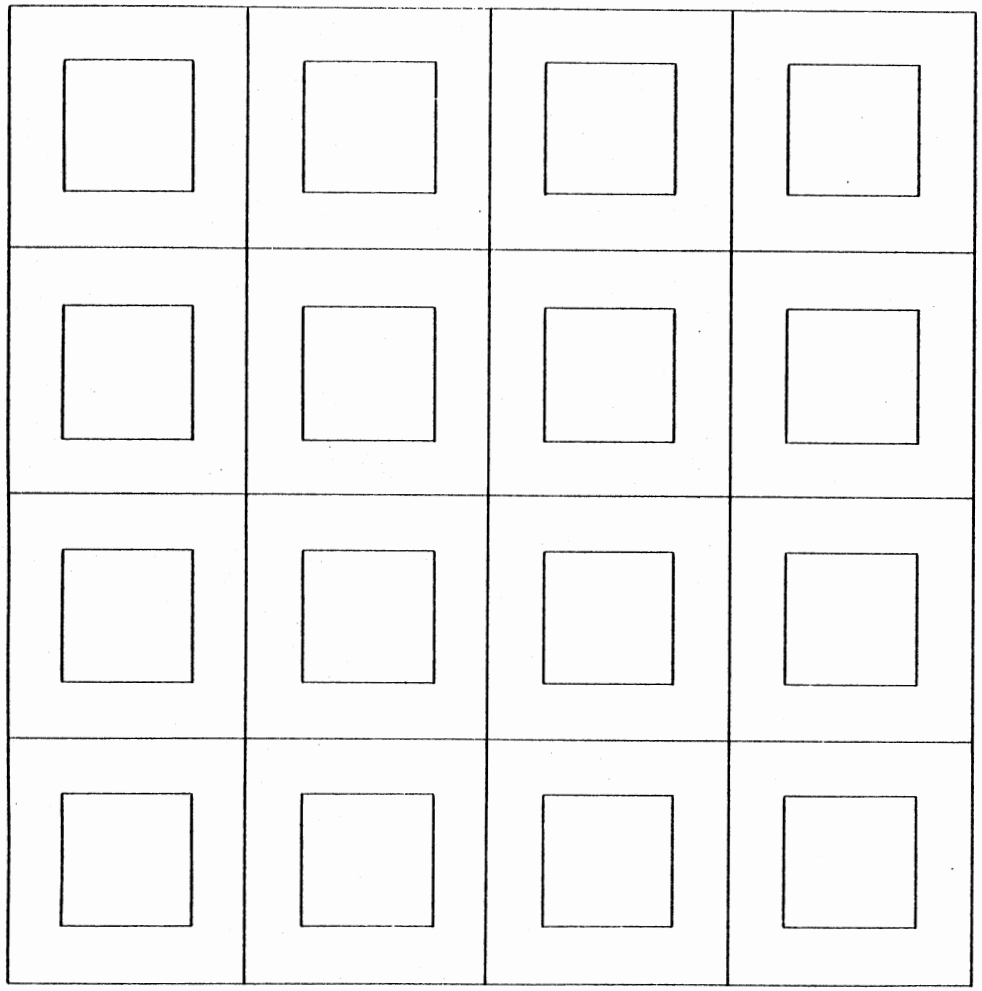
Wylie, R. C. The Self-Concept. Lincoln, Nebraska: University of Nebraska Press, 1961, 1974 (revised).

Zegas, J. A validation study of tests from the divergent production plane of the Guilford Structure of Intellect model. Journal of Creative Behavior, 1976, 10(3), 170-78.

Zweibelson, I. Student Attitudes and Motivation in Relation to Ability. (ERIC Document Reproduction Service No. ED011673, 1967.)

APPENDIX A

DIVERGENT PRODUCTION SUBTESTS, SOI-LA



DFU F__ S__ T__ O__

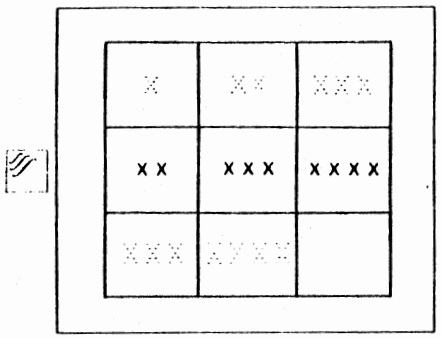
②

Name: _____

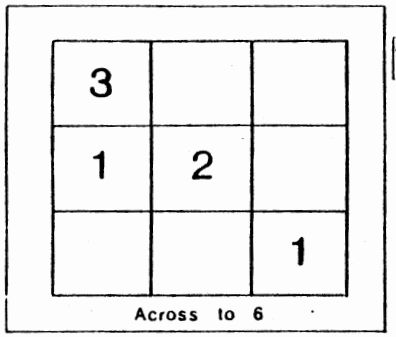
Story

SOI Institute

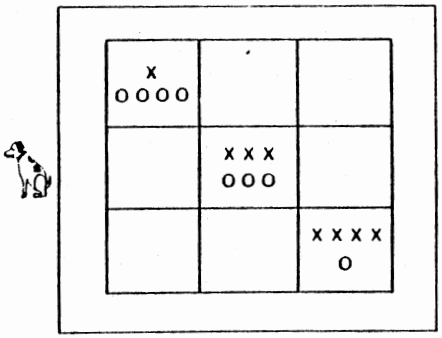
DMU F O



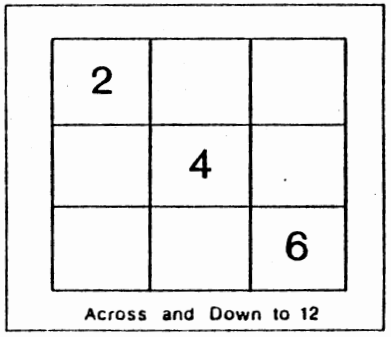
A



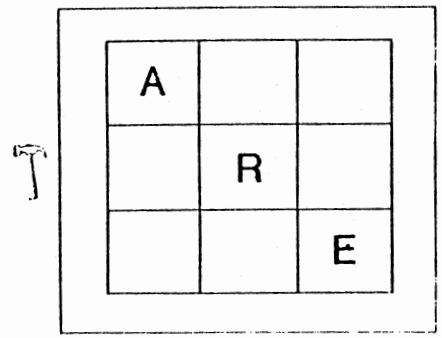
Across to 6



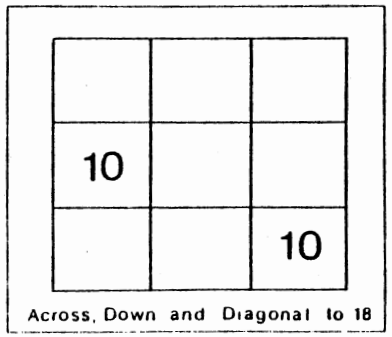
B



Across and Down to 12



C



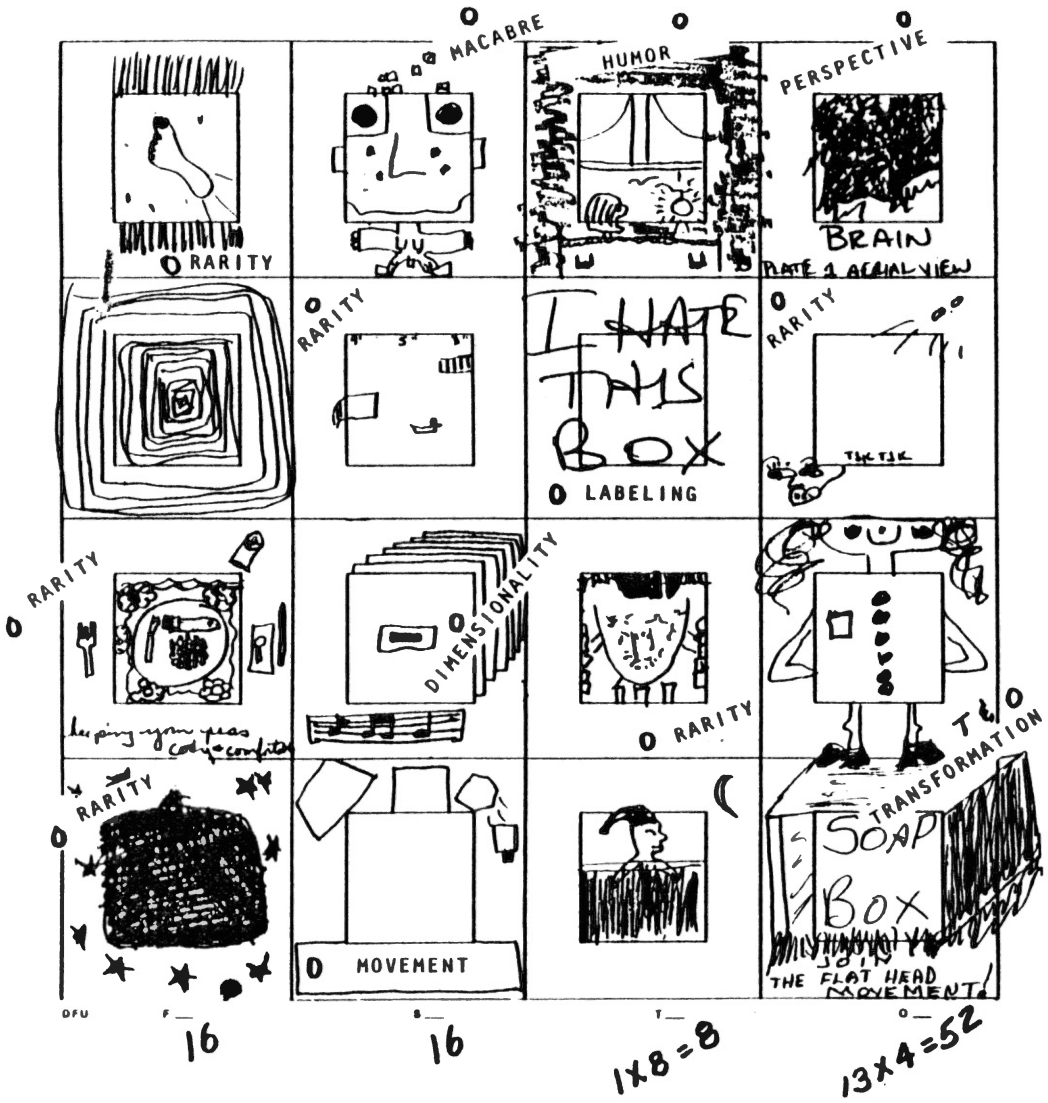
Across, Down and Diagonal to 18

DSR-A F__ S__ C

DSR-B F__ S__ C__

DSR-C

	EXHAUST - FAUNA PAIL - MOUNTAIN COACH - _____	CAIN	CATCH	LOAD	CHIME
1	LATE - PALE GLUE - SLOW GRIT - _____	SNOW	GIVE	BOAT	PRAY
2	TEN - NET LOOT - TOOL STEP - _____	STOP	PETS	TOPS	PORTS
3	JAIL - LION BET - TRAP MOOD - _____	DREAM	MILK	LUNCH	OX
4	WHITTLE - SETTLE SEEM - WHEEL MILLION - _____	MILD	ALLEY	BELT	MARK
5	SEAT - TEA GEARS - SEAR SING - _____	SOFT	INK	GIN	GOES
6	LIVER - VASE BASE - SILK FLOWER - _____	WALK	ONLY	FIND	LOWER
7	TALK - TASK ROPE - RECIPE CHURCH - _____	CHALK	CLOWN	CHOKE	CATCH
8	BLESSING - LESION LIVING - IVIED HELMET - _____	ELM	ELIPSE	HELLO	METER



Scoring Procedures for DFU

F--fluency

(1 point each)

One point for each SQUARE the student fills with a figure. There are 16 squares. The inner and outer square count as one--either portion used is counted as one point.

S--set change

(1 point each)

One point for each different IDEA the student expresses in the figures drawn.

Three houses and one apartment house are counted as two ideas.

All abstract designs are counted as one idea unless they are very different in style or kind.

T--transformation

(8 points each)

Eight points for each time the student uses two or more LARGE SQUARES to draw one idea.

If the squares are different within the "T" score, also score an "S" for each of these squares.

O--orginality

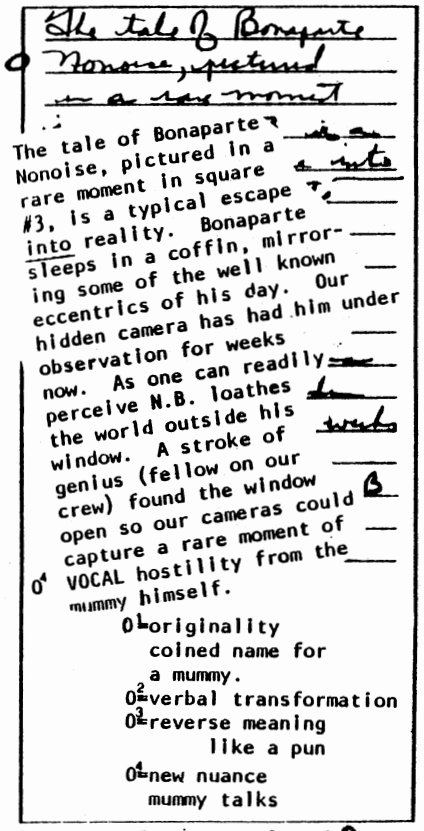
(4 points each)

Four points for each unique drawing or idea of the following types (only one "O" no matter how many times the same type appears):

1. Labeling: writing inside a square to tell what it means.
2. Three dimensional: giving the illusion of space or varying distances.
3. Perspective: showing objects from an uncommon point of view.
4. Movement: indicating a change of position of an object.
5. Humor: showing something comical, amusing, witty, ludicrous, etc..
6. Rarity: depicting an object or idea that no more than two students in thirty (or a classroom) would draw.
7. Elaboration: drawing any "design" which is very unusual or detailed.
8. Transformation: unless it is very simplistic or common. Thus, most "T" figures will also be given "O" scores as well.
9. Macabre: having death or something grisly, gruesome, or horrible as a subject.

Name: _____

Story


The tale of Bonaparte
Nonoise, pictured
in a rare moment

The tale of Bonaparte
Nonoise, pictured in a
rare moment in square
#3, is a typical escape
into reality. Bonaparte
sleeps in a coffin, mirror-
ing some of the well known
eccentrics of his day. Our
hidden camera has had him under
observation for weeks
now. As one can readily
perceive N.B. loathes
the world outside his
window. A stroke of
genius (fellow on our
crew) found the window
open so our cameras could
capture a rare moment of
VOCAL hostility from the
mummy himself.

0¹ originality
coined name for
a mummy.
0² verbal transformation
0³ reverse meaning
like a pun
0⁴ new nuance
mummy talks

DMU F__ O__

86 4X10=40

F--fluency

(1 point each)

One point for each word, including those in the title.

(Maximum: 100)

S--set change

(not scored for DMU)

T--transformation

(not scored for DMU)

O--orginality

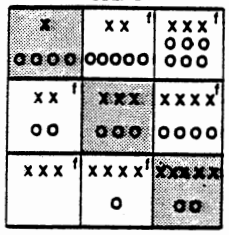
(10 points each)

Ten points for each unique idea or word construction of the following types (only one "O" no matter how many times the same type appears):

1. Choice of a name for a character that is a "play on words".
2. A pun or humorous use of words in a way that suggests two interpretations.
3. Personification or representing inanimate objects or abstract ideas as having personal attributes.
4. A theme for the story which is most unusual, i.e. not descriptive only.
5. Story with a moral.
6. Story written as poetry.
7. A macabre story that has death or something grisly, gruesome or horrible as the subject.
8. Any topic that is rare from individuals of a comparable age.
9. Any idea that evokes a moving emotional response.

SCORING EXAMPLE OF STANDARD RESPONSE

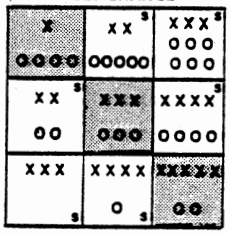
Scoring For FLUENCY



No pattern requirements.
One point for each square filled.
Six open squares—all filled:
6 × 1 = 6 points

(squares qualifying for fluency count indicated by F's)

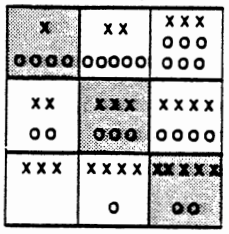
Scoring For SET CHANGE



Six open squares.
One point for each set change.
All open squares are filled with pattern different from given:
6 × 1 = 6 points

(squares qualifying for set change count indicated by S's)

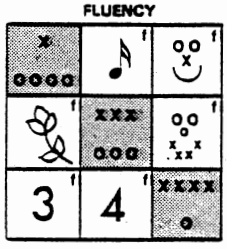
Scoring For ORIGINALITY



Six open squares.
Four points for each original.
No square is filled with anything except x's and o's:
0 × 4 = 0 points

SCORING EXAMPLE OF ORIGINAL RESPONSE

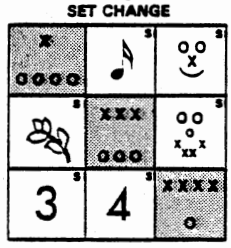
Scoring For FLUENCY



No pattern requirements.
One point for each square filled.
Six open squares—all filled:
6 × 1 = 6 points

(squares qualifying for fluency count indicated by F's)

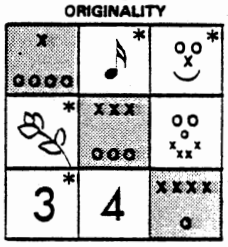
Scoring For SET CHANGE



Six open squares.
One point for each set change.
All open squares are filled with pattern different from given:
6 × 1 = 6 points

(squares qualifying for set change count indicated by S's)

Scoring For ORIGINALITY



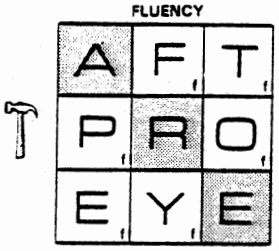
Six open squares.
Four points for each original.
Four squares are filled with something except x's and o's:
4 × 4 = 16 points

(The flower, face, musical note, and numbers receive credit; the second face is a repeat and receives no additional credit. The second number is a repeat and received no additional credit)

(squares qualifying for originality count indicated by *'s)

SCORING EXAMPLE OF STANDARD RESPONSE

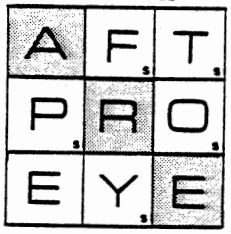
Scoring For FLUENCY



No pattern requirements.
One point for each square filled.
Six open squares—all filled:
6 × 1 = 6 points

(squares qualifying for fluency count indicated by F's)

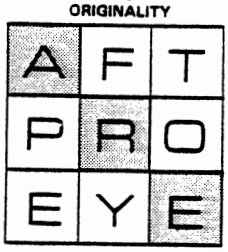
Scoring For SET CHANGE



Six open squares.
One point for each set change.
Five of the six squares are filled using something other than 'A', 'R' or 'E':
5 × 1 = 5 points

(squares qualifying for set change count indicated by S's)

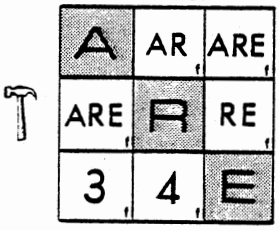
Scoring For ORIGINALITY



Six open squares.
Eight points for each original.
No square is filled with anything except single capital letters:
0 × 8 = 0 points

SCORING EXAMPLE OF ORIGINAL RESPONSE

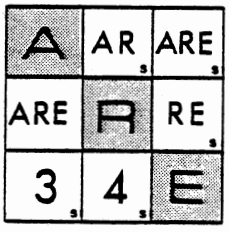
Scoring For FLUENCY



No pattern requirements.
One point for each square filled.
Six open squares—all filled:
6 × 1 = 6 points

(squares qualifying for fluency count indicated by F's)

Scoring For SET CHANGE

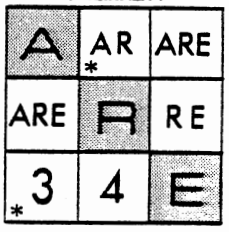


Six open squares
One point for each set change.
Six squares are filled using something other than 'A', 'R' or 'E
5 × 1 = 5 points

(The repeated use of 'ARE' receives no additional credit).

(squares qualifying for set change count indicated by S's)

Scoring For ORIGINALITY

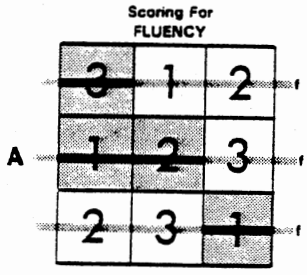


Six open squares
Eight points for each original.
Two squares are filled with something except single capital letters:
2 × 8 = 16 points

(The repeated use of more than one captial letter receives credit only once; the use of numbers receives credit once)

(squares qualifying for originality count indicated by *'s)

SCORING EXAMPLE OF STANDARD RESPONSE



Rule: Across to 6.

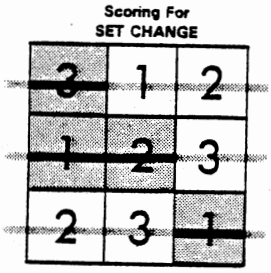
Three rows to be tested.

Two points for each row satisfying the rule.

Three rows satisfy the rule:

3 × 2 = 6 points

(rows qualifying for fluency count indicated by F's)



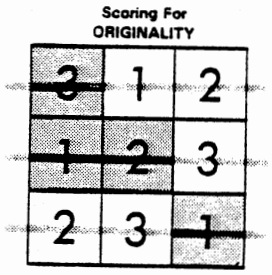
Five open squares.

Rule criterion: only squares in rows satisfying the rule—five eligible squares.

Set change criterion: square filled with something other than '1', '2' or '3' (two points each).

No square is filled with anything representing set change.

0 × 2 = 0 points



Five open squares.

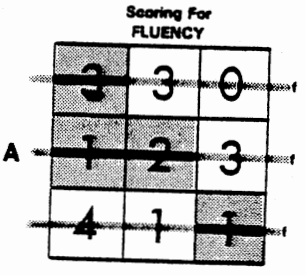
Rule criterion: only squares in rows satisfying the rule—five eligible squares.

Originality criterion: square filled with something other than implicit positive integer and/or implicit addition (twelve points each).*

No square is filled with anything original:

0 × 12 = 0 points

SCORING EXAMPLE OF ORIGINAL RESPONSE



Rule: Across to 6.

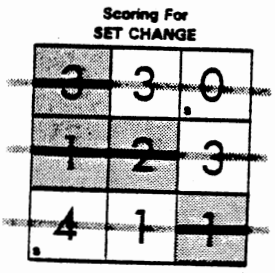
Three rows to be tested.

Two points for each row satisfying the rule.

Three rows satisfy the rule:

3 × 2 = 6 points

(rows qualifying for fluency count indicated by F's)



Five open squares

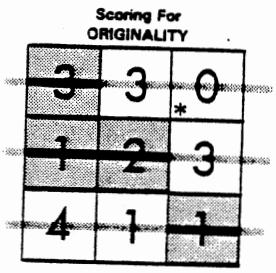
Rule criterion: only squares in rows satisfying the rule—five eligible squares.

Set change criterion: square filled with something other than '1', '2' or '3' (two points each).

Two squares are filled with something representing set change.

2 × 2 = 4 points

(squares qualifying for fluency count indicated by F's)



Five open squares

Rule criterion: only squares in rows satisfying the rule—five eligible squares.

Originality criterion: square filled with something other than implicit positive integer and/or implicit addition (twelve points each).*

One square is filled with something original:

1 × 12 = 12 points

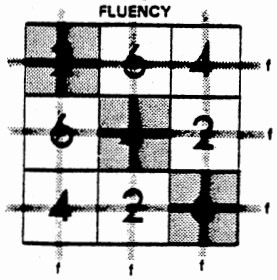
(squares qualifying for originality count indicated by *'s)

*Such as: explicit addition, subtraction, multiplication, division, square root, fraction, percent, exponentials, algebraic expressions, zero.

SCORING EXAMPLE OF STANDARD RESPONSE

B

Scoring For FLUENCY



Rule: Across and Down to 12.

Three rows and three columns to be tested.

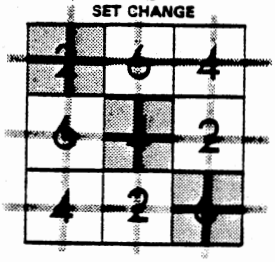
Two points for each row satisfying the rule; two points for each column satisfying the rule.

Three rows satisfy the rule; three columns satisfy the rule:

6 × 2 = 12 points

(rows and columns qualifying for fluency count indicated by F's)

Scoring For SET CHANGE



Six open squares.

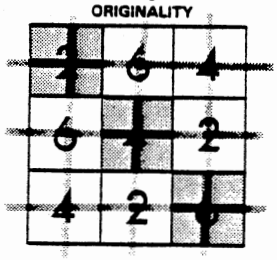
Rule criterion: six open squares involved in rows satisfying rule (six possibilities) and six open squares involved in columns satisfying rule (six possibilities)—in total, twelve possibilities.

Set change criterion: square filled with something other than '2', '4' or '6' (two points each).

No square is filled with anything representing set change.

0 × 2 = 0 points

Scoring For ORIGINALITY



Six open squares.

Rule criterion: six open squares involved in rows satisfying rule (six possibilities) and six open squares involved in columns satisfying rule (six possibilities)—in total, twelve possibilities.

Originality criterion: square filled with something other than implicit positive integer and/or implicit addition (twelve points each).*

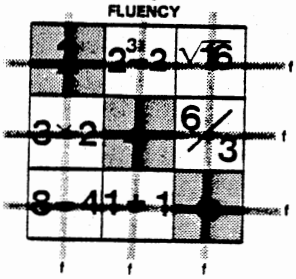
No square is filled with anything original:

0 × 12 = 0 points

SCORING EXAMPLE OF ORIGINAL RESPONSE

B

Scoring For FLUENCY



Rule: Across and Down to 12.

Three rows and three columns to be tested.

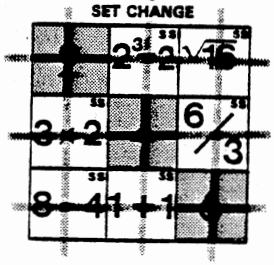
Two points for each row satisfying the rule; two points for each column satisfying the rule.

Three rows satisfy the rule; three columns satisfy the rule:

6 × 2 = 12 points

(rows and columns qualifying for fluency count indicated by F's)

Scoring For SET CHANGE



Six open squares

Rule criterion: six open squares involved in rows satisfying rule (six possibilities) and six open squares involved in columns satisfying rule (six possibilities)—in total, twelve possibilities.

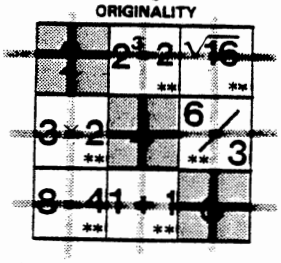
Set change criterion: square filled with something other than '2', '4' or '6' (two points each).

Six squares, involving twelve possibilities, are filled with something representing set change.

12 × 2 = 24 points

(squares qualifying for set change count indicated by S's)

Scoring For ORIGINALITY



Six open squares

Rule criterion: six open squares involved in rows satisfying rule (six possibilities) and six open squares involved in columns satisfying rule (six possibilities)—in total, twelve possibilities.

Originality criterion: square filled with something other than implicit positive integer and/or implicit addition (twelve points each).*

Six squares, involving twelve possibilities, are filled with something original (indicated by the *'s).

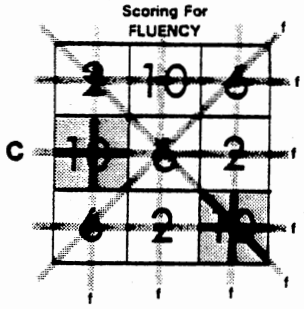
12 × 12 = 144 points

(squares qualifying for originality count indicated by *'s)

*Such as: explicit addition, subtraction, multiplication, division, square root, fraction, percent, exponentials, algebraic expressions, zero.

SCORING EXAMPLE OF STANDARD RESPONSE

Scoring For FLUENCY



Rule: Across, Down and Diagonal to 18.

Three rows, three columns and two diagonals to be tested.

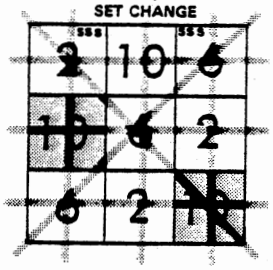
Two points for each row satisfying the rule; two points for each column satisfying the rule, and two points for each diagonal satisfying the rule.

Three rows satisfy the rule; three columns satisfy the rule; two diagonals satisfy the rule:

8 × 2 = 16 points

(rows, columns, and diagonals qualifying for fluency count indicated by F's)

Scoring For SET CHANGE



Seven open squares

Rule criterion: Seven squares involved in rows satisfying rule (seven possibilities); seven squares in columns satisfying rule (seven possibilities); and five squares involved in diagonals satisfying rule (five possibilities)—19 possibilities in total.

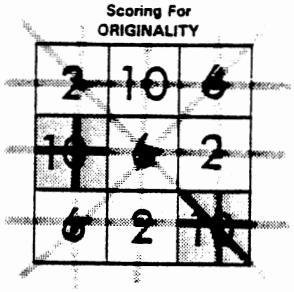
Set change criterion: square filled with something other than '10' (two points each).

Of the 19 possibilities, six meet set change criterion (indicated by the S's).

6 × 2 = 12 points

(no additional credit for 6's and 2's repeated)

Scoring For ORIGINALITY



Seven open squares.

Rule criterion: Seven squares involved in rows satisfying rule (seven possibilities); seven squares in columns satisfying rule (seven possibilities); and five squares involved in diagonals satisfying rule (five possibilities)—19 possibilities in total.

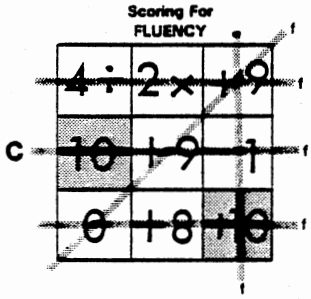
Originality criterion: square filled with something other than implicit positive integer and/or implicit addition (twelve points each).

No square is filled with anything original:

0 × 12 = 0 points

SCORING EXAMPLE OF ORIGINAL RESPONSE

Scoring For FLUENCY



Rule: Across, Down and Diagonal to 18.

Three rows, three columns and two diagonals to be tested.

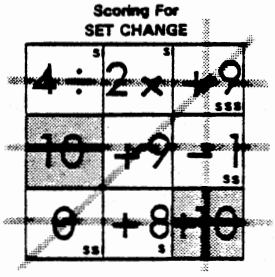
Two points for each row satisfying the rule; two points for each column satisfying the rule, and two points for each diagonal satisfying the rule.

Three rows satisfy the rule; one column satisfies the rule; one diagonal satisfies the rule:

5 × 2 = 10 points

(rows, columns, and diagonals qualifying for fluency count indicated by F's)

Scoring For SET CHANGE



Seven open squares.

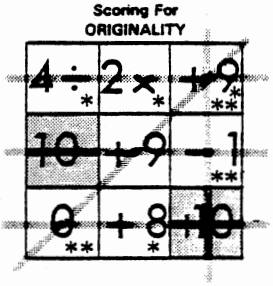
Rule criterion: Seven squares involved in rows satisfying rule (seven possibilities); two squares in columns satisfying rule (two possibilities); and three squares involved in diagonals satisfying rule (three possibilities)—12 possibilities in total.

Set change criterion: square filled with something other than '10' (two points each).

Of the 12 possibilities, ten meet set change criterion (indicated by the S's).

10 × 2 = 20 points

Scoring For ORIGINALITY



Seven open squares.

Rule criterion: Seven squares involved in rows satisfying rule (seven possibilities); two squares in columns satisfying rule (two possibilities); and three squares involved in diagonals satisfying rule (three possibilities)—12 possibilities in total.

Originality criterion: square filled with something other than implicit positive integer and/or implicit addition (twelve points each).*

Of the 12 possibilities, ten meet the originality criterion (indicated by the *'s).

10 × 12 = 120 points

(No additional credit for the +9 repeated)

*Such as: explicit addition, subtraction, multiplication, division, square root, fraction, percent, exponentials, algebraic expressions, zero.

Subtest: DFU

GRADE 2	Male Form A	Male Form B	Male Form A & B	Female Form A	Female Form B	Female Form A & B	Both Sexes Form A	Both Sexes Form B	Both Sexes Form A & B
Median	26.00	26.00	26.00	30.00	29.00	30.00	29.00	27.00	28.00
Mean	28.55	26.31	27.29	30.78	29.22	29.89	29.59	27.70	28.52
Standard Deviation	11.45	10.35	10.87	8.99	10.87	10.11	10.40	10.67	10.58
Standard Error of Estimate	8.79	6.83	7.83	7.19	7.58	7.42	8.12	7.27	7.70
Test/Retest Correlation	.41	.56	.46	.36	.51	.46	.39	.53	.47
Alternate Form Correlation			.42			.45			.45
GRADE 3									
Median	26.00	26.00	26.00	31.00	28.00	29.00	29.00	27.00	28.00
Mean	27.95	27.84	27.89	30.67	28.94	29.69	29.42	28.46	29.05
Standard Deviation	11.12	11.46	11.28	10.71	11.12	10.98	10.98	11.26	11.14
Standard Error of Estimate	8.32	9.51	8.95	7.79	8.81	8.43	7.99	9.13	8.62
Test/Retest Correlation	.44	.31	.37	.47	.37	.41	.47	.34	.40
Alternate Form Correlation			.37			.42			.40
GRADE 4									
Median	28.00	30.00	29.00	31.00	29.00	30.00	29.00	30.00	29.00
Mean	29.80	30.28	30.03	30.64	29.53	30.13	30.20	29.94	30.07
Standard Deviation	10.92	10.83	10.86	10.37	11.94	11.12	10.65	11.34	10.97
Standard Error of Estimate	9.26	8.49	8.95	8.79	8.10	8.46	8.97	8.57	8.77
Test/Retest Correlation	.28	.38	.32	.28	.53	.42	.29	.42	.36
Alternate Form Correlation			.54			.36			.46
GRADE 5									
Median	35.00	34.00	34.00	34.00	35.00	35.00	35.00	34.00	35.00
Mean	34.83	34.78	34.81	34.30	35.11	34.66	34.57	34.95	34.74
Standard Deviation	11.02	12.09	11.46	10.60	11.26	10.89	10.79	11.64	11.16
Standard Error of Estimate	7.71	7.39	7.51	5.99	7.17	6.62	6.90	7.25	7.05
Test/Retest Correlation	.51	.62	.57	.68	.59	.63	.59	.61	.60
Alternate Form Correlation			.48			.50			.49
GRADE 6									
Median	31.00	30.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00
Mean	31.90	30.84	31.46	31.13	32.10	31.58	31.54	31.50	31.52
Standard Deviation	12.29	10.33	11.49	11.32	10.49	10.92	11.82	10.40	11.20
Standard Error of Estimate	9.67	7.92	9.26	7.42	8.53	7.94	8.76	8.39	8.67
Test/Retest Correlation	.38	.41	.35	.57	.33	.47	.45	.34	.40
Alternate Form Correlation			.50			.39			.45

SOI-Learning Abilities Test (SOI-LA): Form-A and Form-B (December 1981 analysis)

Subtest: DMU

	Male Form A	Male Form B	Male Form A & B	Female Form A	Female Form B	Female Form A & B	Both Sexes Form A	Both Sexes Form B	Both Sexes Form A & B
GRADE 2									
Median	21.00	20.00	21.00	27.00	28.00	28.00	23.00	24.00	23.00
Mean	28.23	26.80	27.42	35.50	30.92	32.90	31.66	28.75	30.01
Standard Deviation	25.38	18.47	21.68	24.69	18.41	21.40	25.24	18.51	21.69
Standard Error of Estimate	11.90	14.54	14.21	17.80	10.95	14.19	15.76	12.93	14.22
Test/Retest Correlation	.78	.38	.57	.48	.64	.56	.61	.51	.57
Alternate Form Correlation			.58			.67			.63
GRADE 3									
Median	32.00	30.00	31.00	38.00	39.00	39.00	38.00	35.00	35.00
Mean	37.31	33.32	35.08	43.43	42.70	42.98	40.35	38.55	39.29
Standard Deviation	21.23	17.35	19.20	23.19	19.75	21.08	22.37	19.26	20.58
Standard Error of Estimate	14.55	13.58	14.23	12.27	12.82	12.64	13.04	13.26	13.17
Test/Retest Correlation	.53	.38	.45	.72	.57	.64	.66	.52	.59
Alternate Form Correlation			.54			.50			.53
GRADE 4									
Median	40.00	39.00	40.00	48.00	52.00	50.00	43.00	43.00	43.00
Mean	43.40	41.72	42.60	51.53	54.37	52.85	47.25	47.58	47.41
Standard Deviation	21.50	18.91	20.29	18.52	19.85	19.16	20.51	20.32	20.40
Standard Error of Estimate	13.25	14.58	13.91	11.85	13.91	12.85	12.64	14.58	13.53
Test/Retest Correlation	.62	.40	.53	.59	.50	.56	.62	.48	.56
Alternate Form Correlation			.67			.51			.63
GRADE 5									
Median	50.00	50.00	50.00	61.00	58.00	62.00	56.00	56.00	56.00
Mean	53.63	52.41	53.11	64.04	65.79	64.83	58.75	59.41	59.04
Standard Deviation	21.87	20.91	21.43	20.49	22.51	21.38	21.79	22.71	22.18
Standard Error of Estimate	14.67	12.38	13.86	13.89	15.83	14.81	14.26	14.37	14.37
Test/Retest Correlation	.55	.64	.58	.54	.50	.52	.57	.59	.58
Alternate Form Correlation			.67			.50			.60
GRADE 6									
Median	64.00	67.00	66.00	71.00	72.00	71.00	67.00	70.00	68.00
Mean	62.68	65.79	63.97	71.21	73.52	72.30	66.65	69.81	66.05
Standard Deviation	19.74	19.73	19.74	18.73	17.49	18.14	19.69	18.94	19.40
Standard Error of Estimate	13.53	13.12	13.24	16.00	11.56	13.81	13.92	12.40	13.15
Test/Retest Correlation	.53	.55	.55	.27	.56	.42	.50	.57	.54
Alternate Form Correlation			.53			.29			.43

SOI-Learning Abilities Test (SOI-LA): Form-A and Form-B (December 1981 analysis)

Subtest: DSR

	Male Form A	Male Form B	Male Form A & B	Female Form A	Female Form B	Female Form A & B	Both Sexes Form A	Both Sexes Form B	Both Sexes Form A & B
GRADE 2									
Median	32.00	30.00	30.00	30.00	27.00	29.00	30.00	28.00	30.00
Mean	36.84	33.24	34.81	35.30	30.43	32.48	36.12	31.88	33.70
Standard Deviation	19.80	15.07	17.33	17.13	15.03	16.08	18.54	15.07	16.76
Standard Error of Estimate	14.27	12.18	13.75	16.43	13.05	14.64	15.51	12.58	14.22
Test/Retest Correlation	.48	.34	.37	.08	.24	.17	.30	.30	.28
Alternate Form Correlation			.40			.42			.38
GRADE 3									
Median	43.00	34.00	37.00	42.00	38.00	39.00	42.00	36.00	38.00
Mean	47.63	40.92	43.90	46.04	42.13	43.67	46.82	41.59	43.78
Standard Deviation	23.92	23.02	23.60	25.48	21.75	23.31	24.66	22.26	23.42
Standard Error of Estimate	20.71	18.64	19.60	20.54	18.50	19.08	20.33	18.47	19.17
Test/Retest Correlation	.25	.34	.31	.35	.27	.33	.32	.31	.33
Alternate Form Correlation			.33			.38			.35
GRADE 4									
Median	48.00	53.00	51.00	53.00	49.00	51.00	50.00	51.00	51.00
Mean	51.29	52.93	52.06	55.45	49.92	52.87	53.26	51.52	52.44
Standard Deviation	25.93	25.65	25.76	29.26	21.31	25.95	27.58	23.71	25.83
Standard Error of Estimate	15.34	19.60	17.47	18.03	14.66	17.21	16.77	17.34	17.32
Test/Retest Correlation	.65	.41	.54	.62	.52	.56	.63	.46	.55
Alternate Form Correlation			.39			.42			.40
GRADE 5									
Median	55.00	53.00	57.00	55.00	59.00	59.00	55.00	57.00	58.00
Mean	58.79	54.46	56.93	57.95	62.47	59.98	58.37	58.61	58.47
Standard Deviation	23.88	24.81	24.32	21.89	27.77	24.75	22.87	26.62	24.56
Standard Error of Estimate	19.69	17.63	18.83	19.94	20.87	20.70	19.80	19.48	19.80
Test/Retest Correlation	.32	.49	.40	.17	.43	.30	.25	.46	.35
Alternate Form Correlation			.48			.52			.48
GRADE 6									
Median	60.00	58.00	59.00	57.00	60.00	58.00	58.00	59.00	59.00
Mean	60.93	63.73	62.09	56.11	61.85	58.81	58.68	62.76	60.48
Standard Deviation	23.93	28.99	26.11	19.16	23.87	21.63	21.92	26.38	24.04
Standard Error of Estimate	20.72	25.84	22.91	15.20	20.34	17.57	18.33	23.16	20.53
Test/Retest Correlation	.25	.20	.23	.37	.27	.34	.30	.22	.27
Alternate Form Correlation			.46			.19			.36

SOI-Learning Abilities Test (SOI-LA): Form-A and Form-B (December 1981 analysis)

	DMU	CFU	CMU	CFS	CFT	CMR	CMS	OSR	CSR	MSU-V	MSS-V	MSU-A	MSS-A
DFU	.169	.143	.037	.021	-.021	-.013	-.224	-.009	.050	.095	.052	.207	-.046
DMU	.....	-.052	.128	-.031	.073	.210	-.021	-.013	.030	-.025	.070	.070	.153
CFU	.....	.....	.122	.198	.132	.131	.090	.044	.047	.259	.072	.300	.168
CMU	.....	.....	.....	.111	.195	.367	.334	.130	.118	.197	.136	.131	.081
CFS	.....	.....	.....	.....	.103	.176	.149	.162	.208	.156	.070	.198	.148
CFT	.....	.....	.....	.....	.....	.252	.093	.091	.114	.079	.072	.075	.200
CMR	.....	.....	.....	.....	.....	.....	.367	.219	.197	.165	.190	.091	.192
CMS	.....	.....	.....	.....	.....	.....	.....	.204	.157	.101	.074	.016	.164
OSR	.....	.....	.....	.....	.....	.....	.....	.....	.115	.065	.161	.067	.101
CSR	.....	.....	.....	.....	.....	.....	.....	.....	.....	.088	.127	.118	.102
MSU-V	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.213	.515	.147
MSS-V	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.108	.171
MSU-A	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.154

	MSI	EFU	CFC	EFC	ESC	CSS	ESS	NSS	NST	NSI	MFU	NFU
DFU	.083	.033	.060	.095	.096	-.037	-.023	.043	-.030	.048	.088	.363
DMU	.005	.169	.034	.125	.113	.070	-.029	.205	.224	.029	.117	.091
CFU	.271	.155	.130	.047	.100	.142	.053	-.040	.123	.091	.135	.278
CMU	.187	.152	.133	.014	.258	.193	.044	.066	.351	.193	.112	.157
CFS	.135	.236	.196	.162	.157	.121	.123	.069	.164	.150	.227	.157
CFT	.191	.264	.034	.070	.004	.150	-.032	.034	.080	.001	.242	.074
CMR	.144	.244	.124	.088	.211	.230	.078	.182	.409	.182	.202	.051
CMS	.136	.189	.129	-.095	.279	.272	.073	.240	.290	.166	.184	-.072
OSR	.066	.097	.027	.105	.094	.122	.074	.268	.124	.067	.068	-.090
CSR	.169	.120	-.064	.108	.179	.006	.136	.158	.201	.203	.132	.115
MSU-V	.204	.068	.058	.073	.148	.132	.213	.116	.205	.226	.187	.321
MSS-V	.121	.082	-.008	.012	.117	.140	-.009	.119	.011	.011	.077	.063
MSU-A	.187	.149	.140	.026	.082	.121	.051	-.008	.152	.168	.272	.325

	MSI	EFU	CFC	EFC	ESC	CSS	ESS	NSS	NST	NSI	MFU	NFU
MSS-A	.105	.094	.064	.004	.109	.133	.035	.072	.044	.101	.189	-.007
MSI	.....	.237	.108	.088	.064	.204	.043	.038	.096	.134	.171	.127
EFU	.....	.....	.211	.136	.191	.257	.070	.100	.204	.048	.257	.129
CFC	.....	.....	.....	.039	.098	.175	-.032	-.072	.167	.119	.250	.126
EFC	.....	.....	.....	.....	.080	.034	.055	-.011	.123	.106	.194	.026
ESC	.....	.....	.....	.....	.....	.232	.243	.163	.340	.373	.155	.206
CSS	.....	.....	.....	.....	.....	.....	.201	.148	.394	.267	.225	.034
ESS	.....	.....	.....	.....	.....	.....	.....	.165	.219	.228	-.056	.084
NSS	.....	.....	.....	.....	.....	.....	.....	.....	.041	.108	.077	-.079
NST	.....	.....	.....	.....	.....	.....	.....	.....	.....	.412	.216	.217
NSI	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.155	.198
MFU	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.121

Intercorrelations Between Subtests Scores from the SOI-LA: Grade 2

	DMU	CFU	CMU	CFS	CFT	CMR	CMS	DSR	CSR	MSU-V	MSS-V	MSU-A	MSS-A
DFU	.354	.187	.062	.097	.162	.028	.111	.025	-.040	.032	.012	.128	.100
DMU	.....	.229	.264	.073	.131	.179	.196	-.024	.093	.160	.039	.165	.021
CFU	.....	.....	.172	.158	.127	.230	.279	.156	.054	.071	.055	.141	.096
CMU	.....	.....	.....	.084	.187	.401	.357	.069	.138	.206	.110	.118	.130
CFS	.....	.....	.....	.....	.207	.241	.197	.182	.121	-.000	.000	-.016	.015
CFT	.....	.....	.....	.....	.....	.231	.293	.107	-.040	.031	.053	-.028	.058
CMR	.....	.....	.....	.....	.....	.....	.482	.229	.156	.116	.131	.125	.074
CMS	.....	.....	.....	.....	.....	.....	.....	.196	.132	.115	.200	.064	.140
DSR	.....	.....	.....	.....	.....	.....	.....	.....	.029	-.012	.112	.004	.055
CSR	.....	.....	.....	.....	.....	.....	.....	.....	.....	-.000	.048	.113	-.032
MSU-V	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.245	.328	.100
MSS-V	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.096	.290
MSU-A	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.150

	MSI	EFU	CFC	EFC	ESC	CSS	ESS	NSS	NST	NSI	MFU	NFU
DFU	.042	.108	.162	.031	-.002	.061	.085	.056	.092	.136	-.027	.247
DMU	.004	.197	.043	.009	.140	.267	.216	.145	.242	.079	.079	.328
CFU	.051	.236	.179	.006	.103	.164	.066	.118	.309	.278	.186	.146
CMU	.059	.257	.069	.079	.294	.258	.323	.254	.397	.239	.186	.258
CFS	.042	.192	.179	.183	.295	.209	.203	.221	.167	.215	.246	.072
CFT	-.016	.324	.121	.027	.130	.188	.159	.248	.194	.158	.132	.206
CMR	.151	.252	.089	.172	.353	.356	.266	.350	.427	.263	.259	.165
CMS	.228	.328	.183	.106	.330	.358	.190	.410	.402	.350	.270	.135
DSR	.003	.134	.060	.129	.217	.193	.151	.270	.266	.278	.111	.056
CSR	.037	.001	.058	.011	.104	.119	.116	.080	.171	.120	.085	.068
MSU-V	.127	.066	.076	.103	.113	.154	.099	.124	.133	.130	.140	.097
MSS-V	.308	.041	.050	.056	.009	.132	.057	-.015	.131	.069	.067	-.023
MSU-A	.155	.097	.084	.137	.134	.116	.221	.062	.196	.098	.153	.171

	MSI	EFU	CFC	EFC	ESC	CSS	ESS	NSS	NST	NSI	MFU	NFU
MSS-A	.265	.114	.092	.053	-.057	.007	.048	.096	.055	.118	.025	.122
MSI	.....	.078	.047	.073	.102	.146	.138	.142	.161	.000	.179	-.033
EFU	.....	.....	.179	.107	.273	.335	.190	.317	.231	.194	.228	.164
CFC	.....	.....	.....	.007	.080	.127	-.030	.080	.032	.139	.008	.130
EFC	.....	.....	.....	.....	.067	.073	.110	.139	.137	.042	.135	.013
ESC	.....	.....	.....	.....	.....	.315	.240	.314	.362	.253	.210	.127
CSS	.....	.....	.....	.....	.....	.....	.311	.332	.362	.272	.205	.108
ESS	.....	.....	.....	.....	.....	.....	.....	.232	.282	.065	.191	.097
NSS	.....	.....	.....	.....	.....	.....	.....	.....	.349	.188	.246	.144
NST	.....	.....	.....	.....	.....	.....	.....	.....	.....	.315	.178	.200
NSI	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.204	.237
MFU	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.056

Intercorrelations Between Subtests Scores from the SOI-LA: Grade 3

	DMU	CFU	CMU	CFS	CFT	CMR	CMS	DSR	CSR	MSU-V	MSS-V	MSU-A	MSS-A
DFU	.219	.115	.027	.083	.019	-.037	-.082	.163	-.015	.051	-.129	.204	.026
DMU	.....	.133	.201	.109	.063	.039	.069	.030	.030	.199	.085	.253	.066
CFU	.....	.....	.206	.120	.077	.147	.051	.070	-.005	.058	.002	.079	-.032
CMU	.....	.....	.....	.165	.136	.453	.325	.107	.059	.219	.107	.189	.002
CFS	.....	.....	.....	.....	.136	.230	.323	.279	.113	.154	.090	.155	.220
CFT	.....	.....	.....	.....	.....	.192	.315	.026	.092	.097	.095	.061	.107
CMR	.....	.....	.....	.....	.....	.....	.464	.200	.122	.166	.216	.207	.206
CMS	.....	.....	.....	.....	.....	.....	.....	.121	.189	.254	.326	.104	.272
DSR	.....	.....	.....	.....	.....	.....	.....	.....	.062	.123	.031	.151	.136
CSR	.....	.....	.....	.....	.....	.....	.....	.....	.....	.022	.065	-.053	.066
MSU-V	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.261	.429	.190
MSS-V	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.196	.351
MSU-A	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.243

	MSI	EFU	CFC	EFC	ESC	CSS	ESS	NSS	NST	NSI	MFU	NFU
DFU	-.030	.028	.055	-.007	.007	.060	.015	.031	.021	.017	.000	.208
DMU	.221	.096	.069	.060	.191	.114	.206	.133	.295	.172	.103	.171
CFU	.095	.168	.108	.050	.129	.057	.119	.096	.188	.108	.062	.045
CMU	.150	.200	.232	.088	.400	.275	.242	.265	.431	.308	.138	.044
CFS	.071	.243	.150	.093	.267	.283	.288	.281	.229	.370	.214	-.091
CFT	-.012	.185	.241	.111	.212	.106	.218	.181	.181	.220	.165	.066
CMR	.060	.280	.219	.207	.399	.330	.369	.302	.452	.423	.243	-.092
CMS	.189	.351	.244	.096	.375	.329	.348	.306	.318	.464	.238	.023
DSR	.033	.138	.098	.091	.219	.285	.245	.215	.258	.289	.073	.055
CSR	.085	.069	.056	.081	.190	.054	.162	.123	.071	.163	.072	.009
MSU-V	.240	.149	.196	.063	.230	.154	.174	.188	.255	.202	.076	.081
MSS-V	.243	.213	.123	-.009	.199	.181	.228	.124	.194	.210	.058	.042
MSU-A	.206	.122	.090	.035	.192	.130	.176	.145	.281	.178	.056	.121

	MSI	EFU	CFC	EFC	ESC	CSS	ESS	NSS	NST	NSI	MFU	NFU
MSS-A	.161	.178	.149	.021	.077	.191	.224	.182	.123	.239	.127	-.046
MSI	.....	.242	.167	.074	.144	.139	.136	.106	.207	.155	.056	.104
EFU	.....	.....	.236	.079	.298	.351	.290	.231	.284	.300	.247	-.041
CFC	.....	.....	.....	.120	.246	.200	.131	.198	.248	.214	.184	.047
EFC	.....	.....	.....	.....	.224	.033	.117	.106	.112	.128	.034	-.002
ESC	.....	.....	.....	.....	.....	.358	.403	.382	.341	.398	.191	-.013
CSS	.....	.....	.....	.....	.....	.....	.446	.349	.372	.333	.117	-.000
ESS	.....	.....	.....	.....	.....	.....	.....	.360	.319	.443	.158	.027
NSS	.....	.....	.....	.....	.....	.....	.....	.....	.234	.341	.251	-.002
NST	.....	.....	.....	.....	.....	.....	.....	.....	.....	.431	.262	.044
NSI	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.235	-.024
MFU	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	-.015

Intercorrelations Between Subtests Scores from the SOI-LA: Grade 4

	DMU	CFU	CMU	CFS	CFT	CMR	CMS	DSR	CSR	MSU-V	MSS-V	MSU-A	MSS-A
DFU	.289	.050	.128	.067	.061	.008	-.040	.025	-.016	.100	.122	.123	.022
DMU	.....	.156	.201	.122	.176	.093	.161	.045	.060	.146	.158	.055	.117
CFU	.....	.....	.246	.216	.178	.261	.228	.075	.160	.133	.119	.036	.080
CMU	.....	.....	.....	.243	.092	.336	.342	.081	.191	.215	.175	.160	.138
CFS	.....	.....	.....	.....	.313	.476	.439	.239	.243	.195	.260	.242	.320
CFT	.....	.....	.....	.....	.....	.224	.288	.133	.175	.164	.200	.139	.165
CMR	.....	.....	.....	.....	.....	.....	.578	.256	.341	.300	.234	.167	.278
CMS	.....	.....	.....	.....	.....	.....	.....	.191	.330	.290	.316	.289	.358
DSR	.....	.....	.....	.....	.....	.....	.....	.....	.114	.109	.118	.074	.129
CSR	.....	.....	.....	.....	.....	.....	.....	.....	.....	.097	.100	.126	.222
MSU-V	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.444	.407	.309
MSS-V	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.336	.484
MSU-A	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.314

	MSI	EFU	CFC	EFC	ESC	CSS	ESS	NSS	NST	NSI	MFU	NFU
DFU	.107	.092	-.027	.001	.036	-.009	.028	.010	.107	.029	.002	.198
DMU	.172	.240	.104	-.014	.125	.145	.148	.194	.319	.231	.129	.191
CFU	.161	.197	.091	.070	.193	.199	.216	.217	.306	.184	.163	-.032
CMU	.204	.229	.177	.063	.308	.192	.398	.407	.356	.211	.122	.045
CFS	.198	.352	.328	.118	.389	.343	.441	.363	.363	.430	.249	.025
CFT	.214	.345	.228	.025	.200	.250	.270	.180	.253	.237	.175	.156
CMR	.208	.304	.278	.181	.414	.368	.473	.457	.441	.357	.251	-.093
CMS	.280	.365	.323	.034	.387	.365	.565	.483	.421	.394	.230	-.045
DSR	.082	.212	.124	.084	.273	.215	.238	.194	.207	.247	.157	.066
CSR	.201	.207	.191	.143	.262	.196	.248	.225	.235	.280	.132	.023
MSU-V	.348	.155	.133	.108	.243	.212	.328	.289	.419	.256	.114	.038
MSS-V	.434	.195	.158	.007	.173	.307	.298	.164	.372	.215	.140	.070
MSU-A	.259	.141	.117	.016	.175	.218	.269	.189	.321	.163	.047	-.046

	MSI	EFU	CFC	EFC	ESC	CSS	ESS	NSS	NST	NSI	MFU	NFU
MSS-A	.451	.234	.247	.108	.142	.280	.315	.107	.355	.196	.150	-.062
MSI	.....	.240	.194	.083	.160	.284	.327	.115	.373	.243	.246	.005
EFU	.....	.....	.270	.073	.208	.264	.290	.195	.281	.311	.265	.026
CFC	.....	.....	.....	.083	.233	.250	.278	.201	.281	.268	.123	-.004
EFC	.....	.....	.....	.....	.140	.061	.124	.039	.166	.180	.085	.013
ESC	.....	.....	.....	.....	.....	.365	.396	.543	.389	.398	.213	-.021
CSS	.....	.....	.....	.....	.....	.....	.431	.338	.435	.338	.141	-.040
ESS	.....	.....	.....	.....	.....	.....	.....	.508	.463	.410	.144	.000
NSS	.....	.....	.....	.....	.....	.....	.....	.....	.389	.360	.152	-.035
NST	.....	.....	.....	.....	.....	.....	.....	.....	.....	.407	.241	.058
NSI	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.198	.009
MFU	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.097

Intercorrelations Between Subtests Scores from the SOI-LA: Grade 5

	DMU	CFU	CMU	CFS	CFT	CMR	CMS	DSR	CSR	MSU-V	MSS-V	MSU-A	MSS-A
DFU	.301	.075	.076	.115	.092	.084	.093	-.023	-.043	.050	.131	.097	.190
DMU	.....	.072	.174	.127	.133	.185	.224	.021	.025	.075	.188	.150	.189
CFU	.....	.....	.163	.124	.154	.276	.221	.052	.040	.075	.166	.173	.191
CMU	.....	.....	.....	.163	.184	.462	.442	.106	.244	.202	.199	.215	.276
CFS	.....	.....	.....	.....	.389	.363	.377	.145	.218	.092	.226	.101	.279
CFT	.....	.....	.....	.....	.....	.230	.341	.060	.083	.121	.230	.103	.182
CMR	.....	.....	.....	.....	.....	.....	.528	.126	.286	.122	.236	.304	.315
CMS	.....	.....	.....	.....	.....	.....	.....	.198	.295	.261	.357	.290	.384
DSR	.....	.....	.....	.....	.....	.....	.....	.....	.048	.178	.199	.124	.142
CSR	.....	.....	.....	.....	.....	.....	.....	.....	.....	.011	.124	.057	.107
MSU-V	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.402	.316	.247
MSS-V	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.272	.366
MSU-A	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.398

	MSI	EFU	CFC	EFC	ESC	CSS	ESS	NSS	NST	NSI	MFU	NFU
DFU	.053	.178	.044	.112	.032	.129	.065	.130	.156	.056	-.060	.234
DMU	.149	.232	.107	.070	.140	.135	.133	.146	.260	.108	.073	.165
CFU	-.018	.158	.059	.114	.243	.120	.148	.181	.273	.219	.136	-.030
CMU	.047	.249	.133	.084	.348	.310	.418	.457	.415	.237	.071	-.086
CFS	.197	.395	.166	.133	.306	.279	.327	.343	.230	.256	.124	.020
CFT	.175	.289	.216	.095	.143	.196	.198	.205	.230	.132	.057	.142
CMR	.093	.369	.212	.245	.459	.396	.454	.444	.450	.358	.258	-.051
CMS	.174	.451	.353	.146	.421	.514	.519	.498	.451	.374	.197	-.021
DSR	.048	.121	.087	.020	.171	.224	.268	.255	.110	.174	.076	-.074
CSR	.176	.175	.058	.107	.291	.239	.248	.293	.172	.268	.009	-.012
MSU-V	.245	.194	.118	.059	.153	.267	.200	.172	.290	.130	.024	.068
MSS-V	.257	.285	.251	.110	.265	.319	.276	.273	.295	.205	-.018	.108
MSU-A	.266	.207	.065	.128	.212	.231	.291	.284	.354	.175	.060	-.000

	MSI	EFU	CFC	EFC	ESC	CSS	ESS	NSS	NST	NSI	MFU	NFU
MSS-A	.280	.294	.127	.109	.274	.344	.354	.324	.368	.221	.078	.015
MSI	.....	.223	.102	.153	.090	.194	.092	.136	.201	.022	.022	.100
EFU	.....	.....	.264	.080	.298	.432	.407	.393	.354	.328	.188	.045
CFC	.....	.....	.....	.153	.260	.136	.222	.251	.165	.205	.084	.001
EFC	.....	.....	.....	.....	.149	.118	.115	.151	.125	.161	.070	-.002
ESC	.....	.....	.....	.....	.....	.335	.501	.565	.398	.419	.233	-.106
CSS	.....	.....	.....	.....	.....	.....	.443	.454	.291	.311	.120	.075
ESS	.....	.....	.....	.....	.....	.....	.....	.602	.383	.355	.114	-.133
NSS	.....	.....	.....	.....	.....	.....	.....	.....	.425	.409	.135	-.088
NST	.....	.....	.....	.....	.....	.....	.....	.....	.....	.296	.152	.003
NSI	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.199	.039
MFU	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	-.086

Intercorrelations Between Subtests Scores from the SOI-LA: Grade 6

APPENDIX B

PIERS-HARRIS CHILDREN'S SELF-CONCEPT SCALE

THE PIERS - HARRIS
CHILDREN'S SELF CONCEPT SCALE

(The Way I Feel About Myself)

by

ELLEN V. PIERS, Ph.D.

and

DALE B. HARRIS, Ph.D.

Published by

Counselor Recordings and Tests

BOX 6184 ACKLEN STATION NASHVILLE, TENNESSEE 37212

Here are a set of statements. Some of them are true of you and so you will circle the *yes.* Some are not true of you and so you will circle the *no.* Answer *every* question even if some are hard to decide, but do *not* circle both *yes* and *no.* Remember, circle the *yes* if the statement is generally like you, or circle the *no* if the statement is generally not like you. There are no right or wrong answers. Only you can tell us how you feel about yourself, so we hope you will mark the way you really feel inside.

1. My classmates make fun of me..... yes no
2. I am a happy person..... yes no
3. It is hard for me to make friends..... yes no
4. I am often sad..... yes no
5. I am smart..... yes no
6. I am shy..... yes no
7. I get nervous when the teacher calls on me..... yes no
8. My looks bother me..... yes no
9. When I grow up, I will be an important person..... yes no
10. I get worried when we have tests in school..... yes no
11. I am unpopular..... yes no
12. I am well behaved in school..... yes no
13. It is usually my fault when something goes wrong..... yes no
14. I cause trouble to my family..... yes no
15. I am strong..... yes no
16. I have good ideas..... yes no
17. I am an important member of my family..... yes no
18. I usually want my own way..... yes no
19. I am good at making things with my hands..... yes no
20. I give up easily..... yes no

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21. I am good in my school work ..... yes no
22. I do many bad things ..... yes no
23. I can draw well ..... yes no
24. I am good in music ..... yes no
25. I behave badly at home ..... yes no
26. I am slow in finishing my school work. ..... yes no
27. I am an important member of my class ..... yes no
28. I am nervous ..... yes no
29. I have pretty eyes ..... yes no
30. I can give a good report in front of the class ..... yes no
31. In school I am a dreamer ..... yes no
32. I pick on my brother(s) and sister(s) ..... yes no
33. My friends like my ideas ..... yes no
34. I often get into trouble ..... yes no
35. I am obedient at home ..... yes no
36. I am lucky ..... yes no
37. I worry a lot ..... yes no
38. My parents expect too much of me ..... yes no
39. I like being the way I am ..... yes no
40. I feel left out of things ..... yes no

41. I have nice hair..... yes no
42. I often volunteer in school ..... yes no
43. I wish I were different ..... yes no
44. I sleep well at night..... yes no
45. I hate school..... yes no
46. I am among the last to be chosen for games..... yes no
47. I am sick a lot ..... yes no
48. I am often mean to other people..... yes no
49. My classmates in school think I have good ideas ..... yes no
50. I am unhappy ..... yes no
51. I have many friends ..... yes no
52. I am cheerful ..... yes no
53. I am dumb about most things ..... yes no
54. I am good looking ..... yes no
55. I have lots of pep..... yes no
56. I get into a lot of fights..... yes no
57. I am popular with boys..... yes no
58. People pick on me ..... yes no
59. My family is disappointed in me..... yes no
60. I have a pleasant face ..... yes no

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61. When I try to make something, everything seems to go wrong. yes no
62. I am picked on at home ..... yes no
63. I am a leader in games and sports ..... yes no
64. I am clumsy ..... yes no
65. In games and sports, I watch instead of play ..... yes no
66. I forget what I learn ..... yes no
67. I am easy to get along with ..... yes no
68. I lose my temper easily ..... yes no
69. I am popular with girls ..... yes no
70. I am a good reader ..... yes no
71. I would rather work alone than with a group ..... yes no
72. I like my brother (sister) ..... yes no
73. I have a good figure ..... yes no
74. I am often afraid ..... yes no
75. I am always dropping or breaking things ..... yes no
76. I can be trusted ..... yes no
77. I am different from other people ..... yes no
78. I think bad thoughts ..... yes no
79. I cry easily ..... yes no
80. I am a good person ..... yes no

School-Age Norms for Piers-Harris

School Age Norms (Grades 4 through 12)
(N=1138)

Piers-Harris Raw Score	Percentile	Stanine	Piers-Harris Raw Score	Percentile	Stanine
80			44	27	4
79			43	24	4
78			42	23	3
77			41	21	3
76	99		40	20	3
75	98		39	18	3
74	97	9	38	17	3
73	96	8	37	15	3
72	95	8	36	14	3
71	94	8	35	13	3
70	93	8	34	12	3
69	91	8	33	11	3
68	89	7	32	10	3
67	87	7	31	9	3
66	85	7	30	8	2
65	82	7	29	7	2
64	79	7	28	6	2
63	77	6	27	6	2
62	74	6	26	5	2
61	71	6	25	5	2
60	69	6	24	4	1
59	66	6	23	3	
58	63	6	22	3	
57	60	5	21	2	
56	57	5	20	2	
55	55	5	19	2	
54	52	5	18	1	
53	49	5	17		
52	46	5	16		
51	44	5	15		
50	41	5	14		
49	38	4	13		
48	36	4	12		
47	33	4	11		
46	31	4	10		
45	29	4			

Source: Piers-Harris Children's Self-Concept Scale Manual, (1969).

Normative Group Data for Piers-Harris

Sample	Age or Grade	N	Mean	SD
Small town Pennsylvania Public School Children (Millen, 1966)	grade 4	275	47.79	15.19
	" 6	265	55.36	13.93
	" 8	231	52.04	13.52
	" 10	221	49.67	12.36
	" 12	191	54.56	12.05
Normative Group	Total	1183	51.84	13.87
Rural and Urban Oregon Public Schools (Wing, 1966)	grade 5	510	59 (median)	10.5 (quartile deviation)
Small town Pennsylvania Public Schools (Piers, 1965)	grade 4	111	60.40	11.40
	" 6	113	54.09	12.71
Spokane Public Schools (Eastman, 1965)	grades 5, 6	36	55.94	-----
Denver Public Schools (Guardo, 1966)	grade 6	114	58.35	13.58
East Pennsylvania School (Faris, 1966)	grade 4	221	54.3	-----
	" 5	211	56.2	-----
	" 6	207	52.7	-----
Suburban New York State Special Education Classes (Mayer, 1965).	12-13 yrs.	34	55.97	11.5
	14 "	25	51.08	15.19
	15 "	22	54.64	11.89
	16 "	17	55	12.78
Pennsylvania Public School Stutterers (Morley, 1967)	8-10.3 yrs.	40	56.48	9.15
	10.3-12 "	39	55.36	12.40
North Carolina School for Emotionally Disturbed (Borstelman, 1964)	Younger boys	7	50.4	-----
	Older "	7	60	-----
Economically Deprived Schools, Pontiac, Mich.	grades 4, 5, 6		56.42	12.06
	" 4, 5, 6		55.69	11.07

Source: Piers-Harris Children's Self-Concept Scale Manual, (1969).

Concurrent Validities and Rating Correspondence

	Age or Grade	N	Sex	Measure	Pearson r with Piers-Harris total score
Mayer (1965)	12-16 yrs.	98	Both	Lipsitt Children's Self-Concept Scale	.68**
Cox (1966)	grade 6-9	97	Both	Health Problems	-.48**
	" 6-9	97	Both	Big Problems on SRA Junior Inventory	-.64**
Piers (1965)	grade 4	54	Boys	Teacher Rating	.06
	" 4	57	Girls	" "	.41**
	" 6	58	Boys	" "	.25
	" 6	55	Girls	" "	.17
	" 4	54	Boys	Peer Rating	.26
	" 4	57	Girls	" "	.41**
	" 6	58	Boys	" "	.49**
	" 6	55	Girls	" "	.34*
Cox (1966)	grade 6-9	97	Both	Socially effective behavior	
				Teacher rating	.43**
				Peer rating	.31**
	grade 6-9	97	Both	Superego strength	
				Teacher rating	.40**
				Peer rating	.42**

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

Source: Piers-Harris Children's Self-Concept Scale Manual, (1969).

APPENDIX C

OVERVIEW OF RESULTS

OVERVIEW OF RESULTS

Variable And Number of Studies	Results (Percent of Studies)			
	Open Better	Traditional Better	Mixed Results	No Significant Differences
Academic Achievement (102)	14%	12%	28%	46%
Self-Concept (61)	24%	3%	25%	47%
Attitude toward School (57)	40%	4%	25%	32%
Creativity (33)	36%	0%	30%	33%
Independence and Conformity (23)	78%	4%	9%	9%
Curiosity (14)	43%	0%	36%	21%
Anxiety and Adjustment (39)	26%	13%	31%	31%
Locus of Control (24)	25%	4%	17%	54%
Cooperation (9)	67%	0%	11%	22%
(Overall Average)	(39%)	(4%)	(24%)	(33%)

Source: Horwitz, R. A. Psychological effects of the "open classroom". Review of Educational Research, 1979, 49(1), 71-86.

APPENDIX D

MODIFIED FLANDER'S CLASSROOM

INTERACTION ANALYSIS

Modified Flanders Classroom Interaction Analysis*

TEACHER TALK	(indirect teacher influence)	1. Accepts Feelings (accepts and clarifies the feeling tone of the students in a non-threatening manner. Feelings may be positive or negative. Predicting and recalling feelings are included.)
		2. Praises (praises or encourages student action or behavior. Jokes that release tension, not at the expense of another individual, nodding head or say "uh-huh", or "go on)"
		3. Accepts ideas of student (clarifying, building, or developing ideas or suggestions by a student. As teacher brings more of his own ideas into play, shift to category six.)
		4. Asks divergent question (divergent calls for imagination, a move in new directions, as appropriate answers as can be generated, unusual solutions to problems etc.)
		5. Asks evaluation question (requires use of judgment with some consideration of quality of responses and the implications of what is being proposed.)
	(direct teacher influence)	6. Lectures (giving facts or opinions about content or procedure, expressing own idea; asking rhetorical questions.)
		7. Gives directions (directions, commands, or orders with which a student is expected to comply.)
		8. Criticizes or justifies authority (statements intended to change student behavior, reprimands, explaining actions, self-reference.
STUDENT TALK		9. Student talk, response (teacher initiates contact or solicits student statement.)
		10. Student talk, initiation (talk which student starts. If "calling on" student is only to indicate who may talk next, observer must decide whether student wanted to talk.)
		11. Silence (pauses, short period of silence in which students follow directions or appear to think of answers to questions.)
		12. Confusion (pauses, periods of silence and periods of confusion in which students do not appear to understand communication

*adapted from Amidon and Hough, 1967; p. 125, 389.

TABLE VII

PRELIMINARY STUDY RESULTS USING THE MODIFIED FLANDER'S CLASSROOM INTERACTION ANALYSIS

SCHOOL	GRADE	SESSION	RATIO 1*	RATIO 2**	RATIO 3***
Traditional	- Grade Three	(1)	6/55	61/73	2/61
		(2)	3/49	52/77	2/52
	- Grade Four	(1)	7/75	82/71	2/52
		(2)	3/92	95/23	2/95
	- Grade Five	(1)	17/47	64/79	16/64
		(2)	6/64	70/76	6/70
Open	- Grade Beta	(1)	32/25	57/74	23/57
		(2)	8/57	65/70	8/57
	- Grade Gamma	(1)	6/53	59/58	6/59
		(2)	10/44	54/60	8/54

*Ratio 1 is the sum of tallies in teacher indirect/direct talk (categories 1-3/6-8).

**Ratio 2 is the sum of tallies in teacher talk/student talk (categories 1-8/ 9-10).

***Ratio 3 is the sum of tallies in divergent, evaluative questions/ teacher talk (categories 1-3 & 6-8/ 4-5).

APPENDIX E

DESCRIPTIVE STATISTICS

TABLE VIII

DESCRIPTIVE STATISTICS FOR DIVERGENT PRODUCTION AND SELF-CONCEPT MEASURES FOR THIRD GRADERS IN OPEN AND TRADITIONAL SCHOOLS

Subtest Measures		School: Open (N = 18)	School: Traditional (N = 29)
Divergent Production of Figural Units - Fluency	M	13.44	13.59
	s	3.01	3.08
Divergent Production of Figural Units - Set Change	M	11.94	10.17
	s	4.09	3.34
Divergent Production of Figural Units - Transformation	M	.44	.00
	s	1.89	.00
Divergent Production of Figural Units - Originality	M	8.00	4.69
	s	6.44	5.02
Divergent Production of Semantic Units - Fluency	M	30.78	43.86
	s	14.78	25.14
Divergent Production of Semantic Units - Originality	M	.56	2.76
	s	2.36	4.55
Divergent Production of Symbolic Relations - Fluency	M	30.72	28.86
	s	8.80	10.82
Divergent Production of Symbolic Relations - Set Change	M	28.00	27.03
	s	15.64	14.93
Divergent Production of Symbolic Relations - Originality	M	12.67	7.44
	s	15.11	11.60

TABLE VIII (Continued)

Subtest Measures		School: Open (N = 18)	School: Traditional (N = 29)
Cluster I - Behavior	M	12.72	10.48
	s	4.34	3.83
Cluster II - Intellectual and School Status	M	12.44	11.97
	s	3.11	3.62
Cluster III - Physical Appearance	M	8.22	8.34
	s	3.41	2.79
Cluster IV - Anxiety	M	9.28	8.62
	s	2.80	3.02
Cluster V - Popularity	M	6.78	6.93
	s	1.48	2.14
Cluster VI - Happiness Satisfaction	M	8.17	7.17
	s	2.83	2.74

TABLE IX

DESCRIPTIVE STATISTICS FOR DIVERGENT PRODUCTION AND SELF-CONCEPT MEASURES FOR FOURTH GRADERS IN OPEN AND TRADITIONAL SCHOOLS

Subtest Measure		School: Open (N = 16)	School: Traditional (N = 25)
Divergent Production of Figural Units - Fluency	M	11.88	11.04
	s	9.17	2.95
Divergent Production of Figural Units - Set Change	M	7.81	11.04
	s	4.35	2.98
Divergent Production of Figural Units - Transformation	M	2.25	1.12
	s	9.21	3.17
Divergent Production of Figural Units - Originality	M	13.75	6.40
	s	17.52	2.85
Divergent Production of Semantic Units - Fluency	M	47.94	61.20
	s	25.16	23.35
Divergent Production of Semantic Units - Originality	M	4.38	4.00
	s	5.12	5.00
Divergent Production of Symbolic Relations - Fluency	M	21.13	35.96
	s	8.88	9.59
Divergent Production of Symbolic Relations - Set Change	M	13.19	38.12
	s	15.00	20.10
Divergent Production of Symbolic Relations - Originality	M	2.50	13.12
	s	4.35	11.81

TABLE IX (Continued)

Subtest Measures		School: Open (N = 16)	School: Traditional (N = 25)
Cluster I - Behavior	M	13.63	13.10
	s	2.33	3.03
Cluster II - Intellectual and School Status	M	13.63	13.00
	s	3.42	4.03
Cluster III - Physical Appearance	M	10.13	9.72
	s	2.31	2.69
Cluster IV - Anxiety	M	11.94	9.92
	s	2.04	3.07
Cluster V - Popularity	M	8.75	6.88
	s	1.44	2.60
Cluster VI - Happiness and Satisfaction	M	8.88	8.60
	s	1.67	1.78

TABLE X

DESCRIPTIVE STATISTICS FOR DIVERGENT PRODUCTION AND SELF-CONCEPT MEASURES FOR FIFTH GRADERS IN OPEN AND TRADITIONAL SCHOOLS

Subtest Measures		School: Open (N = 16)	School: Traditional (N = 29)
Divergent Production of Figural Units - Fluency	M	12.63	12.00
	s	3.69	3.97
Divergent Production of Figural Units - Set Change	M	13.00	10.59
	s	4.04	3.92
Divergent Production of Figural Units - Transformation	M	0.00	.83
	s	0.00	2.48
Divergent Production of Figural Units - Originality	M	7.50	3.38
	s	4.92	3.34
Divergent Production of Semantic Units - Fluency	M	53.31	48.45
	s	15.02	15.93
Divergent Production of Semantic Units - Originality	M	5.63	2.76
	s	5.12	4.55
Divergent Production of Symbolic Relations - Fluency	M	24.75	33.17
	s	6.85	10.33
Divergent Production of Symbolic Relations - Set Change	M	15.00	29.17
	s	13.49	14.23
Divergent Production of Symbolic Relations - Originality	M	0.00	7.31
	s	0.00	9.39

TABLE X (Continued)

Subtest Measures		School: Open (N = 16)	School: Traditional (N = 29)
Cluster I - Behavior	M	13.31	13.59
	s	2.66	2.28
Cluster II - Intellectual and School Status	M	14.00	14.00
	s	1.82	2.52
Cluster III - Physical Appearance	M	10.19	10.48
	s	2.34	2.35
Cluster IV - Anxiety	M	11.44	11.17
	s	1.72	2.75
Cluster V - Popularity	M	8.31	8.38
	s	1.54	2.21
Cluster VI - Happiness and Satisfaction	M	9.25	8.86
	s	1.24	1.51

TABLE XI

DESCRIPTIVE STATISTICS FOR DIVERGENT PRODUCTION AND SELF-CONCEPT MEASURES FOR THREE GRADES IN OPEN AND TRADITIONAL SCHOOLS

Subtest Measures		School: Open (N = 50)	School: Traditional (N = 83)
Divergent Production of Figural Units - Fluency	M	12.68	12.27
	s	3.30	3.51
Divergent Production of Figural Units - Set Change	M	10.96	10.58
	s	4.17	3.43
Divergent Production of Figural Units - Transformation	M	.88	.63
	s	5.20	2.29
Divergent Production of Figural Units - Originality	M	9.68	4.75
	s	10.75	4.02
Divergent Production of Semantic Units - Fluency	M	43.48	50.69
	s	18.40	22.67
Divergent Production of Semantic Units - Originality	M	3.40	3.13
	s	3.46	4.67
Divergent Production of Symbolic Relations - Fluency	M	25.74	32.51
	s	8.34	10.58
Divergent Production of Symbolic Relations - Set Change	M	19.10	31.12
	s	14.92	16.92
Divergent Production of Symbolic Relations - Originality	M	5.36	9.11
	s	9.49	11.13

TABLE XI (Continued)

Subtest Measure		School: Open (N = 50)	School: Traditional (N = 83)
Cluster I - Behavior	M	13.20	12.39
	s	3.24	3.39
Cluster II - Intellectual and School Status	M	13.32	12.99
	s	2.90	3.48
Cluster III - Physical Appearance	M	9.46	.51
	s	2.86	2.74
Cluster IV - Anxiety	M	10.82	9.90
	s	2.51	3.10
Cluster V - Popularity	M	7.90	7.42
	s	1.69	2.39
Cluster VI - Happiness and Satisfaction	M	8.74	8.19
	s	2.08	2.20

TABLE XII

DESCRIPTIVE STATISTICS FOR DIVERGENT PRODUCTION AND SELF-CONCEPT MEASURES FOR GRADES THREE, FOUR, AND FIVE IN BOTH SCHOOLS

Subtest Measures		Grades Three (N = 47)	Four (N = 41)	Five (N = 45)
Divergent Production of Figural Units - Fluency	M	13.53	11.37	12.22
	s	3.02	6.06	3.83
Divergent Production of Figural Units - Set Change	M	10.85	.78	11.44
	s	3.71	3.52	3.96
Divergent Production of Figural Units - Transformation	M	0.17	1.56	0.53
	s	1.17	6.15	2.02
Divergent Production of Figural Units - Originality	M	5.96	9.27	4.84
	s	5.77	10.82	3.92
Divergent Production of Semantic Units - Fluency	M	38.85	56.02	50.18
	s	22.52	23.76	15.44
Divergent Production of Semantic Units - Originality	M	1.91	4.15	3.78
	s	3.98	4.98	4.90
Divergent Production of Symbolic Relations - Fluency	M	29.57	30.17	30.18
	s	10.04	9.44	10.03
Divergent Production of Symbolic Relations - Set Change	M	27.40	28.39	24.13
	s	15.04	18.51	15.42
Divergent Production of Symbolic Relations - Originality	M	9.45	8.98	4.71
	s	13.15	9.73	8.28

TABLE XII (Continued)

Subtest Measures		Grades Three (N = 47)	Four (N = 41)	Five (N = 45)
Cluster I - Behavior	M	11.34	13.37	13.49
	s	4.14	2.75	2.39
Cluster II - Intellectual and School Status	M	12.15	13.24	14.00
	s	3.41	3.77	2.28
Cluster III - Physical Appearance	M	8.30	9.88	10.38
	s	3.00	2.52	2.32
Cluster IV - Anxiety	M	8.87	10.71	11.27
	s	2.92	2.89	2.42
Cluster V - Popularity	M	6.87	7.61	8.36
	s	1.90	2.39	1.98
Cluster VI - Happiness and Satisfaction	M	7.55	8.71	9.00
	s	2.79	1.72	1.41

APPENDIX F

ANALYSIS OF VARIANCE SUMMARY TABLES

AND GRAPHS OF MEANS

TABLE XIII

ANALYSIS OF VARIANCE SUMMARY FOR FLUENCY, DIVERGENT PRODUCTION OF FIGURAL UNITS

SOURCE OF VARIATION	DF	SS	MS	F
School	1	5.37	5.37	.48
Grade	2	105.43	52.71	4.69*
School x Grade	2	5.68	2.84	.25
Error	127	1,425.93	11.23	
Total	132			

*$p < .011$

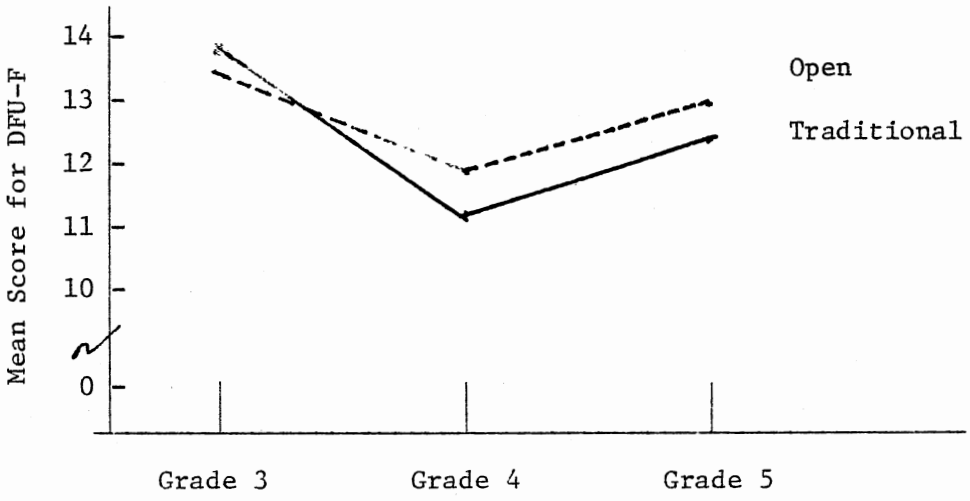

Figure 7. Graph of Means for School Environment and Grade Level for Fluency, Divergent Production of Figural Units

TABLE XIV

ANALYSIS OF VARIANCE SUMMARY FOR TRANSFORMATION, DIVERGENT PRODUCTION OF FIGURAL UNITS

SOURCE OF VARIATION	DF	SS	MS	F
School	1	2.01	2.01	.15
Grade	2	44.71	22.39	1.68
School x Grade	2	19.17	9.86	.74
Error	127	1,688.22	13.29	
Total	132			

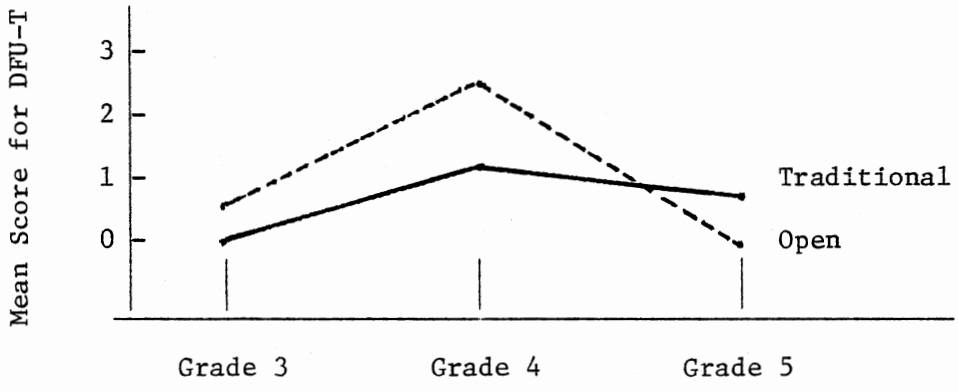

Figure 8. Graph of Means for School Environment and Grade Level for Transformation, Divergent Production of Figural Units

TABLE XV

ANALYSIS OF VARIANCE SUMMARY FOR ORIGINALITY, DIVERGENT PRODUCTION OF FIGURAL UNITS

SOURCE OF VARIATION	DF	SS	MS	F
School	1	759.31	759.31	15.89*
Grade	2	450.00	225.00	4.71**
School x Grade	2	64.53	32.17	.68
Error	127	6,070.03	47.79	
Total	132			

*$p < .046$
**$p < .001$

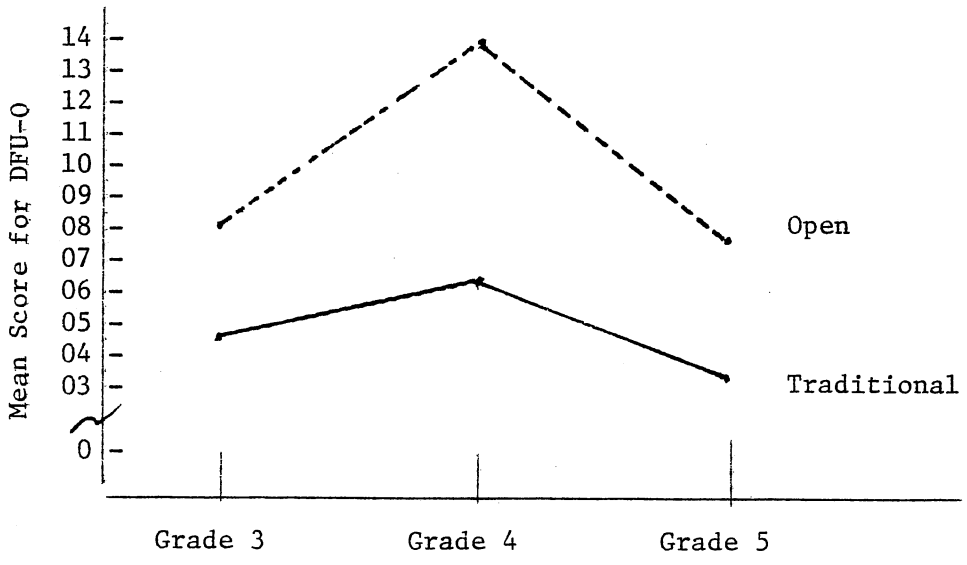

Figure 9. Graph of Means for School Environment and Grade Level for Originality, Divergent Production of Figural Units

TABLE XVI

ANALYSIS OF VARIANCE SUMMARY FOR FLUENCY, DIVERGENT PRODUCTION OF SEMANTIC UNITS

SOURCE OF VARIATION	DF	SS	MS	F
School	1	1,620.60	1,620.60	3.93*
Grade	2	6,787.42	3,393.71	8.20**
School x Grade	2	2,240.81	1,120.41	2.71
Error	127	52,536.11	413.67	
Total	132			

*p < .050
**p < .0004

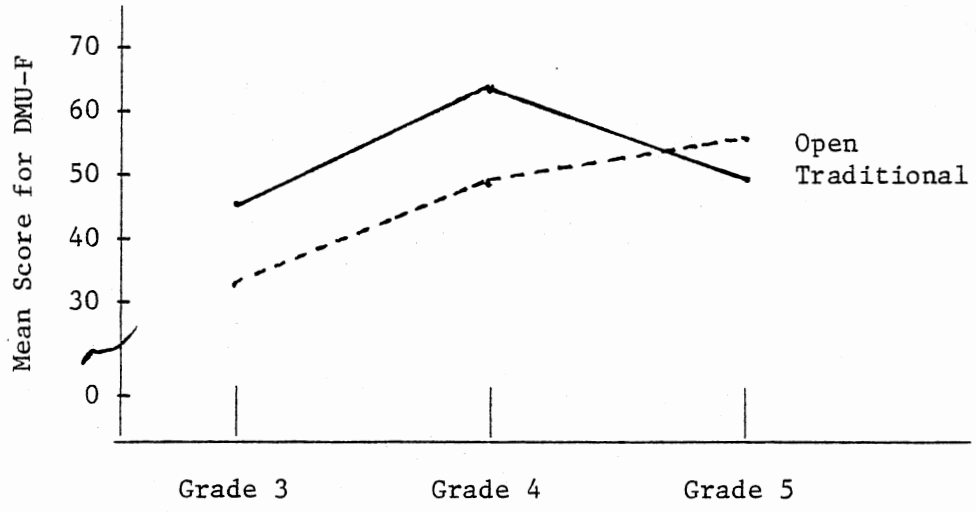

Figure 10. Graph of Means for School Environment and Grade Level for Fluency, Divergent Production of Semantic Units.

TABLE XVII

ANALYSIS OF VARIANCE SUMMARY FOR BEHAVIOR (CLUSTER I) OF SELF-CONCEPT

SOURCE OF VARIATION	DF	SS	MS	F
School	1	20.70	20.70	2.05
Grade	2	133.05	66.53	6.58*
School x Grade	2	37.54	18.77	1.68
Error	127	1,283.07	10.10	
Total	132			

*p < .002

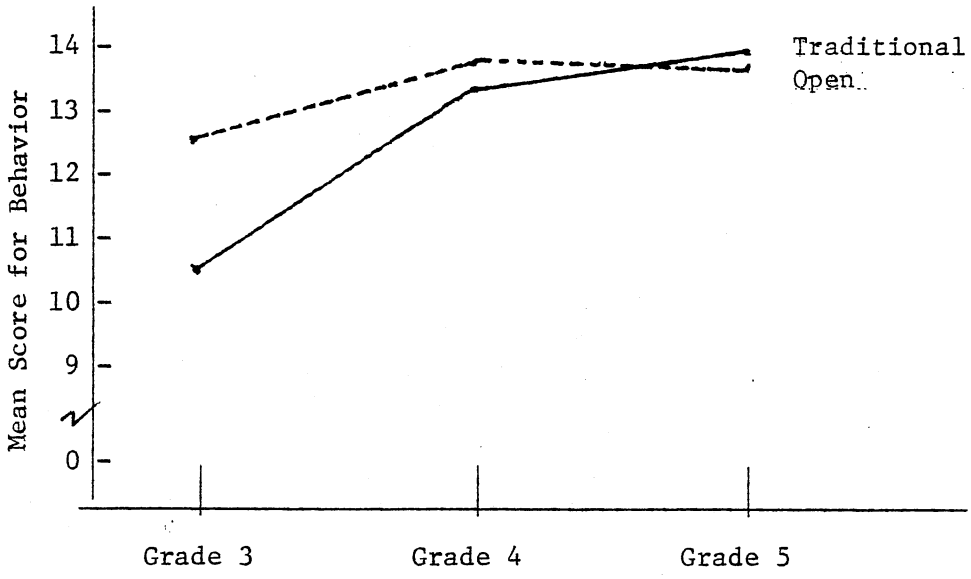

Figure 11. Graph of Means for School Environment and Grade Level for Behavior (Cluster I) of Self-Concept.

TABLE XVIII

ANALYSIS OF VARIANCE SUMMARY FOR INTELLECTUAL AND SCHOOL STATUS (CLUSTER II) OF SELF-CONCEPT

SOURCE OF VARIATION	DF	SS	MS	F
School	1	3.44	3.44	.33
Grade	2	79.79	39.90	3.82*
School x Grade	2	2.92	1.46	.14
Error	127	1,325.16	17.23	
Total	132			

*p < .024

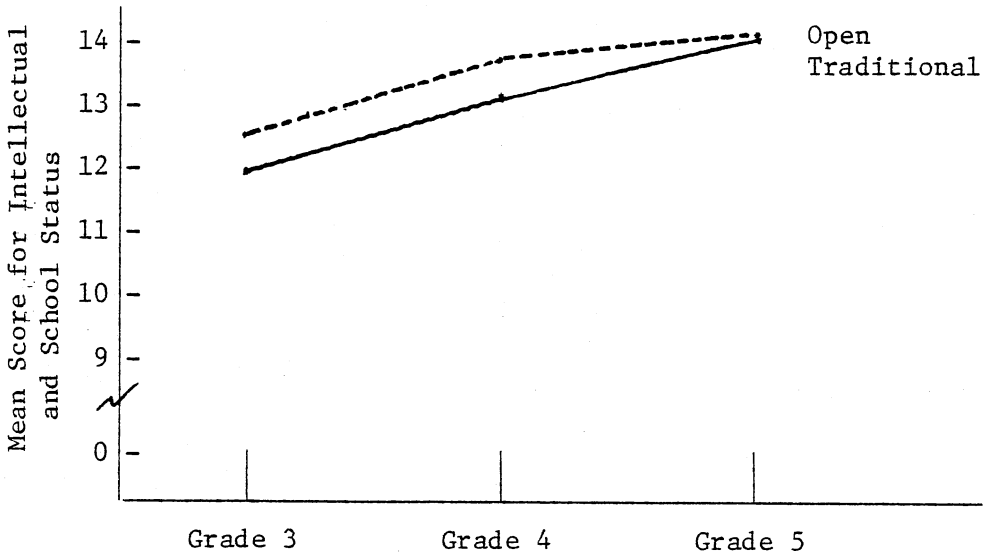

Figure 12. Graph of Means for School Environment and Grade Level for Intellectual and School Status (Cluster II) of Self-Concept

TABLE XIX

ANALYSIS OF VARIANCE SUMMARY FOR PHYSICAL APPEARANCE (CLUSTER III) OF SELF-CONCEPT

SOURCE OF VARIATION	DF	SS	MS	F
School	1	.07	.07	.01
Grade	2	108.44	54.22	7.62*
School x Grade	2	2.60	1.30	.18
Error	127	904.13	7.12	
Total	132			

*$p < .001$

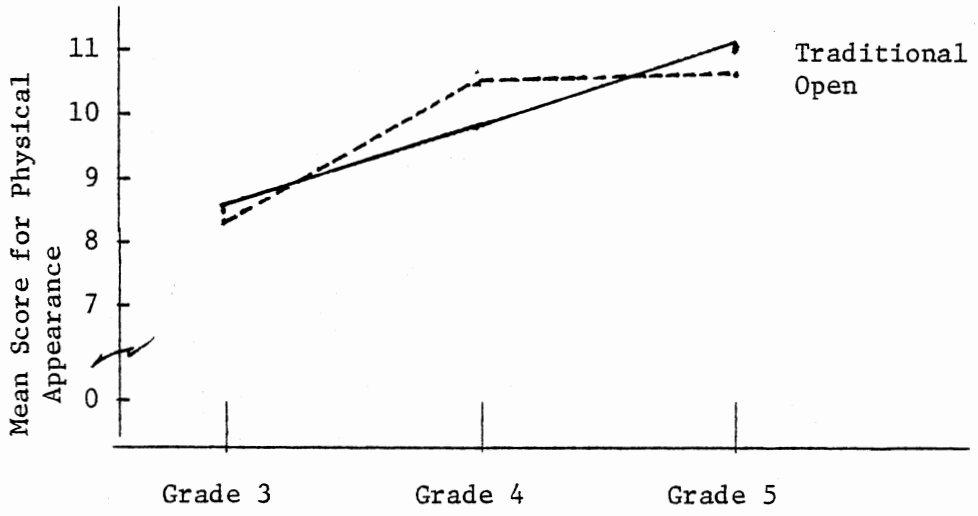

Figure 13. Graph of Means for School Environment and Grade Levels for Physical Appearance (Cluster III) of Self-Concept.

TABLE XX

ANALYSIS OF VARIANCE SUMMARY FOR ANXIETY (CLUSTER IV) OF SELF-CONCEPT

SOURCE OF VARIATION	DF	SS	MS	F
School	1	26.20	26.20	3.57
Grade	2	144.29	72.15	9.82*
School x Grade	2	19.03	9.52	1.29
Error	127	933.29	7.35	
Total	132			

*$p < .0001$

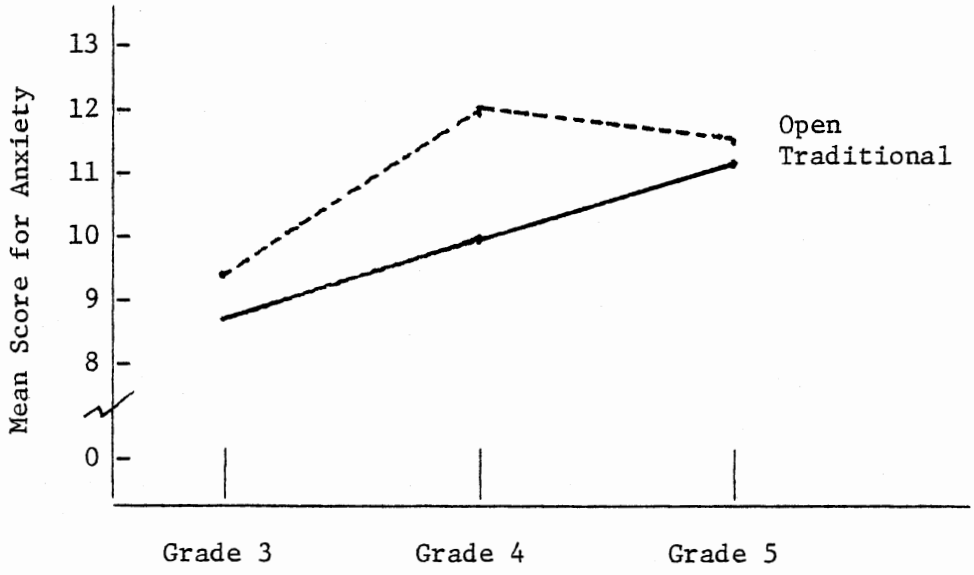

Figure 14. Graph of Means for School Environment and Grade Level for Anxiety (Cluster IV) of Self-Concept.

TABLE XXI

ANALYSIS OF VARIANCE SUMMARY FOR HAPPINESS (CLUSTER VI) OF SELF-CONCEPT

SOURCE OF VARIATION	DF	SS	MS	F
School	1	9.34	9.34	2.15
Grade	2	53.77	26.89	6.20*
School x Grade	2	3.92	1.96	.45
Error	127	550.84	4.34	
Total	132			

*$p < .003$

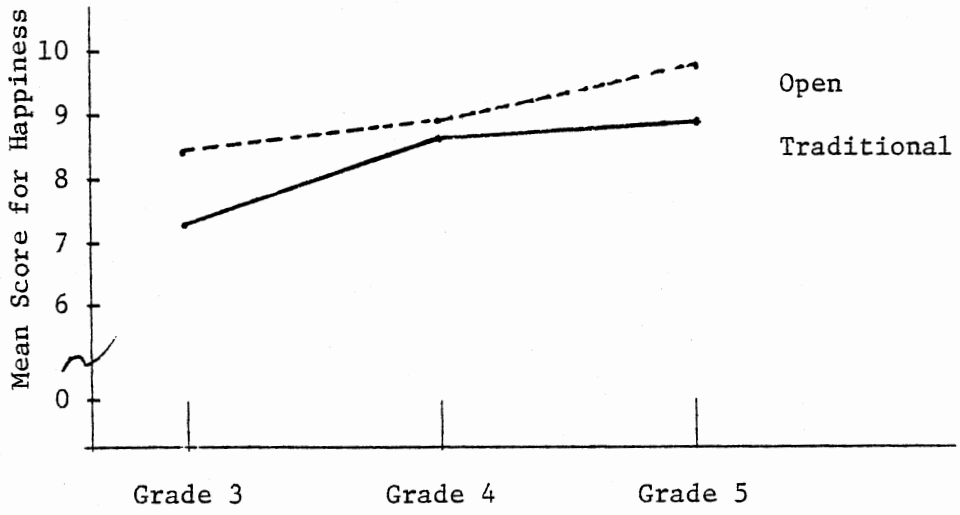

Figure 15. Graph of Means for School Environment and Grade Level for Happiness (Cluster VI) of Self-Concept.

APPENDIX G

CORRESPONDENCE

PERMISSION FOR PRELIMINARY STUDY

TULSA PUBLIC SCHOOLS

Division for
Instructional Support Services
P.O. Box 45208 · Tulsa, Oklahoma

November 20, 1979

Dr. David Perrin
Department of Applied Behavioral Studies
in Education
Oklahoma State University
Stillwater, Oklahoma 74074

Dear Dr. Perrin:

This will approve your request in behalf of Jacqueline Layman to conduct a study in two of our elementary schools.

We understand that you will send an observer to Eliot Elementary, which is a semi-departmental school, to observe the third, fourth and fifth grade classes utilizing the Flanders Classroom Interaction Analysis Scale and that the Beta and Gamma classes at Columbus, which is an open-design school, will be similarly observed.

At the conclusion of her study we request that Mrs. Layman send to me and to each of the two principals a copy of the abstract of her findings.

Sincerely,

Paul I. McCloud

Paul I. McCloud, Associate Superintendent
Instructional Support Services

PIM:bjb

cc: Research Review Committee
Mr. Roger Tomlinson, Principal, Eliot Elementary School
Mrs. Elizabeth Miller, Principal, Columbus Elementary School
✓Mrs. Jacqueline Layman

PERMISSION FOR TEST ADMINISTRATION

TULSA PUBLIC SCHOOLS

Division for
Instructional Support Services
P.O. Box 45208 • Tulsa, Oklahoma

February 22, 1980

Dr. David W. Perrin, Assistant Professor
Department of Applied Behavioral Studies
Oklahoma State University
Stillwater, Oklahoma 74074

Dear Dr. Perrin:

The Research Review Committee has approved your request in behalf of Mrs. Jacqueline Layman to administer the Piers-Harris Self-Concept Scale and three measures of divergent thinking to children in Columbus and Eliot Elementary Schools.

We understand that the administration of these instruments will require no more than one hour for each group of children and that they will be administered only to children whose parents have signed a release granting permission for their child to be tested.

I urge that you get in touch with Mrs. Elizabeth Miller, the principal at Columbus, which is now housed in the Fulton Elementary School building, and with Mr. Roger Tomlinson, the principal at Eliot Elementary School. All arrangements for the gathering of data should be coordinated with these two principals.

We are interested in the findings of the study which is being conducted by Mrs. Layman and would very much appreciate her sending a copy of the abstract of her findings to Mr. Tomlinson, to Mrs. Miller and to me at the conclusion of the study.

Sincerely,

P. M.

Paul I. McCloud, Associate Superintendent
Instructional Support Services

PIM:bjb

cc: Mrs. Elizabeth Miller
Mr. Roger Tomlinson
Dr. Dale Edmond
Mr. Larry Webber
Mr. Robert Brewer
Dr. Jack Griffin
Mr. Johnson Lee
Dr. George Truka
Mrs. Jacqueline Layman

PARENTAL PERMISSION FOR TESTING

February 20, 1980

Dear Parents,

Those of us who work with children in the schools are always interested in finding out more about how children learn and how we can be more successful in teaching all boys and girls. One area in which we lack clear-cut information has to do with the effect of children's self-concept on their ability to think and learn in novel, creative ways.

My purpose in writing you is to inform you of a study that will be carried out at _____ School and to ask your cooperation in allowing your child to participate in the study. Children in grades three, four, and five will be asked to participate.

The study will consist of administering two tests on a group basis sometime during the last week of February, 1980. The tests to be used are: (1) Three subtests from the Structure of Intellect Learning Abilities Test, to assess divergent production learning abilities and, (2) The Piers-Harris Self-Concept Scale for Children to assess the feelings children have about themselves.

Approximately one-half hour of time will be needed for this testing. Special attention will be given to re-assuring the students that the tests are not related to evaluations of their school performance. All information in the study will be handled on a group basis and no individual child's name or test scores will be reported in the findings. A summary of the findings will be available to teachers and administrators in the Tulsa Public School System.

The study will be conducted by Jacqueline Layman, a doctoral candidate at Oklahoma State University with the permission of the Assistant Superintendent for Research, Planning and Development in the Tulsa Public Schools. I welcome your interest and questions and will assume your cooperation and your child's participation unless I hear from you within a few days. There is a tear-off slip below which you may fill out if you wish your child to be excluded from the group study. Thank you very much.

Sincerely,

_____

Principal

- -

Name of child _____

Teacher/Grade _____

I do not wish my child to participate in the group study to learn more about the learning potential of students.

COUNSELOR RECORDINGS AND TESTS

Box 6184 • Acklen Station
Nashville, Tennessee 37212

June 29, 1982

Ms. Jackie Layman Casler
c/o Dr. David Perrin
Room 305-Whitehurst
Oklahoma State University
Stillwater, Oklahoma 74078

Dear Ms. Casler:

Permission is given for you to use the Piers-Harris test within your dissertation. Any or all parts of the dissertation may be reprinted with the publishers permission.

Sincerely,

Nina Peppers

Nina Peppers
Executive Secretary

np

SOI INSTITUTE A NON-PROFIT EDUCATIONAL RESEARCH CORPORATION
343 Richmond Street El Segundo, CA 90245 (213)322-5532

6-28-82

Dear Jackie and Dr. Perrien,
This letter gives you permission to photocopy DFU, DMU (attached) and DSR for the inclusion in your dissertation appendix only.

We will appreciate a copy of your study and findings so that we can include it in our research brochure (also attached); thus other researchers can contact you.

If you work with adults and creativity, you may want to look at the advanced "D" test described in the catalog.

Congratulations.

Dr Meeker