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The Effect of Preschool Experiences on the Achievement of Kindergarten Children Enrolled in the 1971-1972 Follow Through Program in Waterloo, Iowa

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THE EFFECT OF PRESCHOOL EXPERIENCES ON THE ACHIEVEMENT OF KINDERGARTEN CHILDREN ENROLLED IN THE 1971-1972 FOLLOW THROUGH PROGRAM IN WATERLOO, IOWA

An Abstract of a Thesis

Submitted

In Partial Fulfillment

of the Requirements for the Degree

Specialist in Education

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by

David Philip Stetson

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ABSTRACT

The problem of the investigation concerned itself with the effect of preschool experiences on the achievement of the kindergarten children enrolled in the 1971-1972 Follow Through Program in Waterloo, Iowa, which used the Pittsburgh, Pennsylvania, model of individually prescribed instruction. The study explored the effects of preschool experience upon kindergarten males and females as contrasted to the male and female kindergarten children without preschool experience.

Two conceptual constructs gave direction and provided the rationale for this study. The first conceptual construct provided research related to early childhood education presented according to the Geneticist, Environmentalist, and the Interactionalist's positions. The second construct presented research related to preschool learning to show the influences of home atmosphere and preschool attendance.

Each of the six curriculum areas of the P.E.P. (Primary Education Project) Early Learning Curriculum, which were Quantification, Classification, Gross Motor, Visual Motor, Auditory Motor, and Letters and Numerals generated two hypotheses to be investigated. Males with preschool experience were contrasted with males without preschool experience. Females with preschool experience were contrasted with females without preschool experience.

Statistically, the hypotheses were stated in the null and specified a direction for analysis. It was noted that children with preschool experience should evidence higher levels of achievement than those without preschool experience. The effects of preschool experience

was tested with the nonparametric sign test which uses plus and minus signs rather than quantitative measures as its data. The probability associated with the occurrence of a particular number of plus or minus signs was determined by reference to the binomial distribution with $P = Q = \frac{1}{2}$, in Appendix G. The following significance levels of the probabilities were chosen: .05, Highly significant; .10, Significant; and, .10 to .20, Trend toward significant.

The findings showed that generally, preschool experience did make a difference. Preschool experience had a highly significant effect for the males in the curriculum areas of Quantification, Classification, and Auditory Motor. Preschool experience had a highly significant effect for females in Quantification, Classification, Auditory Motor, and Letters and Numerals. A trend toward significant was noted for males and females in the area of Visual Motor. Preschool experience had little or no effect in the curriculum areas of Gross Motor and Letters and Numerals for the males, and Gross Motor for the females.

The findings did suggest that preschool programs are desirable in providing a foundation for kindergarten experiences.

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Chapter 1

INTRODUCTION

Children enter school at various levels of mental and physical development. Teachers attempt to discover the children's strengths and weaknesses to plan the best program possible to meet their needs. However, some children are seriously behind their age mates in language, concept, perceptual, motor, and behavioral development which are not easily overcome through normal schooling. It appears that factors outside the school may be more important in determining educational achievement than are those factors connected with the school.

Since 1930, the federal government has been involved in nationwide programs for preschool children. During the 1930's, it hoped to combat the physical and mental handicaps imposed by the economic Depression; during World War II, care was provided for children of working mothers; and, beginning in the 1960's, the federal government became concerned with the harmful effects of poverty on young children. As a result, the federal government has sponsored many preschool programs, and among these are Head Start, Home Start, and Follow Through.

Administrators should be concerned with the effectiveness of these educational programs. With our more sophisticated knowledge of growth and development during preschool years, it is possible to assess these programs. Accurate assessment of preprimary school programs could be of benefit to educators in developing within the Iowa public system of education, a planned and coordinated early childhood education program. Preprimary school education may be an effective future trouble

shooter and a highly motivating force that could provide the kind of challenge that many boys and girls need in early life.

THE PROBLEM

Statement of the Problem

The problem of this investigation concerns itself with the effect of preschool experiences on the achievement of the kindergarten children enrolled in the 1971-1972 Follow Through Program in Waterloo, Iowa. This study addresses itself specifically to the effect of preschool education on the academic achievement of kindergarten children as evaluated by successful mastery of units. These mastery units were developed by the Learning Research and Development Center (LRDC) at the University of Pittsburgh in Pittsburgh, Pennsylvania. The kindergarten children enrolled in the Follow Through Program during the 1971-1972 school year was the first group in Waterloo receiving individually prescribed instruction using the Pittsburgh Model.

The Purpose of the Study

The purpose of the study was to ascertain if there were measurable values of preschool experiences as evaluated by successful mastery of units which were developed by the LRDC in Pittsburgh. The study attempted to find out what effect preschool experiences had upon the academic achievement of kindergarten children enrolled in the 1971-1972 Follow Through Program in Waterloo, Iowa, as contrasted to those children without preschool experience.

Value of the Study

The value of such a study could lie in its potential to help administrators in evaluating kindergarten programs and in making adjustments to assure that children receive the experiences in kindergarten that would best meet their needs.

New understandings about children and the learning process are constantly emerging. They must be applied in the classrooms if the schools are to serve the children effectively.

School principals constantly receive information, claims, and counterclaims about the new curricular concepts in every conceivable area. The principal cannot afford to accept uncritically the recommendations of studies, but neither can he afford to reject them without thoughtful consideration. His decisions must rest upon information that is pertinent and accurate and upon thinking that is rational and objective.

Importance of the Study

Early childhood education is a vital prerequisite if many children are to have a reasonable chance for success in school. Most educational problems start before the child enters primary. Thus, if educators are going to deal with the cause rather than the effect, education must start by the time the child is three or four.[1]

Dr. Nimnicht, Program Director of the Far West Laboratory for Educational Research and Development in Berkeley, California, sets a high priority on early childhood education because it is economically sound to spend more money at an earlier age to avoid more serious and costly remedial measures later:

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[1]Glen R. Nimnicht, "A New State Priority: Early Childhood Programs," Compact, Vol. 3, No. 6 (December, 1969), p. 5.

> A sound early childhood education program will reduce the number of children who have to be assigned to special classrooms for mentally retarded children, because many children in those classrooms are not biologically retarded but rather environmentally retarded. The need for special remedial reading programs would also decline and, with proper follow-up efforts, few children will drop out of school. All of these efforts will add up to short-term savings but, more significantly, to genuinely measurable long-term gains for our society--giving us more productive, self-sufficient citizens.[2]

Today, all levels of education are being challenged to make our school systems more effective and efficient. The taxpayers are demanding that they get a dollar's worth for each tax dollar spent. Early childhood education could suffer from this austerity. Programs need to be reexamined and educational priorities determined in order that early childhood education be given greater emphasis. Governor Russell W. Peterson of Delaware states that:

> No one area needs greater emphasis than early childhood education. Although most public officials and educators acknowledge the importance of the preprimary years, there is no concensus as to what kind of or how much training should be offered to or required of preschool and kindergarten children. Although many states have established compulsory kindergarten programs and are offering more and more preschool opportunities, there is a shocking lack of analysis of actual operating and capital costs, short- and long-range remedial benefits, teaching needs and possible program alternatives for youngsters during this formative preprimary period.[3]

The challenge of change in our everyday living demands that we commit ourselves to a study of this problem, for increased knowledge and social problems places increasing importance on early childhood education:

> Research shows clearly that the first four or five years of a child's life are the period of most rapid growth in physical and mental characteristics and of greatest susceptibility to environmental influences. Consequently, it is in the early years

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[2]Ibid.

[3]Governor Russell W. Peterson, "Preschoolers and the States," Compact, Vol. 3, No. 6 (December, 1969), p. 2.

> that deprivations are most disastrous in their effects. They can be compensated for only with great difficulty in later years, and then probably not in full. Furthermore, it appears that it is harder to modify harmful learnings than to acquire new ones. Finally, experience indicates that exposure to a wide variety of activities and of social and mental interactions with children and adults greatly enhances a child's ability to learn. Few homes provide enough of these opportunities. It is reasonable to conclude that the postponement of an educational contribution by society until children reach the age of six generally limits the flowering of their potentials.[4]

BACKGROUND OF THE STUDY

The war on poverty generated several early childhood educational research studies during the 1960's to investigate the effects of different procedures for stimulation upon the development of the young child. The classroom programs which resulted from these studies have been concerned also, with parent involvement and parent education in an attempt to modify the school, home, and community environment which surround the child.

Early Training Project

The Early Training Project began its initial state of data collection in 1961 and its active program with children and parents in the spring of 1962. It was a field research study which concerned itself with the particular problem of progressive retardation, which tended to characterize the school progress of children reared in deprived circumstances and attending schools with children like themselves.[5] The children entered school at an initial disadvantage and fell further behind as they went through the years of schooling.

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[4]Educational Policies Commission, Universal Opportunity for Early Childhood Education: The Need for Early Childhood Education (Washington: National Education Association, 1966), p. 5.

[5]Susan W. Gray and Rupert A. Klaus, "The Early Training Project for Disadvantaged Children: A Report After Five Years," Monographs, Serial No. 120, Vol. 33, No. 4 (Chicago: University of Chicago Press, 1968), p. 1.

According to Gray and Klaus, the problem of progressive retardation actually became intensified in 1959.

> In 1959 the current tidal wave of interest in the problem was relatively new. The repercussions of the decision of Brown v. Board of Education of Topeka were being felt in the South. The heavy migration of southern highlanders, southern Negroes, and Puerto Ricans into the large urban centers of the North and Far West was causing problems elsewhere. Yet few active measures were being taken in a systematic way to plan programs to offset the progressive retardation clearly evident in the performance of the children of the poor.[6]

The Early Training Project proved that special intervention programs could have long-lasting effects in altering the aptitudes and attitudes of culturally deprived children in the direction of enabling them to perform more adequately in their school and outside life.[7] By 1966, the program concluded its fifth year and the interest in and execution of intervention projects for young deprived children had become nationwide.[8]

Public education in the United States is primarily a local or state responsibility or both, but early childhood education has been an exception. The federal government has been assuming responsibility for early childhood education as a means of coping with the urgent national problem of poverty affecting a large segment of society.[9]

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[6]Ibid.

[7]Ibid., p. 63.

[8]Ibid., p. 2.

[9]Barbara J. Harned, "The Federal Government and Preschool Education," The National Elementary Principal, Vol. L1, No. 1 (September, 1971), p. 96.

Project Head Start

One of the largest intervention programs that the federal government sponsored was Project Head Start, a program of the Office of Economic Opportunity, which in 1965 had 561,000 children in eight-week summer programs who would enter regular school for the first time that fall.[10] Centers opened in remote rural areas, suburban poverty pockets, inner-city ghettos, Eskimo villages, on Indian reservations, and among migrant groups.

> Since then, Project Head Start has grown to include full-year programs for preschool children age three and above. By 1970, Head Start had served more than 3,804,000 children from low-income families in 50 states, Puerto Rico, The Virgin Islands, and American Samoa.[11]

Head Start was initiated in Waterloo, Iowa, during the summers of 1965 and 1966, and has operated on a full-time basis since 1967. According to Klein, the following represents a brief summary of significant implications of Project Head Start on early childhood education:

> Advocation of a comprehensive approach to programming that considers the total developmental needs of young children.
>
> Influence on professionals and administrators to design programs that are relevant to the cultural and ethnic backgrounds of children and their family life-styles.
>
> Incorporation of parent involvement by bringing the total family unit into the learning process.
>
> Influence on the nation's kindergartens, day care centers, and nursery schools to maintain small adult-child ratios.
>
> Increasing acceptance of nonprofessional teacher aides by school systems, and social welfare and health aides by respective agencies.
>
> Advocation of career development for all staff in preschool programs.

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[10]Jenny W. Klein, "Head Start: National Focus on Young Children," The National Elementary Principal, Vol. L1, No. 1 (September, 1971), p. 99.

[11]Ibid.

Development of new curriculum materials for both young children and for teacher education.

Influence on institutions of higher education to include early childhood teacher education as part of their program.

Encouragement of extensive research in areas related to early childhood, both within and outside the federal government.

Extension of the concept of early evaluation of the growth and development of young children as it relates to their school experiences. As a result, better cumulative record keeping and articulation between preschools and primary grades now exist.

Demonstration that children of preschool and kindergarten age can learn more, faster, and at an earlier age than was thought previously. The result is an increasing demand for new and better teaching methods, provision of special services for early childhood programs, and high-quality experiences for young children.[12]

Home Start

Home Start began in Waterloo, Iowa, in 1968. It was funded under Title III of the Elementary and Secondary Education Act of 1965, and developed in cooperation with the University of Northern Iowa.

Home Start is designed to serve children during the three years preceding entrance into kindergarten. A trained volunteer visits a mother and her child in his home once a week for the purpose of improving the parent-child interaction. Educational toys are placed within the homes for the development of skills such as visual and auditory acuity, tactile activity, attention span and verbal and motor expression. This program provides enrichment at home which is intended to complement the educational methods and procedures that the children meet when they enter school.[13]

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[12]Ibid., p. 103.

[13]Home Start I, Preschool Project, Preschool Program in Compensatory Education (Waterloo, Iowa: Waterloo Community School District, 1971), pp. 2-6.

However, Head Start and Home Start evaluation reports suggested that preschool gains tended to dissipate when they were not reinforced in the primary grades, and that there was a need for a follow-up early education program.[14]

Follow Through Program

President Johnson first proposed the Follow Through Program in his State of the Union Message in January of 1967, and in December, the Congress gave its authorization. Section 222 (a) (2) of P.L. 90-22, Title II--Urban and Rural Community Action Programs reads:

> A program to be known as "Follow Through" focused primarily upon children in kindergarten or elementary school who were previously enrolled in Head Start or similar programs and designed to provide comprehensive services and parent participation activities . . . (to) aid in the continued development of children to their full potential.[15]

In order to assess the relative utility of different approaches in different settings, program developers became model sponsors. The model sponsors became associated with public school systems which had been identified by state, regional, and national educational agencies as both eligible for, and in need of, innovative programs that would lead to sustained gains for disadvantaged children.

From 1968 to 1970, there were 144 Follow Through projects with a total enrollment of about 37,000 children. In the school year 1970-1971, there were 155 Follow Through projects in the fifty states, the

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[14]Robert L. Egbert, "Follow Through," The National Elementary Principal, Vol. L1, No. 1 (September, 1971), p. 104.

[15]Ibid., p. 105.

District of Columbia, and Puerto Rico serving more than 60,000 children.[16]

Three elementary schools in Waterloo, Iowa, began using the Pittsburgh, Pennsylvania, Follow Through Program Model of individually prescribed instruction in 1971. The children coming out of Head Start, Home Start, and some day care facilities who live within the attendance areas of these three elementary schools, continue their education in the Follow Through project. Each child is tested to determine in which areas and levels he is ready to work. Learning activities are prescribed on these levels. The child progresses at his own rate and is tested again after the teacher feels that he has learned the material presented. If the child shows that he had learned the material, he progresses to the next area or level. Careful records are kept in order to see the progress that each child is making.

ASSUMPTIONS AND DEFINITIONS

Basic Assumptions

It is asked that the reader accept the premises that:

1. Many children are already seriously disadvantaged educationally by the time they are four years old.[17]

2. Many children have a higher potential for intellectual growth than is being developed by our current academic education system.[18]

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[16]Beverly Johnson, Follow Through, a phamphlet (Waterloo, Iowa: Waterloo Community Schools, 1972), p. 1.

[17]Home Start I, Preschool Project, loc cit.

[18]Earl S. Shaefer, "Toward a Revolution in Education," The National Elementary Principal, Vol. L1, No. 1 (September, 1971), p. 20.

3. The intellectual development of the child is not a clockwork sequence of events; it also responds to influences from the environment, notably the school environment.[19]

4. Instruction should lead intellectual development by providing challenging but usable opportunities for the child to forge ahead in his development.[20]

5. There is no good evidence so far to suggest that there is only one period of intellectual development sensitive to external intervention.[21]

6. External and situational factors affecting a group can alter internal self-esteem. Parents need to establish warm emotional relationships with their children, and to provide them with standards of behavior. It is through these parental actions that the child acquires a view of self and world that later is turned into performance in appropriate situations.[22]

7. Programs that sustain development and improve development are those that influence the total social environment and represent marked change in the child's social situation.[23]

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[19]Jerome Bruner, The Process of Education (Cambridge: Harvard University Press, 1961), p. 39.

[20]Ibid.

[21]Z. Stein and M. Susser, "Mutability of Intelligence and Epidemiology of Mild Mental Retardation," Review of Educational Research, Vol. 40 (February, 1970), p. 49.

[22]U. Bronfenbrenner, Two Worlds of Childhood: U.S. and U.S.S.R. (New York: Russell Sage Foundation, 1970), p. 65.

[23]Stein and Susser, loc. cit.

Limitations

The limitations to the study were many. They include:

1. The study was limited by the fact that all human beings are uniquely different from each other.

2. Groups rather than individuals were matched. Ranges of age, intelligence, physical, emotional, and social development may have introduced differences between the experimental and contrast groups.

3. Other uncontrolled variables, such as attitudes toward school, levels of family income, place of residence, and the members of the basic family unit may have had some effect upon achievement.

4. Differences in the preschool programs of the children enrolled in Home Start, Head Start, or day care centers also may have had some effect on school achievement.

5. Variance in the sex, race, and training of the teaching staff and classroom aides could have had possible influences on the research subjects as reflected in their achievement.

6. The location of the study was in the midwest section of the United States. Other geographic locations may influence the data.

7. The study was limited to three neighborhood centers with school enrollments of not less than fifty percent minority. Schools with a different racial composition may affect the data.

8. The treatment samples may not have equal representation from each of the three elementary schools by virtue of random sample procedures.

9. The investigation was limited to kindergarten children only, as the 1971-1972 school year was the first year of the Follow Through Program using the University of Pittsburgh instructional model.

10. The influence of parent involvement on the achievement data was not considered.

11. The "Hawthorne effect" of the new Follow Through Program could have affected educational gains. The teachers and children were introduced to differing instructional environments which could have resulted in increased output.

Definitions

PEP instructional units. Instructional objectives that are closely related have been grouped to form instructional units. The instructional units are grouped to maximize the student's learning success and also for ease of administrational and classroom management.[24]

PEP diagnostic post-test. A diagnostic achievement test developed to assess mastery of each of the PEP instructional objectives. The diagnostic post-test is used to assess the competency level of a student's learning performance in terms of a specific objective that he has failed on the pre-test.[25]

Mastery. A stated criterion of minimum acceptable competency in performing a specific behavior.[26]

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[24]Warren Shepler, Follow Through Program Sponsor, Learning Research & Development Center Model for Individualizing Instruction, Manual, Sec. 3 (Pittsburgh: University of Pittsburgh, 1971), p. 6.

[25]Ibid., pp. 7, 19.

[26]Ibid., Sec. 2, p. 20.

Kindergarten. A kindergarten is hereby defined as that part of an elementary school which provides a program of educational activities especially planned for developing the potentialities of children of school age who are past nursery school age but who have not been enrolled in first grade.[27]

Preprimary. The preprimary level is intended only for beginning groups of children during the year or years preceding the primary level. Preprimary level is defined as inclusive of prekindergarten and kindergarten programs.[28]

Preschool. Preschool as used in this study pertains to children before the age of entrance into kindergarten.

Primary. The primary level is a distinct organization within an elementary school for pupils in the primary grades, usually equivalent to grade one through grade three.[29]

Many authors use the terms nursery school, preschool, prekindergarten, and preprimary interchangeably in their publications. The reader should be alerted to this confusing practice when reading the literature. Throughout this study, the terms "kindergarten" and

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[27]The State Board of Public Instruction, Educational Standards, Filed in Compliance with Section 257.25, subsection 10, 1966 Code of Iowa (State of Iowa: State Board of Public Instruction, 1967), p. 8.

[28]Diane B. Gertler, Preprimary Enrollment of Children Under Six: October 1967, U.S. Department of Health, Education and Welfare, Office of Education, National Center for Educational Statistics (Washington: Government Printing Office, 1968), p. 19.

[29]Ibid.

"preprimary" most accurately reflect the programs to which this thesis is devoted.

Summary

This chapter cited the main research problem, the purpose, its importance and the background of the study. Federal involvement in early childhood education has had several positive effects. It has made preschool education more available and reached many children who may not otherwise would have had the benefits of preschool education. Federal involvement has also helped to develop public awareness of the advantages of preschool programs, and has involved people at local levels in innovative programs.

Research has shown that the first few years of life are the period of most rapid physical and mental growth. Deprivations in the early years can be compensated for only with great difficulty in later years.

The Early Training Project proved that early intervention programs could have long-lasting effects in helping culturally deprived children to perform more adequately in school and outside life. Head Start demonstrated that preprimary children can learn more, faster, and at an earlier age than was thought previously. Follow Through Programs were designed to aid in the continued development of children to their full potential.

This study centers on one of many variables that contribute to the academic achievement of kindergarten children: preschool experience. The central question to be answered by this investigation is: What effect does preschool experience have upon the kindergarten achievement of the

subjects? Does preschool experience help prepare children to make the most of their kindergarten experiences?

Chapter 2

REVIEW OF RELATED LITERATURE

The purpose of this chapter is to review studies pertinent to this investigation. They will be presented under two general headings: (1) Experiential Growth, and (2) Preschool Learning Experience.

This chapter will be organized so as to provide research related to early childhood education. The research related to Experiential Growth was presented according to the Genetic Position, the Environmentalist Position, and the Interactionalist Position. The aspect of culture was included in the discussion of organism-environment interaction. Within the culture, the influence of social class membership upon behavior development was discussed.

The research related to Preschool Learning was presented to contrast the influences of non-planned experiences in the home with the influences of planned experiences in Home Start, Head Start, and certain types of nursery school programs.

The central thought in citing such research was to ascertain if there are benefits of preschool programs. Also, that the research generalizations which emerge from an investigation of such data will be beneficial to one studying preschool education.

EXPERIENTIAL GROWTH

Introduction

The research was presented under the heading Experiential Growth according to the geneticist, environmentalist, and interactionalists's

positions. The research showed that a geneticist would say that the genes set limits on an individual's potential. An environmentalist would say that the environment from the moment of birth strongly influences what a child may become. The interactionalist's position showed that "the whole child" was not only a product of his genetic or environmental background, but was a combination of both factors.

Geneticist Position

Generally, geneticists would agree that a person's behavior at a moment in time depends upon what has happened to his body and mind since birth. Although one can apply various statistical techniques to support different sets of assumptions, an individual is the total of his heredity and environment.[1]

Caspari states that genetically, every human being is unique and different from every other human being that is in existence today, that ever existed, and that ever will exist. The uniqueness of the individual will express itself in the unique way in which it will react to a specific environment.

> The main contribution which a geneticist can make to educational research is to stress the fundamental biological fact that every human being is a unique individual and that his genetic individuality will be expressed in the way he reacts to environmental and educational experiences.[2]

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[1]Ira J. Gordon, On Early Learning: The Modifiability of Human Potential (Washington: Association for Supervision and Curriculum Development, NEA, 1971), p. 4.

[2]Ernst Caspari, "Genetic Endowment and Environment in the Determination of Human Behavior: Biological Viewpoint," Readings in Research in Developmental Psychology (Glenview, Illinois: Scott Foresman and Co., 1971), pp. 78-79.

According to Gordon, the chances for any individual to accomplish success will be determined by his own individual life experience and his own individual biological makeup, and cannot be predicted upon the basis of his group membership. Educators are extremely influential in what a child will become by virtue of the opportunities and experiences provided for him.[3]

Lenneberg, in discussing language development, states:

> The nonbiologist frequently and mistakenly thinks of genes as being directly responsible for one property or another; this leads him to the fallacy, especially when behavior is concerned, of dichotomizing everything as being dependent on either genes or environment. Genes act merely on intercellular biochemical processes, although these processes have indirect effects on events in the individual's developmental history. Many alterations in structure and function indirectly attributable to genes are more immediately the consequence of alterations in the schedule of developmental events.[4]

Educators are looking at the genetic contribution in combination with an individual's development. As a child grows he develops new organization, new combinations, and new integrations which represent a qualitative as well as a quantitative difference from his previous level.[5]

Environmentalist Position

Although genes define potential limits of intellectual growth, they do not fix the actual growth. Environment can affect enormous changes within the limits set by physical potential.

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[3]Gordon, loc cit.

[4]E. Lenneberg, "On Explaining Languages," Science, Vol. 164 (May, 1969), p. 638.

[5]Gordon, op. cit., p. 5.

Hunt has thought it is obvious that the genes operate both to prescribe certain basic directions in organismic development and to set irrevocable limits on the range of capacities that can be developed within an organism. Hunt goes on to say, however, that the genes set limits on the individual's potential for intellectual development, but they do not guarantee that his potential will be achieved or fix the level of intelligence as it is commonly measured.[6]

Hunt took the point of view from the following data that environmental conditions during the early months of life, when maturation is most rapid, was especially important for future intellectual development. In studies involving 1724 pairs of twins, it was reported by Hunt that the intelligence of the twins averaged lower than that of the singletons. In another study reported by Hunt, the tested intelligence of children in families with only two widely separated in age was compared with that of children in families with only two close together in age. The intelligence of the more widely separated pairs was significantly higher than that of the less widely separated pairs.[7]

Lenneberg indicated a critical period related to brain development for language learning from studies with retarded or handicapped children before the age of four.

> A survey of children with a variety of handicaps shows that their grasp of how language works is intimately related to their general cognitive growth which, in turn, is partly dependent on physical maturation and partly on opportunities to interact with a stimulus-rich environment.[8]

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[6]J. McV. Hunt, Intelligence and Experience (New York: The Ronald Press Company, 1961), pp. 6-7.

[7]Hunt, Ibid., p. 342.

[8]E. Lenneberg, "On Explaining Languages," Science, Vol. 164 (May, 1969), p. 639.

Bloom studied the relationships between early child experience and later personality and intellectual development. Using correlation statistics between early and late measures on the same set of children, he reported that,

> By about age four, 50 percent of the variation in intelligence at age 17 is accounted for, and . . . in terms of intelligence measured at age 17, from conception to age four, the individual develops 50 percent of his mature intelligence; from four to eight, he develops 30 percent, and from ages eight to 17 the remaining 20 percent. . . . we would expect the variations in the environment to have relatively little effect on the IQ after age eight, but we would expect such variations to have marked effect on the IQ before that age, with the greatest effect likely to take place between the ages of about one to five.[9]

Bloom made the assumption that the early years are fundamental and the most vital research problems in the behavioral sciences are those centered around the effects of early learning and early environments on humans. He feels that much more study still needs to be done to satisfactorily describe the learning process as it takes place in the first few years of life.[10]

Environmental imputs begin at birth, according to Gordon, and they are conveyed to the child by family or family substitutes who operate in terms of their own conditions of life, including ethnic, social class, national, and culture patterns. These inputs interact with the child's own developing organism so that he, in his own uniqueness, develops his own interpretation, his own synthesis of the experiences, and defines his self accordingly. He is, and . . .

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[9]Benjamin S. Bloom, Stability and Change in Human Characteristics (New York: John Wiley & Sons, Inc., 1964), p. 68.

[10]Ibid., p. 216.

> . . . will be neither a simple product of the Huxleyian test tube nor the Skinnerian Walden. The body with which he is born will certainly influence the way he will organize and structure his world, but what we provide for him to organize and structure and the way we provide it will be the food upon which he grows.[11]

What the child may become is strongly influenced by the way he is brought up from the moment of birth. This seems to be the important point. Not only his personality but also his level of competence may be influenced. Gordon further states that there are ten affective factors which influence intellectual and personal behavior and development.

> The affective factors are: consistency of management; the differentiation of self; the disciplinary pattern; the emotional security and self-esteem of the parent; impulsivity of the parent; the parent's belief in internal versus external control of his destiny; the amount of babying and protectiveness shown toward the child; the trusting attitude of the parent toward the "establishment;" the willingness to devote time to the child; and the parent's work habits.[12]

Interactionalist Position

The interactionalists say that much of a child's eventual mental development can be attributed to the quality and quantity of contact with people.

According to Curtis and Boultwood, John Dewey could see no end to the possibilities of change. The possibilities dependent not only on something innate in the organism, but arising from the interrelations and cross-modifications of organism and environment.[13]

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[11]I. J. Gordon, Parent Participation in Compensatory Education (Urbana: University of Illinois Press, 1970), p. 157.

[12]Ibid., p. 9.

[13]S. J. Curtis and M. E. A. Boultwood, A Short History of Educational Ideas, 4th Ed. (London: University Tutorial Press LTD, 1953), p. 473.

Kagan and Moss make a basic assumption of developmental theory that adult behaviors are often established in early childhood. They say that theoretical essays on personality development emphasize that the early dependence of the child on the parent is of the utmost importance in shaping his future personality. The development of a variety of adult motives and behaviors are based on the quality and intensity of the dependent relationship with the mother and mother substitute figures.[14]

A longitudinal research program of the long term stability of childhood behavior patterns was conducted by Fels Research Institute. Kagan and Moss have presented a paper which presents one set of results which have emerged from the Fels longitudinal research population of a group of "normal" adults for whom extensive information was available from birth through adolescence.

> . . . This report dealt specifically with the long term stability of passive and dependent behavior from childhood through adulthood. . . . The results revealed that passive and dependent behaviors were quite stable for women, but minimally stable for men. Over 60 per cent of the correlations between the childhood (ages 6 to 10) and adult ratings of dependency were statistically significant for females, while only nine per cent were significant for men. . . . It was suggested that environmental disapproval and punishment of dependent behavior in young males led to inhibition of and conflict over dependency in the growing boy. The social acceptance of passive and dependent behavior in females would be expected to result in greater stability for this class of responses for women than for men.[15]

The Berkeley Growth Study is another extensive longitudinal research program in which maternal and child behaviors have been

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[14]Jerome Kagan and Howard A. Moss, "The Stability of Passive and Dependent Behavior from Childhood Through Adulthood," Research Readings in Child Psychology, ed. David S. Palermo and Lewis P. Lipsitt (New York: Holt, Rinehart and Winston, Inc., 1963), pp. 96-97.

[15]Ibid., pp. 107-108.

recorded, processed, and intercorrelated with each other, with socio-economic variables, and with the children's mental and motor test scores. Bayley and Schaefer described it as a systematic study of a small but relatively constant sample that has been studied for the first eighteen years of life to afford a view of both stable and changing correlations of other variables with the processes of intellectual development. Their findings showed that the nature of the maternal behaviors, the nature of the child's own behaviors, the sex of the child, as well as a multitude of other genetic and environmental conditions all played some part in the complex patterns of interaction in the development of intelligence.[16]

> The correlations exhibit systematic shifts in pattern with changing age of the children, and these age changes in pattern differ according to sex. In general, the boys' intelligence is strongly related to the love-hostility dimension of maternal behavior. Hostile mothers have sons who score high in intelligence in the first year or so, but have low IQ's from 4 through 18 years. The highly intelligent boys, in addition to having loving mothers, were characteristically happy, inactive, and slow babies, who grew into friendly, intellectually alert boys and well-adjusted extraverted adolescents. The girls who had loving, controlling mothers were happy, responsive babies who earned high mental scores. However, after three years the girls' intelligence scores show little relation to either maternal or child behavior variables . . . The impact of the environment (maternal behavior) on infant boys is persistent: both their behaviors and their intellectual functioning tend to become fixed by the third year and to persist, at least through 18 years. The girls' intellectual functioning, on the other hand, appears to be more genetically determined. It is as though the girls continually readjust their behavior to the concurrent environmental conditions. However, their intelligence is relatively independent of those maternal and child behaviors which are evidently important for the boys.[17]

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[16]Nancy Bayley and Earl S. Schaefer, "Correlations of Maternal and Child Behaviors with the Development of Mental Abilities: Data from the Berkeley Growth Study," Monographs, Vol. 29, No. 6 (Ohio: The Antioch Press, 1964), p. 5.

[17]Ibid., p. 71.

Piaget's ideas seem to be consistent in nature to those of Bayley and Schaefer. Piaget had pictured behavioral development as a process of changes in the structure of behavior and of thought that come with the child's interacting with his circumstances. Piaget's position is neither hereditarian nor environmentalistic; it is both. It is interactionist.[18]

John B. Watson claimed that with the control of the circumstances to be encountered by any healthy infant from birth to seven years, he could make of that infant anything desired. This has been the nature of environmentalism at its most extreme, according to Hunt, and it is a view that also emphasizes action in the process of learning and that minimizes the role of perception and of the central processes.

According to Hunt,

> Piaget's observations are highly dissonant with such a form of extreme environmentalism. In place of a repertoire of numerous minuscule reflexes, Piaget finds in the human neonate a very limited number of quite highly organized behavioral systems. These include: (a) sucking, (b) looking, (c) listening, (d) vocalizing, (e) grasping, and (f) the various motor activities of the trunk and limbs. Piaget emphasized that each of these is a ready-made sensorimotor organization at the human infant's birth.[19]

Also, according to Hunt, Piaget's acceptance of the existence of a few behavioral systems rather than numerous reflexes, implies a theoretical conception of the nature of behavioral organization at birth intermediate between the predeterministic view on the one hand and extreme environmentalism on the other. Piaget's observations tend to

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[18]J. McV. Hunt, Studies in Cognitive Development: Essays in Honor of Jean Piaget, ed. David Elkind and John H. Flavell (New York: Oxford University Press, 1969), p. 11.

[19]Ibid., p. 14.

confirm the following intermediate view:

> Orderliness in the course of development derives not only from genetic preprogramming, but also from the nature of the manner in which these ready-made sensorimotor systems are capable of being coordinated and differentiated in the course of the infant's interaction with his environmental circumstances.[20]

A study was made by Shirley of twenty-five children during the first two years of life which examined the relationship between body growth and motor development. Shirley's study, conducted at the Institute of Child Welfare at the University of Minnesota, applied uniform methods to record when a given response began or ended. In this study, the term "maturation" was used to connote the sum total of the growth processes. A summary of Shirley's study follows:

> Progress in motor control follows an orderly sequence beginning at the head and traveling toward the feet. The sequence as determined from the medians of the group holds for individual babies, and it includes, in addition to items specifically tested for, items of motor play that occurred spontaneously. Hence it is unlikely that the sequence is merely the by-product of the tests. The sequence of development strongly supports the maturation theory of motor development. It appears that maturation gives ability to do motor acts and that subsequent practice gives proficiency in doing them.[21]

The same individuals from the Shirley study were studied by Neilon when they were seventeen years of age in an attempt to investigate the constancy of personality. The study showed that individuality does exist in early infancy and that the pattern of some aspects of personality shown in infancy continues through life. Following are the conclusions of the investigation.

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[20]Ibid., pp. 15-16.

[21]Wayne Dennis, "Environmental Influences Upon Motor Development," Readings in Child Psychology, 2nd. Ed. (New Jersey: Prentice-Hall, Inc., 1963), p. 82.

1. Personality similarities in an individual persist over a period of time.

2. Some individuals are more readily identifiable after a period of time, presumably due to greater uniqueness of personality pattern.

3. The matching technique, utilizing total impression, allows for the demonstration of similarities in personality pattern in the same individual over a period of time.[22]

The investigation by Neilon was another example of organism-environment interaction which revealed that there was enough in common between two personality descriptions of each of a series of persons to permit correct matchings at better than a chance level.

Gesell also discussed organism-environment interaction. He wrote,

> The constitution and conditions of the organism are intimately interdependent. The organismic pattern of one moment, responsive to both internal and external environment, influences the pattern of succeeding moments.[23]

The aspect of culture is important in the discussion of organism-environment interaction, according to Gesell. Interactionism, notes Gesell,

> . . . serves to show how supremely important it is for society to achieve through education and family life on optimal culture to insure a maximum of growth to infants and children. Culture provides the milieu . . . the conditions of growth. It provides a vast complex of symbols, cues, and foci of interest, which are assimilated into the very texture of the growing personality. Culture operates most profoundly and projectively in the first five years of life.[24]

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[22]Patricia Neilon, "Shirley's Babies After Fifteen Years," Readings in Child Psychology, ed. Wayne Dennis (New Jersey: Prentice-Hall, Inc., 1963), pp. 475-485.

[23]Elkind and Flavell, op. cit., p. 6.

[24]Ibid., p. 7.

Effect of culture. To a great extent, according to Gordon, the self of the child is a product of the experiences that his culture provides for him. Culture gives the child ways to organize his perceptions through its language structure and communications. Culture brings the child into contact or prevents him from having relationships with certain people, it teaches him the values he should hold as good, and the attitudes he should hold toward himself and others.[25]

> The culture is taught primarily through the people who surround the child, and he learns through the processes of identification with these people and through differentiation. As he emerges from the home, he carries with him his family culture, a distillation of various subcultures to which he belongs. His experiences in school and in the world at large continue to both enhance and modify his concept of self and his view of the world.[26]

Anastasi discusses that social class membership may have an influence upon behavior development within the culture. The social level of an individual

> . . . may determine the range and nature of intellectual stimulation provided by home and community through books, music, art, play activities, and the like. Even more far-reaching may be the effects upon interests and motivation, as illustrated by the desire to perform abstract intellectual tasks, to surpass others in competitive situations, to succeed in school, or to gain social approval. Emotional and social traits may likewise be influenced by the nature of interpersonal relations characterizing homes at different socio-economic levels.[27]

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[25]Ira J. Gordon, Human Development: From Birth to Adolescence (New York: Harper & Row, 1969), p. 145.

[26]Ibid.

[27]Anne Anastasi, "Heredity, Environment, and the Question "How?," The Causes of Behavior: Readings in Child Development and Educational Psychology, ed. Judy F. Rosenblith and Wesley Allinsmith (Boston: Allyn and Bacon, 1962), p. 23.

Mussen, Conger, and Kagan reported that there are marked social-class differences in all phases of language ability. They said that children from lower-class families, in comparison to those from upper-class homes, had lower vocabulary scores, less advanced sentence structure, poorer sound discrimination, and poorer articulation.[28]

> . . . Infants of working-class families vocalized less than those from middle-class homes. Thus, from age 1 through age 5, upper-middle- and upper-class children are superior in all aspects of language behavior.[29]

Disadvantaged children. Havighurst has said that in all of our big cities, and in many smaller cities and rural counties, educators have been trying to find better ways of teaching children who have been called "culturally deprived," "intellectually deprived," or "socially disadvantaged." Havighurst defined a child as being socially disadvantaged if he is (1) disadvantaged for living competently in an urban, industrial, and democratic society; or (2) one who is handicapped in the task of growing up to lead a competent and satisfying life in the American society.[30]

The socially disadvantaged children were described by Havighurst in terms of certain family characteristics relating directly to the child and in terms of their personal characteristics.

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[28]Paul Henry Mussen, John Janeway Conger, and Jerome Kagan, Child Development and Personality (New York: Harper Row, 1963), pp. 238-239.

[29]Ibid.

[30]Robert J. Havighurst, "Who Are the Socially Disadvantaged?," Knowing the Disadvantaged, ed. Staten W. Webster (San Francisco: Chandler Publishing Company, 1966), pp. 20-22.

Compared with other children whose families give them average or better advantages for getting started in modern urban life, the socially disadvantaged child lacks several of the following family characteristics:

> A family conversation which: answers his questions and encourages him to ask questions; extends his vocabulary with words and with adjectives and adverbs; gives him a right and a need to stand up for and to explain his point of view on the world.
>
> A family environment which: sets an example of reading; provides a variety of toys and play materials with colors, sizes, and objects that challenge his ingenuity with his hands and his mind.
>
> Two parents who: read a good deal; read to him; show him that they believe in the value of education; reward him for good school achievement.[31]

Liddle and Rockwell described the disadvantaged child as usually having an insufficient quality of stimulation.

> His home is crowded and the TV is blaring, but the stimulation lacks variety and meaningfulness, and the language he hears is unlike that he will be expected to use at school. What he sees on television is not interpreted to him so its educational usefulness is limited. Viewing the late show, quite common among disadvantaged children, inhibits learning the next day. The disadvantaged child has too few toys and books, and too little opportunity to be read to or to engage adults in conversation.[32]

According to Havighurst, disadvantaged children come from family environments which produce certain personal deficits. Such children have inferior judgment concerning time, number, and other basic concepts. Havighurst reported that this inferiority is not due to physical defects

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[31]Ibid.

[32]Gordon P. Liddle and Robert E. Rockwell, "The Role of Parents and Family Life," Educating the Disadvantaged Learner, ed. Staten W. Webster (San Francisco: Chandler Publishing Company, 1966), p. 399.

of eyes, ears, and brain, but is due to inferior habits of hearing, seeing, and thinking.

> Presumably, the family environment of these children did not teach them to "pay attention" to what was being said around them, or to the visual scene. Then, when they came to school, performance suffered because they had not learned to "listen" to the teacher and other important people or to "see" the things they are shown in the school.[33]

Havighurst stated that the socially disadvantaged could learn more rapidly and efficiently if they had more concrete experience on which to base their vocabulary and their reasoning skills. He felt that the school curriculum should provide for more building of "readiness" for reading and arithmetic in the preschool and primary grades. Havighurst concluded by saying that the socially disadvantaged are a group that need special attention in the schools and special help to assist them to overcome the disadvantages conferred on them by their families.[34]

The child is a total organization, according to Gordon, and although we may divide him up for the convenience of study, all of our categorizations are artificial constructs.

> The old progressive education slogan of "the whole child" emerges in new fashion as we reintegrate inner and outer, knowing and feeling, and recognize that the child's behavior always reflects his unique combination of all of these factors operating in relation to a specific situation.[35]

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[33]Havighurst, op. cit., p. 25.

[34]Ibid., p. 29.

[35]Ira J. Gordon, On Early Learning: The Modifiability of Human Potential (Washington: Association for Supervision and Curriculum Development, NEA, 1971), p. 12.

PRESCHOOL LEARNING

Introduction

Bruner has said that, "any subject can be taught effectively in some intellectually honest form to any child at any stage of development."[36] It was within this context that the writer attempted to show that early learning experiences are helpful to the individual. Although preschool experiences per se are good, it was felt that planned experiences versus non-planned experiences were better.

Bloom has stated that approximately fifty percent of general achievement at grade twelve (age 18) has been reached by the end of grade three (age 9).

> This suggests the great importance of the first few years of school as well as the preschool period in the development of learning patterns and general achievement. These are the years in which general learning patterns develop most rapidly, and failure to develop appropriate achievement and learning in these years is likely to lead to continued failure or near failure throughout the remainder of the individual's school career.[37]

It may be that retardation is temporary in humans from lack of early learning experiences and can be overcome by later experience, theorizes Gordon; but, as in sports, the game of "catch-up" is far harder to win than the game of staying ahead. When later experience, in the school years and beyond, is built upon the base of a good beginning, growth continues to be enhanced.[38]

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[36]Jerome Bruner, The Process of Education (Cambridge: Harvard University Press, 1961), p. 33.

[37]Benjamine S. Bloom, Stability and Change in Human Characteristics (New York: John Wiley & Sons, Inc., 1964), p. 127.

[38]Ibid., p. 15.

Historical Review of Preschool Organizations

Early childhood programs have been a part of American education for over a century. Hammond traced the development of schools in the United States from 1855 to 1960.[39] A summary of his findings in chronological order follows:

1855--The first kindergarten was established in the United States at Watertown, Wisconsin.

1873--The first public kindergarten was established in St. Louis. Prior to this date, kindergartens were established and maintained largely from private funds.

1917--The Iowa Child Welfare Research Station was established under a state legislative grant.

1920--The Merrill-Palmer School of Detroit, was established through a trust fund. It emphasized educational guidance of parents and children, in contrast to programs of custodial care hitherto considered adequate for children of working mothers.

1922--A nursery school demonstration center for student study and practice was opened at Merrill-Palmer School.

1923--Through the Laura Spelman Rockefeller Memorial, grants were made available whereby child study centers were developed or expanded at various universities.

1920 to 1932--During this period, the number of nursery schools reported to the United Office of Education increased from three to 203. During this same decade the evidence supporting the need for schools for young children centered around the needs of the only child, limited play

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[39]Sarah Lou Hammond, Good Schools for Young Children (New York: The Macmillan Company, 1963), pp. 48-51.

space at home for children, women seeking employment outside the home and needing care for their children, and parents seeking the best environment for the development of their children.

1933--The provision for children's centers as a part of the Federal Emergency Relief Administration was the first time schools for young children became an integral part of a federally supported program designed to relieve unemployment and to supplement existing educational programs. Many and varied laws and regulations resulted from the study of these programs in the centers for underprivileged children.

1930-1942--Two national emergencies, one of financial depression and the other, the war period, greatly expanded the demand for schools for young children. The war-created emergency schools were developed in 1942 through the cooperative endeavors of the federal government and national education organizations to provide adequate care for children of working mothers. This program was later administered by the Work Projects Administration.

1942--As women were mobilized for war emergency work and to replace men in service, attention was brought to focus on the need for legislation to insure that schools for young children provided an educational experience in a satisfactory environment. The Lanham Act provided for federal programs for the care of children of working mothers and for programs to assist the states in establishing needed services.

1943--Thirty-nine states had developed plans for extended school services to be developed under state and local educational agencies, and thirty states had similar plans for child-welfare programs to be administered by welfare agencies.

1950--At the White House Conference, the citizens attending expressed their approval of education for young children through this recommendation: "as a desirable supplement to home life, nursery schools and kindergartens, provided they meet high professional standards, should be included as a part of public opportunities for all children."

1959--In a U.S. Office of Education study, it was reported that there were 102,000 public elementary schools in the nation. Of this number, 70 percent maintained kindergartens and five percent maintained nursery schools.

1960--In the White House Conference, three forums recommended that free public education be extended downward to include kindergartens as a part of the school system.

Effect of Early Experience

Development may be retarded from lack of early experiences. Mothering and adult-child interaction is very important during the first year of life but an early restrictive environment does not appear to have permanent effects. Excellent learning enhances development, however, lack of such learning in one time period may not be made up fully in a later period.

Development depends upon experience, according to Gordon. Provision of early experience enhances development; lack of experience retards it.[40]

In a study reported by Bloom, if identical twins are separated but placed in very similar environments, it is likely that they will have

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[40]Ibid., p. 15.

very similar intelligence test scores, whereas if placed in very different environments, their intelligence test scores will be quite different.[41]

Bloom takes the view that:

> Intelligence is a developmental characteristic in that the mental age or I.Q. compares the general learning of an individual with the progress in the learning of selected samples of behavior made by representative samples of individuals at different ages. . . . If general intelligence is a developmental characteristic and is related to the time it takes the individual to learn various concepts, skills, etc., it would seem reasonable that lack of such learning in one time period may be difficult or impossible to make up fully in another period, whereas unusually excellent learning in one time period is not likely to be lost in a subsequent period.[42]

Hunt states that the studies of R. A. Spitz in 1945, probably have had more influence than any others in convincing many people, especially from the professions of psychiatry and social casework, that intelligence is not fixed but plastic and modifiable and that mothering is crucial during the first year of life.[43]

Dennis and Najarian also studied the effects of early experiences. Their report was concerned with behavioral development in an institution called the Creche in Beirut, Lebanon, whose care of infants was similar in some respects to the study described by Spitz. "Mothering" and all other forms of adult-child interaction were at a minimum because the institution was seriously understaffed. The children came to the institution shortly after birth and remained there until six years of age.

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[41]Benjamin S. Bloom, op. cit., pp. 68-70.

[42]Ibid., p. 71.

[43]J. McV. Hunt, Intelligence and Experience (New York: The Ronald Press Company, 1961), p. 33.

Contact with the mother ceased upon the child's entrance to Creche and the contact with mother-substitutes was slight because the adult-child ratio was one to ten. Comparison data were available from American norms and from certain groups of Lebanese subjects.[44]

Dennis and Najarian found that in terms of developmental quotients, the mean quotient at two months was approximately 100. Between three and twelve months the mean was 63. In the tests given at the four- and five-year level, the mean scores were roughly 90. A conclusion from the data follows:

> Retardation in the last 9 months of the first year to the extent of a mean IQ of 65 does not result in a generally poor performance at $4\frac{1}{2}$ to 6 years, even when the child remains in a relatively restricted environment. The study therefore does not support the doctrine of the permanency of early environmental effects.[45]

Changing intelligence patterns. Studies have shown that an improved environment stimulates learning. However, most change takes place at an early age and an improved environment has a decreasing effect with increasing age. Studies have also shown that intelligence test scores do not accurately reflect the basic learning abilities of culturally disadvantaged children. The lack of opportunities afforded by their environment may limit the developed skills disadvantaged children bring to a learning situation, but parental influences may have a greater effect on their intellectual and personal behavior and development.

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[44]Wayne Dennis, and Pergrouhi Najarian, "Development Under Environmental Handicap," Readings in Child Psychology, 2nd. Ed. (New Jersey: Prentice-Hall, Inc., 1963), pp. 315-331.

[45]Ibid., pp. 329-330.

Two studies which contributed to the research regarding the pattern of change of intelligence in relation to the environment are those of Kirk and Lee. In the Kirk study, mentally retarded children in an institution were given a one year preschool experience intended to stimulate their learning. The children were tested prior to the preschool experience, at about four and one-half years of age, retested at the end of the preschool experience, and then tested again several years later. Another group of children in the institution was used in the contrast group. With only two exceptions, individuals in the experimental group gained in a consistent pattern.[46]

The Lee study followed several groups of minority children with repeated tests until the ninth grade. It was reported that:

> The children who were born in Philadelphia maintained about the same mean scores from grades 1 to 9. The children who were born in the South and moved to Philadelphia by age 6 gained an average of $6\frac{1}{2}$ I.Q. points from grades 1 to 9. The children who were born in the South and moved to Philadelphia by grade 4 gained about 3 I.Q. points from grades 4 to 9, whereas the children who were born in the South and moved to Philadelphia by grade 6 gained only 2 I.Q. points during the period grades 6 to 9.[47]

The conclusion of the study, according to Lee, is the decreasing effect of an improved environment with increasing age. Lee also noted that the greatest changes took place in the first few years of a child's life in the new environment.[48]

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[46]Samual Kirk, Early Education of the Mentally Retarded (Urbana: University of Illinois, 1958), p. 16.

[47]Earl Lee, "Negro Intelligence and Selective Migration: A Philadelphia Test of the Klineberg Hypothesis," American Sociological Review, 16 (1951), pp. 227-233.

[48]Ibid.

Jensen reports that, "Tested IQ correlates highly with learning ability in middle-class children. IQ correlates negligibly with learning ability in lower-class children."[49]

> The rate of acquisition is a function of the basic learning abilities and the opportunities afforded by the environment. In a good environment we should therefore expect to find a very high correlation between learning ability and intelligence. Educability is the ability to learn school subjects by means of classroom instruction. To profit from ordinary classroom instruction, the learner must bring many developed skills to the situation: the voluntary control of attention, the perception of order, self-initiated rehearsal of newly acquired behavior, self reinforcement for successful performance, . . . and etc. In short, the learner himself must be able to act on the instructional input in order to master it. An intelligence test score is one indication of the degree to which a child has the equipment to act so as to be educable by ordinary means.[50]

Jensen concluded that it is the lack of these cognitive skills tapped by intelligence tests and required for educability, rather than in basic learning abilities, that culturally disadvantaged children differed most from typical middle-class children.[51]

Gordon listed nine parental cognitive factors which have been identified by laboratory or field research as having influenced intellectual and personal behavior and development:

> . . . amount of academic guidance provided for the child; the parent's cognitive operational level and style; the presence of planned cultural activities; the amount of direct instruction of the child; the educational aspirations for the child; the use of external resources such as kindergarten and nursery; the

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[49]Arthur R. Jensen, "Social Class, Race, and Genetics: Implications for Education," Readings in Research in Developmental Psychology, ed. Ira J. Gordon (Glenview, Illinois: Scott Foresman and Co., 1971), p. 65.

[50]Ibid.

[51]Ibid.

> intellectual climate of the home as evidenced by books, etc.; the verbal facility of the parents; and the frequency of verbal contact between parent and child.[52]

Curriculum patterns. A number of studies was cited to show the benefits of nursery and kindergarten experience. It was not always possible to separate the influences of home atmosphere from the influences of school attendance itself, however, several responses were cited that did appear to be strengthened as a result of school experience. Today's American kindergartens bear some likenesses to the schools of Froebel and Montessori and place emphasis on the development of the individual child as he operates in a group. Recent studies indicated that young children could learn significant concepts informally through established kindergarten experiences in active exploration and discovery without imposition of new restraints.

According to Mussen, Conger, and Kagan, the basic aims of the nursery school include the promotion of personal adjustment and the improvement of social relations. They feel that in many cases, the nursery school affords the child his first contact with groups of peers, and thus marks the beginning of peer influences.[53]

> Some of the responses learned at home are likely to be reinforced further in nursery school and hence to acquire greater habit strength. Other responses are likely to be punished by peers or nursery school teachers and hence to lose habit strength. It might therefore be anticipated that the

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[52]Ira J. Gordon, Parent Participation in Compensatory Education (Urbana: University of Illinois Press, 1970), pp. 8-9.

[53]Paul Henry Mussen, John Janeway Conger, and Jerome Kagan, Child Development and Personality, 2nd Ed. (New York: Harper & Row, Publishers, 1963), p. 334.

child's behavior will change somewhat as a consequence of nursery school experience.[54]

Mussen, Conger, and Kagan reported upon a number of studies to evaluate either the immediate or long-time effects of nursery school attendance.[55] The following are the benefits they cited:

1. The nursery school children became less inhibited, more spontaneous, and more socialized after six months than the comparison group.

2. The nursery school children gained more than the other children in initiative, independence, self-assertion, self-reliance, curiosity, and interest in the environment.

3. In a fall observation, the children who had previously attended nursery school were more sociable than the others and spent a significantly greater proportion of their time in social activities.

4. Children attending nursery school eliminated more "undesirable" infantile, and dependent habits during the year than a matched group of peers who did not go to preschool.

5. Those who had attended nursery school longer than the contrast group showed fewer maladaptive reactions such as avoiding strangers, shrinking from notice, giving in easily, twisting their hair, tenseness, playing with fingers, wriggling, refusing food, enuresis, leaving tasks incomplete, and dawdling with food.

Sears and Dowley referred to a study by Thompson as being unique in research on teaching in the nursery school. They compared this experiment at the nursery school level to the Eight-Year Study of

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[54]Ibid.

[55]Ibid., pp. 335-336.

Chamberlin, Chamberlin, Drought, and Scott in 1942 at the high school level, and to studies by Jersild in 1939 and 1941 on activity group programs in nursery and elementary schools.[56]

Thompson's research design involved two different curricula for children in two matched groups for eight months. The study has been highly regarded because it was carried out in a naturalistic classroom rather than in a laboratory setting and the children were equated for personality traits on a number of measures: constructiveness, ascendance, social participation, leadership behavior, nervous habits, chronological age, intelligence quotient, and socioeconomic position of the parents. The preschool used in the experiment had experienced teachers with advanced training in preschool education, flexible and abundant play materials, children above average in intelligence, drawn from the upper two socioeconomic strata of a university city, and parents who had attempted to apply modern child development principles in rearing their children. Examination of the effects on the children at the end of the period showed strong differences between groups.[57]

> The results showed that Group B, the highly guided group, (1) was more constructive, when faced with possible failure, than Group A; (2) was more ascendant than Group A; (3) showed more participation; (4) showed more leadership; and (5) was significantly lower than those of Group A in destructive behavior.
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> No differences were found between the two groups in number of nervous habits; in IQ changes; in making rationalizations; in

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[56]Pauline S. Sears and Edith M. Dowley, "Research on Teaching in the Nursery School," Handbook of Research on Teaching, ed. N. L. Gage (Chicago: Rand McNally & Company, 1963), pp. 831-834.

[57]G. G. Thompson, "The Social and Emotional Development of Preschool Children Under Two Types of Educational Programs," Psychological Monographs, 56:5, 1944.

number of conflicts over property rights; and in getting equipment for the equipment's sake.

While results found here may not be applicable to other situations, this study is noteworthy for its careful control of the teaching method involved and the clear effects it revealed on the children experiencing these two environments. The children who were exposed to a personal guidance type of teacher method surpassed the children who had less personal guidance in the numerous ways mentioned.[58]

These studies are consistent in suggesting that children benefit from preschool attendance. The outstanding benefits seem to be advances in sociability, self-expression, independence, initiative, social adaptability, and interest in the environment. It is not always possible, in these studies on changes in human behavior, to separate the influences of home atmosphere from the influences of preschool attendance itself. Nevertheless, it seems reasonable to conclude that preschool attendance itself may play an important part in strengthening such responses as social outgoingness, independence, and self-expression which appear to be the responses highly rewarded in many schools.[59]

According to Headley, today's American kindergarten is a direct descendant of the German kindergarten of Froebel (1782-1852), but it has undergone many changes in the course of its existence in our country. Headley felt that it was only natural that a school planned for the youth of an old country steeped in tradition should fail to fulfill completely the requirements of the children of a young, pioneering, and intensely practical land. When the theories and practices of Madame Montessori (1870-1952) became known in the early part of the twentieth century, they

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[58]Ibid.

[59]Mussen, Conger, and Kagan, op. cit., p. 337.

were absorbed into the kindergartens already in existence with little difficulty.[60]

> At present there are few kindergartens in the country which can be labeled strictly "Froebelian" or "Montessorian;" yet every kindergarten today bears some likeness to both these schools.
>
> Many of the activities of the Froebelian school, such as singing, playing, talking, painting, gardening, modeling, weaving, looking at pictures and listening to stories, have been incorporated into our American kindergartens. . . .
>
> From the Montessori program we have taken over both procedures and materials dealing with the social and self-help aspects of the school. We have adopted Montessori's notions of children's responsibility for the housekeeping of the room. We have heartily agreed with her insistence on the importance of self-help and the exercises of practical life. . . .[61]

The objectives of the modern nursery school or kindergarten place the emphasis on the development of the individual child as he operates in a group, according to Hammond. The teacher strives to provide a stimulating environment in which appropriate materials and learning situations provide rich experiences for child guidance as he is motivated to learn.[62]

Hammond reported that:

> (1) Children with kindergarten experience tend to make relatively more rapid progress in the first five grades than children who have not attended kindergarten.
>
> (2) The proportion of first-grade repeaters in cities without kindergarten programs is much greater than in cities with programs.

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[60]Neith E. Headley, Education in the Kindergarten, 3rd. Ed. (New York: American Book Company, 1959), p. 32.

[61]Ibid., pp. 32-33.

[62]Sarah Lou Hammond, Good Schools for Young Children (New York: The Macmillan Company, 1963), pp. 52-53.

(3) Children in grades one through three with kindergarten background show a marked advantage in both reading rate and comprehension over children who have not attended kindergarten.[63]

Robison and Spodek undertook two studies to test whether kindergarten children could learn some meaningful beginning concepts within a discipline or body of knowledge. They implied a concurance with Bruner's suggestion that even young children could begin to learn significant concepts. Robison and Spodek emphasized children's efforts in active exploration and discovery.[64]

> Control data in both studies indicated that the significant progress made by the children could not have been attributed to maturation or to every day experience.
>
> The studies showed it was possible to organize learning experiences in kindergarten into discrete episodes which extended over a long period of time. . . . The studies indicated that intellectual learning could be pursued by children chiefly through established kindergarten experiences and activities, without imposing new restraints or formalities upon young children. . . . Meeting information and ideas in different contexts and through different kinds of experiences contributed to children's growing efforts to categorize, classify, and conceptualize.[65]

Almy noted that if educational experimentation of the early childhood years involved sufficient awareness of the repercussions it may have on the development of children's thinking at later levels, future historians may refer to the 1960's as the beginning of the renaissance of early childhood education.

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[63]Ibid.

[64]Helen F. Robison and Bernard Spodek, New Directions in the Kindergarten (New York: Teachers College Press, 1965), pp. 14-17.

[65]Ibid.

> Nursery and kindergarten education will emerge from the doldrums of the past ten or fifteen years and assume an importance equal to or perhaps even greater than first and second grades. In any event, it seems clear that education in the early childhood years can become more fruitful than is often the case at the present time.[66]

Summary

This chapter has presented the research related to early childhood education to ascertain the benefits of preschool programs. In summary, the research was presented under the heading Experiential Growth according to the geneticist, environmentalist, and interactionalist's positions. Studies showed that "the whole child" was not only a product of his genetic or environmental background, but a combination of both factors. The aspect of culture was included in the discussion of organism-environment interaction to show that the self of the child is a product of the experiences in his environment. A disadvantaged child was described as one who could not live competently in an urban, industrial, and democratic society, or one who is handicapped from growing up to lead a competent and satisfying life in America.

The child was described as a total organization and his behavior always reflects his unique combination of genetic and environmental factors operating in relation to a specific situation.

Research was presented under the heading Preschool Learning to show that early learning experiences were helpful to the individual. The historical review of preschool organizations in the United States

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[66]Millie Almy, "New Views on Intellectual Development in Early Childhood Education," Intellectual Development: Another Look, ed. A. Harry Passow (Washington: Association for Supervision and Curriculum Development, 1964), p. 22.

was summarized from 1855 to 1960. Studies showed that mothering and early experiences were very important but an early restrictive environment may not have permanent effects. Studies also showed that an improved environment stimulates learning but has a decreasing effect with increasing age.

The benefits of nursery and kindergarten experience were cited. The theories and practices of Froebel and Montessori were reported to have had the greatest influence in American kindergartens. More educational experimentation of the early years is needed, but it was noted that future historians may refer to the 1960's as the beginning of the renaissance of early childhood education.

Chapter 3

EXPERIMENTAL PROCEDURES

The purpose of this chapter is two-fold: (1) to establish the experimental design and procedures of this study; and, (2) to state the hypotheses under investigation.

THE RESEARCH DESIGN

Location of the Study

The study was conducted in the midwest section of the United States in Waterloo, Iowa, a community of approximately 80,000 persons. The principal industries include the building of tractors and meat packing. The schools in the community were built following the "neighborhood school concept." The children attend the school in their neighborhood unless they choose to be bused for desegregation and integration, or are bused to fill empty classrooms from overcrowded population areas. Of the 10,739 students enrolled in kindergarten through the sixth grade in thirty elementary schools, eleven percent were minority.

Subjects of the Investigation

The study included sixty-four subjects who were randomly selected from the school population of the kindergarten children who were in the Follow Through Program at Hawthorne, Longfellow, and Roosevelt Elementary Schools in Waterloo, Iowa.

The kindergarten males and females in this study were white or minority with chronological ages of five or six. There were no Mexican-American, Oriental, or Puerto Rican/Cuban children in the classes.[1]

Selection of the Subjects

The population of the Follow Through kindergarten children were separated into two populations. The students in one population represented those children who had preschool experience. The children in the other population were the students who did not have preschool experience. The two populations were then alphabetized by surname. Then the two populations were separated into two discrete populations from the preschool experience population, and again from the population without preschool experience.

The students in one discrete population from the preschool experience population were males and the other discrete population was females. The students in one discrete population from the kindergarten population without preschool experience were males and the other discrete population was females. From these four discrete populations, a random sample was taken of every third student arriving at four treatment samples of sixteen students each.

Thus, the four treatment samples consisted of sixteen males and sixteen females with preschool experience and sixteen males and sixteen females without preschool experience.

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[1]Application for a Follow Through Program (Waterloo, Iowa: Waterloo Community Schools, 1971-1972), pp. 20-24.

STATISTICAL PROCEDURES

Use of Nonparametric Statistics

The rationale for the use of nonparametric statistics is similar to the explanation of Lohnes and Cooley in their book, Introduction to Statistical Procedures:

> Since Siegel's excellent text appeared in 1956 there has been a spread of interest among behavioral scientists in inference models that do not require special assumptions about the forms of the population distribution that are sampled. Frequently data have to be collected in ways that simply do not warrant the assumption of interval scales and normal distributions, and it is well that models that avoid these assumptions are available.[2]

Since the Follow Through Kindergarten Program is a "follow through" of the Home Start and Head Start Programs, it was expected that most students would have preschool experience. According to Ferguson, in experimental work situations where either little is known about the population distributions or these distributions are known to depart appreciably from the normal form, nonparametric tests may be appropriately used.[3]

Use of the Sign Test

Several different nonparametric tests were available to treat the data regarding the effects of preschool experience upon the achievement scores of the subjects. The sign test gets its name from

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[2]Paul R. Lohnes and William W. Cooley, Introduction to Statistical Procedures: With Computer Exercises (New York: John Wiley, 1968, p. 187.

[3]George A. Ferguson, Statistical Analysis in Psychology and Education (New York: McGraw-Hill, 1966), p. 354.

the fact that it uses plus and minus signs rather than quantitative measures as its data.

> The sign test is applicable to the case of two related samples when the experimenter wishes to establish that two conditions are different. The only assumption underlying this test is that the variable under consideration has a continuous distribution. The test does not make any assumptions about the form of the distribution of differences, nor does it assume that all subjects are drawn from the same population. The different pairs may be from different populations with respect to age, sex, intelligence, etc.; the only requirement is that within each pair the experimenter has achieved matching with respect to the relevant extraneous variables.[4]

In this particular study, the central relevant extraneous variable is whether or not the child has had preschool experience. If two groups are equal in achievement, for each member in the first group that surpassed his matched partner, there should also be a member of the second group who surpassed his partner. The sign test counts the number of cases in one group who exceeds their matched partners and compares this with the number of persons in the second group who exceed their matched partners. Subjects in one treatment sample group who surpass the subjects in the other treatment sample group will be a randomly determined event, like heads or tails on a coin toss.

If the groups are equal, the pluses and minuses will be randomly distributed around a median of zero. The null hypothesis is therefore that the median difference is zero. If there are considerably more of one sign than the other, the distribution of differences is clearly not random, and the hypothesis of equal change in the two groups must be rejected.[5]

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[4]Sidney Siegel, Nonparametric Statistics for the Behavioral Sciences (New York: McGraw-Hill, 1956), p. 68.

[5]Clinton L. Chase, Elementary Statistical Procedures (New York: McGraw-Hill Book Company, 1967), p. 186.

According to Barnes, the null hypothesis is the hypothesis that the results obtained for the difference between two or more groups is not due to the deliberately introduced independent variable, but is due to an error or accident of sampling. Evidence is used not to prove some positive hypothesis but to progressively disprove or discredit the null hypothesis.[6]

Statistically this study specifies a direction for analysis. It notes that kindergarten children with preschool experience should evidence higher levels of achievement on specific requirements than those kindergarten students who have not had preschool experience. Consequently, the statistical testing does more than attempt to show that there is no difference between the two groups.

The null hypothesis, H_o, would be that a particular population (2) is less proficient than the other population (1), indicated statistically as $U_2 < U_1$. It can also mean that there is no difference between the performance levels of either group, indicated statistically as $U_2 = U_1$. These two forms can be combined as $U_2 \leq U_1$.[7]

Spiegel notes that in many instances it becomes practical to formulate a statistical hypothesis for the sole purpose of rejecting or nullifying it.[8] In doing so, the implication is established that the

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[6]Fred P. Barnes, Research for the Practitioner in Education (Washington D.C.: Department of Elementary School Principals, N.E.A., 1964), pp. 79-80.

[7]Dorothy C. Adkins, STATISTICS An Introduction for Students in the Behavioral Sciences (Columbus, Ohio: Charles E. Merrill Books, Inc., 1964), p. 324.

[8]Murray R. Spiegel, Theory and Problems of Statistics (New York: Schaum Publishing Company, 1961), p. 167.

alternative hypothesis is more tenable than the null hypothesis, that is to say, that the alternative to what has been rejected is more readily acceptable.

Rejecting the null hypothesis in this study means that we accept the alternative hypothesis. The alternative hypothesis make the prediction that the children with preschool experience will score higher. According to Barnes, "The appropriate null hypothesis would be that experimental group scores will be equal to or less than those of the control group."[9]

The null hypothesis tested by the sign test is that:

$$p(X_A > X_B = p(X_A < X_B) = \tfrac{1}{2}$$

where X_A is the score of the first treatment sample and X_B is the score of the second treatment sample.

In applying the sign test, focus was centered on the direction of the difference between every X_{Ai} and X_{Bi}, noting whether the sign of the difference was plus or minus. H_o is rejected if too few differences of the predicted sign (+) occur.

The probability associated with the occurrence of a particular number of plus or minus signs can be determined by reference to the binomial distribution with $P = Q = \frac{1}{2}$, where N equals the number of pairs. If a matched pair shows no difference; that is, the difference being zero, thus having no sign, it is dropped from the analysis and N is thereby reduced. Appendix G gives the probabilities associated with the

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[9]Barnes, op. cit., p. 82.

occurrence under H_o of values as small as x for $N \leq 25$. x equals the number of fewer signs.[10]

The sign test may be either one-tailed or two-tailed. In a one-tailed test, the advance prediction states which sign, plus or minus, will occur more frequently.[11] The one-tailed test will be used in this study with the prediction stating a plus sign. Thus, this study tests for the effect of preschool experience on kindergarten children from a selected population. It infers that such experience is beneficial to the student and his successive learning experiences.

Probability Value

Since the hypotheses predicted the direction of difference, the region of rejection was one-tailed. It was felt by the investigator that the five percent level of significance was unnecessarily stringent. As Barnes stated:

> . . . It should be noted that there is nothing sacred, other than custom, about the one and five percent levels. There may be situations in which an individual is willing to operate at the ten percent level or more.[12]

The following significance levels were chosen as a way to increase the likelihood of getting more information from the data:

Highly significant	.05
Significant	.10
Trend toward significant	.10 to .20

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[10]Siegel, op. cit., p. 69.

[11]Ibid.

[12]Fred P. Barnes, Research for the Practitioner in Education (Washington D.C.: Department of Elementary School Principals, N.E.A., 1964), p. 80.

Measurement of Progress

The P.E.P. (Primary Education Project) early learning curriculum is an individualized learning curriculum involving specified sequences of instructional objectives. The specified sequences permit each child to work through the graded steps of the P.E.P. curriculum at a rate and in a manner suited to the child's own needs. The sequential flow charts of instructional objectives may be seen by consulting Appendixes A to F.

The P.E.P. early learning curriculum consists of those basic skills and concepts that are essential for subsequent school learning.[13]

The six curriculum areas are:

1. Quantification
2. Classification
3. Gross Motor
4. Visual Motor
5. Auditory Motor
6. Letters and Numerals

Progress is measured by the number of units mastered.

Procedure of Comparisons

In each of the six curriculum areas of the P.E.P. (Primary Education Project) Follow Through Kindergarten Program, the following two comparisons were made regarding the effects of preschool experience upon the number of units mastered of the subjects:

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[13]The Instructional Component of the Follow Through Program (Waterloo, Iowa: Waterloo Community School District, 1971), p. 2.

1. The treatment sample group of sixteen males with preschool experience was compared with the treatment sample group of sixteen males without preschool experience.

2. The treatment sample group of sixteen females with preschool experience was compared with the treatment sample group of sixteen females without preschool experience.

One additional comparison was discussed as an observation in Chapter 5. Students from the experimental sample with preschool experience were compared with students from the contrast sample from the same kindergarten population without preschool experience. The comparison simply compared kindergarten children with or without preschool experience and ignored the variables of sex. The data was discussed only as an observation for analysis because the comparison contained more than one variable.

Coding Procedures

The number of units mastered in the curriculum areas of Quantification and Classification were expressed numerically and ranged from Units One to Fourteen. The number of units mastered in the four curricular areas of perception, which were Gross Motor, Visual Motor, Auditory Motor, and Letters and Numerals were expressed alphabetically and ranged from Units A to I. Therefore, the response requested from the teachers regarding the number of units mastered was placed on an ordinal scale by requesting that the number of units mastered always be indicated by a number. The number of units mastered by March 29, 1972, was the date used as the completion time, as this date was the end of the Third Report Period used in the Waterloo Community Schools.

The names of the sixty-four kindergarten males and females used in this study were coded to facilitate processing of the data.

Collection of the Data

The Kindergarten Follow Through Teachers were given class lists to bring up to date and were asked to identify the students with preschool experience. The teachers were later given the names of the students included in the study with a letter of explanation (Appendix H). They were asked to write a number on the forms provided for each of the six curriculum areas listed which stated how many units the students mastered as of March 29, 1972 (Appendix I).

HYPOTHESES

The six curriculum areas of the P.E.P. (Primary Education Project) Follow Through Kindergarten Program generated twelve hypotheses to be investigated. All hypotheses originated from two conceptual constructs, both of which were noted in Chapter 2. These conceptual constructs are: (1) the effects of environment on experiential growth, and (2) preschool learning. The hypotheses are as follows:

Hypothesis H_1--The Quantification scores of males with preschool experience will be equal to or less than those scores of males without preschool experience.

Hypothesis H_2--The Quantification scores of females with preschool experience will be equal to or less than those scores of females without preschool experience.

The same two hypotheses will apply identically for the five additional curricular areas, which are Classification, Gross Motor,

Visual Motor, Auditory Motor, and Letters and Numerals. Table 1 displays the hypotheses to be investigated.

Table 1

Treatments to be Investigated

Hypotheses	Treatment Sample 1 With Preschool Experience	Treatment Sample 2 Without Preschool Experience	Treatment Areas
1	Males	Males	Quantification
2	Females	Females	
3	Males	Males	Classification
4	Females	Females	
5	Males	Males	Gross Motor
6	Females	Females	
7	Males	Males	Visual Motor
8	Females	Females	
9	Males	Males	Auditory Motor
10	Females	Females	
11	Males	Males	Letters &
12	Females	Females	Numerals

Summary

The study was conducted in Waterloo, Iowa, and included sixty-four kindergarten children randomly selected who were in the Follow Through Program. The experimental sample contained sixteen males and sixteen females with preschool experience. The contrast sample contained sixteen males and sixteen females without preschool experience.

The six curriculum areas of the P.E.P. (Primary Education Project) early learning curriculum were Quantification, Classification, Gross

Motor, Visual Motor, Auditory Motor, and Letters and Numerals. Progress was measured by the number of units mastered.

The six curriculum areas of the P.E.P. generated twelve hypotheses to be investigated. The appropriate null hypothesis was that the scores of the kindergarten children with preschool experience would be equal to or less than those scores of the kindergarten children without preschool experience.

The sign test deals with paired sets of data. If the differences between the two sets of data are randomly distributed, the median difference between the pairs of scores will be zero. The sign test, then, tests the hypothesis that the obtained pair differences are zero.

The rationale for the use of nonparametric statistics was explained in that they may be appropriately used when it is expected that the population distributions depart appreciably from the normal form. The effects of preschool experience was tested with the non-parametric sign test.

Chapter 4

PRESENTATION OF THE DATA

The purpose of this chapter is to report the analysis of data concerning the effects of preschool experiences on the achievement of kindergarten children enrolled in the 1971-1972 Follow Through Program in Waterloo Iowa.

Introduction

This chapter contains the twelve hypotheses used to investigate the six curriculum areas of the P.E.P. (Primary Education Project), which are Quantification, Classification, Gross Motor, Visual Motor, Auditory Motor, and Letters and Numerals. It presented the data for male and female kindergarten students that were subjected to the sign test. Calculation of the probability of an observed distribution required the counting of positive and negative signs, and then referring these values to the table of probabilities in Appendix G, where $P = Q = \frac{1}{2}$. Levels of significance were determined by the guidelines stipulated in Chapter 3. The following significance levels were chosen:

Highly significant	.05
Significant	.10
Trend toward significant	.10 to .20

The student's achievement scores were determined by their levels of mastery, as noted in Appendixes A to F. The number of units mastered was placed on an ordinal scale. The names of the children in this study were coded to facilitate processing of the data.

QUANTIFICATION LEVELS OF MASTERY

Hypothesis (Null) One--Quantification Scores of Males

The Quantification scores of males with preschool experience will be equal to or less than those scores of males without preschool experience.

A group of sixteen male students with preschool experience were compared with sixteen male students without preschool experience testing for achievement on quantification levels of mastery. Table 2 displays the data as arranged for application of the sign test.

Table 2

Quantification Scores of Males With Preschool Experience and of Males Without Preschool Experience

Treatment Sample 1 Males With Preschool Experience*	Quantification Number of Units Mastered	Treatment Sample 2 Males Without Preschool Experience*	Quantification Number of Units Mastered	Sign** Predicted: $T_1 > T_2$
81	3	4	1	+
87	9	10	5	+
90	4	18	13	-
99	5	23	4	+
105	7	29	7	0
111	8	34	1	+
119	4	41	8	-
122	9	42	2	+
130	8	57	1	+
134	11	62	10	+
139	6	67	6	0
146	2	71	2	0
149	3	2	3	0
155	7	22	0	+
158	9	32	3	+
169	7	45	3	+

*N = (16-4) = 12

**$\underline{x}$ = number of fewer signs = 2

By consulting Appendix G, the probability was determined at .019. This value was well within the prescribed level of .05 and would be considered as a rare event. Consequently, the null hypothesis was rejected in favor of the alternate hypothesis. Preschool experience had a highly significant effect on the ability of male kindergarten students to master a greater number of sequential levels of quantification tasks.

Hypothesis (Null) Two--Quantification Scores of Females

> The Quantification scores of females with preschool experience will be equal to or less than those scores of females without preschool experience.

A group of sixteen female students with preschool experience were compared with sixteen female students without preschool experience testing for achievement on quantification levels of mastery. Table 3 displays the data as arranged for application of the sign test.

By consulting Appendix G, the probability was determined at .018. This value was well within the prescribed level of .05 and would also be considered as a rare event. The null hypothesis was rejected in favor of the alternate hypothesis. Preschool experience had a highly significant effect on the ability of female kindergarten students to master a greater number of sequential levels of quantification tasks.

CLASSIFICATION LEVELS OF MASTERY

Hypothesis (Null) Three--Classification Scores of Males

> The Classification scores of males with preschool experience will be equal to or less than those scores of males without preschool experience.

Table 3

Quantification Scores of Females With Preschool Experience and of Females Without Preschool Experience

Treatment Sample 1 Females With Preschool Experience*	Quantification Number of Units Mastered	Treatment Sample 2 Females Without Preschool Experience*	Quantification Number of Units Mastered	Sign** Predicted: $T_1 > T_2$
84	10	6	5	+
91	1	13	2	-
95	9	21	8	+
100	12	25	1	+
106	11	30	10	+
112	7	37	6	+
117	7	42	8	-
125	11	48	10	+
129	3	52	6	-
136	5	56	0	+
144	9	63	7	+
151	9	51	1	+
160	10	5	9	+
166	3	14	0	+
173	7	26	7	0
181	12	44	1	+

*N = (16-1) = 15

**$\underline{x}$ = number of fewer signs = 3

A group of sixteen male students with preschool experience were compared with sixteen male students without preschool experience testing for achievement on classification levels of mastery. Table 4 displays the data as arranged for application of the sign test.

By consulting Appendix G, the probability was determined at .020. The prescribed significance level was .05. Therefore, the probability was small, two out of one hundred repeated times, that chance variation might have produced the observed results. Consequently, the null hypothesis was rejected in favor of the alternate hypothesis. Preschool experience had a

highly significant effect on the ability of male kindergarten children to master a greater number of sequential levels of classification tasks.

Table 4

Classification Scores of Males With Preschool Experience and of Males Without Preschool Experience

Treatment Sample 1 Males With Preschool Experience*	Classification Number of Units Mastered	Treatment Sample 2 Males Without Preschool Experience*	Classification Number of Units Mastered	Sign** Predicted: $T_1 > T_2$
81	5	4	3	+
87	7	10	7	0
90	5	18	7	-
99	7	23	5	+
105	7	29	6	+
111	7	34	4	+
119	7	41	7	0
122	7	47	4	+
130	7	57	5	+
134	7	62	7	0
139	5	67	5	0
146	5	71	5	0
149	6	2	6	0
155	6	22	3	+
158	7	32	5	+
169	5	45	5	0

*N = (16-7) = 9

**$\underline{x}$ = number of fewer signs = 1

Hypothesis (Null) Four--Classification Scores of Females

The Classification scores of females with preschool experience will be equal to or less than those scores of females without preschool experience.

A group of sixteen female students with preschool experience were compared with sixteen female students without preschool experience testing for achievement on classification levels of mastery. Table 5 displays the data as arranged for application of the sign test.

Table 5

Classification Scores of Females With Preschool Experience and of Females Without Preschool Experience

Treatment Sample 1 Females With Preschool Experience*	Classification Number of Units Mastered	Treatment Sample 2 Females Without Preschool Experience*	Classification Number of Units Mastered	Sign** Predicted: $T_1 > T_2$
84	7	6	5	+
91	7	13	5	+
95	5	21	7	-
100	7	25	5	+
106	7	30	7	0
112	6	37	7	-
117	7	42	7	0
125	7	48	5	+
129	6	52	5	+
136	7	56	3	+
144	7	63	5	+
151	7	51	6	+
160	7	5	7	0
166	5	14	4	+
173	7	26	5	+
181	7	44	5	+

*N = (16-3) = 13

**$\underline{x}$ = number of fewer signs = 2

By consulting Appendix G, the probability was determined at .011. This value was well within the prescribed level of .05 and the null hypothesis was rejected in favor of the alternate hypothesis. Preschool experience had a highly significant effect on the ability of female kindergarten students to master a greater number of sequential levels of classification tasks.

GROSS MOTOR LEVELS OF MASTERY

Hypothesis (Null) Five--Gross Motor Scores of Males

The Gross Motor scores of males with preschool experience will be equal to or less than those scores of males without preschool experience.

A group of sixteen male students with preschool experience were compared with sixteen male students without preschool experience testing for achievement on gross motor levels of mastery. Table 6 displays the data as arranged for application of the sign test.

Table 6

Gross Motor Scores of Males With Preschool Experience and of Males Without Preschool Experience

Treatment Sample 1 Males With Preschool Experience*	Gross Motor Number of Units Mastered	Treatment Sample 2 Males Without Preschool Experience*	Gross Motor Number of Units Mastered	Sign** Predicted: $T_1 > T_2$
81	8	4	2	+
87	5	10	7	-
90	6	18	8	-
99	5	23	2	+
105	7	29	8	-
111	3	34	5	-
119	5	41	7	-
122	7	47	5	+
130	2	57	8	-
134	8	62	8	0
139	7	67	8	-
146	5	71	4	+
149	7	2	4	+
155	8	22	4	+
158	8	32	8	0
169	6	45	6	0

*N = (16-3) = 13

**$\underline{x}$ = number of fewer signs = 6

By consulting Appendix G, the probability was determined to be that of pure chance, namely, .500. Since the significance level was predicted at .10, the null hypothesis could not be rejected. There is no statistical evidence that preschool experience had a significant effect.

Hypothesis (Null) Six--Gross Motor Scores of Females

The Gross Motor scores of females with preschool experience will be equal to or less than those scores of females without preschool experience.

A group of sixteen female students with preschool experience were compared with sixteen female students without preschool experience testing for achievement on gross motor levels of mastery. Table 7 displays the data as arranged for application of the sign test.

By consulting Appendix G, the probability of this event was determined to be .254. Since the significance level was predicted at .10, the null hypothesis could not be rejected. There is no statistical evidence that preschool experience had a significant effect.

VISUAL MOTOR LEVELS OF MASTERY

Hypothesis (Null) Seven--Visual Motor Scores of Males

The Visual Motor scores of males with preschool experience will be equal to or less than those scores of males without preschool experience.

A group of sixteen male students with preschool experience were compared with sixteen male students without preschool experience testing for achievement on visual motor levels of mastery. Table 8 displays the data as arranged for application of the sign test.

Table 7

Gross Motor Scores of Females With Preschool Experience and of Females Without Preschool Experience

Treatment Sample 1 Females With Preschool Experience*	Gross Motor Number of Units Mastered	Treatment Sample 2 Females Without Preschool Experience*	Gross Motor Number of Units Mastered	Sign** Predicted: $T_1 > T_2$
84	6	6	6	0
91	7	13	2	+
95	8	21	8	0
100	8	25	7	+
106	8	30	8	0
112	8	37	2	+
117	8	42	7	+
125	7	48	2	+
129	8	52	8	0
136	8	56	5	+
144	7	63	8	-
151	8	51	8	0
160	4	5	8	-
166	7	14	7	0
173	8	26	8	0
181	6	44	7	-

*N = (16-7) = 9

**$\underline{x}$ = number of fewer signs = 3

Consulting Appendix G, the probability was determined to be .151. The trend toward significant level was predicted from .10 to .20. This reflects a definite trend toward significance within the levels established, but the null hypothesis could not be rejected. There is no statistical evidence that preschool experience had a significant effect.

Table 8

Visual Motor Scores of Males With Preschool Experience and of Males Without Preschool Experience

Treatment Sample 1 Males With Preschool Experience*	Visual Motor Number of Units Mastered	Treatment Sample 2 Males Without Preschool Experience*	Visual Motor Number of Units Mastered	Sign** Predicted: $T_1 > T_2$
81	4	4	3	+
87	8	10	7	+
90	6	18	9	-
99	6	23	7	-
105	8	29	7	+
111	6	34	2	+
119	6	41	9	-
122	6	47	6	0
130	8	57	7	+
134	8	62	9	-
139	5	67	6	-
146	7	71	6	+
149	6	2	4	+
155	5	22	3	+
158	8	32	4	+
169	6	45	5	+

*N = (16-1) = 15

**$\underline{x}$ = number of fewer signs = 5

Hypothesis (Null) Eight--Visual Motor Scores of Females

The Visual Motor scores of females with preschool experience will be equal to or less than those scores of females without preschool experience.

A group of sixteen female students with preschool experience were compared with sixteen female students without preschool experience testing for achievement on visual motor levels of mastery. Table 9 displays the data as arranged for application of the sign test.

Consulting Appendix G, the probability was determined to be .194. The trend toward significant level was predicted from .10 to .20. This

reflects a trend toward significance within the levels established, but the null hypothesis could not be rejected. There is no statistical evidence that preschool experience had a significant effect.

Table 9

Visual Motor Scores of Females With Preschool Experience and of Females Without Preschool Experience

Treatment Sample 1 Females With Preschool Experience*	Visual Motor Number of Units Mastered	Treatment Sample 2 Females Without Preschool Experience*	Visual Motor Number of Units Mastered	Signs** Predicted: $T_1 > T_2$
84	9	6	4	+
91	4	13	5	-
95	7	21	6	+
100	7	25	5	+
106	9	30	9	0
112	6	37	6	0
117	6	42	7	-
125	9	48	8	+
129	5	52	5	0
136	6	56	2	+
144	8	63	9	-
151	7	51	5	+
160	7	5	9	-
166	5	14	5	0
173	6	26	5	+
181	8	44	5	+

*N = (16-4) = 12

**$\underline{x}$ = number of fewer signs = 4

AUDITORY MOTOR LEVELS OF MASTERY

Hypothesis (Null) Nine--Auditory Motor Scores of Males

The Auditory Motor scores of males with preschool experience will be equal to or less than those scores of males without preschool experience.

A group of sixteen male students with preschool experience were compared with sixteen male students without preschool experience testing for achievement on auditory motor levels of mastery. Table 10 displays the data as arranged for application of the sign test.

Table 10

Auditory Motor Scores of Males With Preschool Experience and of Males Without Preschool Experience

Treatment Sample 1 Males With Preschool Experience*	Auditory Motor Number of Units Mastered	Treatment Sample 2 Males Without Preschool Experience*	Auditory Motor Number of Units Mastered	Sign** Predicted: $T_1 > T_2$
81	3	4	4	-
87	6	10	4	+
90	5	18	5	0
99	4	23	3	+
105	5	29	4	+
111	6	34	4	+
119	5	41	5	0
122	5	47	1	+
130	4	57	4	0
134	5	62	5	0
139	4	67	3	+
146	4	71	1	+
149	5	2	4	+
155	6	22	0	+
158	5	32	2	+
169	5	45	5	0

*N = (16-5) = 11

**$\underline{x}$ = number of fewer signs = 1

By consulting Appendix G, the probability was determined at .006. This value was well within the prescribed level of .05 and would be considered as an unusual occurrence. The null hypothesis was rejected in favor of the alternate hypothesis. Preschool experience had a highly

significant effect on the ability of male kindergarten students to master a greater number of sequential levels of auditory motor tasks.

Hypothesis (Null) Ten--Auditory Motor Scores of Females

> The Auditory Motor scores of females with preschool experience will be equal to or less than those scores of females without preschool experience.

A group of sixteen female students with preschool experience were compared with sixteen female students without preschool experience testing for achievement on auditory motor levels of mastery. Table 11 displays the data as arranged for application of the sign test.

Table 11

Auditory Motor Scores of Females With Preschool Experience and of Females Without Preschool Experience

Treatment Sample 1 Females With Preschool Experience*	Auditory Motor Number of Units Mastered	Treatment Sample 2 Females Without Preschool Experience*	Auditory Motor Number of Units Mastered	Sign** Predicted: $T_1 > T_2$
84	5	6	5	0
91	5	13	4	+
95	4	21	5	-
100	6	25	1	+
106	5	30	5	0
112	6	37	4	+
117	5	42	5	0
125	5	48	4	+
129	4	52	3	+
136	3	56	3	0
144	5	63	5	0
151	5	51	3	+
160	5	5	5	0
166	4	14	4	0
173	5	26	2	+
181	4	44	2	+

*N = (16-7) = 9

**$\underline{x}$ = number of fewer signs = 1

By consulting Appendix G, the probability was determined at .020, which was well within the prescribed level of .05. The null hypothesis was rejected in favor of the alternate hypothesis that preschool experience had a highly significant effect on the ability of female kindergarten children to master a greater number of sequential levels of auditory motor tasks.

LETTERS AND NUMERALS LEVELS OF MASTERY

Hypothesis (Null) Eleven--Letters and Numerals Scores of Males

> The Letters and Numerals scores of males with preschool experience will be equal to or less than those scores of males without preschool experience.

A group of sixteen male students with preschool experience were compared with sixteen male students without preschool experience testing for achievement on letters and numerals levels of mastery. Table 12 displays the data as arranged for application of the sign test.

By consulting Appendix G, the probability of this event was determined to be .387. Since the significance level was predicted at .10, the null hypothesis could not be rejected. There is no statistical evidence that preschool experience had a significant effect.

Hypothesis (Null) Twelve--Letters and Numerals Scores of Females

> The Letters and Numerals scores of females with preschool experience will be equal to or less than those scores of females without preschool experience.

A group of sixteen female students with preschool experience were compared with sixteen female students without preschool experience,

Table 12

Letters & Numerals Scores of Males With Preschool Experience and of Males Without Preschool Experience

Treatment Sample 1 Males With Preschool Experience*	Letters & Numerals Number of Units Mastered	Treatment Sample 2 Males Without Preschool Experience*	Letters & Numerals Number of Units Mastered	Sign** Predicted: $T_1 > T_2$
81	0	4	0	0
87	5	10	1	+
90	1	18	13	-
99	1	23	3	-
105	12	29	1	+
111	1	34	0	+
119	0	41	1	-
122	8	47	0	+
130	3	57	1	+
134	13	62	13	0
139	1	67	1	0
146	1	71	2	-
149	1	2	2	-
155	0	22	0	0
158	6	32	0	+
169	8	45	0	+

*N = (16-4) = 12

**$\underline{x}$ = number of fewer signs = 5

testing for achievement on letters and numerals levels of mastery. Table 13 displays the data as arranged for application of the sign test.

By consulting Appendix G, the probability was determined at .033. This value was within the prescribed level of .05 and the probability was less than four out of one hundred repeated times that chance variation might have produced the observed results. Therefore, the null hypothesis was rejected in favor of the alternate hypothesis. Preschool experience had a highly significant effect on the ability of female kindergarten students to master a greater number of sequential levels of letters and numerals tasks.

Table 13

Letters & Numerals Scores of Females With Preschool Experience and of Females Without Preschool Experience

Treatment Sample 1 Females With Preschool Experience*	Letters & Numerals Number of Units Mastered	Treatment Sample 2 Females Without Preschool Experience*	Letters & Numerals Number of Units Mastered	Sign** Predicted: $T_1 > T_2$
84	4	6	0	+
91	0	13	0	0
95	3	21	0	+
100	11	25	0	+
106	7	30	0	+
112	3	37	2	+
117	8	42	1	+
125	13	48	8	+
129	1	52	1	0
136	7	56	2	+
144	0	63	7	-
151	0	51	0	0
160	11	5	13	-
166	0	14	0	0
173	0	26	0	0
181	10	44	0	+

*N = (16-5) = 11

**$\underline{x}$ = number of fewer signs = 2

Summary

Twelve hypotheses were tested. Six of these sought to determine the effects of preschool experiences on the achievement of male kindergarten subjects. The other six hypotheses sought to determine the effects of preschool experiences on the achievement of female kindergarten subjects. These were tested with the nonparametric sign test.

Levels of significance were set, as well as a trend toward significance. The following significance levels were chosen as a way of getting more information from the data:

Highly significant	.05
Significant	.10
Trend toward significant	.10 to .20

Table 14, Summary of Data Measuring the Effects of Preschool Experience on Achievement of Kindergarten Children, indicates that the Preschool experience had little or no effect on males tested for Gross Motor, Visual Motor, and Letters and Numerals levels of mastery.

Table 14

Summary of Data Measuring the Effects of Preschool Experience on Achievement of Kindergarten Children

Hypotheses	Subjects	Treatment Areas	Probability	Decision
1	Males	Quantification	.019	reject
2	Females	Quantification	.018	reject
3	Males	Classification	.020	reject
4	Females	Classification	.011	reject
5	Males	Gross Motor	.500	not reject
6	Females	Gross Motor	.254	not reject
7	Males	Visual Motor	.151	not reject, but significant trend
8	Females	Visual Motor	.194	not reject, but significant trend
9	Males	Auditory Motor	.006	reject
10	Females	Auditory Motor	.020	reject
11	Males	Letters & Numerals	.387	not reject
12	Females	Letters & Numerals	.033	reject

Preschool experience had little or no effect on females tested for Gross Motor and Visual Motor levels of mastery. However, in Hypotheses 7 and 8, a trend toward significance was noted. The null hypothesis of Hypotheses 1, 2, 3, 4, 9, 10, and 12 was rejected in favor of the alternate hypothesis, namely, that preschool experience does affect the achievement of kindergarten children.

Chapter 5

SUMMARY, FINDINGS, AND CONCLUSIONS

This chapter presents a summary of the investigation together with the findings and some conclusions related to the findings. Questions for further investigation are suggested and implications for present educational practice are discussed.

SUMMARY

Public education in the United States has traditionally been a local or state responsibility or both. However, since the 1930's, the federal government has been involved in nationwide preschool programs for certain types of children.

In the 1930's, the federal government legislated programs for preschool children to combat the physical and mental handicaps imposed by the economic Depression. Care for children of working mothers was provided during World War II. In the 1960's, the federal government sponsored programs for disadvantaged children of preschool age as a means of coping with the national problem of poverty. Research showed that deprivations in the early years could be compensated with only great difficulty in later years. The Early Training Project which began in 1962, found that early intervention programs could have long-lasting effects in helping culturally deprived children to perform more adequately in school and outside life.

Project Head Start has operated on a full-time basis since 1967 in Waterloo, Iowa, to lessen the damaging effects of poverty on disadvantaged preschool children. Home Start I began in Waterloo in 1968 to help preschool children at home in ways which would complement the educational program children would meet when they entered school. The Follow Through Project began in three elementary schools in Waterloo in 1971 to "follow through" on the services provided in Home Start, Head Start, and some day care facilities.

The problem of this investigation concerned itself with the effect of preschool experiences on the achievement of the kindergarten children enrolled in the 1971-1972 Follow Through Program in Waterloo, Iowa. The study explored the effects of preschool experience upon kindergarten males and females as contrasted to the male and female kindergarten children without preschool experience.

The purpose of this study was to make the writer more knowledgeable of the instructional component of the Follow Through Program. As an Elementary School Principal, he has been concerned with the improvement of instruction as a means of raising the achievement of kindergarten children. The value of such a study could lie in its potential to help administrators in evaluating kindergarten programs and in making adjustments to assure that children receive the experiences in kindergarten that would best meet their needs.

Discussion of the Related Literature

Two conceptual constructs gave direction and provided the rationale for this study: (1) the effects of environment on experiential growth, and (2) preschool learning. The first conceptual construct was chosen to provide research related to early childhood education. The

research related to experiential growth was presented according to the Geneticist, Environmentalist, and the Interactionalist's positions. The second conceptual construct was chosen to present research related to preschool learning. The research related to preschool learning was presented to contrast the influences of non-planned experiences in the home with the influences of preschool programs which are planned experiences.

According to the Geneticist's position, genes set limits on the individual's potential. The uniqueness of the individual will express itself in the unique way in which he will react to a specific environment. The Environmentalists felt that what the child may become is strongly influenced by the way he is brought up from the moment of birth. The Interactionalist's position was both hereditarian and environmentalistic. Behavioral development was described as a process of changes in behavior that results from the child's interaction with his environment.

Research related to preschool learning showed the benefits of nursery and kindergarten experience, but it was not always possible to separate the influences of home atmosphere from the influences of school attendance itself. However, studies indicated that young children could learn significant concepts informally without imposition of new restraints.

Experimental Procedures

The third chapter established the experimental design and procedures of the study and stated the hypotheses under investigation.

The study was conducted in Waterloo, Iowa, and included sixty-four subjects who were randomly selected from the school population of the kindergarten children who were in the 1971-1972 Follow Through

Program. The kindergarten males and females in this study included both white or minority children with chronological ages of five or six.

Progress was measured by the number of units mastered in the six curriculum areas of the P.E.P. (Primary Education Project) Early Learning Curriculum, which were Quantification, Classification, Gross Motor, Visual Motor, Auditory Motor, and Letters and Numerals. In each of the six areas of the P.E.P. curriculum, two comparisons were made regarding the effects of preschool experience upon the number of units mastered by the subjects. Males with preschool experience were contrasted with males without preschool experience. Females with preschool experience were contrasted with females without preschool experience. Therefore, the six curriculum areas of the P.E.P. generated twelve hypotheses to be investigated.

The effects of preschool experience was tested with the non-parametric sign test. The sign test gets its name from the fact that it uses plus and minus signs rather than quantitative measures as its data. If the achievement of the experimental and contrast treatment sample groups were equal, the pluses and minuses would have been randomly distributed around a median of zero. The null hypothesis was therefore, that the median difference was zero. The null hypothesis was rejected if there was considerably more of one sign than the other.

Statistically the study specified a direction for analysis; namely, that kindergarten children with preschool experience should evidence higher levels of achievement than those without preschool experiences.

Rejecting the null hypothesis in this study meant that the alternative hypothesis was accepted. The alternative hypothesis made

the prediction that the children with preschool experience would score higher than those children without preschool experience.

The probability associated with the occurrence of a particular number of plus or minus signs was determined by reference to the binomial distribution with $P = Q = \frac{1}{2}$, in Appendix G. The following significance levels were chosen: .05, Highly significant; .10, Significant; and, .10 to .20, Trend toward significant. The null hypothesis was rejected if the probability of the event occurring was within the established significance levels.

FINDINGS

Twelve hypotheses were used to investigate the six curriculum areas of the P.E.P. Six of the twelve hypotheses were concerned with the effects of kindergarten experience upon the males, while the other six centered on the female subjects.

In each set of six curricular areas, male and female kindergarten subjects with preschool experience were paired with similar subjects without preschool experience. For each case, the following levels of significance were chosen: .05, Highly significant; .10, Significant; and, .10 to .20, Trend toward significant. The probability was determined by consulting Appendix G.

Hypotheses One and Two--Quantification

The probability that preschool experience had a chance effect was .019 for males and .018 for females. Since the .019 and .018 levels were well within the prescribed level of .05, the null hypothesis was rejected. Preschool experience had a highly significant effect on the

abilities of male and female kindergarten subjects to master a greater number of sequential levels of Quantification tasks.

Hypotheses Three and Four--Classification

The probability that preschool experience had a chance effect was .020 for males and .011 for females. Since the .020 and .011 levels were well within the prescribed level of .05, the null hypothesis was rejected. Preschool experience had a highly significant effect on the abilities of male and female kindergarten subjects to master a greater number of sequential levels of Classification tasks.

Hypotheses Five and Six--Gross Motor

The probability that preschool experience had a chance effect was .500 for males and .254 for females. Since the .500 and .254 levels were not within the prescribed level of .10, the null hypothesis was sustained. It must be concluded that there is no statistically significant evidence to support the value of preschool experience in Gross Motor levels of mastery.

Hypotheses Seven and Eight--Visual Motor

The probability that preschool experience had a chance effect was .151 for males and .194 for females. Since the significance level was set at .10, the null hypothesis was sustained. It must be concluded that there is no statistically significant evidence to support the value of preschool experience in Visual Motor levels of mastery. However, the probabilities of .151 and .194 were within the established levels of .10 to .20, which reflected a definite trend toward significance.

Hypotheses Nine and Ten--Auditory Motor

The probability that preschool experience had a chance effect was .006 for males and .020 for females. Since the .006 and .020 levels were well within the prescribed level of .05, the null hypothesis was rejected. Preschool experience had a highly significant effect on the abilities of male and female kindergarten subjects to master a greater number of sequential levels of Auditory Motor tasks.

Hypotheses Eleven and Twelve--Letters and Numerals

The probability that preschool experience had a chance effect was .387 for males and .033 for females. The results are statistically highly significant for the females because they are within the .05 level. The results for the males are not within the .10 level of significance. The null hypothesis must be sustained for the males but rejected for the females. Preschool experience had a highly significant effect on the abilities of female kindergarten subjects to master a greater number of sequential levels of Letters and Numerals tasks, but it did not have a significant effect on the males.

CONCLUSIONS

In general, preschool experiences did make a difference on the achievement of kindergarten children in specific areas of the P.E.P. (Primary Education Project) Early Learning Curriculum, who were enrolled in the 1971-1972 Follow Through Program in Waterloo, Iowa.

Preschool experience had a highly significant effect for males in the curriculum areas of Quantification, Classification, and Auditory Motor. A trend toward significance was noted in the area of Visual

Motor. Preschool experience had little or no effect for males in the curriculum areas of Gross Motor and Letters and Numerals.

Preschool experience had a highly significant effect for females in the curriculum areas of Quantification, Classification, Auditory Motor, and Letters and Numerals. A trend toward significance was noted in the area of Visual Motor. Preschool experience had little or no effect in the curriculum area of Gross Motor.

The findings do suggest that preschool programs are desirable in providing a foundation for kindergarten experiences.

Additional Observations

1. It would appear that preschool experience is more significant in conceptual skills than in motor skills.

2. There is only one area in which the findings suggest that preschool experience has greater value for one sex than the other. In the area of Letters and Numerals females tended to profit from preschool, but the results did not substantiate an improvement for the males.

3. The value of the preschool experiences were still evident after seven months of kindergarten.

Suggestions

1. One could recommend that the study be done earlier in the school year to specifically identify readiness. In this way, any achievement due to greater maturity and kindergarten experience would be eliminated.

2. Testing might be done over a period of years to determine for how long a period of time the influence of preschool experience is evident in the achievement of the children.

3. The study could also be designed to determine the effects of socio-economics, race, and culture.

4. It appears from the results that preschool education has been more concerned with the conceptual areas than with motor skills. Factors of human development may be limiting motor achievement, but it would further appear from the findings of this study that steps should be taken to strengthen the program in Gross Motor and Visual Motor experiences at the kindergarten and preschool levels in Waterloo. Additional study in these areas may be warranted.

5. Although it was not statistically significant, a trend was noted toward higher achievement in the area of Visual Motor for those children with preschool experience. There is the possibility that the mastery expectancy levels were inappropriate. The Visual Motor behavioral objectives should be carefully examined to determine if the tasks are too difficult for the children to perform.

6. Preschool experience had little or no effect on males tested for Letters and Numerals. Mastery of the behavioral objectives of these levels and units required responses to be written. More concern should be shown for the physical development of males to provide greater readiness for fine motor tasks.

7. Considering that preschool experience does make a difference on kindergarten achievement, it appears that early education programs should become more prevalent at the state and local levels.

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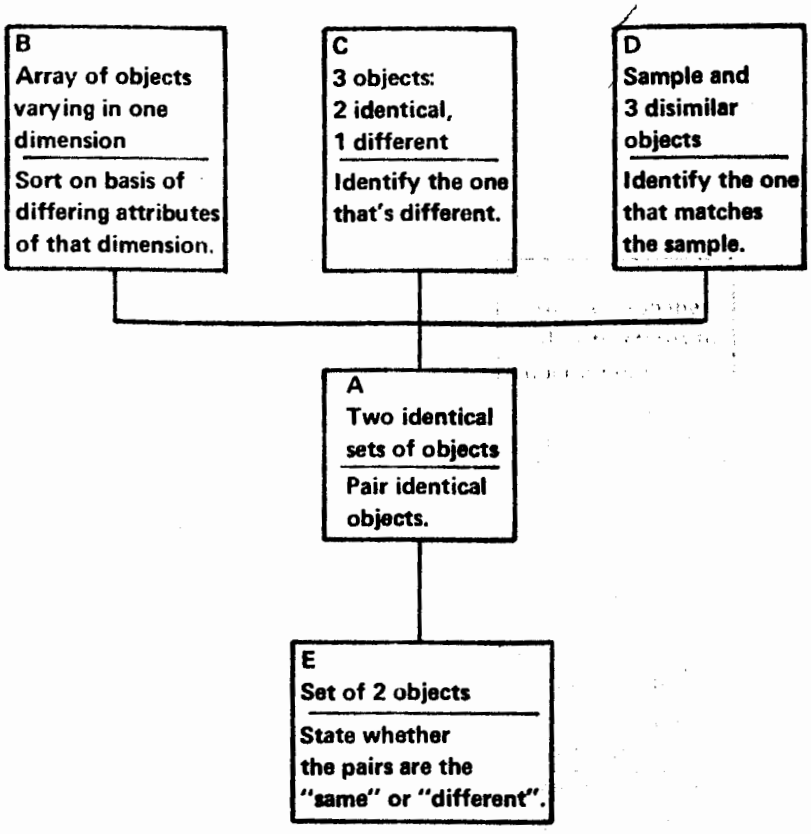
APPENDIXES

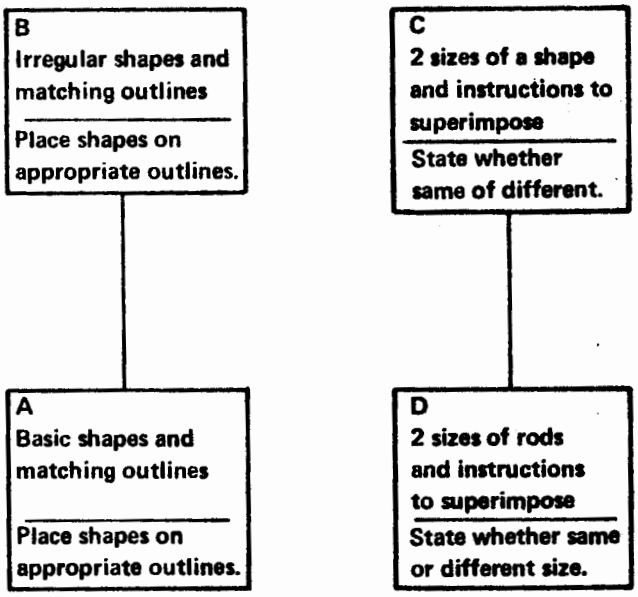
APPENDIX A

SEQUENTIAL FLOW CHARTS OF CLASSIFICATION INSTRUCTIONAL OBJECTIVES OF THE P.E.P. (PRIMARY EDUCATION PROJECT) EARLY LEARNING CURRICULUM

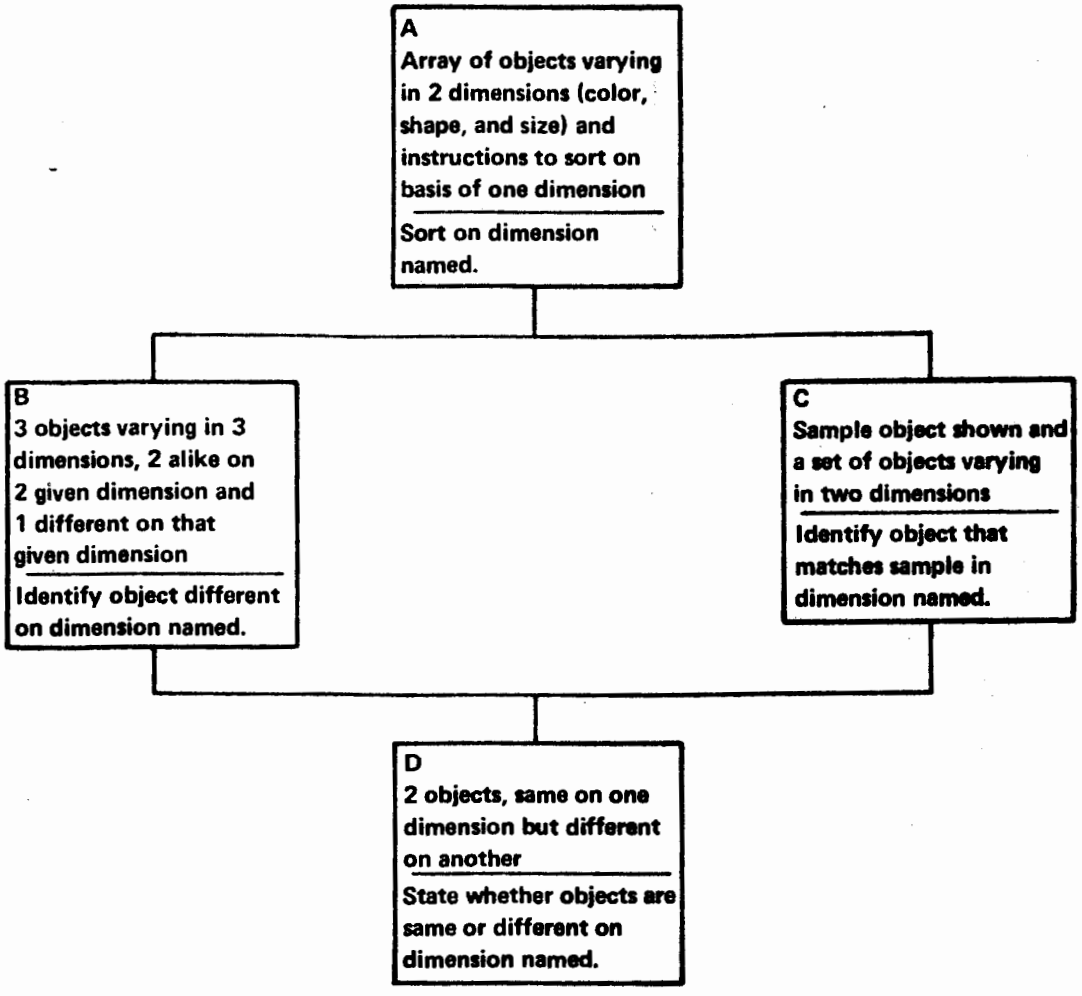
PEP CLASSIFICATION CURRICULUM
CLASSIFICATION I - Unit 1 - Basic Matching Skills



PEP CLASSIFICATION CURRICULUM
CLASSIFICATION I - Unit 2 - Shape and Size Discrimination

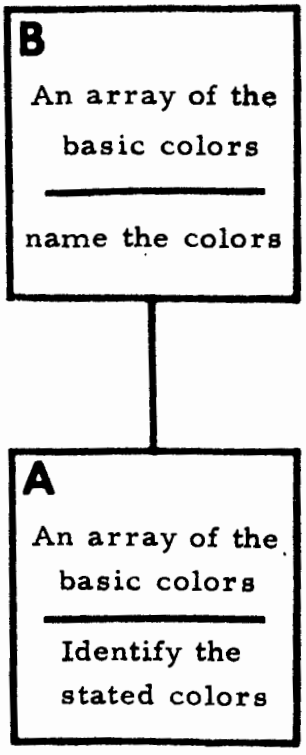


PEP CLASSIFICATION CURRICULUM
CLASSIFICATION I - Unit 3 - Advanced Matching Skills



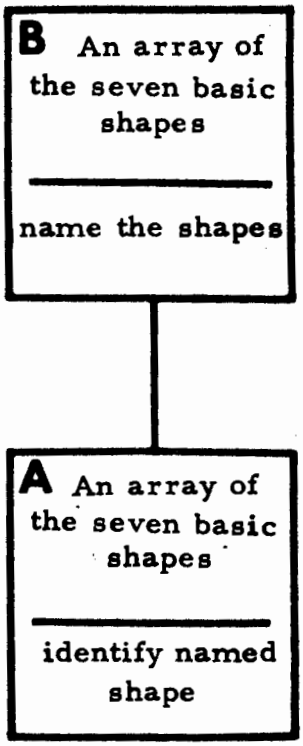
PEP CLASSIFICATION CURRICULUM

CLASSIFICATION I - Unit 4 - Color Naming

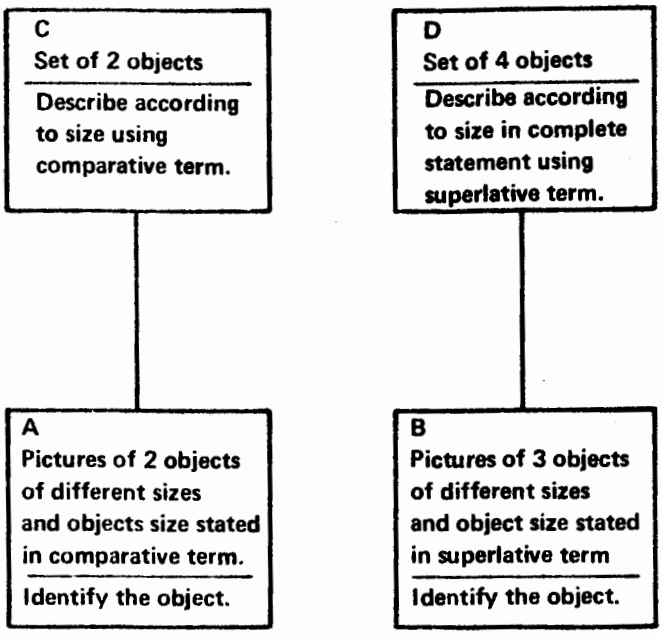


PEP CLASSIFICATION CURRICULUM

CLASSIFICATION I - Unit 5 - Shape Naming

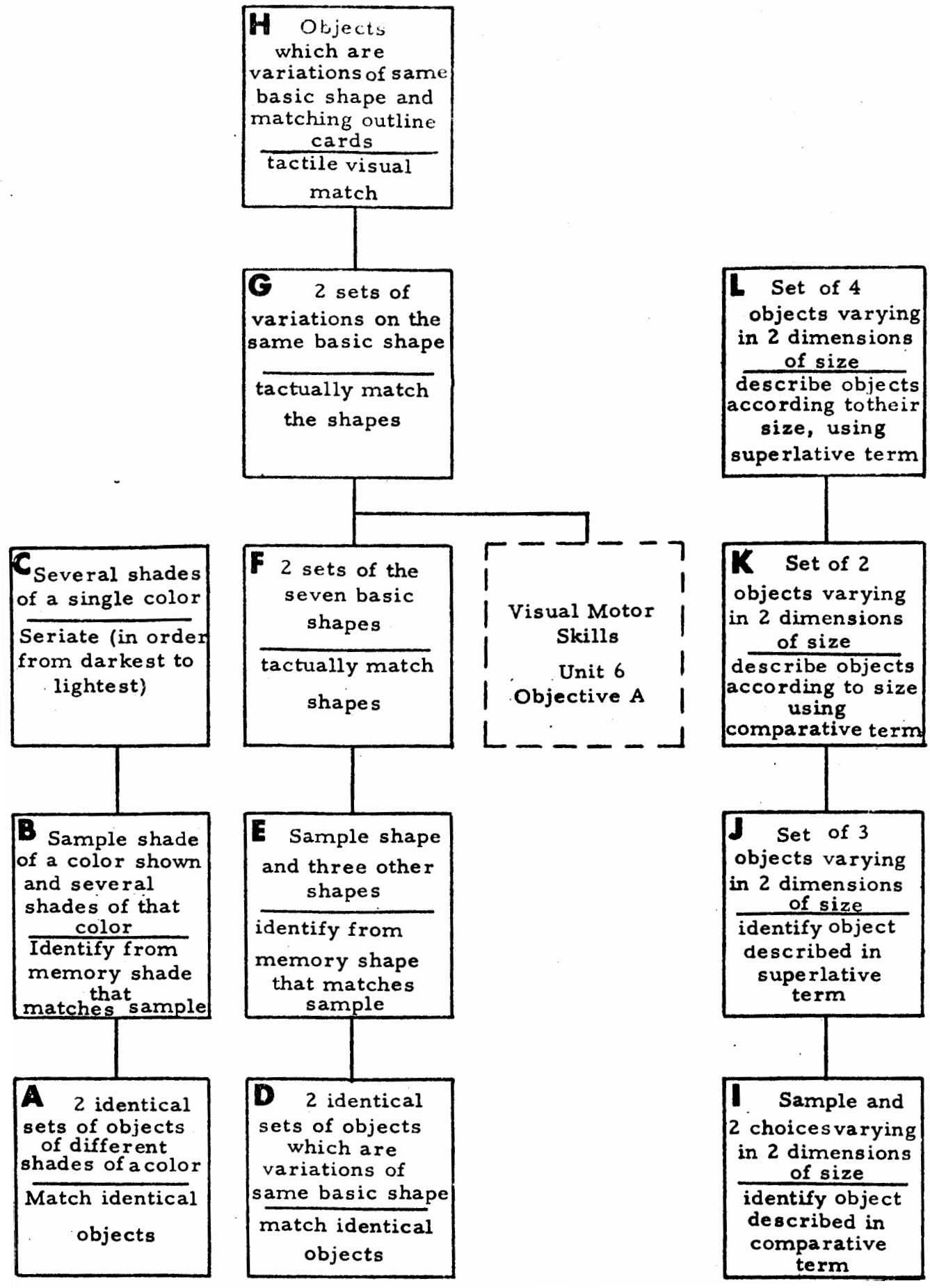


PEP CLASSIFICATIO URRICULUM
CLASSIFICATION I - Unit C Size Description



PEP CLASSIFICATION CURRICULUM CLASSIFICATION I - Unit 7

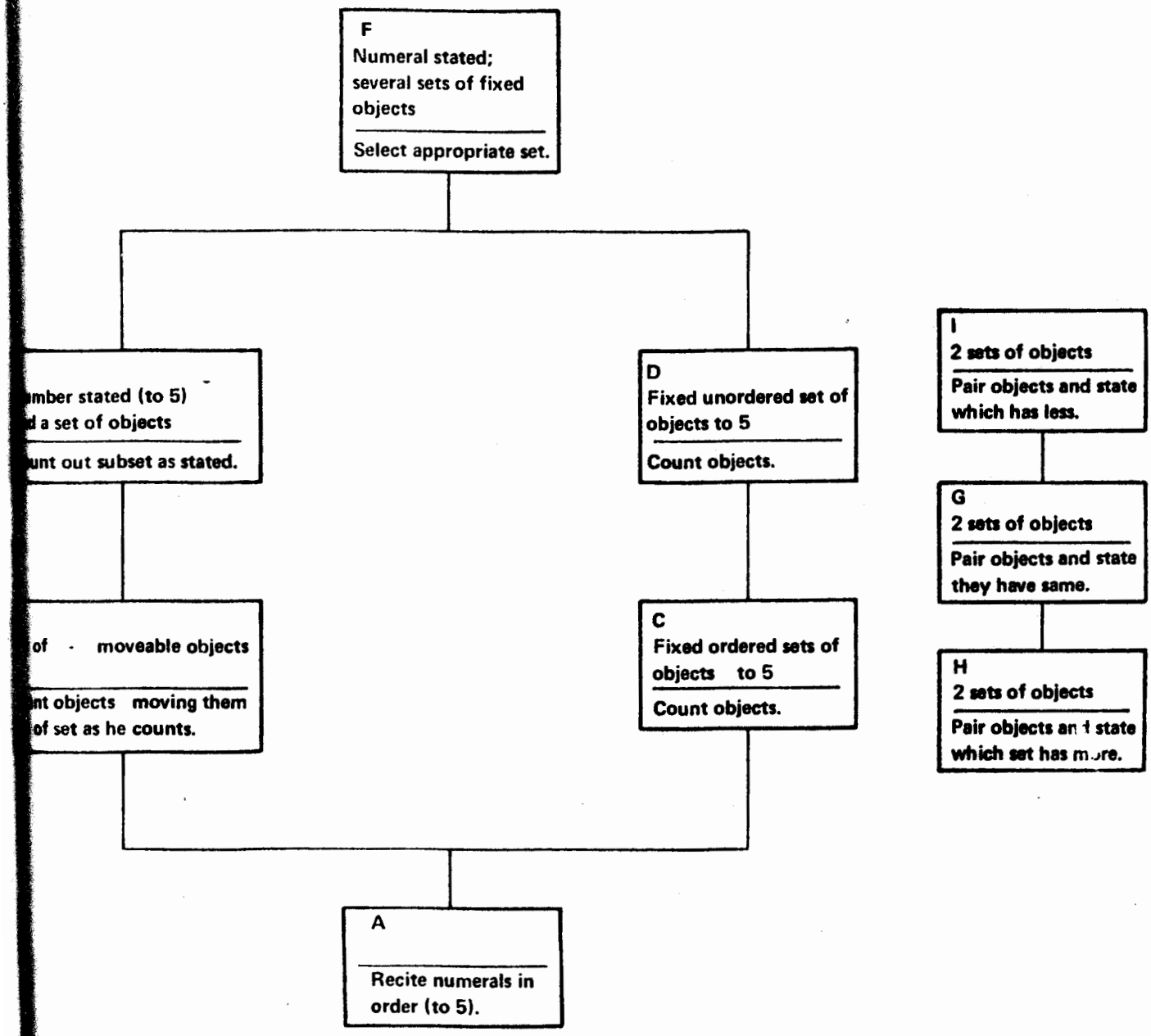
- Advanced Color-Size-Shape discrimination



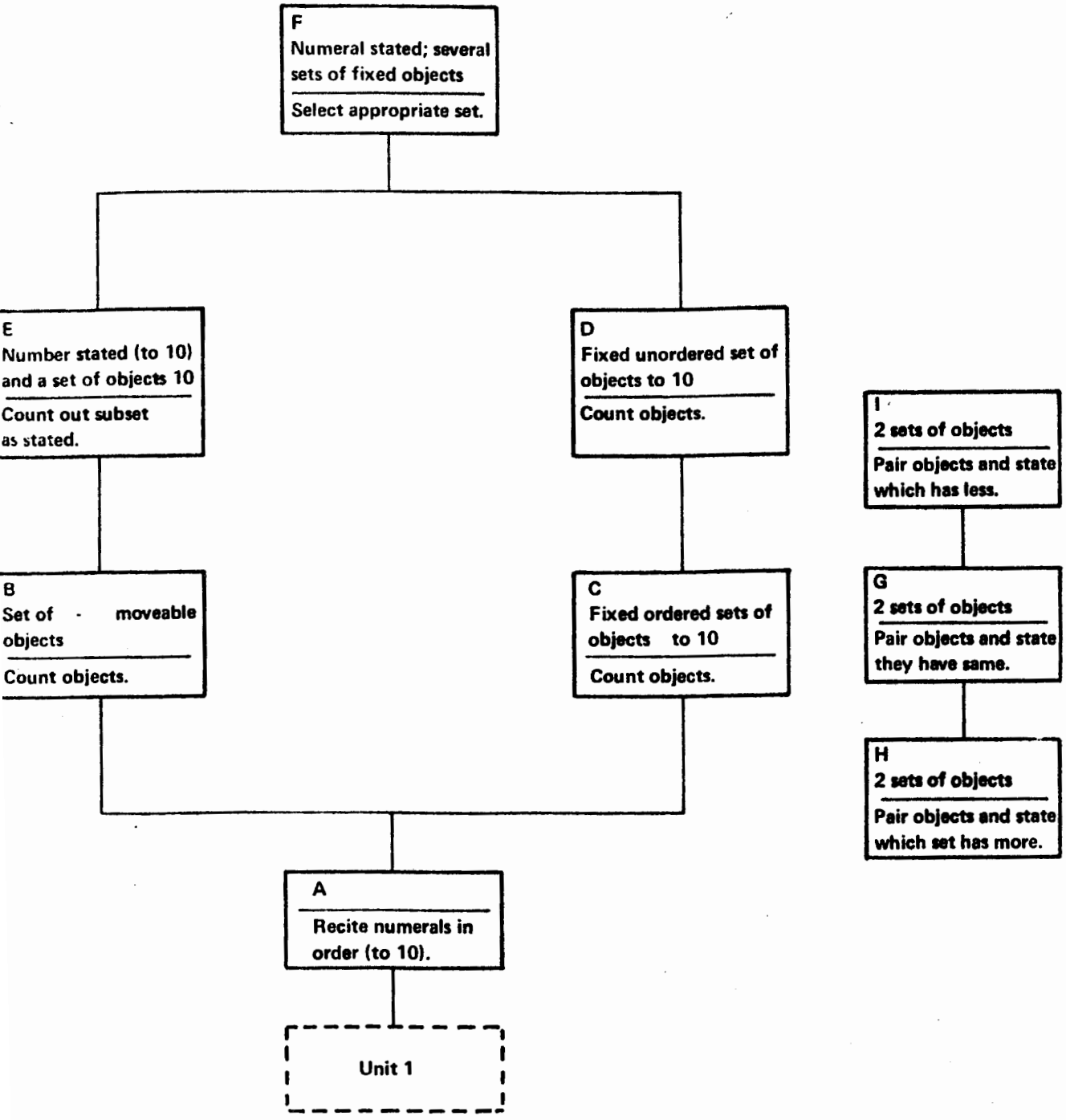
APPENDIX B

SEQUENTIAL FLOW CHARTS OF QUANTIFICATION INSTRUCTIONAL OBJECTIVES OF THE P.E.P. (PRIMARY EDUCATION PROJECT) EARLY LEARNING CURRICULUM

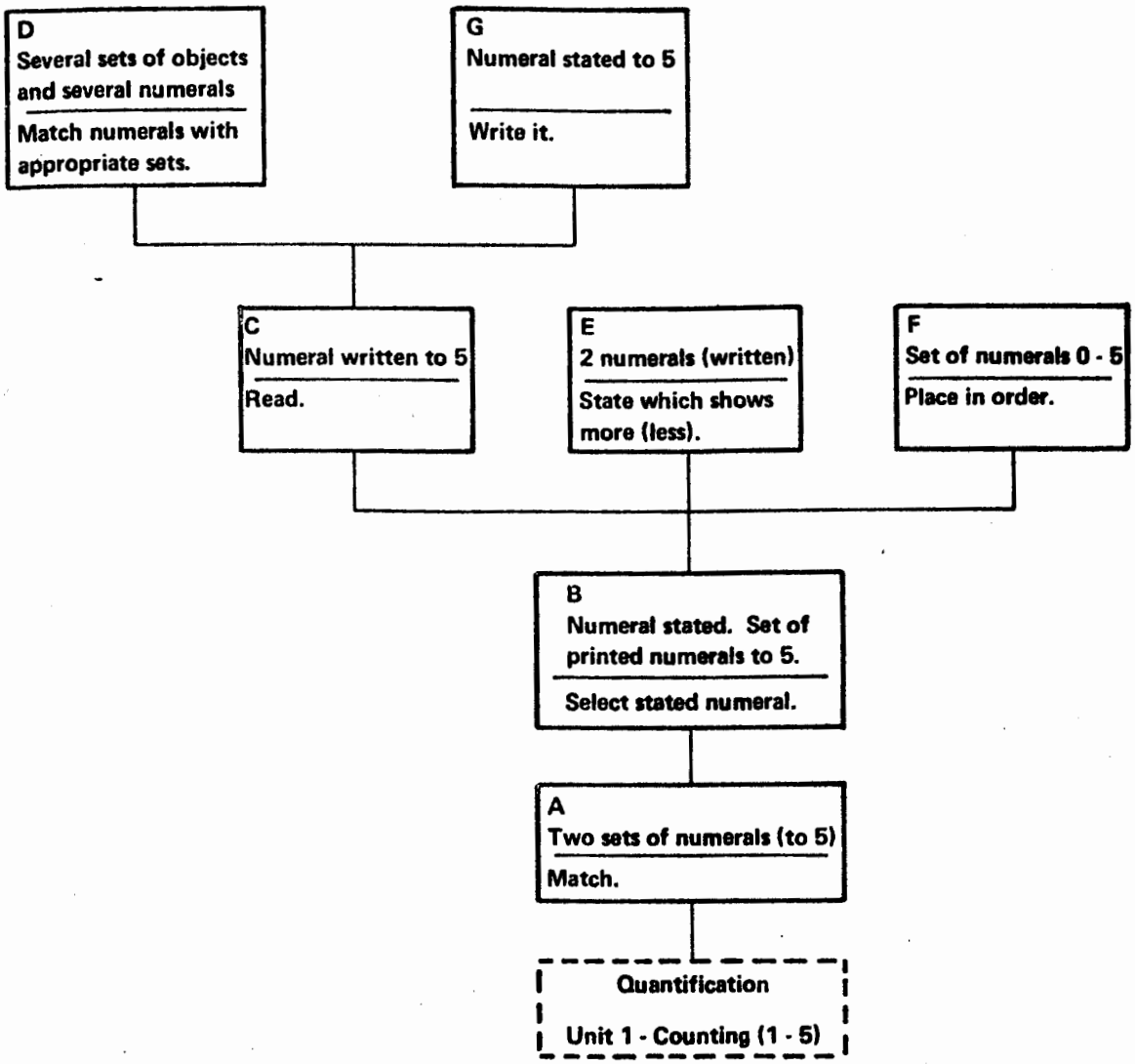
PEP Introductory Mathematics Curriculum
Quantification Unit 1 - Counting (1-5)



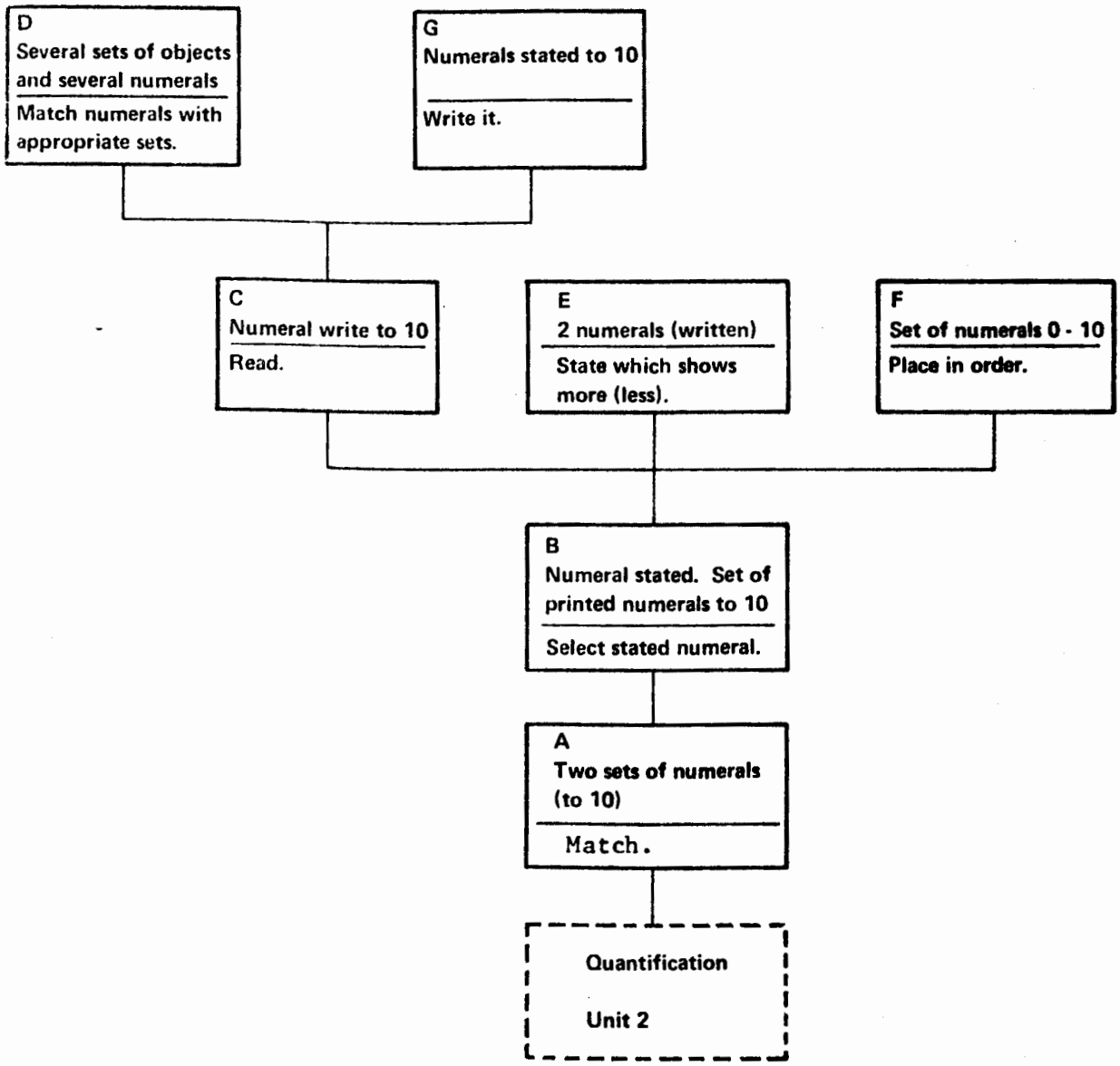
PEP Introductory Mathematics Curriculum
Quantification Unit 2 - Counting (1-10)

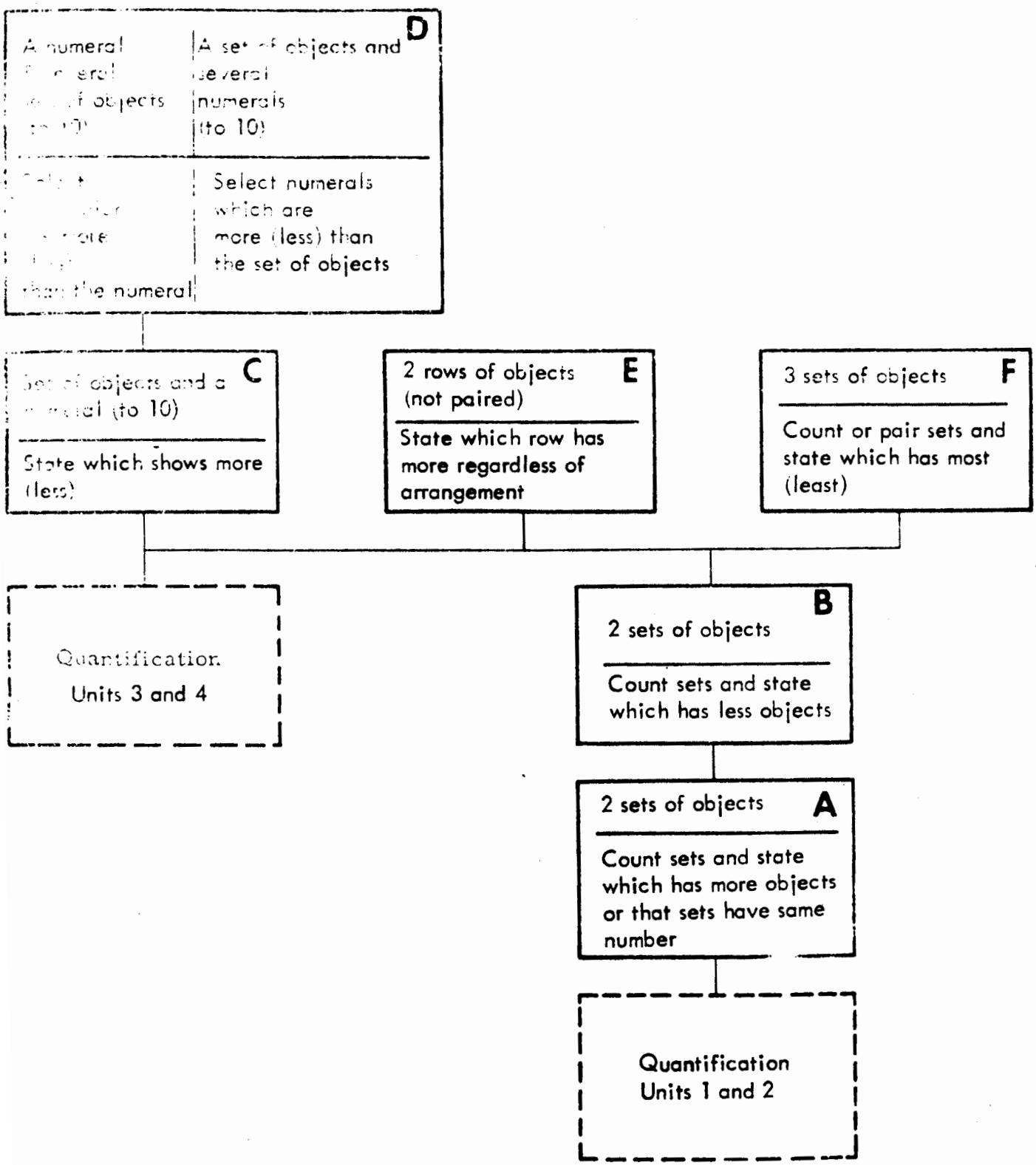


PEP Introductory Mathematics Curriculum
Quantification Unit 3 - Numeration (0-5)

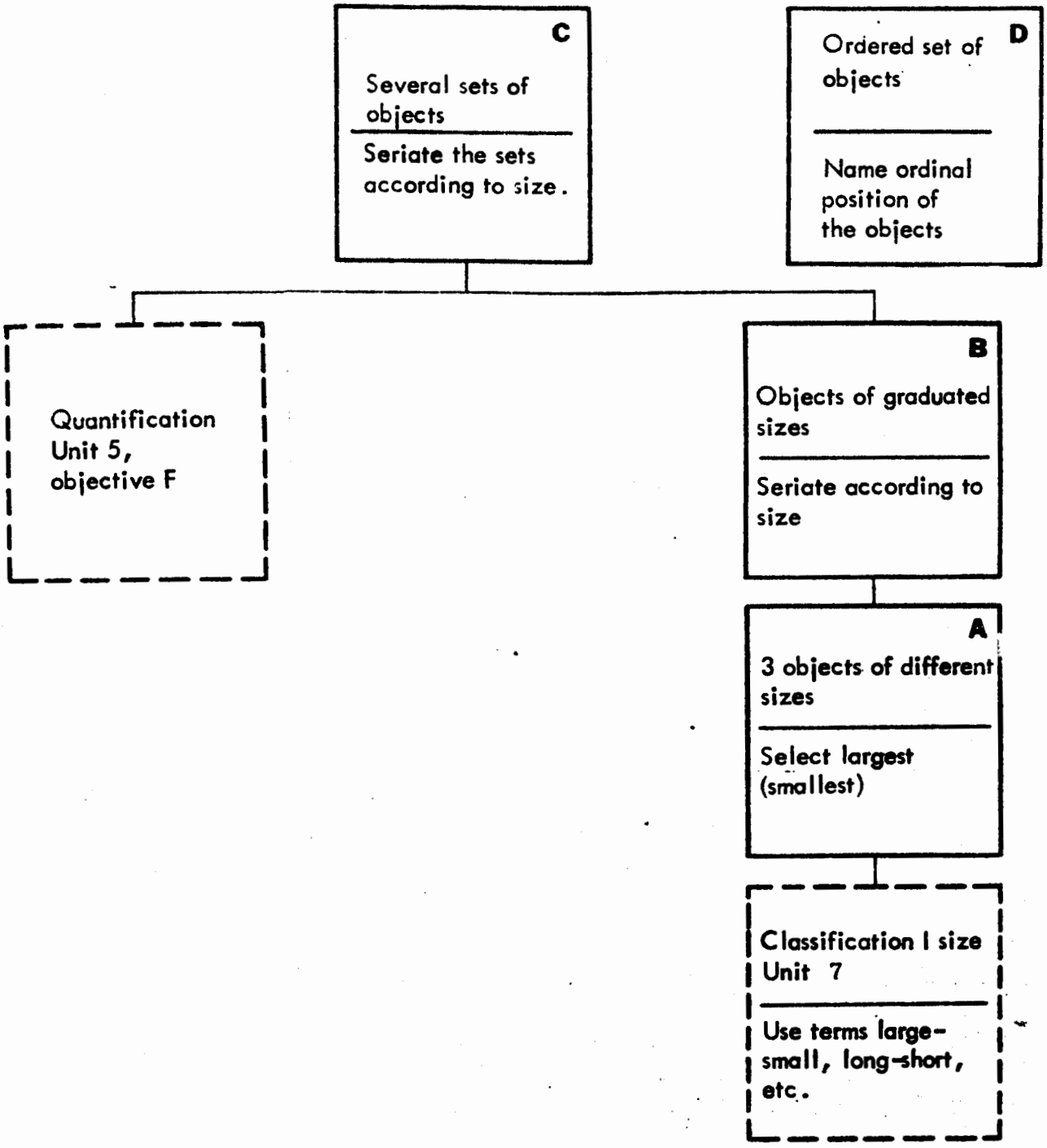


PEP Introductory Mathematics Curriculum
Quantification Unit 4 - Numeration (6-10)

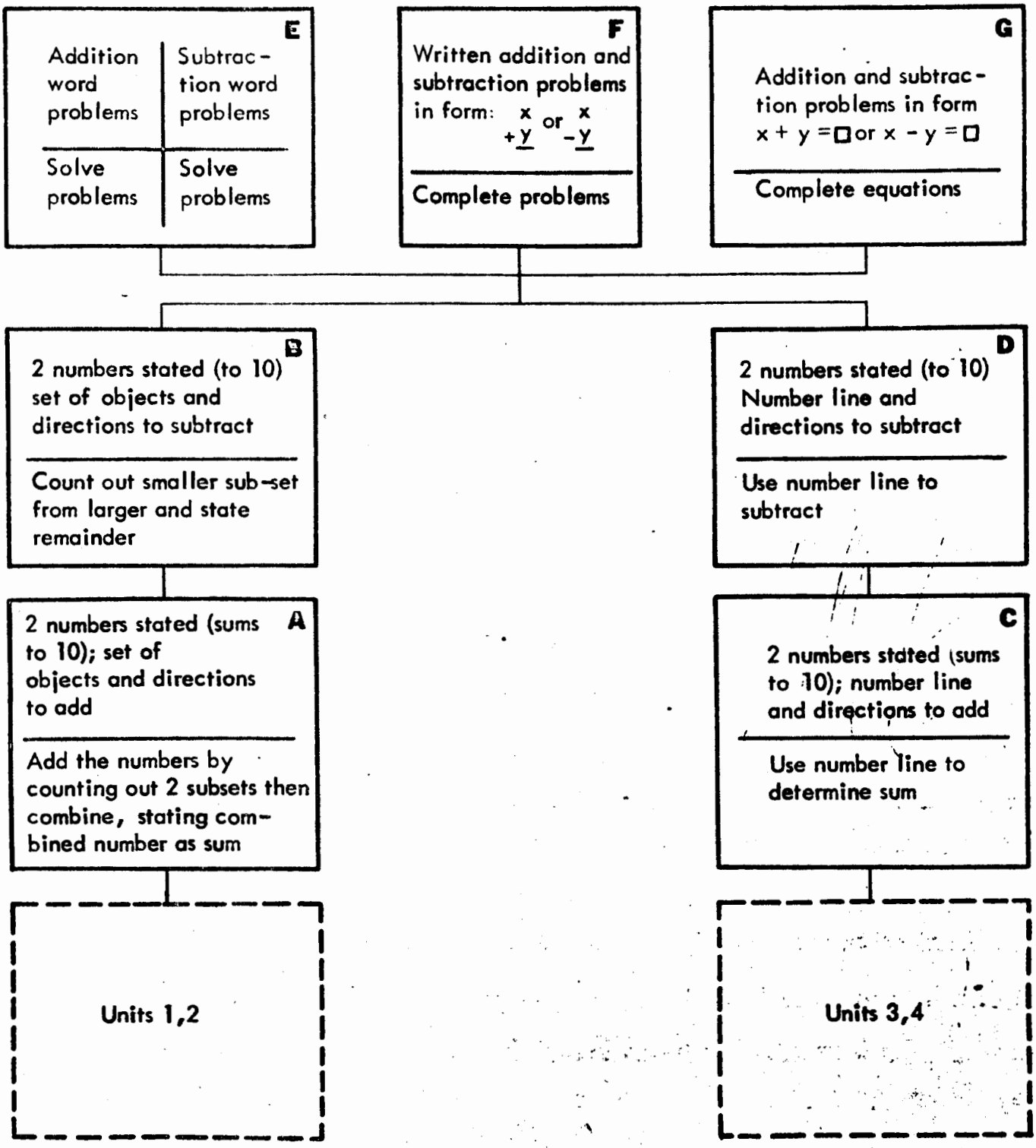


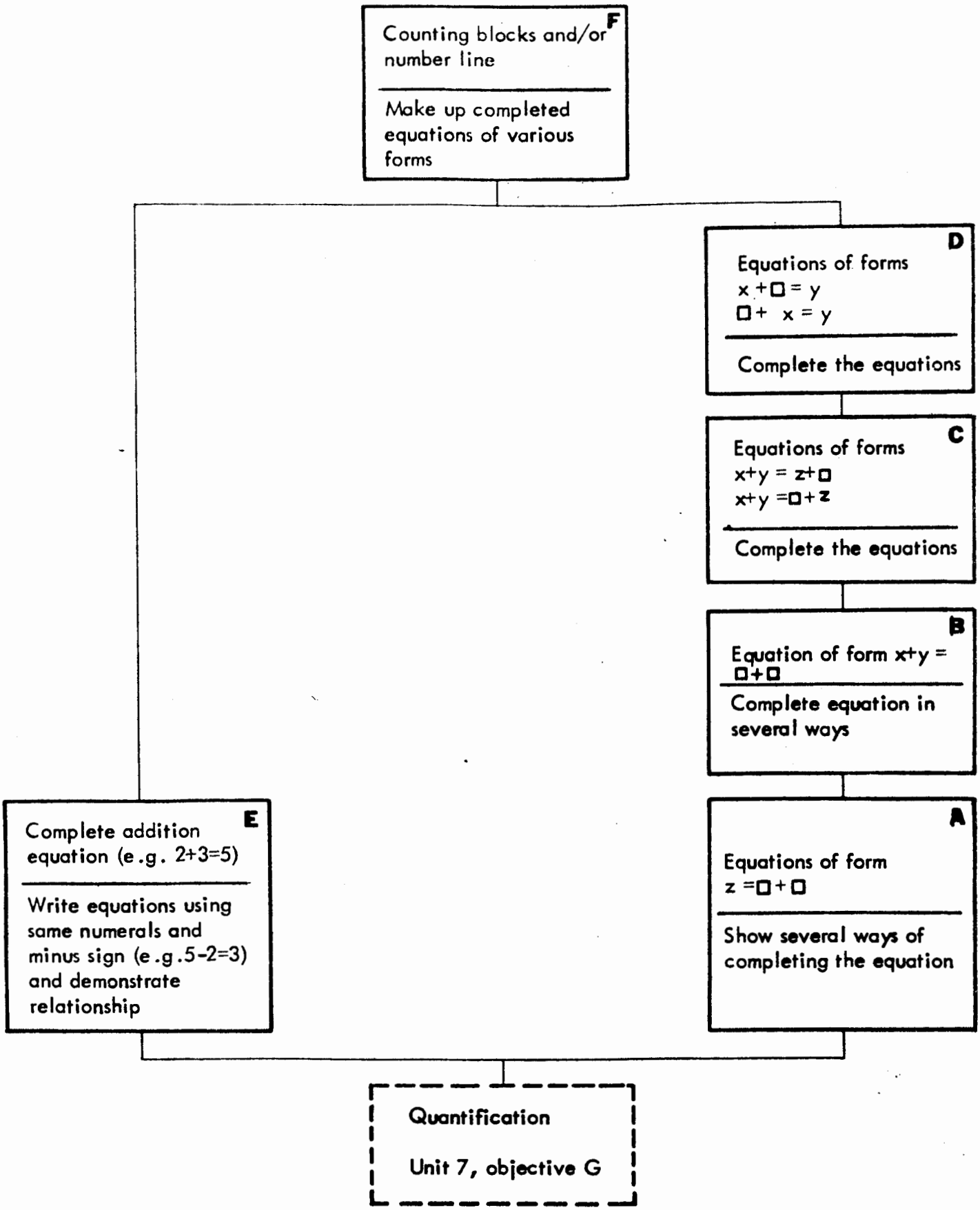

D
A numeral
A set of objects and several numerals (to 10)
Select numerals which are more (less) than the set of objects
C
State which shows more (less)
E
2 rows of objects (not paired)
State which row has more regardless of arrangement
F
3 sets of objects
Count or pair sets and state which has most (least)
Quantification Units 3 and 4
B
2 sets of objects
Count sets and state which has less objects
A
2 sets of objects
Count sets and state which has more objects or that sets have same number
Quantification Units 1 and 2

PEP Introductory Mathematics Curriculum
Quantification Unit 6 - Seriation

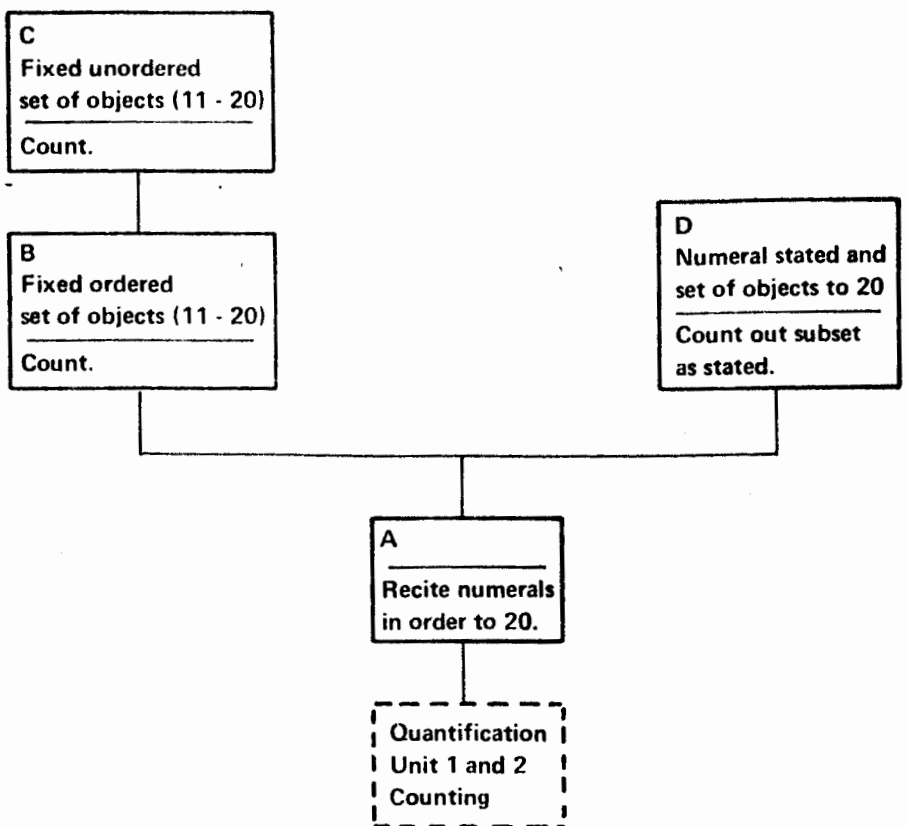


PEP Introductory Mathematics Curriculum
Quantification Unit 7 - Addition and Subtraction

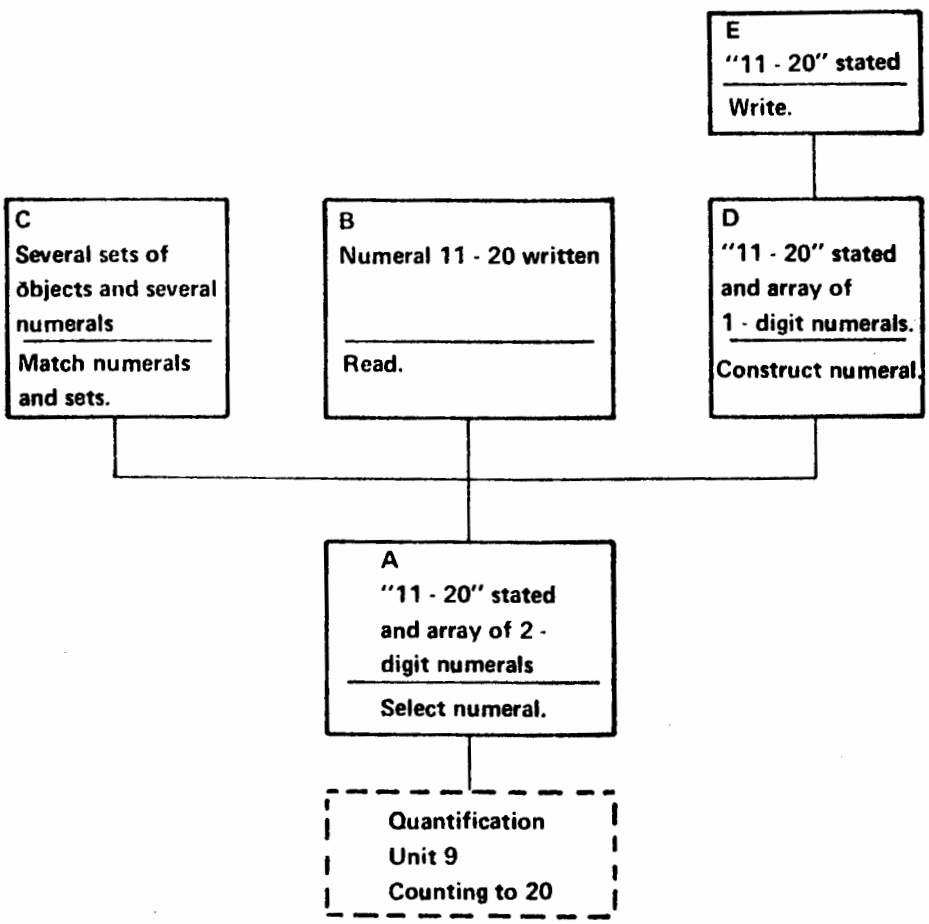


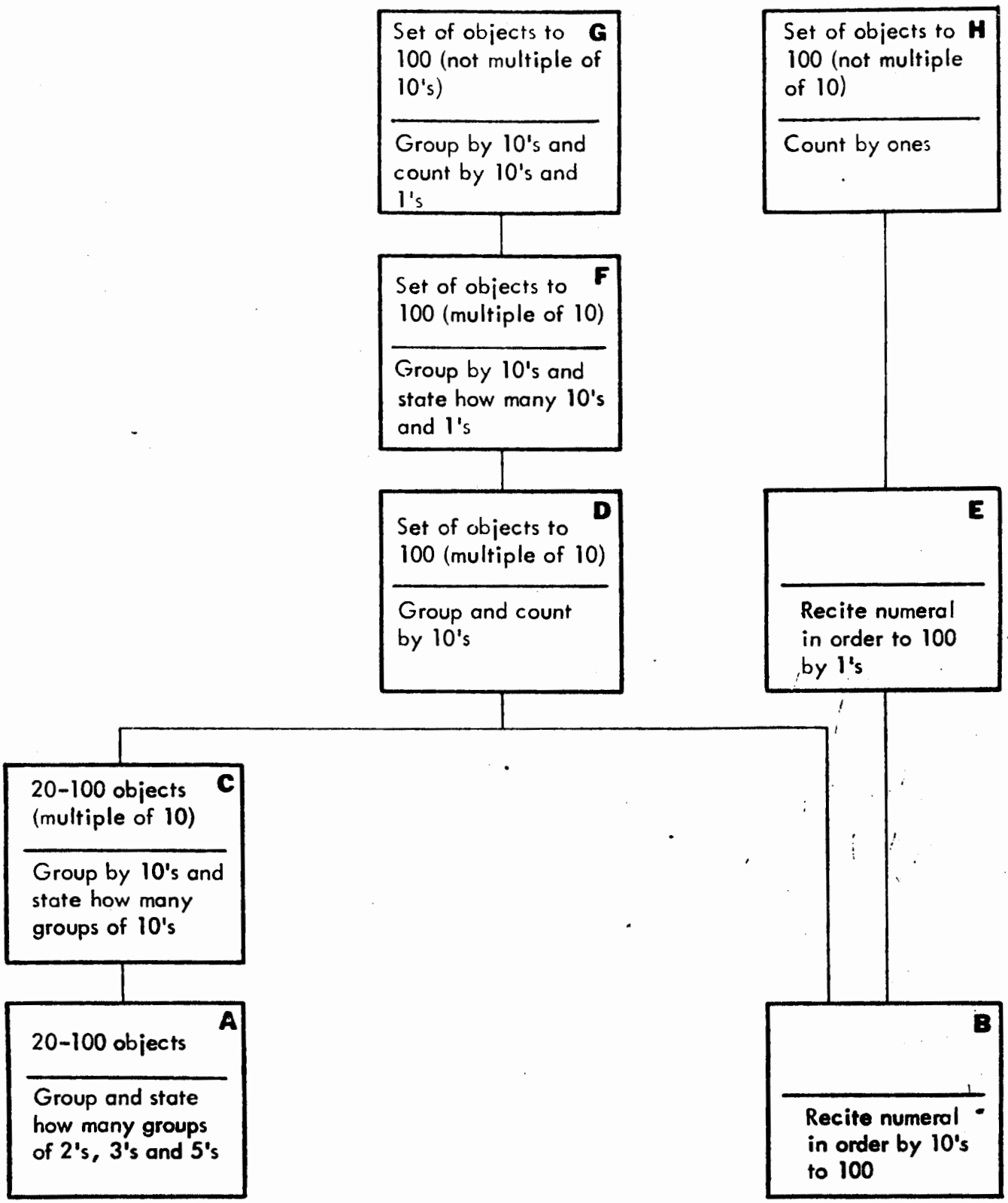

F
Counting blocks and/or number line
Make up completed equations of various forms
D
Equations of forms
x + □ = y
□ + x = y
Complete the equations
C
Equations of forms
x+y = z+□
x+y =□+z
Complete the equations
B
Equation of form x+y = □+□
Complete equation in several ways
A
Equations of form
z =□+□
Show several ways of completing the equation
E
Complete addition equation (e.g. 2+3=5)
Write equations using same numerals and minus sign (e.g.5-2=3) and demonstrate relationship
Quantification
Unit 7, objective G

PEP Introductory Mathematics Curriculum
Quantification Unit 9 - Counting (11-20)

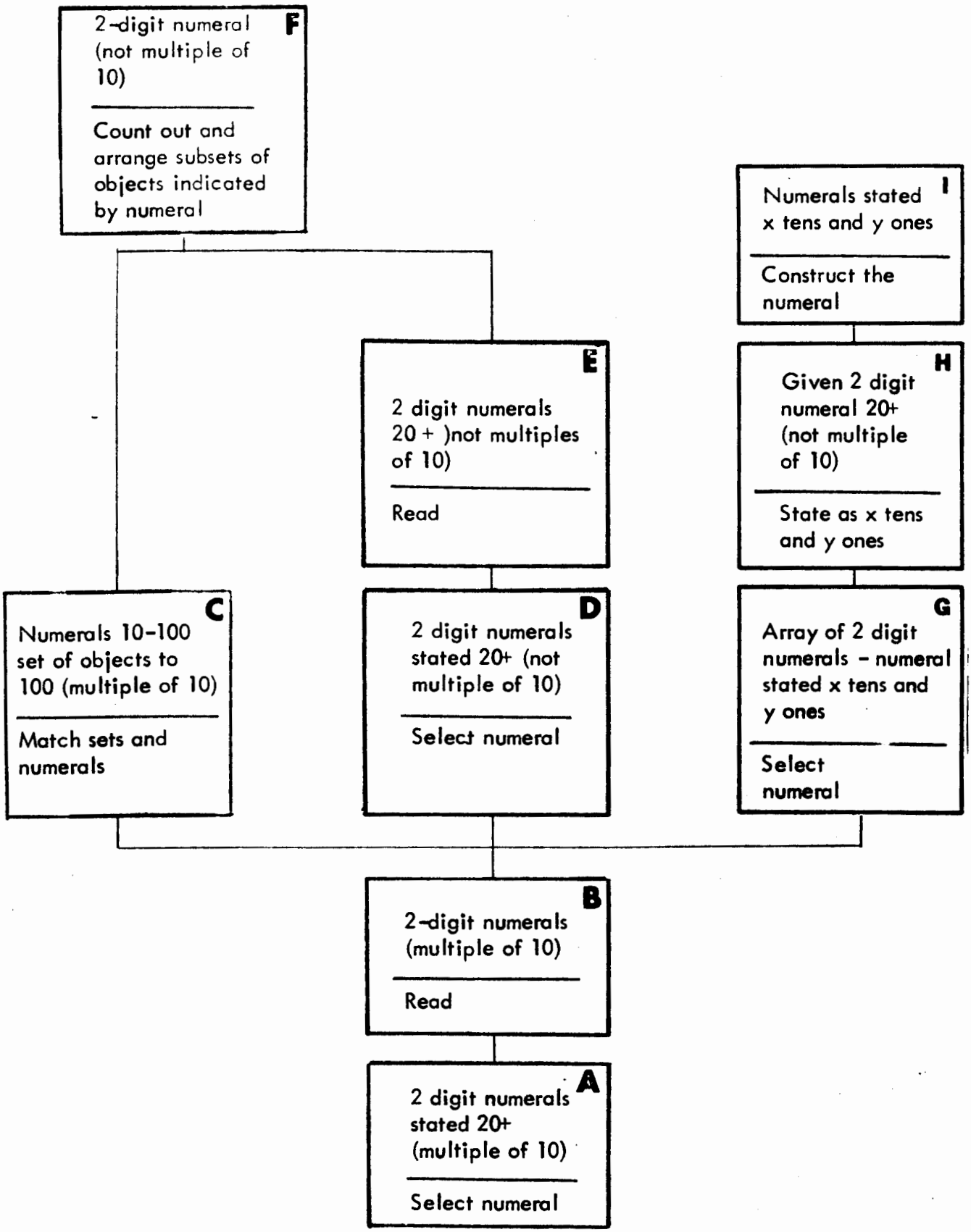


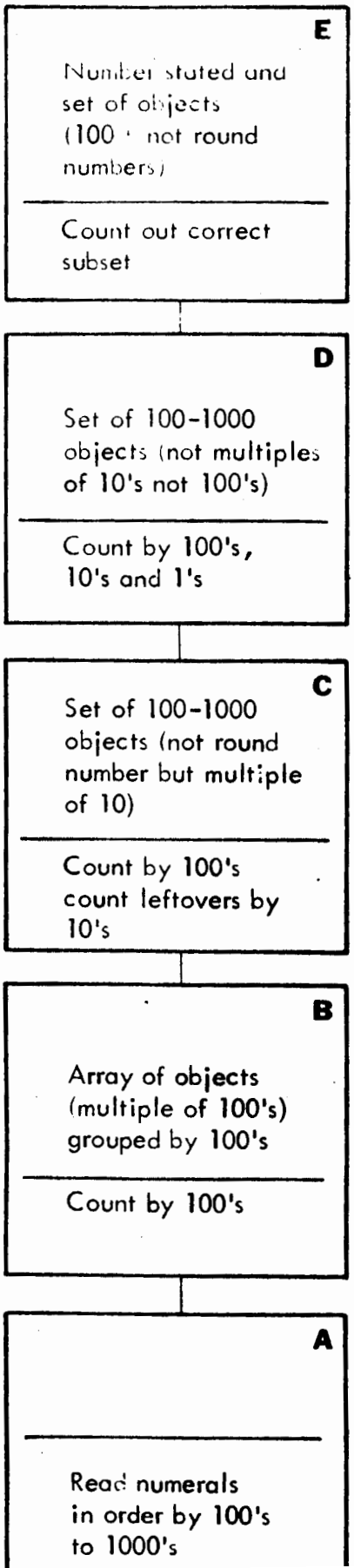
PEP Introductory Mathematics Curriculum
Quantification Unit 10 - Numeration (11-20)

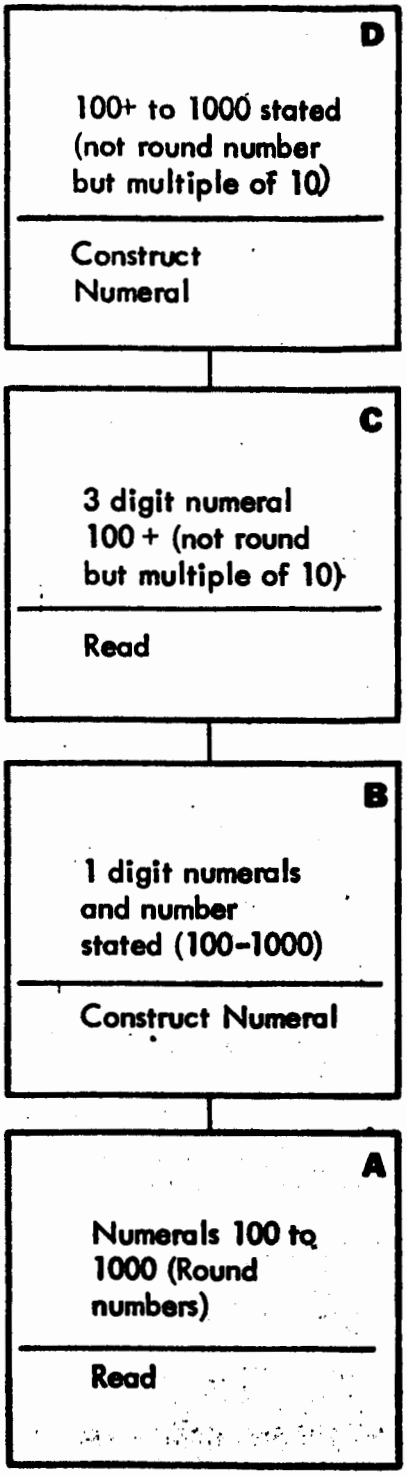



G
Set of objects to 100 (not multiple of 10's)
Group by 10's and count by 10's and 1's
H
Set of objects to 100 (not multiple of 10)
Count by ones
F
Set of objects to 100 (multiple of 10)
Group by 10's and state how many 10's and 1's
D
Set of objects to 100 (multiple of 10)
Group and count by 10's
E
Recite numeral in order to 100 by 1's
C
20-100 objects (multiple of 10)
Group by 10's and state how many groups of 10's
A
20-100 objects
Group and state how many groups of 2's, 3's and 5's
B
Recite numeral in order by 10's to 100

PEP Introductory Mathematics Curriculum
Quantification Unit 12 - Numeration (21-100) Part 1




E
Number stated and set of objects (100 + not round numbers)
Count out correct subset
D
Set of 100-1000 objects (not multiples of 10's not 100's)
Count by 100's, 10's and 1's
C
Set of 100-1000 objects (not round number but multiple of 10)
Count by 100's count leftovers by 10's
B
Array of objects (multiple of 100's) grouped by 100's
Count by 100's
A
Read numerals in order by 100's to 1000's


D
100+ to 1000 stated (not round number but multiple of 10)
Construct Numeral
C
3 digit numeral 100 + (not round but multiple of 10)
Read
B
1 digit numerals and number stated (100-1000)
Construct Numeral
A
Numerals 100 to 1000 (Round numbers)
Read

APPENDIX C

SEQUENTIAL FLOW CHARTS OF GROSS MOTOR INSTRUCTIONAL OBJECTIVES OF THE P.E.P. (PRIMARY EDUCATION PROJECT) EARLY LEARNING CURRICULUM

	1	2	3	4
C	Balance on one foot.	Hop forward on one foot.	Skip.	Move tongue and eyes in same direction simultaneously.
B	Balance on one hand and opposite knee.	Hop in place on one foot.	Broad jump--12 inches.	Move tongue to right and left; move eyes to right and left targets.
A	Stand, one foot crossed in front of other.	Walk forward, one foot crossing over the other.	Jump forward on two feet.	Click teeth; move eyes to far right and left.

5	6	7	8
Tie a bow.	Name haptically designated body parts.	Angels in snow--move one arm and ipsilateral leg simultaneously.	Hop, alternating feet after every second hop.
Draw a horizontal line between two dots.	Name visually designated body parts.	Angels in snow--move one leg only.	Tap, alternating hands after every second tap.
Cut paper with scissors.	Identify named body parts.	Angels in snow--move one arm only.	Tap, alternating hands with each tap.

APPENDIX D

SEQUENTIAL FLOW CHARTS OF VISUAL MOTOR INSTRUCTIONAL OBJECTIVES OF THE P.E.P. (PRIMARY EDUCATION PROJECT) EARLY LEARNING CURRICULUM

VISUAL MOTOR

	1	2	3	4	5
I				Given drawing of Design Board P with 10 bands, draw pattern on representation of board.	Given drawing of Design Board P with 10 bands draw pattern on representation of board, all dots omitted.
H			Given drawing of Design Board P with 8 bands, construct pattern.	Given drawing of Design Board P with 8 bands, draw pattern on representation of board.	Given drawing of Design Board P with 7 bands, draw pattern on representation of board with 16 dots omitted
G			Given drawing of Design Board P with 5 bands, construct pattern.	Given drawing of Design Board P with 5 bands, draw pattern on representation of board.	Given drawing of Design Board P with 4 bands, draw pattern on representation of board with 8 dots omitted.
F			Given drawing of Design Board P with 3 bands, construct pattern.	Given drawing of Design Board P with 3 bands, draw pattern on representation of board.	
E			Given drawing of Design Board I with 3 bands (1 diagonal) construct pattern on DBI.	Given drawing of Design Board I with 3 bands, draw pattern on representation of board.	
D	Given drawing of Design Board F with 2 bands, trace pattern.	Given Design Board F with 2 bands, construct pattern on Design Board F.	Given drawing of Design Board F with 2 bands, construct pattern on DBF.	Given drawing of Design Board F with 4 bands, draw pattern on representation of board.	
C	Given Design Board F with 2 rubber bands, superimpose bands.	Given Design Board F with 3 bands, replicate pattern (model & test board color coded).	Given drawing of Design Board F with 2 bands, construct pattern on Board (model & test bd. color coded)		
B	Given 2-direction cube arrangement, superimpose cubes.	Given 2-direction cube arrangement, replicate model.	Given drawing of squares, replicate pattern with cubes.		
A	Given 1-direction cube arrangement,	Given 1-direction cube arrangement,			

APPENDIX E

SEQUENTIAL FLOW CHARTS OF AUDITORY MOTOR INSTRUCTIONAL OBJECTIVES OF THE P.E.P. (PRIMARY EDUCATION PROJECT) EARLY LEARNING CURRICULUM

	1	2	3	4
H				
G				
F				
E				Given spoken phrase, 1-, 2- and 3-syllable words, say each word and clap simultaneously.
D				Given spoken phrase of 1- and 2-syllable words, say words and clap simultaneously.
C				Given spoken phrase of 1-syllable words, say each word and clap simultaneously.
B	Given music, changing tempo, clap in synchrony.	Given long and short claps, draw in synchrony.	Given long and short claps, reproduce pattern.	Given spoken numerals, clap once for each.
A	Given march music, clap in synchrony.	Given series of claps, draw a dash for each.	Given series of claps, reproduce correct number.	

5	6	7	8	9
	Given 2 spoken words and designated medial sound, identify word that contains sound.	Given spoken word with initial 2-consonant blend, then word with 1 sound omitted, identify sound.	Given spoken word, repeat, omitting sound of a 2-consonant blend sound.	Given spoken word, substitu 1 sound with a other designat sound.
	Given 2 spoken words and designated consonant sound, indicate which word ends with sound.	Given spoken 1-syllable word, then word with final sound omitted, identify omitted sound.	Given spoken 1-syllable word, repeat , omitting final sound.	Given spoken 1-syllable wor substitute beg ning or ending sound with ano designated sou
	Given 2 spoken words and a designated sound, indicate which word begins with sound.	Given spoken 1-syllable word, then word with initial sound omitted, identify omitted sound.	Given spoken 1-syllable word, repeat word omitting initial sound.	
Given spoken 3-syllable word, "write" with dashes and "read" syllable requested.	Given spoken 3-syllable word, indicate presence or absence or specified syllable.	Given spoken 3-syllable word, then 2 of the syllables, indicate which was omitted.	Given spoken 3-syllable word, omit designated syllable.	
Given spoken phrase of 1- and 2-syllable words "write" with dash and "read" word requested.	Given spoken 2-syllable word, indicate presence or absence of specified word.	Given spoken 2-syllable word, then only one of the syllables, say omitted syllable.	Given spoken 2-word series, omit designated word.	
Given spoken phrase of 1-syllable words, "write" with dash and "read" word requested.	Given spoken series of 1-syllable words, indicate presence or absence of specified word.	Given spoken series of 3 1-syllable words, then same series with 1 omitted, indicate which was omitted.		
Given spoken numerals, draw a dash for each.				

APPENDIX F

SEQUENTIAL FLOW CHARTS OF LETTERS AND NUMERALS INSTRUCTIONAL OBJECTIVES OF THE P.E.P. (PRIMARY EDUCATION PROJECT) EARLY LEARNING CURRICULUM

	1	2	3	4	5	6
D	Print a dictated numeral: 0 - 9	Print a dictated capital letter: A C D E G	Print a dictated capital letter: J O Q U	Print a dictated capital letter: I L M T V	Print a dictated capital letter: W X Y Z	Print a dictated capital letter: B F H K
C	Given a printed numeral, name it: 0 - 9	Given a printed capital letter, name it: A C D E G	Given a printed capital letter, name it: J O Q U	Given a printed capital letter, name it: I L M T V	Given a printed capital letter, name it: W X Y Z	Given a printed capital letter, name it: B F H K
B	Given stated numeral, recognize it in an array: 0 - 9	Given stated capital letter, recognize it in an array: A C D E G	Given stated capital letter, recognize it in an array: J O Q U	Given stated capital letter, recognize it in an array: I L M T V	Given stated capital letter, recognize it in an array: W X Y Z	Given stated capital letter, recognize it in an array: B F H K
A	Numerals: match to sample: 0 - 9	Capital Letters: match to sample: A C D E G	Capital Letters: match to sample: J O Q U	Capital Letters: match to sample: I L M T V	Capital Letters: match to sample: W X Y Z	Capital Letters: match to sample: B F H K

7	8	9	10	11	12	13
Print a dictated capital letter: N P R S	Print a dictated lower case letter: a c d e g	Print a dictated lower case letter: j o q u	Print a dictated lower case letter: i l m t v	Print a dictated lower case letter: w x y z	Print a dictated lower case letter: b f h k	Print a dictated lower case letter: n p r s
Given a printed capital letter, name it: N P R S	Given a printed lower case letter, name it: a c d e g	Given a printed lower case letter, name it: j o q u	Given a printed lower case letter, name it: i l m t v	Given a printed lower case letter, name it: w x y z	Given a printed lower case letter, name it: b f h k	Given a printed lower case letter, name it: n p r s
Given stated capital letter, recognize it in an array: N P R S	Given stated lower case letter, recognize it in an array: a c d e g	Given stated lower case letter, recognize it in an array: j o q u	Given stated lower case letter, recognize it in an array: i l m t v	Given stated lower case letter, recognize it in an array: w x y z	Given stated lower case letter, recognize it in an array: b f h k	Given stated lower case letter, recognize it in an array: n p r s
Capital Letters: match to sample: N P R S	Lower case Letters: match to sample: a c d e g	Lower case Letters: match to sample: j o q u	Lower case Letters: match to sample: i l m t v	Lower case Letters: match to sample: w x y z	Lower case Letters: match to sample: b f h k	Lower case Letters: match to sample: n p r s

APPENDIX G

TABLE OF PROBABILITIES ASSOCIATED WITH VALUES AS SMALL AS OBSERVED VALUES OF x IN THE BINOMIAL TEST

TABLE OF PROBABILITIES ASSOCIATED WITH VALUES AS SMALL AS OBSERVED VALUES OF x IN THE BINOMIAL TEST*

Given in the body of this table are one-tailed probabilities under H_o for the binomial test when $P=Q=\frac{1}{2}$. To save space, decimal points are omitted in the p's.

N \ x	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
5	031	188	500	812	969	+										
6	016	109	344	656	891	984	+									
7	008	062	227	500	773	938	992	+								
8	004	035	145	363	637	855	965	996	+							
9	002	020	090	254	500	746	910	980	998	+						
10	001	011	055	172	377	623	828	945	989	999	+					
11		006	033	113	274	500	726	887	967	994	+					
12		003	019	073	194	387	613	806	927	981	997	+	+			
13		002	011	046	133	291	500	709	867	954	989	998	+	+		
14		001	006	029	090	212	395	605	788	910	971	994	999	+	+	
15			004	018	059	151	304	500	696	849	941	982	996	+	+	+
16			002	011	038	105	227	402	598	773	895	962	989	998	+	+
17			001	006	025	072	166	315	500	685	834	928	975	994	999	+
18			001	004	015	048	119	240	407	593	760	881	952	985	996	999
19				002	010	032	084	180	324	500	676	820	916	968	990	998
20				001	006	021	058	132	252	412	588	748	868	942	979	994
21				001	004	013	039	095	192	332	500	668	808	905	961	987
22					002	008	026	067	143	262	416	584	738	857	933	974
23					001	005	017	047	105	202	339	500	661	798	895	953
24					001	003	011	032	076	154	271	419	581	729	846	924
25						002	007	022	054	115	212	345	500	655	788	885

\+ 1.0 or approximately 1.0.

* Reproduced from Siegel, S., Nonparametric Statistics for the Behavioral Sciences, 1956. McGraw Hill, New York.

APPENDIX H

LETTER OF EXPLANATION TO TEACHERS

May 10, 1972

Kindergarten Follow Through Teachers,

Thank you for bringing your class lists up to date and indicating whether or not the children had preschool experience. The names were put into two groups, those with and without preschool. The names were alphabetized by surname and a random selection was made of every third student. Enclosed are the names of the students included in the study.

Will you please write a number for each of the six curriculum areas listed which states how many Units the students have mastered as of March 29, 1972. For example, in the area of Quantification, if a child has mastered Units 3, 5, and 7, write a 3 on the blank. In the area of Auditory Motor, if a child has mastered Units A and B, write a 2 on the blank.

I realize the end of the school year is a very busy time and I have tried to keep your work to a minimum. Will you please complete the forms as soon as possible and return them to your school office.

Thank you in advance for your cooperation.

Dave Stetson

APPENDIX I

UNITS OF MASTERY FORM

Please write a number which states how many Units this student has mastered as of March 29, 1972.

CLASSIFICATION _____

QUANTIFICATION _____

GROSS MOTOR _____

VISUAL MOTOR _____

AUDITORY MOTOR _____

LETTERS & NUMBERALS _____

(YOUR RESPONSE MUST BE A NUMBER)