THE EFFECTS OF DIFFERENTIAL KINDERGARTEN PROGRAM LENGTH ON ACHIEVEMENT AMONG DEVELOPMENTALLY READY AND NOT-READY CHILDREN

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CHAPTER I

THE RESEARCH PROBLEM

Introduction

The area of early childhood education is based upon optimistic assumptions about mans' innate potential for growth and the almost endless modifiability and flexibility of human behavior (Feuerstein, 1968; Hunt, 1964). Our knowledge of how environmental circumstances affect our behavior has been thoroughly demonstrated by the behavioral psychologists; yet, it is also recognized that there are more than the presses of environmental variables that establish the wide repertory of human responses we see. Modifiability of human behavior is apparently limited by various aspects of personality and adaptability and particularly by the organic determiner of age. Depending upon the response called for, the degree of modifiability can be limited by either young age or old age (Bloom, 1964). In some instances, the older the organism the slower the learning process since unlearning previously established responses must occur before new responses can be learned. In other cases, the age of an organism can be too young and the person lacks the maturity to make the associations necessary to learn.

This age limitation is not always best represented by chronological time but is better considered as the total developmental growth of the individual (Ilg & Ames, 1965). This developmental age would

represent the pace of growth unique to the individual, recognizing that besides the passage of time, a multitude of factors from physiology, culture, and learning experiences influence the total development of the individual. For purposes of this study, it is assumed that this broader definition of developmental age is more revealing than mere chronological age, and predictions gain precision when developmental age is utilized over the grossness of chronological age.

The differential importance of development and the effects of environment is a major question when early childhood education is studied. Due to imperfection inherent in psycho-educational research, it is not surprising that such a complex issue has no definitive resolution. Therefore, the controversy continues about how to prepare effective learning environments, the developmental age at which to expect academically related performance, and how the two factors of development and environment interact. As Cohen (1977) says, kindergarten is currently at a crossroads and is being called upon to not only account for its curriculum but act as a preventative institution. Whether educators will choose to do this by extending the kindergarten day, developing cognitively based curriculum, and didactically teaching; by influencing others with the developmentally based philosophy of the importance of creative play and experiential learning; or by reaching a middle ground, a compromise position will hopefully be justified by empirical research and thoughtful study.

Problem Statement

The problem examined in this study is: How is the achievement

of students affected by varying lengths of formal school programming in kindergarten? Children of legal kindergarten age participated in one of three kindergarten program lengths. The students were identified as developmentally ready or developmentally not ready. An achievement test was administered at the end of the kindergarten year and the effects of ability, race and gender were statistically controlled when the results of the study were analyzed.

For purposes of this study, developmental readiness was determined by the child's developmental age score obtained on the Gesell School Readiness Test. These age scores were assigned in six months intervals. To be considered ready, the developmental age of the child had to correspond with the continuum five years upon entering kindergarten to six years upon entering first grade. To be classified not ready, the developmental age was less than five at the beginning of kindergarten and less than six at the beginning of first grade. Achievement was defined as subtest scores obtained on the SRA Level A Achievement Series, 1978 edition. Ability was defined as scores obtained on the SRA Educational Ability Series Test (EAS). The three levels of kindergarten considered were: half-day kindergarten - either morning or afternoon program two and one-half hours in length, five days a week; extended-day kindergarten - program from 8:45 a.m. until 2:00 p.m., five days a week; all-day kindergarten - program from 8:45 a.m. until 3:15 p.m., five days a week.

Theoretical Framework

Currently there appear to be two viewpoints concerning the appropriateness of kindergarten program length that stem from two

major theoretical views concerning the way children develop and learn. These two perspectives are called developmental and compensatory in this study.

Beginning in the 1960s, an awareness of the importance of early childhood experiences brought about many changes in the area of early childhood education. Experiments by compensatory theorists such as Deutsch (1964) indicated that preschool, kindergarten, or day-care experience or a combination of these are associated with higher scores on intelligence tests than are achieved by children without such experience. Regardless of social class affiliation, the advantage is evident at first grade level and even more at grade five, he found. With such information to counteract the notion that intelligence is genetically predetermined and fixed, and with increased recognition of the child's dependence on sensory stimulation for cognitive development, there has resulted an emphasis on early learning situations (Bloom, 1965). The compensatory education programs were begun to maximize a child's exposure to the benefits of structured educational programming as a way of equalizing educational opportunities for all children. Theories underpinning compensatory programs (Bloom, 1965; Deutsch, 1964; Hunt, 1970) suggest that, given an appropriate program, children will profit educationally by extended exposure to school experiences. Therefore, children at all readiness levels should excel in direct proportion to the length of their kindergarten program.

A tentative hypothesis of the compensatory theorists states that children should perform better on school achievement tests if they participate in an all-day program than if they are in an extended-day

program; and better in an extended day than if they are in a half-day program.

The other perspective reflects the ideas of developmental theorists (Ilg & Ames, 1964; Moore & Moore, 1979). It is this contention that a child's ability to profit from educational programs is dependent on the maturation or readiness level of the child. For the developmental theorist, it is the time factor inherent in the maturation of the individual that is important, rather than the time factor imposed by a school program on the child. It is their idea that five-year-old children are not, as a rule, ready for all day attendance since they do not have the stamina in energy or adaptability required for full-time school participation.

A tentative hypothesis of the developmental theorists is that there would be no difference between children in different program lengths of kindergarten but that developmentally ready children would perform better than developmentally not-ready children on achievement criteria.

Significance of Problem

Theoretical Importance

The purpose of this study is to attempt to resolve two differing theoretical views--developmentalist and compensatory--by measuring their practical application during one year of school. The importance of such examination comes if it can be determined that either approach is a valid and effective force in producing achievement and minimizing school failure.

Validation of the developmentalist position would suggest that

school readiness could be accurately predicted through a screening instrument and that providing time to grow would be as important as specific curricular concerns or length of time in programs.

If program length proves to be a major contributing factor toward achievement, as the compensatory view suggests, then the extra time available during the preschool and kindergarten years becomes more precious for educational planning. The hope for modifiability of human behavior rests strongly on the idea of early intervention, and the school has been recognized as the most appropriate social agency for providing the stimulation (Blank, 1970). "It is through this institution, which reaches every child, the requisite stimulation for facilitating learning, psychological maturation, and acculturation can be most efficiently organized and programmed" (Deutsch, 1964, p. 254). If in fact the environment is the important variable, then we will not waste children's valuable time waiting for something to develop when our own efforts to produce change are not being optimally utilized.

Practical Importance

Projections by the Urban Institute of Washington ("Instructor: Special Report," 1979) indicate that by 1990 45 percent of American children under the age of six - about 10 million of them - will have working mothers. As traditional family patterns change and more women enter the labor force, early education programs to care for young children become increasingly important as a social necessity. Assuming that one-sixth of these children will be of kindergarten age, 1.6 million children will be in need of an all day child care/educational

environment and many more parents would likely prefer it for their children if given the option. For parents early childhood education has become a partner in child rearing. Parents look to school personnel to help them provide the best ways to extend children's learning while knowing the right kind of environment to make them happy and well socialized.

The demands on early education programs come from more directions than mere numbers however. Not only do we expect the school to succeed with all children who enter the doors, we also seem to expect the students to master quantitatively more material than they did in the past. Since the advent of Sputnik and computerized technology, there has been a constant upgrading of educational content causing a pushing downward of the old material. Therefore, children are having to learn more, faster, at younger levels to fall in line with the pace of education as it exists today. A major controversy in kindergarten is how to respond to this pushing down of the curriculum without turning the kindergarten into a watered-down version of first grade (Cohen, 1977).

It has been demonstrated that children can learn academics at younger ages, but the issue of what is appropriate for children to learn at early ages has not been settled (Robinson & Spodek, 1965). Obviously, the kindergarten comes at a critical period in a child's development. Bloom (1964, p. 128) states "the nature of the learning environment is most critical during the periods of most rapid change in learning" which he identifies as between four and six. Therefore, the importance of that kindergarten year cannot be ignored, but the year must be used wisely in a way that is most beneficial to

children. Since some states are moving to make kindergarten mandatory for students before going to first grade (Pipho, 1982), it is obvious that studies of kindergarten effectiveness are needed.

The educator must be always diligent in a search for a more effective process of education. There is always the danger that the new fad, the best sell job, or maintaining the status quo will lead to programming that is not empirically justified. It is obvious that school failure still exists and attempts to prevent it at the early childhood level are much more promising than remedial approaches (Arter & Jenkins, 1979). Our special education departments are bulging, but obviously this is not the solution for the majority of children. Prevention and consistent attention to quality education must be paramount.

CHAPTER II

REVIEW OF LITERATURE

Structure of the Chapter

This study is concerned with two major viewpoints that have affected the direction of early childhood education, specifically kindergarten. For lack of better nomenclature, the theoretical perspectives will be called developmental for that group which highlights the biologically determined growth patterns and compensatory for those who give particular weight to the factors of environment. The review of literature will attempt to clarify these two theoretical positions concerning the nature of readiness and expand on the implications the two positions have had on educational practice.

The experimental aspect of the study is concerned with program length in kindergarten. Therefore, research studies concerning the effects of differiential time in kindergarten have been reviewed and summarized. The studies have been covered in two parts in a chronological sequence; first those supporting extended kindergarten and then those not supporting longer programming.

Another aspect of this review of literature is a report on the studies that indicate the predictive power of the Gesell School Readiness Test since this instrument has been utilized to classify students for purposes of study. The chapter concludes with a

general summary of how the literature forms a rationale for the research.

Readiness

Within the behavioral sciences there is ambiguity in the definition and assessment of school readiness and much debate over the factors that influence it (Kulberg, 1973). Though each society has common-sense type ideas about what behaviors are typical of given ages, there is considerable diversity of opinion about how readiness relates to educational practice.

Different theorists have conflicting ideas about the nature of child development which set the stage for their interpretation of readiness. Depending on their inferences about the effects of environment and biological imperatives, their view of the role of education changes. The two extreme positions will be dealt with in this review.

Arnold Gesell's primary interest, for instance, was with the process of growth and the inner drive of the organism for growth. Using his training in experimental and chemical embryology, he emphasized in his infant studies the intrinsic relation of neural ripening to function. Stolz (1958) quotes Gesell:

> The nervous system grows according to its own intrinsic pattern and thereby establishes the primary forms of behavior. These forms are not determined by stimulation from the outside world. Experience has nothing specifically to do with them (p. 10).

Bruner represents a theorist who holds the position at the other end of the maturation/environment continuum from Gesell. Bruner (1960, p. 7) holds that "the foundations of any subject may

be taught to anyone at any age in some form" and, thereby, suggests that a degree of readiness is always present. He holds that school readiness is dependent almost entirely upon the experiential background of the learner. It is the school's job then to find the appropriate instructional techniques that meet the child where he is as a product of his experiences.

Generally, the differences between their theoretical approaches boils down to the age-old nature-nurture controversy. In a review of issues about school readiness, Tyler (1964) warns against the trap of this endless debate and suggests a more empirical approach that involves attempts to build for readiness. If, indeed, readiness is a matter of inner forces, deliberate efforts to train for readiness should have no effect greater than that of waiting for readiness to evolve. If, on the other hand, nurture is a dominant force, deliberate effort should provide demonstrable effects. In view of the logic of Tyler's recommendation, the heat of the debate, and the educational significance of this issue, it is surprising that few such direct comparisons have been made (Kulberg, 1973).

Developmental Point of View

Support for the various positions on readiness has come for the most part from indirect sources. Gesell's (1929) co-twin control studies in stair climbing led to the conclusions that early practice in motor skills is ineffective and that maturity comes from the passage of time. This finding has been expanded by Ilg and Ames (1965) of the Gesell Institute of Human Development into educational practices that recommend the delay of instruction until those inner

forces of maturation indicate a child is ready. It is their philosophy that children move through invariant sequences in a biologically determined timetable. Similarly to the Gesell studies they think that by observation of a child's task approach to a standard set of activities, the child will reveal his true maturity level based upon the trends and stages characteristic of normal growth. In determining one's developmental age, the assessment attempts to consider the child as a total being rather than in terms of IQ or socioeconomic conditions. The physical, social, emotional, and intellectual aspects of development are interrelated and by responding to behavior tests, the developmental age at which the child is grounded can be determined. It is this developmental age that should then be used to place the children in school rather than their chronological age or intellectual level.

The idea that growth is not a straight line function is one that is ignored by legal mandates concerning school entrance and grade placement. Historically, the criterion for school entrance has been a chronological age set by state law. Such a practice assumes that all children develop at the same rate and are ready for the same experiences at the same chronological age. Children, however, do not develop at the same rate. Child development specialists have found that there may be a two to four-year spread in maturation among normal children at the age of six (Carll & Richard, n.d.; Heffernan, 1964; Olson, 1947).

Once a child's developmental age has been assessed, a developmental placement program is recommended. This is an educational plan that provides the correct curriculum for the developmental age

of the child regardless of the child's chronological age. The placement must appreciate that readiness for any given task has its roots in the biological-maturational makeup of the child and does not intend to produce it, hurry it, nor ignore it.

According to the Gesell Institute no child should be expected to perform successfully in kindergarten until he is fully five years of age developmentally. As a matter of fact, some developmentalists suggest that the child of five to seven lacks stamina in energy or adaptability and, therefore, would profit by some reduction in school attendance (Ferguson, 1957; Ilg & Ames, 1965).

Ilg and Ames are not alone in their concern over children starting school before they are ready. Moore and Moore (1973) reach the conclusion that research findings overwhelmingly indicate that young children should be allowed to grow in a home environment undisturbed by the interference of formal schooling until age seven or eight. The maturity level which implies total school readiness may be as late as 11 or 12 (Moore & Moore 1979). Only when children are handicapped beyond the ability of parents to provide therapy or when parents are physically, emotionally, or financially unable to care for their children do they see justification for early schooling programs. They see schooling for five-year-olds as something that "clearly threatens the welfare of the child" since cognitively based programs require consistent reasoning of which children younger than eight are not capable (Moore & Moore, 1973, p. 15). It is suggested that the development of the typical young child's intellect does not require the stimulation of educational programs but will respond automatically within a simple, undistracted home environment (Moore & Moore, 1979).

Moore & Moore (1979) reject the early stimulation theory of Bloom (1964) by saying:

> It is like forcing open a rosebud, beautiful in its potential and perfect in its immaturity, but not yet ready to fully bloom. No matter how delicately you open it, you end up with a damaged rose (p. 16).

Heffernan (1964, p. 497) also addresses the need to protect five-year-olds from an academically based kindergarten that may be "warping children to satisfy adult demands." She quotes Dr. Kenneth Zike, head of the Department of Pediatrics, Harbor General Hospital, Los Angeles:

> Only about 25 per cent of the children in kindergarten have reached a neurological maturity to cope with the symbolization necessary for reading. The eye may be ready to receive the visual image, but for more than 75 per cent of the children, the neurological system has not reached the maturity needed to make connections between what they see and what they understand. There is nothing that can be done to speed up this readiness - only time can do this.
>
> At least 50 per cent of the children with learning problems referred to the neurological clinic at Harbor General Hospital have had no traumas, no birth injuries or other physical deviations. Their trouble seems to come from pressure - pressure to do a task they have not the maturity to do (p. 497).

Strom (1965) observed that the value attached to academic achievement and the pressures to grow up and achieve earlier could be damaging to personal development. He suggests that parents are often unaware of the frustration of early education. It is his opinion that the challenges are too great, it is too physically taxing, and the motivation is based on adult approval rather than internally based.

Neurophysiologically, the young child is not completely ready for regular tasks which require abstract or cause-to-effect thinking until he is seven or eight or older (Moore & Moore, 1973). Cognitive

psychologists suggest the age span of seven to eleven as the time when a child becomes able to reason abstractly, as required, for example in reading. This conclusion is underscored variously by Piaget (1966), Almy (1966), and Furth (1970).

Berson (1968, p. 27) states the position that seems to reflect many in the early childhood education field that extended programs such as all-day kindergarten may be a necessary evil for children "living in adversity" but regrets that this is the case. Instead she "would prefer that all five-year-olds receive the challenge and stimulation of being in a school situation part of the day, and a rich home life the other part" (p. 28). Hosely (1965) contends that while a partial day is profitable the whole day in school may be far too fatiguing - emotionally if not physically. The anxieties and strains present a threat to the child's mental and emotional health.

Though research in the area is inconclusive, Halliwell (1968) has concluded from reviewing studies on entrance age and school success there is a significant advantage to postponing early school entrance. The studies report early entrance to first grade results in lower achievement throughout the grades when compared with achievement of later entrants of similar abilities.

Brener and Scott's (1973) 15-year study on school readiness concluded that the older a child is, the better he will function and structure his environment. They agree that the biological timetable of normal development makes ineffective and unnecessary any attempts to speed up learning with specific training.

In the book School Can Wait, the authors suggest that the redundancy of structured learning in school where similar materials

are repeated year after year can retard learning (Moore & Moore, 1979). This situation would be unnecessary if children could wait a year or two longer before entering school so they would be more nearly ready academically and could learn the same skills quickly without boredom and tedious repetition. Moore and Moore state:

> Research is needed to determine more definitely whether, as it appears, such delays would successfully reduce both the frustration and anxiety of so much early learning and the apathy and low achievement of later school years. At this point, from reviews of more than 7,000 early childhood education studies, we can find no systematic body of evidence to the contrary (p. 101).

Mermelstein and Shulman's (1967) study suggests that formal, structured education may not improve academic achievement in the early years as much as has been supposed, at least up to age nine. The study compared six and nine-year-old children from Prince Edward County, a community that had been without public schools for four years with children who had regular schooling in an adjoining county. The researchers found no difference in performance between the two groups of six-year-olds or the two groups of nine-year-olds.

Generally, the theorists operating from a developmental point of view suggest that the effects of increased time in school may have negative influences on young children - particularly those who are developmentally immature. Rohwer (1971) concludes that poor attitudes toward school are associated with children who enroll early and Witherspoon (1973) found some evidence that both achievement and adjustment of children in kindergarten through third grade suffered when length of the school year was extended.

Compensatory Education Point of View

The theoretical frame of reference that here is referred to as compensatory education began in the early sixties when authors such as Bloom, Hunt, Deutsch, and others focused on the segment of the population classified as socially disadvantaged and culturally deprived. The orientation of this frame of reference is in many ways antithetical to the developmentalist position and has found acceptance in the early childhood education camp as a new way to conceptualize the potential of all children and plan for their educational stimulation.

Hunt (1964) outlines the major differences between the two models by listing six premises that the developmentalist has believed but are refuted by the compensatory planners. They are:

1. a belief in fixed intelligence;
2. a belief in predetermined development;
3. a belief in the fixed and static, telephone-switchboard nature of brain function;
4. a belief that experience during the early years, and particularly before the development of speech, is unimportant;
5. a belief that whatever experience does affect later development is a matter of emotional reactions based on the fate of instinctual needs;
6. a belief that learning must be motivated by homeostatic need, by painful stimulation, or by acquired drives based on these (p. 210).

From this perspective the concept of readiness "rejects the old attitude of passive waiting" (Passow, 1970, p. 41) and substitutes planned experiences and creative environmental conditions. Bruner's (1960, p. 33) proposition "that any subject can be taught effectively in some intellectually honest form to any child at any stage of development" suggests that it is the analysis of tasks that must be attended to; children are always ready. McCandless (1961,

p. 121) warns too that to minimize opportunities for children's learning on the assumption that maturation will take care of development "ignores the fact that more subtle results of early and late teaching have been neglected." Effective and economical learning is more than a matter of moving in on the child at some maturationally defined point in time. As Brownell (1951, p. 446) states: "reading readiness is not now left to chance and to time alone; it is produced."

Tyler (1964) suggests that more progress would be made if less weight was given to the concept of maturation and more emphasis given to the notion that readiness depends on appropriate stimulation and opportunity for relevant learning experiences. It is exposure, practice and integration that are important to knowledge and skill acquisition. Here theorists are dealing with what has been labled "educational readiness" as contrasted with biological, psychological, and sociological readiness (Woody, 1937). This educational readiness is the center of the process of education and is a type of readiness over which the teacher has considerable influence.

Compensatory programming is based on the assumption that children are not failing to succeed in school due to inferior innate resources or lack of maturation but that the interaction between inadequately prepared children with insufficient curricula combines to retard achievement. Deutsch (1964) reiterates:

> Implied is the assumption that one does not sit by and wait for children to 'unfold', either on the intellectual or behavioral levels. Rather it is asserted that growth requires guidance of stimulation, and that this is particularly valid with regard to the child who does not receive the functional prerequisites for school learning in the home (p. 260).

Hunt (1961) points out that

> . . . the counsel from experts on child-rearing during the third and much of the fourth decades of the twentieth century to let children be while they grow and to avoid excessive stimulation was highly unfortunate (p. 362).

Ausubel (1959) would agree since he said that it would take at least another generation of teachers before the more fallacious and dangerous overgeneralizations of developmental principles would be discarded.

The proposal to enrich programming recognizes the value of prevention at the earlier periods of development. Evidence pointing to the influence of background variables on patterns of language and cognitive development of the child, and a subsequent diffusion of the effects into all areas of the child's academic and psychological performance have expanded the interest in program development during the first five years (Deutsch, 1964). Bloom's analysis of hundreds of studies dealing with intelligence, achievement, attitudes, and personality points up the early stabilization of many characteristics. With respect to general intelligence measured at age 17, for example, Bloom concludes that the individual develops about 50 percent of this mature intelligence between conception and age 4, another 30 percent from ages 4 to 8 and the remaining 20 percent from ages 8 to 17. Other characteristics follow a similar pattern, suggesting that the early development is of crucial importance in laying the base for further development. The central thesis which emerges from Bloom's analysis is that:

> Change in many human characteristics becomes more and more difficult as the characteristics become more fully developed. Although there may be some change in a particular characteristic at almost any point in the individual's history, the amount of change possible is a

> declining function as the characteristic becomes increasingly stabilized (Deutsh, 1964, p. 218).

It is this type of study of early cognitive development, language learning, concept formation, and affective development that has provided the impetus for reexamination of early childhood programs in general and of compensatory programs for the disadvantaged in particular (Passow, 1970). Fowler (1962) highlighted the importance of early intervention when he reviewed findings on cognitive learning. He indicates that seemingly minimal cognitive stimulation in the preschool years, when organized appropriately to the capabilities of the child, can be highly affective in accelerating the development of intellectual functions. He writes:

> Few systematic methods have been devised for educating young children, especially in complicated subject matter. We have in mind methods for simplifying and organizing the presentation of cognitive stimuli. Equally important, methods must be sufficiently flexible and play oriented to be adaptable to the primary learning levels and personality organization characteristic of the infant and young child.
>
> The advantages of utilizing the now relatively untapped 'preschool' years for cognitive education are, of course, manifest. Most obvious, is the availability of more years of childhood to absorb the increasingly complex technology of modern society, a technology already requiring many of the more productive years of development to acquire. A second is the less evident but more crucial possibility that conceptual learning sets, habit patterns and interest areas, may well be more favorably established at early than at later stages of the developmental cycle (1962, pp. 145-146).

Underlying compensatory programs and most expanded early childhood programs are four assumptions that Deutsch (1965) identifies for study:

1. Earlier intervention is always superior to later;
2. Any intervention program is better than none;

3. If a rich, structured program is begun for children when they are three or four years of age, it will ignite growth potential which has up to then been dormant in the child;
4. Where there has been limitation of environmental encounters the child should be exposed to as much compensatory stimulation as possible.

As Hunt (1964) and Passow (1970) indicate, promising ways of overcoming immaturity and experiential deprivation are embodied in enriched preschool and kindergarten activities. The goal of facilitating maximum growth and utilization of potential is suitable for all children and represents the blending of developmental goals for all early childhood programs with the special efforts for the disadvantaged. This goal involves "devising environments, strategies, and techniques to make it possible for more children to 'learn to learn' and to be more self-initiating and self-propelled in the learning process" (Deutsch, 1965, p. 16).

Recently Palmer and Anderson (1979) presented a review of 10 longitudinal studies to in fact determine if the early intervention programs begun in the 1960's were affective. The results indicate that a significant difference existed between those children who received intervention and those who did not when grade retention and special education class placement was analyzed. Five studies reported significantly higher reading scores for children exposed to early intervention. Of the eight studies concerning arithmetic, four intervention groups were significantly higher, two found girls better but not boys, and one showed the non-intervention group

higher but not significantly so. The authors concluded that the data from these studies appeared to be compelling evidence for the effects of early childhood education. They also concluded that the earlier the intervention and the longer it lasted, the better.

Basically this compensatory education perspective was instrumental in the organization of longer day programs in kindergarten for not only disdvantaged children but all children. The American Association of Elementary Kindergarten-Nursery Educators recommended that

> . . . a full time kindergarten program be required for all children as a prerequisite to entrance into first grade and that kindergarten be recognized as an essential ingredient of the total school experience (Gilstrap, 1969, p. 2).

The organization indicated that an all-day program was supported by research and could enrich the lives of all children. When recommending all-day kindergartens, Gilstrap (1970) said:

> Educators have become increasingly aware that the rate of learning during the relatively unplanned preschool years may well surpass that of the later, more highly organized years of school life. The major foundations for what the child will be expected to learn during the school years have most certainly been started by the time he enters kindergarten. The teacher's responsibility is to assess the quality of each pupil's emerging foundations, so that any needed shoring up can be done as early as possible and so that the first year of school life will strengthen rather than undermine a still vulnerable psychological structure (p. 40).

Related Research Findings Concerning the Extension of Kindergarten

Historically, kindergartens began as all-day programs and were trimmed to half-day sections in response to the need to provide for larger numbers of children with less expense (Gorton and Robinson,

1968). In their report, Gorton and Robinson indicated that no completed research was available to compare traditional half-day kindergarten programs with the all-day programs such as they were recommending. By 1970, the NEA had also recommended that a full-day program replace half-day kindergartens. With little empirical evidence available, studies began to examine the effects of program length on student progress particularly with the culturally disadvantaged population.

Two studies conducted by Winter and Klein (1970) attempted to answer whether an extended-day kindergarten produced higher achievement than the half-day program and was an extended program beneficial for "educationally disadvantaged" and "educationally advantaged" pupils. Children were selected on the basis of tests and teacher ratings of maturity in personal and social adjustment. Ninety minutes of extended programming was available for the experimental groups and the others attended regular half-day programs. Of the "educationally disadvantaged" group, every subtest and total score obtained during posttesting was larger than those scores obtained for the half-day pupils. This rare occurrence verified the value of the extended-day program.

For the "educationally advantaged" population, selected as "most ready" by their teachers, no statistically significant differences were obtained on the Metropolitan Readiness Test or on the Stanford Early School Achievement Test. The authors hypothesized that these readiness tests did not have a high enough ceiling since publisher's tests in reading and math significantly favored the extended-day students.

Follow-up data one year later for both groups indicated that the extended-day pupils exceeded their counterparts.

The authors noted that parents and teachers involved in this study scrutinized the extended-day students for signs of fatigue, frustration, or disinterest in school. At the conclusion of the study, none of these symptoms had materialized.

Nieman (1971, 1975) has addressed the issue of time spent in kindergarten and preschool in a longitudinal study of the Cincinnati Early Childhood Education Project reported for 1969-1975. The rationale behind the project stated that they anticipated a positive relationship between test scores and the amount of time students participated in classes. They found that this positive relationship did exist regardless of the wide range of teaching styles, materials, and methodologies utilized across the district. During each of the six years, children attending all-day kindergarten classes performed significantly higher than those in the traditional half-day classes on the Metropolitan Readiness Test. Using the Peabody Picture Vocabulary Test, Nieman suggested that all-day kindergarten also has a significantly positive effect on intelligence scores. The longitudinal evidence suggests that gains in readiness and intelligence test performance are maintained until the end of the second grade.

The conclusions drawn were that there seems to be strong evidence that the more treatment given to very young children, the more positive the results will be since the more exposure children had to organized school the better the children performed on readiness tests.

In a paper presented at the annual meeting of the American Educational Research Association, Mueller (1977) compared all-day Title

I effects to half-day non-Title I programs. While all-day kindergarten appeared to be slightly better than half day as a Title I treatment, the results also suggest that there is some evidence that all-day kindergarten is a treatment that may inhibit remedial class placement in later school grades.

Mayesky's (1980) study of 189 kindergarten children predicted that lengthening the school day would have significant benefits in the areas of mathematics, reading, and language skills. The predictions were confirmed using the Metropolitan Achievement Tests. The author's conclusions suggest that additional time for mastering skills in kindergarten enhances opportunities for achievement in later grades and is therefore a preventative method that is cost efficient compared to remedial programs.

In Humphrey's (1980) year-and-a-half long study, four schools' all-day programs were compared to a randomly selected population of children selected from schools offering the traditional half-day kindergarten. Results of the California Achievement Tests showed that except in one case all scores were significantly higher for all-day kindergarten children and follow-up results obtained when the children were in first grade indicated that the results were maintained with significantly higher reading scores on the Gates-MacGinitie Reading Test.

Since there is some concern in the literature that five-year-old children lack the physical endurance to cope with extended time in school, attendance records were compared to determine if there were more illnesses or absences toward the end of the week or generally for the full-day children. There were no

significant differences found between attendance patterns and generally the full-day students had a lower absentee rate than the half-day students.

Alper and Wright (1979) indicated that the extra time provided by an extended-day program increases opportunities for parent participation. Evaluators felt that a major strength of the extended-day program was parent involvement leading to better teacher and parent understanding of the children. These findings are similar to those of the Ferguson Florrissant School District in Missouri (1974) who extended their kindergarten program to provide more opportunity for learning experiences and parent-teacher contact.

In a paper to the National Conference of the Association for Childhood Education International, Oelerich (1979) reported on the status of her investigation of the three main attendance patterns utilized around the country: all day, half day, and all-day alternate day. In her study, whenever differences existed in scores on the Metropolitan Readiness Test they favored the all-day group.

Other studies by Mouw (1976), Cleminshaw (1978), Wenger (1978), Gornowich (1974), and Minnesota State Department of Education (1972) point to the existing confusion over program effects in the all-day alternate day versus half-day every day controversy. Contradictory results were obtained in regard to cognitive effects leading Mouw to determine that the type of program was not the contributing factor for its success but the child's maturation level. She concluded that not every child would adjust to an all-day program.

The following studies concerning the effect of kindergarten programming have had more negative results. In a two-year evaluation

report of seven kindergarten curricula in Fort Worth, the effect of half-day and all-day attendance was measured (Lysiak, 1976). The results were not supportive of full-day programs for middle socioeconomic level children either year. The first-year evaluation supported full-day programs for low socioeconomic level children but high level socioeconomic children did not demonstrate a consistent relationship across the instructional programs studied.

Overall, the examination of the independent effects of variables indicated that the pretest was the most significant predictor of the posttest and only socioeconomic status added significantly to this prediction. Sex, ethnicity, or program length were insignificant variables.

In a three-year study of the effects on achievement of all-day and half-day kindergarten groups, Johnson (1974) found no statistically significant difference between the Stanford Early School Achievement Test or the "PREP" Walker Readiness Test. Even when cultural factors were considered, there was no significant difference between the two groups. In subsequent first grade reading level attainment one year later, again there was no significant difference between the scores of those who attended all-day and those who attended half-day programs.

Since there was no significant gain in achievement by the all-day over the half-day programs, it was concluded that the all-day program did not provide any special academic benefit to culturally disadvantaged children or to the children as a whole.

In a study of four public school districts in Texas, 110 children were randomly selected and the difference between half-day and

all-day kindergarten attendance was investigated (Hatcher, 1978). Using the Metropolitan Readiness Test for cognitive development, the California Test of Personality for affective development, and the Valett Developmental Survey of Basic Learning Abilities for psychomotor development, no significant differences between all-day and half-day students were reported. It was concluded that kindergarten children can be expected to increase in cognitive, affective, and psychomotor development but that length of the kindergarten day is not a significant factor as measured by the instruments in the study.

Summary

This literature review does not produce conclusive evidence concerning the advantages of longer program length. Though all studies reviewed began with a similar premise that full-day kindergarten would be more advantageous to children's learning than half-day programs because of the increased amount of time provided, the results are inconsistent and sometimes conflicting.

More emphasis has been placed on culturally deprived populations and the assumption that socioeconomic level is a major determiner in educational need or ability to profit from compensatory programs. Only the Winter-Klein (1970) study made any attempt to consider readiness beyond that determined by socioeconomic level. Even so, their readiness measures were mainly cognitive instruments to determine educational advantaged and disadvantaged pupils. Mouw (1976) also suggests that maturity level is an important variable when determining the appropriateness of extending the kindergarten program but no study is made of this aspect.

Gesell School Readiness Test

Ilg, Ames, and Apell from the Gesell Institute conducted their basic study of school readiness in Weston, Connecticut, from 1957 to 1960. Included were 100 children in kindergarten, 26 first graders, and 31 second graders. The majority of the subjects fell in the high average or better category of intelligence and came from professional or semi-professional families. The children were evaluated through a developmental examination described in the book School Readiness (Ilg & Ames, 1965).

Ilg and Ames use the term consistency when addressing the concept of reliability. For the developmental tests the proportion of subjects consistent on the first and final tests ranged from 78 percent consistent in the kindergarten group to 95 percent in the first-grade group.

Correspondence between predictions based on the developmental examination response and the teachers' ratings of readiness for their grade at the end of any given school year ranged from 83 percent for kindergarten subjects to 68 percent for first graders, and 59 percent for second graders.

The researchers returned to Weston in the fall of 1963 when the original kindergarten children were in sixth grade. At this time the correlation between sixth-grade school performance and prediction of readiness based on behavior tests was .74; correlation between sixth-grade school performance and kindergarten IQ was .56. The findings also confirmed that the ready subjects for all groups tended to be slightly older on the average than questionable and not ready subjects and of a slightly higher intelligence than those in the

questionable or not-ready groups. The Weston findings suggest an acceleration of girls over boys since more girls than boys were fully ready and more boys than girls were questionably ready and not ready.

To fully standardize the developmental examination, the authors extended their sample population to 100 children at each grade level using students in North Haven, Connecticut. Still the sample came from upper socioeconomic levels and had above average intelligence with a mean IQ of 117.4 on the California Mental Maturity Scale.

Though the Gesell Institute has been criticized for their lack of attention to selection of a random population, the pattern represents Arnold Gesell's philosophy that the sequences in development are universal and that a study of "normal" infants or children would reveal these universal sequences (Stolz, 1958). Therefore, the authors maintain that in their highly selected sample can be seen the normal developmental sequences in spite of the studies which have shown the influence of cultural phenomena on development.

The Weston and North Haven studies culminated in the book School Readiness by Ilg and Ames which was published in 1965. The book serves as a manual for the developmental test administration and scoring.

In an effort to examine some of the psychometric properties of tests composed of Piaget's and Gesell's tasks, Kaufman (1971) has studied the School Readiness Test in two studies. Mewha (1976) reports a telephone conversation with Kaufman in which he said that he had started the research with a bias against the tests, but that as he worked with them he found the tests had predictive powers.

The largely perceptual-motor Gesell School Readiness Test is

scored in a clinical manner by the developmental examiner. Therefore, to facilitate a psychometric analysis of the test the battery was divided into 11 units and an objective system was devised to score these units. Analysis showed that the sum of the 11 tasks correlated .79 with the developmental examiner's clinical total for the complete sample and .87 with a sample scored by Gesell Institute personnel. Kaufman also obtained results of the Lorge-Thorndike Intelligence Test on the 103 children in the sample.

Results of the study indicate that the School Readiness Test is a reasonably reliable instrument with a reliability coefficient of .84. Girls scored significantly higher than boys on the Gesell tests, but no significant sex differences were observed on the MA or IQ.

The difficulty level of the School Readiness Test tasks was appropriate for a five-year-old. The corrected task-total correlation was substantial with a median r = .58. The task that correlated highest was Copy Forms with a corrected r = .67 with the total.

Total scores on the test correlated about .60 with MA, .50-.55 with IQ, and about .30 with chronological age. All correlations were statistically significant at $p<.01$.

A follow-up study by Kaufman and Kaufman (1972, p. 521) on this same population when they reached the end of first grade found that the Gesell battery was an "excellent predictor of school readiness". The Stanford Achievement Test was used as the criteria for achievement and the Gesell School Readiness Tests correlated .64 with the composite score; this was higher than the correlation of the Lorge-Thorndike MA of .58 and the IQ of .57.

Andrews (1971) determined the validity of the Gesell School Readiness Test in predicting school readiness at the end of kindergarten according to the Metropolitan Readiness Test, teacher ratings on the Pupil Adjustment Scale, and the promotion-retention records of 434 kindergartners. The Gesell School Readiness Test, chronological age, and a developmental quotient were all predictor variables. Developmental age was found to be the best predictor and was significantly related at the .01 level to all criterion variables. Chronological age was the poorest predictor of the Metropolitan scores and teacher ratings and the developmental quotient was the poorest predictor of promotion retention.

Andrews (1971) states:

> The results of this study demonstrate the Gesell test to be a good predictor of school readiness as measured by the criterion variables. Developmental Age is consistently better than Chronological Age in predicting success in kindergarten.
>
> The benefit derived from knowing a child's Developmental Age before he enters a classroom can help in providing an appropriate learning situation for him. Establishing the child's Developmental Age before he enters school can help in counseling with parents on the child's probability for success in kindergarten. When a child is developmentally unready for the expectations of the kindergarten program, the flexible entrance policy would be most realistic, that is entrance based on a minimum Developmental Age rather than on a set chronological age (p. 3082).

In a study of 187 students in a middle class community, behavioral age scores as measured by the Gesell School Readiness Test and achievement scores as measured by the Stanford Achievement Test were collected by Esch (1972) over a three-year period. Esch determined that the Gesell test was a valid measure since it was significant at the .01 level with the Stanford Achievement Test. Total scores from

the Gesell were significantly correlated with total scores from the Stanford but subscores were not. This indicates more reliable data exists in the total scores than in the subscores.

The author also found a significant difference between groups with a behavioral age less than 5.5 years and groups with a behavioral age greater than or equal to 5.5 years as measured by the Gesell. Though the author found conflicting results when the three years' groups of students were considered alone, the total results indicate the School Readiness Test was a better predictor than the ABC Inventory for educational placement.

Glennon's (1978) study to determine the relationship between developmental placement based upon the use of the Gesell School Readiness Test and school success was conducted with a sample of 58 pupils. They were administered the Gesell test prior to entering kindergarten in 1970 and then completed six years of elementary school in a suburban school district. The Gesell test was the criterion for admitting children to kindergarten and placing children for instructional purposes into developmentally "younger" or "older" groups in kindergarten and subsequently into developmental groups through grade three in two schools. In the third school, a "middle" group was established in grades one through three.

The following conclusions were drawn from the findings of this study:

1. The "older" pupils scored higher than the "younger" group on the Metropolitan Readiness Test;
2. The "older" group scored higher than the "younger" group on the Stanford Achievement Test in two schools.

However, in the school with the "middle" group, the scores were not significantly different between the three groups;

3. The majority of teachers felt that a child should have a developmental age of five prior to kindergarten admission;
4. The majority of primary and special area teachers felt that developmental grouping benefits children; whereas, intermediate teachers questioned the value of developmental grouping;
5. The teachers reported they found the Copy Forms and Incomplete Man subtests of the Gesell test more useful than other subtests.

The purpose of Mewha's (1976) study was to evaluate the predictiveness of the Gesell Test. The School Readiness Test correlated with the Stanford Achievement Test .42 which was significant at the .01 level. Correlations with the Metropolitan Readiness Test was .39 and with the Stanford-Binet Vocabulary Test was .24.

Mewha (1976) states:

> While the Gesell Developmental Examination and the SAT correlation of .42 was not the highest one found, the value of the GDE is shown most clearly by the fact that from 112 children in the study, all except three younger girls scored at seven-year-old mental age level near the beginning of the second year. Thus nearly all the children who were placed according to the GDE predictions prior to kindergarten met with school success at the second grade level (pp. 84-85).

The author further provided statistical evidence that children repeating kindergarten measure at a level of work which is not significantly different from the level of non-repeaters and that

children placed behaviorally test almost unanimously at grade level or above by the second grade. Therefore, by holding immature children to gain more readiness for education at a time when they will not feel a sense of failure, the school can build a foundation for learning which could provide a higher quality of education at later dates.

Summary

This literature review verifies that there is a continuing controversy in the area of early childhood education about the nature of children's development and the appropriateness of extended educational programs at the kindergarten level. Though studies have been done to measure the effects of program length between half day and all day, no studies include the extended-day (three-quarter day) program for evaluation. The studies done have also neglected the variable of readiness level and have for the most part only been concerned with the effects of differential socioeconomic groups. To draw on the advice of Tyler quoted earlier that to solve the basic nature-nurture controversy, empirical studies that try to train for readiness while holding the effects of developmental level constant should be made.

In public schools there is a practical question about who, if anyone, would most benefit from extended kindergarten programs. Should longer kindergarten programs be developed for children who are most ready so they can fully benefit and learn at an optimal rate; should longer exposure to school be for those who for one reason or another are not behaviorally mature and might need extra

time to become socialized to the demands of formal education; is there a compromise time in school that provides adequate educational stimulation and still time for out of school play? Prior research does not provide an answer to these questions and it is the purpose of this study to gather information toward that end.

CHAPTER III

METHODOLOGY

Introduction

This study measured the relative effectiveness of program length in kindergarten and its affect on the achievement of students who were identified as developmentally ready and developmentally not ready for kindergarten placement. Three lengths of kindergarten programs were studied and the achievement of the students was measured by a standardized test appropriate for the kindergarten level.

Subjects

The study was conducted using the kindergarten populations of five Tulsa Public Schools that have been designated Magnet schools. The Magnet school concept is to offer an enriched program with reduced class size to encourage the voluntary integration of schools. The Magnet schools automatically draw students from the existing neighborhoods surrounding their buildings and recruit volunteer students from across the district striving for an equal black-white racial balance within each school across all grades. Four of the schools were located in the northern quadrant of the city with predominately black neighborhood populations. Therefore, they recruited predominately white students to participate in their schools. One school was located in the southern quadrant of the

city with a predominately white neighborhood population. Therefore, they recruited predominately black students for their program. Bus transporation was provided for all kindergarten students to and from school if they lived one and one-half miles or more from school.

Two of the schools selected for the study offered kindergarten programs that were extended-day programs which ran from 8:45 a.m. to 2:00 p.m. The student population tested in these extended-day kindergartens was 120. One school offered both an all-day kindergarten that operated from 8:45 a.m. until 3:15 p.m. and two half-day kindergartens that were two and one-half hours long. There were 21 all-day children and 36 half-day children tested. One school offered four half-day kindergarten programs from which 74 children were tested. One school offered five all-day kindergartens with a tested population of 91.

The total number of subjects tested was 342. The study included all children who were screened with the Gesell School Readiness Test and remained in the program to take the SRA achievement test. In this population, 61 percent (n=209) of the children enrolled were black, 34 percent (n=116) were white, and 5 percent (n=17) were of other racial origins. The gender breakdown was 54 percent (n=184) males and 46 percent (n=158) females.

All of the children were of legal age to be enrolled in kindergarten having turned five by September 1, 1981. Eight percent (n=26) of the children were six years of age in September, 1981.

The class sizes in all schools did not exceed 25 children for each teacher. Aides were provided at the approximate rate of one for each two teachers.

The kindergarten programs were supervised by one instructional supervisor and generally utilized similar materials, curriculum guides, and approach. Except for variations in teachers, there was no reason to believe the programs differed except in length of the school day.

Instrumentation

Gesell School Readiness Test

The Gesell School Readiness Test was utilized to determine the developmental age of each kindergartener in the five participating schools. (The test is sometimes referred to in the literature at the Gesell Developmental Examination.) Four subtests of the battery were recommended for screening purposes by a consultant from the Gesell Institute of Human Development. The following subtests were administered in this order: Initial Interview, Cube Test, Copy Forms, and Incomplete Man. Approximately 20 minutes were spent with each child for the individual evaluation. A certified school psychometrist or psychologist from the Department of Psychological Services, Tulsa Public Schools, administered the developmental examinations in rooms provided in each elementary school.

Due to the somewhat subjective scoring of the test, the overall developmental age scores were determined by the consensus of a team of four psychologists who had developed expertise with the instrument. Interjudge reliability was calculated using an analysis of variance to estimate reliability of measurements (Winer, 1971). To obtain an estimate of reliability, 40 screening instruments were scored yielding a reliability of .80.

Reliability and validity data on the Gesell School Readiness Test has been reported earlier in the section on the predictiveness of the test in Chapter II. To review, Ilg and Ames (1965) report test-retest coefficients ranging from .78 to .95. Kaufman's (1971) study of reliability of the instrument yielded a reliability coefficient of .84. As a predictor of teacher ratings, Ilg and Ames (1965) report correspondence between the School Readiness Test classifications and kindergarten teacher judgement at 83 percent. They report correlation between sixth grade school performance and prediction of the School Readiness Test at kindergarten at .74. Kaufman (1971, 1972) found that total scores on the School Readiness Test correlated .60 with Lorge-Thorndike Mental Age, .50-.55 with Lorge-Thorndike IQ, and .64 with the Stanford Achievement Test.

Mewha (1976) supplies the only other statistical data found on the Gesell School Readiness Test in a study in which the correlation between the Stanford Achievement Test and the School Readiness Test was .42, .39 with the Metropolitan Readiness Test, and .24 with the Stanford-Binet Vocabulary Test.

The Gesell School Readiness Test was selected because it is a developmental test used to determine the degree of maturation through a child's performance in a standardized situation. The test is based on those biological and behavioral trends and gradients that are supposed to represent characteristics typical of children of 2 to 10 years of age. The norms are said by the test authors to be representative of all children rather than a particular population and, therefore, represents an attempt toward non-biased testing. The information from the test is intended to be useful in deciding

whether a child is ready for a particular school experience like kindergarten and has been proven to be an effective instrument for that purpose. Critiques of the instrument follow:

> The combined test and manual presents the basic educational viewpoint of the Gesell Institute: that children should be entered in school and assigned on the basis of their developmental behavior age, not on the basis of chronological age or IQ . . . . This volume will be a valuable resource for investigators and school psychologists seeking to develop screening procedures for school entry and initial class assignments . . . . The author's approach assumes the basic issue of school readiness to be placement according to general behavioral maturity within given curricular arrangements. They do not consider either curricular modification in terms of developmental level or curricula as a means of facilitating behavioral growth (Borstelmann, 1965, p. 164).

> It is understood in this book that any signs of immaturity can be picked up in the developmental examination because they show in the child's performances, in his conversations and in his approach to the situation. There is no doubt that experienced examiners such as our authors and their co-workers have no difficulty recognizing some such manifestations. It is easily evident, to those who have seen them at work, that in the individual case their judgment is guided by many factors besides the less elusive and more objective behavior signs mostly described in the book. The purpose of this book is to help parents and school administrators. It is recommended that examiners must be well trained in the giving of these tests but it is not specified that they must have psychological insight and sensitivity of their own. Perhaps the omission of emotional and individual factors is justified by the limited purpose of the book; perhaps a more sophisticated approach could lead to misuse and misinterpretation. Yet one cannot help feeling that things are made too simple here and that the reader is not made aware enough of the pitfalls of a "quickie" examination. The labor and skill necessary for a true full appraisal of a child's psychological status and development are not emphasized enough and that seems a serious omission (Taylor, 1965, pp. 572-573).

> Ilg and Ames think of the GSRT as being a measure of one basic construct - behavioral maturity. The presence of a clear general factor might offer support to the existence of this construct . . . . The partitioning of the common factor variance suggests the following picture of the nature of the abilities underlying GSRT performance: two parts behavioral maturity (factor I), one part abstract intelligence (factor II), and one part experience (factor III) (Kaufman, 1971, p. 1358).

> The results of the present study also offer strong empirical support of the effectiveness of the GSRT as a predictor of school achievement. Although Ilg and Ames have been expousing this position with fervor based on their vast clinical experience, it is obvious that the empirical justification is both necessary and long overdue (Kaufman, 1972, p. 532).

SRA Level A Achievement Test

The SRA Achievement Series, 1978 edition, was used as a measure of the dependent variable. Level I is appropriate for end of the year kindergarten students or beginning of the year first graders. The instrument was selected for the following reason:

1. Its utilization maintains consistency with the standard achievement testing done throughout the school system as a whole. It allows direct comparison between scores obtained currently and in the future for purposes of longitudinal study.
2. The general ability portion of the test allows for some measure of differentiation between ability and academic achievement.
3. It is a recently developed test that yields scores for seven subscales which allows for more detailed analysis of the data.

The subtests and their internal consistency (KR-20) reliability coefficients are listed in Table I. No test-retest reliability coefficients are reported by the publishers.

No validity studies were reported for Level A but the majority of the correlations reported between test scores at other levels of the achievement series and course grades range between .43 and .79.

TABLE I

RELIABILITY DATA BASED ON FALL
1978 NATIONAL SAMPLE
(Grade K, N=367)

Test	Reliability Coefficients
Visual Discrimination	.92
Auditory Discrimination	.91
Letters & Sounds	.82
Listening Comprehension	.78
Reading Total	.94
Math Concepts	.81
Educational Abilities Series	.78
Composite Score	.95

Source: SRA Technical Report #1, 1979, p. 9.

The majority of the correlations between reading scores and reading/English course grades range between .51 and .78. For math scores and grades, the correlations range between .59 and .79.

Correlations of the SRA Achievement Series and other achievement test scores were calculated for samples of students in grades three, five, seven, and high school. The total battery score correlations are in the .80s and .90s and the individual test score correlations are in the .70s and .80s. This indicates general consistency in scores across test batteries.

The contents of the SRA Level A are described in the SRA Achievement Series, Examiner's Manual (1978) as follows:

> Visual Discrimination contains 25 items that test letter features, letter forms, and word forms. The students choose from four alternatives the shape that is just like the shape in the box at the beginning of each item.
>
> Auditory Discrimination is a 25-item test. The students listen to pairs of words read by the examiner and determine whether the words are the same or not.
>
> Letters and Sounds consists of matching upper and lower case letters, letter identification, and letter-sound correspondence. It is a 25-item test.
>
> Listening Comprehension tests understanding directions, grasping main ideas, identifying details, perceiving relationships, drawing conclusions, and oral vocabulary. It is a 35-item test.
>
> Mathematics Concepts tests numeral recognition, sets and numbers, ordinal expressions, counting, shape and pattern recognition, and spatial and geometric relationships. It is a 30-item test.
>
> The Educational Ability Series provides an estimate of educational ability by measuring picture vocabulary, number, picture grouping, and spatial relations. A variety of summary and derived scores (verbal, non-verbal, and total; quotients, percentiles, and stanines) are available from the EAS. It is a 40-item test (p. 2).

The entire SRA Achievement Series was standardized in the

spring and fall of 1978 on students in 542 schools. Large city norms are based on scores of 19,003 students from 74 public schools in seven public school districts with student populations of 100,000 or more. The number of kindergarten students tested in the spring was 559 and in the fall, 193. The spring testing results indicated that 45 percent of the children tested were black, 39 percent white; majority of family incomes ranged between $5,000.00 and $19,999.00; a larger proportion of children's parents completed at least high school and were employed in skilled, semiskilled, or as service workers.

Procedures

The Psychological Services staff evaluated children enrolled in the kindergarten programs of four schools from August 26 to September 4, 1981. An individual evaluation was made and a score was determined by the evaluator for each subtest administered. When all testing was completed, a team of four psychologists who had used the test for two years previously checked all scoring and reached a consensus on a total developmental age for each child tested.

Since the four original schools had high numbers of students enrolled in extended-day and all-day programs but only a small number enrolled in half day, another northside Magnet school offering half-day kindergarten was included in this study in the spring of 1982. Before including this school, a study was done to determine if the classification of ready-not ready made in the fall had remained consistent throughout the year so children tested at different times could be compared. A random sample of 60 students tested in

the August-September screening were selected. Fifteen random selections were made from each of the following groups: extended day-ready, all day-ready, extended day-not ready, and all day-not ready. These children were retested with the Gesell School Readiness Test in April and their results compiled similarly to the fall screening program.

A 2X2 chi-square test (see Table II) was performed to determine the association between the pretest and posttest classifications. Yates' correction for continuity was applied since there is only one degree of freedom (Downie & Heath, 1965).

Results of the study indicated that there was a significant relationship between pretest and posttest assignment ($\chi^2=38.442$, $p<.001$). There was virtually no difference between classifications made in the fall and in the spring on the same children. Therefore, the researcher could justifiably make the assumption that children classified as ready in April would have also be classified ready if the test had been given in August and the children receiving not ready classifications would also have been not ready earlier in the fall. This allowed for the addition of a fifth school, offering half-day kindergarten, to be included in the study. The additional half-day students were tested with the Gesell School Readiness Test in April after obtaining parental permission. Their developmental ages were calculated in a similar fashion as others in the study. To be classified as ready, these children had to obtain a developmental age of five and one-half or more in the April screening. Children with developmental ages below five and one-half were classified not-ready.

The SRA Level A and the SRA EAS were administered to all

TABLE II

CHI-SQUARE CONTINGENCY TABLE FOR CLASSIFICATIONS CONCERNING READINESS FROM FALL PRETEST TO SPRING POSTTEST WITH GESELL SCHOOL READINESS TEST

		POSTTEST	
		NOT READY	READY
PRETEST	READY	2	28
	NOT READY	27	3

$\chi^2 = 38.442$, df = 1, $p<.001$

kindergarten students in the five schools in May. Small groups were tested at a time over five days in an effort to insure an optimal testing environment. The adult-student ratio during SRA testing was 1:5. Teachers were trained in test administration by the school psychologist and assisted by school personnel during test administration.

Hypotheses

Considering that the theoretical rationales concerning readiness and extended program length lead to differing expectations, the hypotheses are stated in the null form rather than in any one of the directions implied by a particular perspective.

Hypothesis One: There is no differential effectiveness between the three levels of kindergarten in terms of achievement in the following areas:

A. Composite

B. Visual Discrimination

C. Auditory Discrimination

D. Letters and Sounds

E. Listening Comprehension

F. Total Reading

G. Mathematics Concepts

Hypothesis Two: There is no difference between those students classified ready and those classified not ready in terms of achievement in the following areas:

A. Composite

B. Visual Discrimination

C. Auditory Discrimination

D. Letters and Sounds

E. Listening Comprehension

F. Total Reading

G. Mathematics Concepts

Hypothesis Three: There is no interaction between the levels of kindergarten and the readiness classification of the students which significantly influences achievement in the following areas:

A. Composite

B. Visual Discrimination

C. Auditory Discrimination

D. Letters and Sounds

E. Listening Comprehension

F. Total Reading

G. Mathematics Concepts

Hypothesis Four: Developmental age is not a significant predictor of achievement in the following areas:

A. Composite

B. Visual Discrimination

C. Auditory Discrimination

D. Letters and Sounds

E. Listening Comprehension

F. Total Reading

G. Mathematics Concepts

Data Analysis

Hypotheses One, Two, and Three were investigated using multiple

regression analyses of 2 X 3 factorial designs (classification of readiness by length of time in program), the multiple regression counterpart of analysis of covariance (Edwards, 1979). There were two levels of the readiness classification (ready and not ready for kindergarten placement according to the Gesell School Readiness Test criteria) and three levels of the length of time in program (half-day, extended or three-quarter day, and all-day kindergarten). The dependent variable, academic achievement according to seven subtests, was measured by the SRA Achievement Test. The raw scores obtained from the SRA were transformed into standard scores using the formula: $Z = \frac{x-\bar{x}}{sd}$ (10) + 50. Each subtest then had a mean of 50 and a standard deviation of 10. The use of covariates attempts to control statistically any initial differences in the students caused by ability, as measured by the SRA Educational Abilities Series, gender, and race. Kirk (1968) identifies analysis of covariance as particularly appropriate for situations involving the use of intact groups since the use of statistical control can remove bias that is impossible to eliminate by experimental control. Incorporating multiple covariates increases the power of the analysis and by adjusting for initial group differences on those variables, reduces the bias in the estimate of treatment effects (Cook & Campbell, 1979).

Computations were completed using Statistical Analysis System (SAS) (Barr, Goodnight, Sall, & Helwig 1976). The minimum requirement for significance was set at a conservative alpha level of .01 to control the experimentwise error rate.

Hypothesis Four was investigated by the calculation of Pearson product-moment correlation coefficients between developmental age, calculated in terms of six months intervals, and raw scores obtained on the SRA achievement subtests. The product-moment correlational technique was deemed appropriate because interval level measurement was utilized in each measurement instrument and the relationship between any given pair of variables was assumed to be linear. Computations were done utilizing the SAS and a .01 alpha level was established to determine significance. The coefficient of determination (r^2) was calculated to indicate the proportion of the variance among the SRA scores that could be explained by differences in the Gesell developmental age variable.

CHAPTER IV

RESULTS

Introduction

The purpose of this chapter is to present the results of the statistical analysis utilized for the four hypotheses considered in this study. The major focus of the study was to examine the effects of readiness level and length of kindergarten program on achievement. The correlations between developmental age and aspects of achievement were also examined. The results provide information regarding the efficacy of extended programs at the kindergarten level for children categorized as developmentally ready and not ready and the capability of the developmental age criterion to significantly predict achievement.

Discussion of the Results

Descriptive statistics for the 342 subjects are presented in Table III. The number of subjects' scores included in each subtest, the mean, and the standard deviation of the raw scores for the seven SRA subtests, the SRA Educational Ability Series (EAS) portion, and the Gesell School Readiness Test developmental age scores in months are included.

In order to determine the effect the lengths of kindergarten programming and the readiness level have on achievement, multiple

TABLE III

DESCRIPTIVE STATISTICS FOR SRA RAW SCORES AND GESELL SCHOOL READINESS TEST DEVELOPMENTAL AGE IN MONTHS

Variable	N*	Mean	Standard Deviation
Dev. Age	342	55.280	5.508
SRA Comp.	340	42.958	12.032
SRA Vis. Dis.	342	16.643	6.585
SRA Aud. Dis.	341	17.689	5.908
SRA L & S	340	14.211	5.111
SRA Lis. Comp.	341	21.958	6.059
SRA Tot. Rd.	340	70.564	19.238
SRA Math Con.	342	19.043	5.950
SRA EAS	342	19.836	5.912

*Testing occurred over a five-day period. Different Ns reflect the number of children present who received scores on the subtests.

regression analyses were utilized. The group means of the seven achievement measures were adjusted for differences between the groups on the covariates ability, race, and gender in order to statistically control for initial differences in the students. These covariates were selected since they are extraneous sources of variation that are usually significantly correlated ($p<.05$) with the dependent variable but irrelevant to the objectives of the experiment. Though experimental control of these concomitant variables was not possible, it was possible to measure them and statistically control for their influence. The correlations between the covariates and the dependent and independent variables are listed in Table IV.

Hypotheses One A: There is no differential effectiveness between the three levels of kindergarten in terms of achievement on the Composite score. Referencing Table V, this hypothesis is rejected since there is a significant difference between the group means of the three program levels for the Composite score. The Composite score is derived by the formula [.33 X (Reading Total)] + [1.03 x (Mathematics Concepts)]. The mean of the half-day group (48.380) is significantly lower than the mean of the extended-day (51.527) and the mean of the all-day program (50.673). There is no significant difference between the extended-day and all-day programs.

Hypothesis One B: There is no differential effectiveness between the three levels of kindergarten in terms of achievement on the Visual Discrimination score. Referencing Table VI, this hypothesis is not rejected. The length of time in the program does not have a significant effect on these results. In this area the means between the half day (49.619), the extended day (51.203), and the all

TABLE IV

PEARSON PRODUCT-MOMENT CORRELATION COEFFICIENTS FOR INDEPENDENT, DEPENDENT, AND COVARIATE VARIABLES; PROBABILITY ASSOCIATED WITH CORRELATION; NUMBER OF OBSERVATIONS

	1	2	3	4	5	6	7	8	9	10	11
1. Gesell Dev. Age	--	0.57799 0.0001 340	0.57431 0.0001 342	0.37237 0.0001 341	0.43006 0.0001 340	0.49914 0.0001 341	0.58274 0.0001 340	0.52649 0.0001 342	0.53702 0.0001 342	-0.23599 0.0001 342	0.15530 0.0040 342
2. SRA-Comp		--	0.76032 0.0001 340	0.74341 0.0001 340	0.77947 0.0001 340	0.83190 0.0001 340	0.95606 0.0001 340	0.94987 0.0001 340	0.76987 0.0001 340	-0.39276 0.0001 340	0.09205 0.0901 340
3. SRA-VD			--	0.50195 0.0001 341	0.55541 0.0001 340	0.55651 0.0001 341	0.81677 0.0001 340	0.64862 0.0001 342	0.55098 0.0001 342	-0.23130 0.0001 342	0.14124 0.0089 342
4. SRA-AD				--	0.51814 0.0001 340	0.59435 0.0001 341	0.80074 0.0001 340	0.62004 0.0001 341	0.52484 0.0001 341	-0.26499 -0.0001 341	0.06363 0.2413 341
5. SRA-LS					--	0.58108 0.0001 340	0.79639 0.0001 340	0.68647 0.0001 340	0.56422 0.0001 340	-0.30299 0.0001 340	0.14883 0.0060 340
6. SRA-LC						--	0.83991 0.0001 340	0.74982 0.0001 341	0.73856 0.0001 341	-0.42606 0.0001 341	0.12976 0.0165 341
7. SRA-TR							--	0.82955 0.0001 340	0.72997 0.0001 340	-0.37316 0.0001 340	0.14598 0.0070 340
8. SRA-MC								--	0.74168 0.0001 342	-0.39348 0.0001 342	0.02573 0.6353 342
9. SRA-EAS									--	-0.38936 0.0001 342	0.01477 0.7854 342
10. RACE										--	0.12462 0.0212 342
11. GENDER											--

TABLE V

SUMMARY TABLE FOR MULTIPLE REGRESSION ANALYSIS OF SRA COMPOSITE SCORES USING GENDER, RACE, AND ABILITY AS COVARIATES

Source	df	SS	MS	F	p
Model	8	22190.575	2773.821	78.41	.0001
Error	331	11709.424	35.375		
Total	339	33900.000			
		Independent Variables			
Group[a]	1	705.136	705.136	19.93	.0001
Time[b]	2	576.511	288.255	8.15	.0004
Group X Time	2	190.132	95.066	2.69	.0695
		Covariates			
Gender	1	149.753	149.753	4.23	.0404
Race	1	349.565	349.565	9.88	.0018
Ability	1	8669.391	8669.391	245.06	.0001

[a]The two groups are ready and not ready.

[b]The three lengths of time of the programs are half day, extended (three-quarter) day, and all day.

TABLE VI

SUMMARY TABLE FOR MULTIPLE REGRESSION ANALYSIS OF SRA VISUAL DISCRIMINATION SCORES USING GENDER, RACE, AND ABILITY AS COVARIATES

Source	df	SS	MS	F	p
Model	8	13179.501	1647.437	26.22	.0001
Error	333	20920.498	62.824		
Total	341	34100.000			
		Independent Variables			
Group	1	1983.907	1983.907	31.58	.0001
Time	2	141.712	70.856	1.13	.3250
Group X Time	2	79.175	39.587	.63	.5332
		Covariates			
Gender	1	357.813	357.813	5.70	.0176
Race	1	13.846	13.846	.22	.6390
Ability	1	3495.199	3495.199	55.63	.0001

day (50.205) are not significantly different from each other.

Hypothesis One C: There is no differential effectiveness between the three levels of kindergarten in terms of achievement on the Auditory Discrimination portion. According to the data presented in the Table VII, the hypothesis is not rejected. Group means for variations in program length are nonsignificant. The means for the half day (48.814), extended day (51.570), and the all day (49.726) indicate no significant differences between groups at the .01 criterion level.

Hypothesis One D: There is no differential effectiveness between the three levels of kindergarten in terms of achievement on the Letters and Sounds subtest. With reference to Table VIII, this hypothesis is rejected. Time in class has a significant effect on the Letters and Sounds subtest means. The mean of the extended-day program (51.833) is significantly higher than the mean of the half-day program (47.947). The mean associated with the all-day program (50.650) is not significantly different from the other two levels.

Hypothesis One E: There is no differential effectiveness between the three levels of kindergarten in terms of achievement on the Listening Comprehension subtest. Based on the data in Table IX, this hypothesis is not rejected. There is no significant difference between the group means on the Listening Comprehension subtest. The means are half day 49.373, extended day 50.468, all day 50.547.

Hypothesis One F: There is no differential effectiveness between the three levels of kindergarten in terms of achievement on the Total Reading subtest. With reference to the data in Table X this hypothesis is rejected. The Total Reading subtest score is a

TABLE VII

SUMMARY TABLE FOR MULTIPLE REGRESSION ANALYSIS OF SRA AUDITORY DISCRIMINATION SCORES USING GENDER, RACE, AND ABILITY AS COVARIATES

Source	df	SS	MS	F	p
Model	8	10401.462	1300.182	18.29	.0001
Error	332	23598.537	71.079		
Total	340	34000.000			
		Independent Variables			
Group	1	68.912	68.912	.97	.3255
Time	2	436.123	218.061	3.07	.0478
Group X Time	2	312.300	156.150	2.20	.1128
		Covariates			
Gender	1	91.708	91.708	1.29	.2568
Race	1	148.775	148.775	2.09	.1489
Ability	1	4543.695	4543.695	63.92	.0001

TABLE VIII

SUMMARY TABLE FOR MULTIPLE REGRESSION ANALYSIS OF SRA LETTERS AND SOUNDS SCORES USING GENDER, RACE, AND ABILITY AS COVARIATES

Source	df	SS	MS	F	p
Model	8	13354.289	1669.286	26.89	.0001
Error	331	20545.710	62.071		
Total	339	33900.000			
		Independent Variables			
Group	1	424.371	424.371	6.84	.0093
Time	2	864.722	432.361	6.97	.0011
Group X Time	2	178.838	89.419	1.44	.2383
		Covariates			
Gender	1	549.499	549.499	8.85	.0031
Race	1	334.131	334.131	5.38	.0209
Ability	1	4083.621	4083.621	65.79	.0001

TABLE IX

SUMMARY TABLE FOR MULTIPLE REGRESSION ANALYSIS OF SRA LISTENING COMPREHENSION SCORES USING GENDER, RACE, AND ABILITY AS COVARIATES

Source	df	SS	MS	F	p
Model	8	20464.928	2558.116	62.75	.0001
Error	332	13535.071	40.768		
Total	340	34000.000			
		Independent Variables			
Group	1	269.998	269.998	6.62	.0105
Time	2	92.832	46.416	1.14	.3215
Group X Time	2	116.032	58.016	1.42	.2424
		Covariates			
Gender	1	499.963	499.963	12.26	.0005
Race	1	894.325	894.325	21.94	.0001
Ability	1	8353.419	8353.419	204.90	.0001

TABLE X

SUMMARY TABLE FOR MULTIPLE REGRESSION ANALYSIS OF SRA TOTAL READING SCORES USING GENDER, RACE, AND ABILITY AS COVARIATES

Source	df	SS	MS	F	p
Model	8	20529.643	2566.205	63.53	.0001
Error	331	13370.356	40.393		
Total	339	33900.000			
		Independent Variables			
Group	1	808.548	808.548	20.02	.0001
Time	2	424.579	212.289	5.26	.0057
Group X Time	2	206.616	103.308	2.56	.0790
		Covariates			
Gender	1	497.919	497.919	12.33	.0005
Race	1	364.929	364.929	9.03	.0029
Ability	1	7457.602	7457.602	184.62	.0001

score derived by the summation of the scores obtained on the Visual Discrimination, Auditory Discrimination, Letters and Sounds, and Listening Comprehension subtests. The length of time in kindergarten is a significant factor in this subtest score. The mean of the half-day group (48.750) is significantly lower than the mean of the extended-day group (51.524). The mean of the all-day group (50.341) is not different from either of the other ones.

Hypothesis One G: There is no differential effectiveness between the three levels of kindergarten in terms of achievement on the Mathematics Concepts subtest. Referencing Table XI, this hypothesis is rejected. The effect of time is significant. In this case the half-day mean (48.267) is significantly lower than both the extended-day (51.353) and the all-day groups (50.841). No significant differences between the extended and all-day programs exist.

Overall, the time variable is significant in four of the seven SRA subtest areas and not significant in three subtest areas. In all cases where a significant difference exists, the extended-day program has higher test results than the half-day program. In the case of two of these subtests, a difference is found in favor of the all-day program over the half-day program. There are no significant differences between the extended and all-day programs.

Hypothesis Two A: There is no difference between those students classified ready and those classified as not ready in terms of achievement on the Composite score. Again referencing Table V, this hypothesis is rejected. In the Composite score, the ready group mean of 51.878 is significantly greater than the not-ready group mean of 48.508.

TABLE XI

SUMMARY TABLE FOR MULTIPLE REGRESSION ANALYSIS OF SRA MATHEMATICS CONCEPTS SCORES USING GENDER, RACE, AND ABILITY AS COVARIATES

Source	df	SS	MS	F	p
Model	8	20393.937	2549.242	61.94	.0001
Error	333	13706.062	41.159		
Total	341	34100.000			
		Independent Variables			
Group	1	478.267	478.267	11.62	.0007
Time	2	593.545	296.772	7.21	.0009
Group X Time	2	102.254	51.127	1.24	.2901
		Covariates			
Gender	1	1.306	1.306	.03	.8587
Race	1	389.083	389.083	9.45	.0023
Ability	1	8340.900	8340.900	202.65	.0001

Hypothesis Two B: There is no difference between those students classified ready and those classified not ready in terms of achievement on the Visual Discrimination score. According to Table VI this hypothesis is rejected. The means for Visual Discrimination are ready, 53.167 and not ready, 47.518. The not-ready group is significantly lower than the ready group.

Hypothesis Two C: There is no difference between those students classified ready and those classified not ready in terms of achievement on the Auditory Discrimination score. Again referencing Table VII, this hypothesis is not rejected. Though the ready group mean is numerically higher than the not-ready group mean, no difference at the .01 criterion level was found. The ready mean is 50.563 and the not-ready mean is 49.510.

Hypothesis Two D: There is no difference between those students classified ready and those classified not ready in terms of achievement on the Letters and Sounds subtest. This hypothesis is rejected according to the data presented in Table VIII. The ready group mean of 51.451 is significantly greater than the not-ready group mean of 48.836.

Hypothesis Two E: There is no difference between those students classified ready and those classified as not ready in terms of achievement on the Listening Comprehension subtest. This hypothesis is not rejected on the basis of the data presented in Table IX. The group means for the ready group were 51.172 and the not-ready group were 49.087.

Hypothesis Two F: There is no difference between those students classified ready and those classified not ready in terms of

achievement on the Total Reading subtest. This hypothesis is rejected since a significant difference is noted in Table X. The Total Reading means are significantly different at ready, 52.009 and not ready, 48.400.

Hypothesis Two G: There is no difference between those students classified ready and those classified not ready in terms of achievement on the Mathematics Concepts subtest. This hypothesis is rejected since the ready mean, 51.540 is significantly greater than the not ready mean, 48.767 according to Table XI.

Hypothesis Three A through G: There is no interaction between the levels of kindergarten and the readiness classification of the students which significantly influences achievement in the following areas: A. Composite, B. Visual Discrimination, C. Auditory Discrimination, D. Letters and Sounds, E. Listening Comprehension, F. Total Reading, and G. Mathematics Concepts. No interactions between time and group membership were found to be significant at the .01 level according to Table V through Table XI. Therefore, the hypothesis is not rejected concerning each area of achievement identified.

Hypothesis Four A: Developmental age is not a significant predictor of achievement on the Composite subtest. This hypothesis is rejected on the basis of the data presented in Table IV. The correlation coefficient between developmental age and the Composite score is significant at .5780 and the coefficient of determination is .334.

Hypothesis Four B: Developmental age is not a significant predictor of achievement on the Visual Discrimination subtest. This hypothesis is rejected since the correlation coefficient between developmental age and Visual Discrimination is significant at .5743 (See Table IV). The coefficient of the determination is .329.

Hypothesis Four C: Developmental age is not a significant predictor of achievement on the Auditory Discrimination subtest. This hypothesis is rejected according to the data in Table IV. The correlation coefficient is .3723, and the coefficient of determination is .138.

Hypothesis Four D: Developmental age is not a significant predictor of achievement in Letters and Sounds. This hypothesis is rejected on the basis of the information in Table IV which reports a correlation coefficient of .4301. The coefficient of determination is .184.

Hypothesis Four E: Developmental age is not a significant predictor of achievement in Listening Comprehension. This hypothesis is rejected, referencing Table IV, since the correlation coefficient of .4991 is significant. The coefficient of determination is .249.

Hypothesis Four F: Developmental age is not a significant predictor of achievement in Total Reading. The correlation coefficient (.5827) is significant according to the data in Table IV. Therefore, this hypothesis is rejected. The coefficient of determination is .339.

Hypothesis Four G: Developmental age is not a significant predictor of achievement in Mathematics Concepts. This hypothesis is rejected since, according to Table IV, the correlation coefficient (.5264) is significant. The coefficient of determination is .277.

Overall, the correlations between developmental age and all SRA subtests are significant at the .001 level. The correlations range from .37 to .58 with a median correlation of .53. The coefficients of determination indicate the proportion of the variance among the

achievement scores that is attributable to the differences in the predictor variable developmental age. The results indicate that developmental age scores account for between 14 and 34 percent of the variance in the achievement areas measured. The median coefficient of determination is .277.

CHAPTER V

SUMMARY AND CONCLUSIONS

Summary of the Investigation

The effects on achievement of three levels of kindergarten programming for children who were categorized as developmentally ready and not ready for kindergarten were examined in this study. The research was undertaken to empirically examine the ideas of two theoretical perspectives labeled previously as developmental and compensatory. The developmental perspective highlighted by the authors Ilg and Ames (1965) and Moore and Moore (1973, 1979) postulates that it is the biologically determined force of maturation that determines whether a child is able to profit from academic stimulation. Such authors suggest that the child who is not at least fully five years of age developmentally speaking should not be expected to perform successfully in a kindergarten curriculum and that the child's capacity for achievement evolves naturally as time passes and maturity occurs not as a result of educational training. The compensatory theorists such as Hunt (1964), Deutsch (1964), and Passow (1970), on the other hand, suggest that exposure, practice, and appropriate stimulation at the earliest time for the longest period is the most beneficial to produce achievement. These theorists are not content to wait for development to unfold but prefer to take advantage of the young child's periods of rapid growth in the early

school years to intervene with expanded educational programming that will enhance a child's learning more directly. This study follows the suggestion of Tyler (1964) to test empirically which approach, the developmentalist or the compensatory, produces optimal achievement results. By categorizing children as developmentally ready and developmentally not ready and then exposing them to varied lengths of kindergarten programming, some implications can be drawn concerning the role of development and the role of training. In other studies concerning program length, only two levels of kindergarten have been identified, half day and all day. This study has further included a three-quarter-day program called extended-day kindergarten. The literature does not offer conclusive evidence concerning the advantages of longer program length and has nowhere measured the variable of developmental readiness as a contributing factor in a child's ability to profit from the program. In order to provide information not currently found in the research literature, three major hypotheses were formulated concerning the effects of developmental readiness, program length, and the interaction of these variables on seven achievement test scores. Another hypothesis concerned the ability of the school readiness test to predict achievement.

Data were obtained from 342 children of legal kindergarten age who were enrolled in five Tulsa Magnet schools. The children were tested with a screening instrument designed to determine a child's developmental age and readiness for the kindergarten program. The children attended one of three lengths of kindergarten programming - half day, extended day, and all day - which utilized similar

materials, curricula, and resources. An achievement battery was administered at the end of the school year identifying seven aspects of achievement. Multiple regression analyses using ability, race, and gender as covariates were used to analyze the data and test the first three major hypotheses. To test the fourth major hypothesis, Pearson product-moment correlation coefficients and coefficients of determination were calculated between developmental age scores and achievement scores to determine how well the developmental age, as measured by the readiness test, predicted aspects of achievement.

Conclusions

Within the limits and findings of the present study, the following conclusions are suggested based upon the previously identified hypotheses.

Hypothesis One A: Achievement as measured by the Composite score was significantly affected by the length of programming. Both the extended and all-day programs outperformed the half-day programs to a significant degree.

Hypothesis One B: Achievement in the Visual Discrimination area was not significantly affected by program length.

Hypothesis One C: Achievement in Auditory Discrimination was not significantly affected by the various length of programs studied.

Hypothesis One D: Achievement on the Letters and Sounds subtest was significantly affected by the length of kindergarten participation. The mean of the extended-day program scores was significantly higher than the mean of the scores of the half-day students in the program.

Hypothesis One E: The mean scores on the Listening Comprehension subtest were not significantly affected by kindergarten program length.

Hypothesis One F: The Total Reading score which is a summation of the scores obtained on Visual Discrimination, Auditory Discrimination, Letters and Sounds, and Listening Comprehension was significantly affected by program length. The extended-day program outperformed the half-day program significantly.

Hypothesis One G: Achievement on the Mathematics Concepts subtest was significantly affected by program length. The extended-day and the all-day programs were both significantly higher than the half-day program.

When the results are considered together it is noted that it is the more academic areas that are directly influenced by more time in class. More time for instruction is effective in teaching the academic skills of letter and number recognition, beginning and ending sounds, shapes, and numerical comparisons. These are the skills that are measured in the subtests Letters and Sounds and Mathematics Concepts and that are significantly affected by extended program time. The more nonacademic subtests of Visual Discrimination, Auditory Discrimination, and Listening Comprehension are unaffected by being in class longer. These subtests measure the more abstract perceptual processes of auditory and visual discrimination and perceiving verbal and pictorial relationships. It appears that these skills may be more developmental in nature and not significantly influenced by amount of teaching time.

Results of the analysis further indicate that the extended-day

program was superior to the half-day program for maximizing achievement in four of the seven subtests. The all-day program was superior to the half-day program in two of the seven subtest areas. Since no significant difference was noted between the extended and all-day programs it can be concluded that there is no significant benefit to achievement derived from the additional hour and fifteen minutes the all-day children spend in class over the time the extended-day children spend in class. Further, when the means obtained from the three program lengths are ranked, a uniform pattern develops. In each subtest but Listening Comprehension, the extended-day students rank first, the all-day students rank second, and the half-day students rank third. On the Listening Comprehension subtest, the ranking is all day first, extended day second, and half day third. This tends to reiterate the extended days' superiority over the other two program lengths.

Hypothesis Two A: The children classified as developmentally ready performed significantly better on the Composite score than the children classified not ready.

Hypothesis Two B: The children classified as developmentally ready performed significantly better on the Visual Discrimination subtest than the children classified not ready.

Hypothesis Two C: The achievement on the subtest Auditory Discrimination was not significantly affected by the readiness classification.

Hypothesis Two D: Developmentally ready children performed significantly better than developmentally not-ready children on the Letters and Sounds subtest.

Hypothesis Two E: Achievement on the Listening Comprehension subtest was not significantly affected by the readiness classification at the .01 criterion level.

Hypothesis Two F: Those children categorized as developmentally ready performed significantly better than those children categorized not ready on the Total Reading score.

Hypothesis Two G: Children who were developmentally ready obtained significantly higher scores on the Mathematics Concepts subtest than those children who were developmentally not ready.

Overall, the effect of readiness level was significant in five of the seven subtest areas. In all subtests, the ready children obtained higher scores than the not-ready children.

Hypothesis Three A through G: There was no interaction between the levels of kindergarten and the readiness classification of the students which significantly influenced achievement on any of the subtests administered. Based on the analysis performed, it is not possible to specify any combination of program and readiness level that is superior nor does one variable differentially affect the other to a significant degree.

Hypothesis Four A: Developmental age is a significant predictor of the Composite score and accounts for 34 percent of the variance in that score.

Hypothesis Four B: Developmental age is a significant predictor of the Visual Discrimination score and accounts for 33 percent of the variance in that score.

Hypothesis Four C: Developmental age is a significant predictor of the Auditory Discrimination score and accounts for 14 percent of the variance in that score.

Hypothesis Four D: Developmental age is a significant predictor of the Letters and Sounds subtest score and accounts for 18 percent of the variance in that score.

Hypothesis Four E: Developmental age is a significant predictor of the Listening Comprehension subtest score and accounts for 25 percent of the variance in that score.

Hypothesis Four F: Developmental age is a significant predictor of the Total Reading subtest score and accounts for 34 percent of the variance in that score.

Hypothesis Four G: Developmental age is a significant predictor of the Mathematics Concepts subtest score and accounts for 28 percent of the variance in that score.

According to Gay (1976), a correlation coefficient much below .50 is generally useless for group prediction. Based upon this criterion, developmental age is seen as a meaningful predictor of the Composite, Visual Discrimination, Listening Comprehension, Total Reading, and Mathematics Concepts subtests. Linton and Gallo (1975) further suggest that in the behavioral sciences if one can identify a variable that can account for more than 10 percent of the variance of another variable the results would be more meaningful than those of most studies published. Based on this criterion, developmental age is seen as a meaningful component of all the subtest scores and particularly meaningful as a predictor of the Composite, Total Reading, and Visual Discrimination subtests where at least 33 percent of the variance is shared between developmental age and achievement scores.

General Conclusions

This study was undertaken to provide information of an empirical nature to help resolve two differing theoretical views concerning the achievement acquisition of children and the factors responsible for early school learning. The developmentalist position in its pure form would postulate that children would develop in a fixed sequence at a biologically determined rate. The variable of school programming length would be immaterial to a child's rate of growth or the amount of learning of which the child was capable. To verify the developmentalist position the results of this study should find a significant difference between the groups of children on the readiness variable since ready children would be more able to profit from the kindergarten experience and gain academic knowledge than those children classified not ready. Further, it would be postulated that increased time in school would prove nonsignificant since it is the passage of time for development rather than the amount of time in school that has the greatest impact on learning.

To verify the position of the compensatory theorists, the amount of exposure time to education would be the overriding variable significantly affecting achievement. Regardless of the readiness state of the child, more time and stimulation in class should bring about achievement in all areas. Therefore, in this study the readiness group affiliation would be nonsignificant.

Results of this study do not overwhelmingly support one of these theories to the exclusion of the other but indicate that different types of learnings may be differentially affected by extended teaching time at the kindergarten level. Though the

developmentalists position would suggest that no significant changes in achievement over the time levels should have been suspected, in fact, more time in class was influential and those children did have higher achievement in the academic skills areas than the children attending only half-day programs. The developmentalists position obtained support from the findings that three subtests measuring perceptually based processes of discrimination and association were not increased by time in kindergarten. One could speculate that exposure can increase the child's ability to recognize and learn by rote those reading and math readiness skills tested but that school exposure alone does not pull along perceptual or organizational development. The developmentalists could have also postulated that in all cases a significant difference between readiness groups would demonstrate itself in achievement. This was supported by the data of five of the seven subtests but was not supported by those subtests Auditory Discrimination and Listening Comprehension. It can be further speculated that one explanation for this finding lies in the makeup of the instrument utilized for readiness screening. The Gesell School Readiness Test subtests utilized for this study were almost exclusively performance based with little weight placed on a verbal component. Since the Gesell instrument as used in this project did not initially discriminate on the basis of verbal skills, it therefore may not have discriminated as affectively between those children with high and low scores on auditory discrimination and listening items.

The compensatory position would suggest that children's achievement scores would be positively affected by longer classroom

exposure. This study offers support to that supposition when some limitations are considered. The results indicate that longer programs are most affective as extended or three-quarter day programs and that lower achievement came from half-day programs consistently. There is no significant evidence to suggest that achievement increases by extending the day to a full-day program, however. Those skills most significantly affected by longer periods in the classroom were academically related and significant effects were not found in the more perceptually based tasks.

Limitations

The major limitation of this study is that the sample studied was within intact groups not amenable to random assignment. The groups studied may well represent the Magnet school population in this location but the self selection of students into the programs may limit the generalizability of the study and any suppositions concerning cause and effect. It is possible that families who chose to participate in the Magnet programs as well as in extended kindergarten experiences are not representative of the normal school population.

This population does have the advantage of representing a wide range of racial, socioeconomic groups, and cultural backgrounds giving breadth over a sampling of neighborhood school intact groups. The Magnet schools are further desirable vehicles for study because of their particular goal of providing enriched programs that are innovative and creative.

A second limitation is that there are many variables other than

achievement as measured by a standardized test that might be affected by program length. This study does not purport to measure the whole child in terms of the other aspects that might be affected by extended school exposure.

It is further recognized that the definition of readiness used in this study is limited by the rationale of the Gesell School Readiness Test instrument. As others have pointed out, readiness may not be the unitary construct that the Gesell test infers (Borstelmann, 1965; Kulberg, 1973). Use of terms like ready and not ready suggest the influence of a general factor of immaturity, while attention to dynamic psychological processes and background experiences is ignored. A review of studies on readiness and its assessment reveals no generally accepted definition of the term. Psychologists tend to focus upon perceptual-motor skills, social-emotional factors, academic and cognitive skills while kindergarten teachers are concerned with behavioral manifestations, attention span, and adaptability. The confusion over the particular aspects that determine readiness is compounded by lack of certainty over how important any one or combination of factors is to school success. This study has intended to offer a partial clarification to this confusion. By measuring the validity of the instrument to predict achievement, the basic tenets of the appropriateness of developmental age and the particular method of assessment have been tested.

Recommendations

1. Though the researcher has postulated that longer program length has had a differential effect on those skills of an academic

nature and those dealing with perceptual processing such as discrimination and association, such a dicotomy is not actually specified by the SRA achievement series. Further research to test the hypothesis that longer periods of instruction increase academic learning more so than perceptual process areas is warranted.

2. A longitudinal follow-up study should be undertaken to determine the long term effects of differing lengths of kindergarten on the achievement of children as they progress through the elementary grades.

3. A longitudinal follow-up study should be undertaken to determine if the achievement of those children classified ready and not ready remains significantly different in the academic areas as they progress through elementary school.

4. Since the Gesell School Readiness Test subtests utilized in this study have their lowest predictive powers on those achievement subtests measuring language skills and auditory abilities, utilization of additional subtests with more emphasis on verbal skills should be included in the screening battery to determine if the predictive power could be significantly increased.

5. Further study is warranted to determine if fatigue is a meaningful variable that negatively affects kindergarteners' performance in an all-day school environment.

Practical Implications

The results of this research can offer a practical contribution to the educational planning of the kindergarten year. The results offer support for the following conclusions:

1. The Gesell School Readiness Test is a reliable instrument that can be utilized with confidence to determine the readiness level of children at any time during the kindergarten year. A designation of readiness obtained in the fall will remain consistent for the individual child through the year regardless of the length of program the child participates in. The study specifically indicates that children tested in the fall and determined ready for kindergarten were also ready for first grade when tested in the spring. Children tested in the fall and classified not ready were also not ready for first grade when tested in the spring. Therefore screening programs can be justifiably conducted at any time during the kindergarten year.

2. Increasing the length of the school day in kindergarten significantly increases children's academic skills mastery. Perceptual development is apparently unaffected by lengthening the school day.

3. The program length that is most beneficial for maximizing academic achievement is the extended-day (three-quarter) format. According to the variables considered in this study, there is no benefit obtained by the extra time provided in the all-day program over the extended day.

4. The Gesell School Readiness Test is an important and meaningful predictor of school achievement. Since up to one-third of a child's variance in achievement can be accounted for by scores on this one screening instrument, the short time required for testing appears justified. It should be noted, however, that two-thirds of the variance in achievement apparently comes from a

combination of other variables. Therefore, this one instrument provides valuable information but should not be utilized in isolation to determine a child's placement in school.

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