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Effects Of Title I Pre-Kindergarten On Istep+ Scores

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EFFECTS OF TITLE I PRE-KINDERGARTEN ON ISTEP+ SCORES

A Dissertation

Presented to

The School of Graduate Studies

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In Partial Fulfillment

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Doctor of Philosophy

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by

Janice L. Schroeder

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APPROVAL SHEET

The dissertation of Janice L. Schroeder, Contribution to the School of Graduate Studies, Indiana State University, Series III, Number 871, under the title *Effects of Title I Pre-Kindergarten on ISTEP+ Scores* is approved as partial fulfillment of the requirements for the Doctor of Philosophy Degree.

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ABSTRACT

Researchers, educators, and administrators have intended to improve school achievement for low-income children by providing Title I pre-kindergarten in public schools. It is assumed that third grade low-income children would be more prepared for the Indiana Statewide Testing for Educational Progress (ISTEP+) if they had participated in Title I pre-kindergarten programs. The purpose of this study is to determine whether participation in Title I pre-kindergarten improves the ISTEP+ battery scores of students, and to measure factors that might be related to student achievement. Among the predictors investigated in this study are a program factor (participation in Title I pre-kindergarten) and personal attributes of students (parental status, sex, retention of grade, socio-economic status measured by free/reduced lunch count, and race). Data for this study were collected by Fort Wayne Community Schools system in Fort Wayne, Indiana. Using this information, the researcher used multiple regression procedures to measure the relationship of each predictor with the criterion variable, ISTEP+ battery scores of third grade students.

Four hundred twenty-five Title I students were included in this study. The findings indicated that participation in Title I pre-kindergarten and personal attributes were related to student achievement as measured by the ISTEP+ battery scores.

Additionally, low-income students were found to score lower than their non-poverty peers. Sex of students, socio-economic status of full-pay lunch count, race, and

participation in Title I pre-kindergarten as isolated variables were found non-significant in predicting student achievement.

Further research is recommended to investigate the effects of Title I pre-kindergarten on the ISTEP+ battery scores of students. It is recommended that this study be repeated under similar conditions.

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RATIONALE FOR THE STUDY

Introduction

Early childhood education programs are now recognized as helping students to be more successful in school (Berrueta-Clement, Schweinhart, Barnett, Epstein, & Weikart, 1984). Fort Wayne Community Schools (FWCS) recognizes the need to assist students with their academic success and now offers Title I pre-kindergarten programs to students who are in need of early education to help promote academic success. FWCS' Title I pre-kindergarten programs, as well as other early education programs across the nation, are gaining the attention of educators and policy makers as programs are in need of review to explore short-term and long-term effects on academic performance. Policy makers were convinced by longitudinal research (Berrueta-Clement et al., 1984) of the effectiveness of "high-quality" early education programs. American educators defined "high-quality" early education programs as having a child-centered curriculum that emphasized play, low teacher-child ratios, and curricula indicative of the best known practices in research and education. These early childhood programs, which evolved through the use of public funds, enhanced children's growth and development and promoted parental involvement. The rationale for this study is to gauge the effectiveness of early childhood programs as reflected by third grade student achievement scores.

Research (Lazar, Darlington, Murray, Royce, & Snipper, 1982; Hubbell, 1983) evidenced the long-term effectiveness of high-quality early childhood education as improving the lives of low-income children and their families. Specifically, the Perry Project (Berrueta-Clement et al., 1984) explored the long-term effects of 123 African American youths from families of low socio-economic status who were at risk of school failure on the participation or nonparticipation of high-quality early childhood programs. Children were divided randomly into two groups: an experimental group attending a high-quality preschool program with a child-centered curriculum which focused upon developmentally appropriate, child-centered experiences during child care, and a control group of children who did not participate in the preschool program. Information was collected annually from students during the ages of 3 to 11 and again at ages 14, 15, and 19—assessing family demographics, cognitive and academic abilities, attitudes, scholastic accomplishments, involvement in delinquent and criminal behavior, use of welfare assistance, and employment (Berrueta-Clement et al., 1984, p. 1).

The longitudinal studies reported findings from the Perry Preschool Project experimental group throughout the end of preschool year (Weikart, Rogers, Adcock, & McClelland, 1971), through fourth grade (Weikart, Bond, & McNeil, 1978), through age 15 (Schweinhart & Weikart, 1980), and through age 19 (Berrueta-Clement et al., 1984). Results of these studies indicated the following beneficial effects of participating in the preschool program: (1) an improvement of cognitive performance during preschool years, (2) an improvement of scholastic placement and achievement during school years, (3) a decreased rate in delinquency and crime, (4) a decreased use of welfare assistance, (5) a

decreased rate of incidence of teenage pregnancy, (6) an increased rate in high school graduation, and (7) an increased rate in the frequency of enrollment in postsecondary employment (Berrueta-Clement et al., 1984, p. 1).

The Age 19 Study (Berrueta-Clement et al., 1984) evidenced rates of employment and participation in college or vocational training for students attending preschool as nearly twice that for those who did not attend preschool. Other long-term benefits included a decreased rate of teenage pregnancy (including live births) and reduced rates of detention, arrest, and high school dropouts for participants in the preschool programs compared with non-participatory students. Also, the ratio of years spent in special education classes was shown to be slightly half for students attending preschool. Students who attended preschool had higher functional competency scores than those who did not attend (Berrueta-Clement et al., 1984). Implications of these findings are enormous and yield positive results in cost benefits to the participants, their families, and the community over a lifetime.

Concerns about childhood education were reported in the National Commission on Excellence in Education in 1983. People sought ways to improve the quality of education, including the passage of legislation which dramatically shifted the public's attitude in favor of preschool education through the establishment of the Head Start program (Berrueta-Clement et al., 1984). However, during the 1970s, early education for low-income families began to decrease. New programs became less popular, and cuts in social programming were introduced by the Reagan administration. The survival of early intervention programs was threatened.

The Perry Preschool Project (Berrueta-Clement et al., 1984) was studied to determine how low-income children could be successful in school. The study produced an instrumental body of evidence and research which legitimized preschool education, specifically its cost-effective nature as a social investment. The study demonstrated that high-quality preschool education can alter the lives of children living in poverty and supported the position that preschool programs were worthwhile investments capable of long-term positive outcomes. The value of preschool education was estimated to be seven times the cost of one year in the preschool program.

Since 1995, the need for high-quality early education programs and the urgency to develop provisions for such programs have increased. Child poverty has grown dramatically, reaching crisis proportions in some school districts. Even the Clinton administration recognized the need for programming and public support. During President Clinton's first year in office, he addressed the issue of poverty in the school districts by reconsidering the underlying logic of compensatory programs. Specifically, his administration directed that intervention programs be supplemental to regular education instruction provided by the public schools for the intended purpose of giving extra help to children from disadvantaged environments. To regain public support of compensatory programs for children in poverty area schools, he kept the foundational design and political justifications for the compensatory programs but made some major changes, including the title of "Chapter I" to "Title I," the major compensatory program in the United States (Connell, 1994). He proposed a new way of thinking about education, and expressed concern about children living in poverty. He wanted to employ strategies

dealing with these concerns utilizing current practices and social research.

Compensatory programs cannot be reinvented in isolation. "Rethinking" leads to discussion about how inequalities are produced in education, shifting away from the characteristics of the disadvantaged to the institutional character within school systems (Connell, 1994, p. 126). "The goal of Title I and other compensatory education programs is to ensure that all children leave the primary grades with the skills and attitudes to be successful in later grades" (Madden, Slavin, Karweit, Dolan, & Wasik, 1991, p. 593). According to research (Madden et al., 1991), remediating learning deficits after they are already well established is extremely difficult. At-risk children need additional help at a tender age while they are still motivated and confident of overcoming learning deficits, which are relatively insignificant and remediable. The most important goal in educational programming for students at risk is to try to make certain that we do not squander the greatest resource we have: the enthusiasm and positive self-expectations of young children themselves. The practical implication of this ideal is that Chapter I (later named Title I), special education, and other services for at-risk children must shift from an emphasis on remediation to an emphasis on prevention (Madden et al., 1991, p. 593).

Research regarding the benefits of early education continues to support the continued use of such programs in public schools. During the 1920s to the 1950s, work in child development regarding readiness was greatly influenced by Gessell. Gessell (1925, 1928, 1940) believed that child development was controlled by maturation and unfolding of automatic behaviors related to the neural ripening or "intrinsic growth" as a result of the progress of motor or cognitive skills (Teale & Sulzby, 1994, p. ix). Research (Dennis,

1941; McGraw, 1935) on motor development supported Gessell's maturationalist theory of cognitive development. Changes in a child's development were seen as being largely unaffected by the environment (Hunt, 1964). Implications of this theory led educators to believe that if a child is not ready for educational instruction, it is better to allow maturation to take place without educational intervention. Gessell, like other maturationalists, insisted that the environment must allow the child to grow at his own pace in order to facilitate the neural ripening of the child (Ausubel, 1961).

The developmental theory posed by maturationalists prompted researchers to test the readiness of a child for school instruction. In 1929, Morphett and Washburne (as cited in Teale & Sulzby, 1994) administered the Stanford-Binet and the Detroit First-Grade Intelligence Test to 141 first-grade children in the Winnetka, Illinois schools. The test was given in February and then in June to calculate the mental ages and reading achievement of these children at the beginning of the school year. The correlation ratios indicated that children who made considerable progress in February and June were those who began the school year with a mental age of six years, six months. These results indicated that "it pays to postpone the beginning of reading until a child has attained a mental age of six years and six months" (as cited in Teale & Sulzby, 1994). This study became the model for the mental-age concept of readiness. The ripening/mental-age/delay instruction prevailed for four decades (Teale & Sulzby, 1994, p. x).

Readiness testing became widely influential in the field of education along with traditional drills of phonetic analysis and subskill-based instruction. Betts (as cited in Teale & Sulzby, 1994) challenged the usage of readiness tests. She claimed that readiness

tests were designed to indicate not just that a child is or is not ready for school; rather, they could be used as a diagnostic tool for intervention. The influence of educational intervention by Betts (as cited in Teale & Sulzby, 1994) changed the way that educators viewed the methods of instruction and textbooks used in the classroom. Specific descriptions of intervention techniques were soon included in textbooks to help children who were deficient in one of the areas of auditory readiness or visual readiness as shown on the readiness tests. During the 1930s, readiness workbooks were included as supplemental instruction for teachers in addition to the texts. These methods for instruction were presented as sequential instructional books, known as basal readers, reflecting the sequential steps in child development.

Readiness testing faced challenges by other researchers in education. Clay (1967), a New Zealand pioneer for young children, began studying reading behaviors (i.e., directionality and proper book handling) in young children to determine how reading difficulties could be identified as early as possible. Her research with five-year-old entrants showed that children had a great deal of knowledge about printed language prior to school instruction. Prior to this research, reading and writing were introduced with oral language instruction only after children entered school. Clay (1967, p. 24) concluded that "there is nothing in this (Clay's) research that suggests that contact with printed language forms should be withheld from any five-year-old on the ground that he is immature."

Goodman (as cited in Teale & Sulzby, 1994) believed that this model would also apply to children described as "at-risk"of developing a delay in reading due to risk factors in the young children and/or the environment, such as poverty, lack of nutrition, premature

birth weight, congenital malformations, anomalies, mutant genes, acute illness, radiation, harmful drugs, and other prenatal and postnatal risks. She indicated through research that these children had an understanding and knowledge of printed language at a very early age. Specifically, students demonstrated behaviors of how to handle books involving the use of directionality in written language as a function of print in a book. Later she said, "It slowly became clear to me that children's discoveries about literacy in a literate society such as ours must begin much earlier than at school age" (as cited in Teale & Sulzby, 1994, p. xvii).

The rationale for pushing for education in young children prior to school-aged years stemmed from increased research on young children. At Harvard in the 1960s, infant research became widespread among psychologists. Infant research by Kagan (1990), Bruner (1960), and others demonstrated that preschoolers knew more information than educators ever realized and that learning could take place during the early years. Bruner interpreted his findings in the Process of Education by placing an emphasis on teaching subjects in the early grades in order to get children ready to read as soon as possible instead of waiting for the magical mental age (Bruner, 1960).

Bloom's (1964) analysis of a multitude of longitudinal studies also supported education for the early years. Results of his research concluded that the majority of human intellectual development takes place before the age of five, with 50% of the intelligence measured at the age of 17 already developed by age four (Bloom, 1964, p. 88). He believed the preschool years were the most rapid period in development and the most significant in determining further development. He insisted that deprivation during

preschool years could hold serious consequences for both cognitive and affective development in children later in life. Nash (1997) theorized that the first few years of life are critical periods, "windows of opportunity," when the brain demands certain types of input in order to create or stabilize certain long-lasting structures. The window for developing language and acquiring syntax was closed as early as five or six years of age, while the windows for adding new words may never close (p. 51). Hunt (1961) and Piaget (1970) emphasized that quality encounters with the environment during the early years could increase the level of intellectual capacity in adult years.

The 1960s social revolution of African Americans reinforced the emphasis on environmental factors. African American children and other minority children needed help to overcome the disadvantages due to poverty. Early intervention became the key in helping to achieve equality for all children. Federally funded intervention programs, intended to enhance learning for children from deprived environments, brought a new emphasis and importance to the early childhood years. Projects such as Head Start, Early Head Start, Follow Through, and Home Start were funded for migrant and bilingual children with special needs including economically disadvantaged children as well as those with mental and physical disabilities. Instructional methods and materials developed for these projects were used in early childhood programs in the public schools. Preschool children who were considered at risk for school failure in the primary grades, including children with disabilities and other special needs, were also served in early intervention and compensatory programs (Wortham, 1998).

In recent years, compensatory programs such as Title I continued the effort to

provide quality education for economically disadvantaged children. The current effort in providing Title I pre-kindergarten to impoverished children is directly related to the argument that school performance deficits are a result of deprived or impoverished environments and that compensatory preschooling can offset the negative effects of that experience by increasing the level of performance in children by the time they reach school age (Garber, 1988). These benefits are directly related to school performance as indicated on achievement tests. This study seeks to test whether compensatory preschool can be used as a predictor to assess school achievement as measured by the Indiana Statewide Testing for Educational Progress (ISTEP+).

Background of the Study

Fort Wayne Community Schools is an urban school district that enrolls an average of 31,000 students in kindergarten through grade 12 each year. During the 1999-2000 school year, Fort Wayne Community Schools enrolled 31,751 students, of whom 15,966 were elementary education students, kindergarten through grade five. There were 10,017 majority (Caucasian) students and 5,949 minority students enrolled in elementary buildings during the 1999-2000 school year. Students receiving free/reduced-price lunches comprised 39.6% of all students in the district for the same year. Student achievement for FWCS students in grade three during the 1999-2000 school year was measured by the Indiana Statewide Testing for Educational Progress (ISTEP+). This state-mandated test is used to measure how well students are learning in relation to Indiana state academic standards (FWCS data).

The ISTEP+ Total Battery Normal Curve Equivalent scores (TB NCE) for FWCS third grade students during the 1999-2000 school year was 58.6 (54.7 reading, 59.1 language arts, and 61.6 mathematics). ISTEP+ scores (TB NCE) at the Indiana state level for third grade during that year were 61.0 (57.4 reading, 61.5 language arts, and 64.1 mathematics). Of the FWCS students who participated in ISTEP+ testing, 1,345 (57%) of third grade students scored above standard in language arts. However, 949 (40%) of FWCS third grade students scored below standard in language arts (FWCS data). Academic performance of all children is a concern for the FWCS urban school district. Students who scored below the state standard are of greater concern.

The issue of student academic performance as measured by ISTEP+ scores is the subject of this study. Student achievement for FWCS students in grade three during the 1999-2000 school year was measured by the Indiana Statewide Testing for Educational Progress (ISTEP+). This state-mandated test is used to measure how well students are learning in relation to Indiana state academic standards (FWCS data). How schools assess academic performance is an important aspect of an educational system. Some measures used by conventional teaching methods are not successful with indigent children. Families living in poverty are powerless in the educational process; they are the most dependent on educational resources but have no assurances that their needs will be met, unlike their wealthier counterparts (Connell, 1994). Therefore, how Indiana schools address the factor of poverty is critical in evaluating the academic performance of indigent children as measured by their ISTEP+ scores.

Many educators believe that students are ready to learn when they begin formal

education (Teale & Sulzby, 1994; Chall, 1967). Children of poverty lack that which enables them to integrate new knowledge into existing schema necessary for learning (Connell, 1994). Therefore, they are deemed at risk of school failure and lack readiness skills used in formal instruction (Connell, 1994). In 1989, President Bush and the national governors held an educational summit in Virginia and established the national education goals. The first goal states that by the year 2000, all children in America will start school ready to learn (Task Force on Education, 1990).

Children living in poverty are most at risk for academic failure and below-average cognitive performance. The percentage of children living in the United States, reared in families of poverty has been increasing since 1970 (Huston, 1991). The number of preschool children living below the poverty level between the years 1971 and 1992 has also increased from 3.5 million to 6 million respectively, an increase of over 70% (National Center for Family Literacy, July 1996). In 1994, the poverty line was considered to be $14,340 for a family of four. In 1996, one out of four individuals in the U.S. (25%) under the age of 18 was living in poverty (Payne, 1998). During the 1999-2000 school year, the poverty level of Fort Wayne Community School service area rose to 39.6% (FWCS records), qualifying seven Title I program sites to service children as stated by the Title I grant (Public Law 103-382—Oct. 20, 1994). Funding for school-wide programs for low-income children are stated as follows in Section 1114 of Public Law 103-382:

> In general.—A local educational agency may use funds under this part, in combination with other Federal, State, and local funds, in order to upgrade the

> entire educational program in a school described in subparagraph (A) or (B) if, for the initial year of the school wide program, the school meets (A) For the school year 1995-1996—(i) the school serves an eligible school attendance area in which not less than 60 percent of the children are from low-income families; or (ii) not less than sixty of the children enrolled in the school are from such families; (B) For the school year 1996-1997 and subsequent years—(i) the school serves an eligible school attendance area in which not less than 50 percent of the children are from low-income families; or (ii) not less than 50 percent of the children enrolled in the school are from such families. (Public Law 103-382, 1994)

Pertinent language associated with this study is the Title I—Amendments to the Elementary and Secondary Education Act of 1965, which recognizes the need for high-quality education for all individuals and a fair and equal opportunity to obtain that education for the societal good. It states as follows:

> (1) although the achievement gap between disadvantaged children and other children has been reduced by half over the past two decades, a sizable gap remains, and many segments of our society lack the opportunity to become well-educated; (2) the most urgent need for educational improvement is in schools with high concentrations of children from low-income families and achieving the National Education Goals will not be possible without substantial improvement in such schools; (3) educational needs are particularly great for low-achieving children in our Nation's highest-poverty schools, children with limited English proficiency, children of migrant workers, children with disabilities, Indian children, children

> who are neglected or delinquent, and young children and their parents who are in need of family-literacy services; (4) while Title I and other programs funded under this act contribute to narrowing the achievement gap between children in high poverty and low poverty, such programs need to become even more effective in improving schools in or to enable all children to achieve high standards; and (5) in order for all students to master challenging standards in core academic subjects as described in the third National Education Goal described in section 102(3) of the Goals 2000: Educate America Act, students and schools will need to maximize the time spent on teaching and learning the core academic subjects. (Title I—Helping Disadvantaged Children Meet High Standards, 1994)

According to Title I of the Elementary and Secondary Education Act, the goal of Title I is to improve the educational opportunities for economically disadvantaged children by helping them succeed in school (U.S. Department of Education, 1994). Increasing the proficiency levels of grades and academic achievement are two primary goals for Title I programs. The federal government and local educational agencies (LEAs) share the responsibility of the administration of Title I. Both federal and local agencies submit data to state educational agencies (SEAs) for approval. Title I pre-kindergarten programs meet eligibility standards by using two sets of criteria: (1) Title I attendance areas in which children live and (2) academic performance is shown to be below the age or grade level at which a local education agency will provide free education (U.S. Department of Education, 1994).

The eligibility for funding in an area is calculated by the state using a formula that

includes the average amount the state spends per child and the percentage of children ages five to seventeen who live in families below the poverty line. Other considerations included in the formula are the number of children who are in families receiving Aid to Families with Dependent Children (AFDC) payments which exceed the current census poverty level and the number of neglected and delinquent children who have lived in institutions for more than 30 days. The United States Secretary of Education provided the baseline data to set each state's grant allocations. Total Title I funding for the 1993-1994 school year was $6.8 billion which amounts to about $900 per eligible student (all ages) (U.S. Department of Education, 1994). The services provided for each of the Title I programs may vary per program. Some of the services provided include education and development, direct health services, health referrals, dental services, speech and hearing assessments, screenings for disabilities, social service referrals, and direct social services.

Purpose of the Study

The purpose in this study is twofold: (a) to determine whether participation in Fort Wayne Community Schools (FWCS) Title I pre-kindergarten program improved ISTEP+ battery scores of third grade students while controlling for the program factor (participation in Title I pre-kindergarten) and personal attributes (parental status, sex, retention, socio-economic status (SES) measured by free/reduced lunch, and race); and (b) to find a combination of variables from the two categories (program factor and personal attributes) to best predict achievement of third grade students in Fort Wayne Community Schools.

This study measured student achievement by the Indiana Statewide Testing for Educational Progress (ISTEP+) battery scores of third grade students enrolled in the Fort Wayne Community Schools system in Fort Wayne, Indiana during the 1999-2000 academic year. It was believed that through this study, factors capable of differentiating participants and non-participants in the Title I pre-kindergarten program would be determined. The results would guide teachers, administrators, researchers and other educators in the development of school programs intended to improve school achievement for children enrolled in Title I pre-kindergarten. It may also encourage more children to participate in Title I pre-kindergarten programs.

Statement of the Problem

Research Questions

Specifically, the study was designed to answer the following questions:

1. Do combined factors (program factor and personal attributes) predict FWCS students' achievement battery scores measured by the ISTEP+?

2. Does the program factor (participation in Title I pre-kindergarten) predict FWCS students' achievement battery scores measured by the ISTEP+?

3. Do the combined personal attributes (parental status, sex, retention, socio-economic status (SES) measured by paid, reduced, and free lunch, and race) affect FWCS students' achievement battery scores measured by the ISTEP+?

4. Does each individual personal attribute (parental status, sex, retention, socio-

economic status (SES) measured by paid, reduced, and free lunch, and race) affect FWCS students' achievement battery scores measured by the ISTEP+?

Delimitations, Limitations, and Assumptions

Delimitations

The present research involved only the students enrolled in the Title I pre-kindergarten programs in the FWCS system in Fort Wayne, Indiana during the 1999-2000 school year. Subjects of the study were enrolled in specific buildings that housed Title I pre-kindergarten programs during the school years of 1994-1995 in the FWCS system. Since Title I programs are federally funded and identified by number of students who obtain free lunches ("high-poverty" children), all students for the purpose of this study are considered to be low-income or disadvantaged children. "Low poverty" represented children who received reduced-cost lunches and "no poverty" represented children who received full-pay lunches.

Other delimitations include the following: (a) factors such as the mobility of students enrolled in the pre-kindergarten program; students may have moved to other schools within the FWCS system, or moved out of the school system during the school years 1994-1999; (b) factors that contribute to the academic development of a child outside the FWCS system; and (c) factors that influence academic development outside the FWCS system, i.e., divorce, stress and abuse.

The Fort Wayne Community Schools' personnel department assured the researcher that all pre-kindergarten teachers participating in the study were certified elementary

education teachers by the State of Indiana, holding additional endorsements or licensure (i.e., an associate's degree in early childhood, and/or a kindergarten endorsement) beyond a bachelor's degree in elementary education, during the school years of 1993-1994. Other teachers participating in this study also held a teacher's license by the State of Indiana.

A further delimitation of the study is defined as the method of instruction in the pre-kindergarten programs. All sites were encouraged to use the High/Scope (Weikart et al., 1971) curriculum, used by the Perry Preschool program, as an open framework of educational experiences. This "high-quality" child-centered curriculum allows for experiences based on the natural development of young children (Weikart et al., 1971). Many Fort Wayne Community School teachers needed training in the use of the High/Scope curriculum. Also, during the 1993-1994 school year, all Title I pre-kindergarten sites were in the process of evaluating each program for the purpose of becoming accredited by the National Association for the Education of Young Children (NAEYC) (Bredekamp & Copple, 1997), collectively a Title I pre-kindergarten program in the FWCS corporation. Both the High/Scope curriculum and the NAEYC accreditation process are based on the principle that teachers provide learning experiences that match developmental levels of young children ages four and five, as stated by the NAEYC guidelines for four-year-olds and five-year-olds (Bredekamp & Copple, 1997). Some pre-kindergarten teachers were trained in implementing the guidelines for developmentally appropriate practices (DAP) (Bredekamp & Copple, 1997) as identified by the NAEYC, prior to the 1993-1994 school year. Other pre-kindergarten teachers were not. Because of this discrepancy in the completion of the training for certified staff during this initial

year of the FWCS Title I pre-kindergarten programs, the method of instruction was not identified as a variable in this study.

Limitations

Limitations of this study are as follows:

1. The independent variables, namely participation in Title I pre-kindergarten, parent status, sex, retention, socio-economic status of "no poverty" (full-pay lunch), socio-economic status of "low poverty" (reduced-pay lunch), socio-economic status of "high poverty" (free lunch), and race, are already in place as an ex post facto design and therefore cannot be manipulated by the investigator.

2. Generalization regarding the results of this study is limited to similar populations to those used in this study.

3. Possible factors may have existed in different settings which contributed to the academic performance and achievement outside of the FWCS system. For example, students may have been dually enrolled in Head Start or other high quality ECE programs while attending Title I pre-kindergarten programs. Possibly, children were involved in after-school educational activities or tutorial-type situations, providing a greater opportunity to increase academic performance.

4. Possible factors may have existed in different settings which influenced academic performance and achievement outside of the FWCS system.

5. Maturation may have occurred during the passage of time as an intervening event. With the passage of time, some students may have improved their listening ability,

concentration upon subject matter, interest in subject matter, or other factors that could have contributed to understanding the content of material or testing practices which would affect academic performance.

6. This study is limited by the reliability and validity of the ISTEP+ as marketed by CTB/McGraw-Hill.

7. This study is an ex post facto study. Data were gathered by the Fort Wayne Community Schools (FWCS) prior to this study. The investigator has verified the accuracy of the data through interviews with personnel from the FWCS, who have used these data repeatedly since they were collected initially upon enrollment during the 1993-1994 school year. Errors, when discovered, were corrected continuously.

Assumptions

While the best measure for socio-economic status (SES) would probably be the family income, to accurately identify each family's SES is beyond the funding and scope of this study. This study will measure SES by the free/reduced lunch data reported by parents ("family data forms"). For the purposes of this study, it is assumed that the "family data forms" are accurately reflective of each family's socio-economic status based on the guidelines for attending Title I programs. It is assumed that students attending Title I pre-kindergarten are eligible for a Title I program.

The researcher assumes that a child receiving "paid lunch" indicates a family income above poverty level, that a child receiving "reduced-pay lunch" is at poverty level, and that a child receiving "free lunch" is from a family at the most impoverished level,

below poverty. Children living in poverty were considered disadvantaged children (Huston, 1991).

Operational Definitions Used in the Study and Interpreting Data

The following terms are definitions.

Association for Childhood Education International (ACEI): The Association for Childhood Education International was founded in 1892 as a kindergarten organization to guide and support professionals in the field. Later in the 1930s, it broadened its focus to include preschools and elementary schools. This professional organization publishes a journal called Childhood Education and holds conferences as part of its mission.

Aid to Families with Dependent Children (AFDC): Aid to Families with Dependent Children was a welfare program that provided short-term support for poor children and families, such as food stamps. In 1996, this program was replaced by the Temporary Assistance for Needy Families (TANF).

At-risk: At-risk is a term used by a variety of professionals to describe infants and young children whose academic success is at risk due to some condition that might be a deterrent to successful learning (i.e., developmental delay due to a combination of factors such as extreme prematurity, chronic poverty, or early medical problems).

Attrition: Attrition is a term is used by researchers to describe the loss of participants within a study over time.

Battery score: "Battery score" is a term used by researchers to describe the total testing score. For the purposes of this study, battery score is a term used to describe a

weighted average of ISTEP+ subtest scores in subject areas of reading, language arts, and mathematics.

California Testing Bureau (CTB)/McGraw-Hill: California Testing Bureau (CTB)/McGraw-Hill is the test contractor for the Indiana Statewide Testing for Educational Progress (ISTEP+).

Child care: Child care occurs in places that provide care of children for a large portion of the day for working parents or parents who are unable to provide care for their children. It is often available to children of varied ages. Basic care-taking activities of eating, dressing, resting, toileting, as well as playing/ learning time are important components of this type of care.

Child-centered programs: Child-centered programs are early childhood programs that offer educational curricula with health and developmental screenings, parent involvement, and social service assistance.

Child Development Associate (CDA): A CDA is a credential earned by individuals who work in child care. This credential is earned via university/college credit that demonstrates a knowledge-base of child development and appropriate practices for young children. Credit can be earned on the job as part of a required practicum experience.

Child Study Movement: The Child Study Movement is a nursery school movement established by Hall in the late 1800s as a natural outgrowth of a new psychology that emerged when children were studied in a scientific manner. University laboratory schools provided information on how children grow and learn at different ages and stages to further understanding of child growth and child psychology.

Cognitive or interactive developmental curriculum: A cognitive or interactive developmental curriculum views learning as an active exchange between the child and the environment. The key element is teacher-initiated activities that foster children's reasoning and problem-solving abilities.

Compensatory programs: Compensatory programs are educational programs intended to make up for experiences (as cultural) lacked by disadvantaged children.

Constructivist approach: A constructivist approach is a Piagetian view of development. Children literally construct their knowledge of the world and level of cognitive functioning through experiences with their environment. Children continuously organize, structure, and restructure experiences in relation to existing schemes (information) of thought.

Criterion-referenced testing: Criterion-referenced testing refers to scores that measure student achievement relative to an academic standard.

Cronbach's alpha: Cronbach's alpha is a statistical term used to describe a reliability measure in which the observed score is an accurate reflection of the true score.

Developmentally appropriate practices (DAP): DAP are principles that guide early childhood educators to improve the quality of care for young children. DAP encompasses all facets of the early childhood program including the climate of the classroom (physical environment, daily schedule and learning experiences), the techniques/ learning experiences used to meet individual needs of children, and the implementation program policies. DAP emphasizes a child-initiated, teacher-directed program.

Developmental delay: Developmental delay is a term used by educators and other

professionals to describe young children who show a delay in one or more areas of development (communication, cognition, motor development or social or emotional development).

Early Childhood Care and Education (ECCE): Early Childhood Care and Education programs are specially designed to improve the cognitive development of economically disadvantaged children.

Early Childhood Programs: Early Childhood Programs are programs that provide services for children ages birth through eight in part-day and/or full-day centers, homes, institutions, kindergartens and primary schools.

Early Head Start: Created in 1995, Early Head Start is a program that extends the Head Start program to serve at-risk children from birth to age three. This program provides services such as health care, nutrition counseling, and home visits to help families prepare young children for school experiences.

Early intervention: Early intervention is a provision of services for children from birth to age three and their families to optimize each child's learning potential and daily well-being, increasing opportunities to function effectively in the community. This applies to children who are discovered to have, or to be at risk of developing, a handicapping condition or special need that may affect their development.

Even Start: Even Start is an early intervention family-literacy program funded by the United States Department of Education in 1990 to improve the educational opportunities of low-income children and adults. Even Start supports the philosophy that the educational attainment of children and their parents are interrelated and that improving

literacy skills of parents will have a positive impact on the educational experience of their children. Even Start programs mandate that participating families take part in parent early education, parent education and adult education programs.

Ex post facto design: An ex post facto design is a statistical term used to describe data that is gathered prior to the study and stored for later research.

Fade out: Fade out is a term used by researchers to describe the initial effects present in a study that seem to disappear in a follow-up study.

Follow Through: Follow Through is a program that extends the Head Start program to children in grades one through three by working with school personnel rather than working apart from schools. The Follow Through program is based on the philosophy that early intervention yields higher IQ scores for children who use such programs than for children who did not receive intervention services.

Head Start: Head Start is a federally funded program originated during President Lyndon Johnson's War on Poverty and continues to date. Head Start is designed to improve the education, health and nutrition of disadvantaged children prior to kindergarten entrance. Children learn to develop skills needed to be successful in school. Head Start also provides services to parents and the community to improve the quality of education and literacy for these children while living in the home.

High-poverty children: High-poverty children are operationally defined for this study as children who received free school lunches.

High-quality programs: A "high-quality" program is a term used by educators to describe programs that empower children to initiate their own learning activities while

solving everyday intellectual, social, and physical problems relating to the environment. Developmentally appropriate practices are key elements in this program involving a child-centered curriculum.

High/Scope: High/ Scope is a model of a high-quality early childhood education program that empowers children by encouraging them to initiate and carry out their own learning activities. The High/Scope program strives to develop in children a broad range of skills including problem solving, interpersonal, and communication skills needed to be successful in society.

Home Start: Home Start is a federally funded program connected with Head Start to bring early education experiences to the homes of disadvantaged young children.

Indiana Statewide Testing for Educational Progress Plus (ISTEP+): ISTEP+ is a standardized test developed by CTB/McGraw-Hill of Montgomery, California. Students are tested in grades three, six, eight, and ten for program evaluations and student academic performance in reading and math.

Lantham Act Nursery Schools: Lantham Act Nursery Schools were federally funded child-care centers servicing children of working mothers employed by defense plants during World War II.

Least restrictive environment: Least restrictive environment is a term used by educators and legislators to describe the environment in which a child is able to receive programing services that meet his or her specific needs, allowing the child to be educated with non-disabled peer in a regular classroom or a classroom in which a child learns best.

Low-poverty children: Low-poverty children are operationally defined for this

study as children who received reduced-cost school lunches.

Multidisciplinary team: A multidisciplinary team is a term emerged from a medical model in which specialists who have expertise in areas suspected of causing medical difficulties examine patients while consulting other members of differing speciality areas. The education field used this model to involve professionals from many disciplines including speech pathologists, occupational therapists, physical therapists, classroom teacher, administrator, and special education teacher. Parents are also invited to become involved members of the team to plan appropriate curriculum strategies for individual children.

National Association for the Education of Young Children (NAEYC): NAEYC is the Nation's largest and best-known professional organization for early childhood educators. NAEYC sets standards for the early-childhood field, provides training for teachers to design programs for children based on what is known about young children.

No-poverty children: No-poverty children are operationally defined for this study as children who paid for the school lunches they received.

Norm-referenced tests: Norm-referenced tests are tests that compare student performance to that of a cross section of students in various areas of the country who were administered the same test.

Nursery school: Nursery school is a term used to describe programs for the education of children ages two through four. Many nursery schools have half-day programs designed for children of mothers who do not work outside the home, although many children who have working parents do attend.

Open framework or open classroom model: Open framework is a belief that children must direct their own learning while the teacher provides stimulating materials to support children's choices.

Pre-kindergarten (Pre-K): Pre-K programs provide care and education for children ages four and five before their entrance into kindergarten. The federal government and state government have provided funds to service low-income children as part of the public elementary school system.

Preparedness: Preparedness is a term is used by the National Association for the Education of Young Children (NAEYC) to describe the teacher's ability to understand appropriate and inappropriate practices regarding young children in order to prepare an optimum learning environment, achieving a balance between child-initiated learning and adult guidance.

Preschool education: Preschool education is a term used by educators to describe any educational program for children before their entrance into kindergarten. Preschool programs, designed for children ages three to five years, are rapidly becoming a part of the public school system.

Project Care: Project Care is an Infant Health and Development Program (IHDP) for children ages one to three years old. This full-day program consists of weekly home visits for the first year followed by bi-weekly visits for children and families. These visits are intended to meet the needs of both parents and children.

Psychoanalytical model: A psychoanalytical model is a rigid training model recognizing the feeling of both the adult and child.

Psychodynamic model: A psychodynamic model is an early childhood program characterized by a child-centered environment with a high degree of permissiveness.

Public Law 94-142: Education for All Handicapped Children Act of 1975 is a federal law passed in 1975 requiring that every child between the ages of 3 and 21 with a disability will be provided a free and appropriate public education in the least restrictive environment.

Public Law 99-457: The Individual with Disabilities Education Act Amendments of 1986 extended a mandate to provide early intervention services to the 3- to 5-year-old population (Part B) and offered states additional incentives to provide early intervention for the birth through 2-year-old population and their families (Part H). Part C of the amendments, reauthorizes funding of model of service delivery (e.g., audiology, case management, family training, counseling, occupational therapy, physical therapy, psychological services, social work services, special instruction, and speech-language pathology) for young children previously known as Handicapped Children Early Education Projects (HCEEP).

Public Law 103-382: Title I—Amendments to the Elementary and Secondary Act of 1965 improves educational opportunities for impoverished children by linking early experiences and high-quality education for all individuals to school success.

Readiness: Readiness is a term prevalently used by educators in the 1960s and again in the 1980s. Educators such as Morphett and Washburne (as cited in Teale & Sulzby, 1994) believed that readiness to learn involved many factors including motivation, physical development, emotional maturity, intellectual ability, and health. Instead of

waiting for a child's natural maturation process to unfold, these educators focused on nurturing child development through instruction in a set of skills identified as prerequisites for reading.

Reliability: Reliability is an indicator of how consistently a test measures whatever it measures.

Retention status: Retention status is a term used in the study to describe students who are retained at grade level.

Sex of students: Sex of students is a term used in the study to describe male and female gender.

Socio-economic status (SES): Socio-economic status (SES) is a measurement of the family's economic standing based on income, education, and employment of parents.

Student "family data form": A student "family data form" is a term used by Fort Wayne Community Schools Student Services Department to describe the registration form completed by parents of students entering the public school system.

Title I pre-kindergarten programs: Title I pre-k programs are programs funded by federal, state, and local agencies, providing free appropriate public education for children ages four to five years old, living in poverty. Most pre-kindergarten programs provide education for 12 to 15 children in the school setting with a teacher and an assistant.

Title I programs: Title I programs, formerly known as Chapter I programs, provide services according to Title I of the Elementary and Secondary Education Act to improve the educational opportunities for economically disadvantaged children to help them succeed in school.

Total Battery Normal Curve Equivalent (TB NCE): TB NCE is a term used in the study to describe the total battery norm-referenced scores of the ISTEP+, which include English/Language Arts and Mathematics.

University laboratory schools: University laboratory schools are schools associated with colleges or universities to provide quality programs in education to children while college students practice teaching techniques to learn about child development. Data are also collected to further research in the education of children.

Validity: Validity is a term used by researchers to describe how well a test actually measures what it claims to measure.

Wash out: Wash out is a term used by researchers to describe the initial effects found in a study that are not present in a follow-up study.

Summary

Chapter 1 was introduced with the rationale of the study, followed by the background of the study, purpose of the study, statement of the problem, delimitations, limitations, and assumptions. Operational and constituitive definitions used in this study conclude this chapter. The rationale for this study is that early intervention Title I pre-kindergarten programs have an effect on achievement test scores. This study seeks to test whether compensatory preschool can increase performance on achievement tests, namely the Indiana Statewide Testing for Educational Progress (ISTEP+). The background of this study addresses the size of the population of the city of Fort Wayne and provides a description of the student population serviced by Fort Wayne Community Schools. Third

grade students' achievement test results and meal code status were identified. The poverty level of the Fort Wayne area provided eligibility for seven Title I program sites to service children as stated by the grant. The purpose of the study is to determine whether combined factors (program factor and personal attributes) affect ISTEP+ scores. Individual personal attributes are also examined. This study used the ISTEP+ battery scores of third grade students to measure achievement. The results encourage more students to participate in Title I pre-kindergarten programs.

Title I—Amendments to the Elementary Education Act (1965) identified early experiences as an important link necessary for school success and academic achievement in disadvantaged children. During the Virginia Summit, the Educational Goals (Goal One) pointed out that by the year 2000, "all children in America will come to school ready to learn" (Task Force on Education, 1990). Schools and families must understand the urgency to find ways to educate young children living in poverty, narrowing the achievement gap of high-poverty, low-poverty, and no-poverty children, i.e., children identified as "free lunch," "reduced lunch," and "paid lunch."

Chapter 2

REVIEW OF THE LITERATURE

Introduction

This research examines whether personal attributes and the program factor defined as participation in the Title I pre-kindergarten program can predict achievement battery scores of Title I pre-kindergarten students in the Fort Wayne Community Schools system. Conducting this research requires a background knowledge of factors relating to the eligibility for participation in the Title 1 pre-kindergarten programs and an understanding of research related to the effects of poverty on achievement.

The review of the literature will be explained in three parts. The first section introduces early childhood education programs in a historical perspective. Next, "early intervention," socio-economically disadvantaged students, and their cognitive achievements are discussed. The second section also discusses problems relating to cognitive achievement and short-term benefits for economically disadvantaged children. Section three reviews reliability of standardized instruments used in assessing student achievement and the instrument used in this study.

Early Childhood Education Programs Historical Aspects

Two revolutionary events changed the family economy and education for young

children during the last 150 years. First, the need for early education for the average family became apparent during the 1800s as fathers, then mothers, spent much of their day at jobs away from home, causing changes to occur in traditional families (Hernandez, 1995). Job instability, high divorce rates, and an increased number of births out-of-wedlock all factored in the need for changes in child care (Schweinhart & Weikart, 1985). Children under the age of six, who were once reared by a full-time mother, spent the majority of time away from homes in school or in child care (Hernandez, 1995; Schweinhart & Weikart, 1985; Roopnarine & Johnson, 1993). During the past 55 years, the number of young children living in single working-parent homes or dual-families escalated, bringing about a need for alternative care. Second, the Great Depression of 1929 and World War II had a permanent effect on the education of young children. Nursery school education became an important service for all children, not just for wealthy families (Roopnarine & Johnson, 1993).

The rate at which mothers entered the workforce has risen dramatically in the last 59 years (Roopnarine & Johnson, 1993). Hernandez (1995) reported that 87% of children under the age of six were living with an unemployed parent devoted to full-time child care in the year 1940. By 1989, only 48% of children under the age of six were provided care by a full-time unemployed parent. In 1940, seven percent of mothers were employed, rising to a rate of 43% in 1980, and 51% in 1990 (Hernandez, 1995). In the last sixty years, school enrollment, educational attainment, increasing rates of mothers in the workforce, the enactment of compulsory school attendance policies, child labor law, and welfare reform were some of the major factors that increased the need for nonparent child

care (Hernandez, 1995; Schweinhart & Weikart, 1985; Roopnarine & Johnson, 1993; Teale & Sulzby, 1994). Nursery schools were established in the late 1800s in response to the families' need for child care, a development which permanently affected the field of early childhood education (Hernandez, 1995).

Among the first to conceptualize a new school for young children was McMillan (as cited in Puckett & Diffily, 1999), who established a nursery school in Deptford, England to save young children from the unhealthy conditions of the ghettos and the streets. The term "nursery school" was used to describe the healthy climate and growth-enhancing school for infants and toddlers. The type of education for children ranging from the age of three months to five years was to be more than custodial care. It was designed to create healthy minds in a clean environment offering care and nutrition, which was more than the common government-sponsored "day nurseries" could offer families (Puckett & Diffily, 1999).

As the nursery school movement found its way to the United States, scientific interest in the growth and development of children also emerged throughout the world (Puckett & Diffily, 1999). This interest sparked the child study movement, a natural outgrowth of a new psychology in which colleges and universities gathered information on how children grow and learn at different stages in a university "laboratory school setting." These settings provided opportunities to gather data on child development research, provide teacher training, and provide quality care to young children in support of parents.

The Works Projects Administration (WPA) offered to establish nursery schools in 1933 as a viable option to support parents and to stimulate economic growth to improve

the community and society as a whole (Roopnarine & Johnson, 1993). The health and nutrition focus in the nursery school program assisted families in need to combat malnutrition. This focus led to the popularity of WPD nursery schools in the 1940s and 1950s. At the time, nursery schools focused on child care rather than education, which undermined the efforts of the Children's Bureau and the National Education Association to maintain professional standards for training teachers (Stewart, 1990). Limited WPD teacher qualifications (attending a two-week training session as well as the lack of focus on educational issues for nursery school educators) led parents to choose private schools for their children, causing a demise for nursery school programs. As a result, the federal government no longer provided funds for WPD nursery school programs.

In 1943, Congress passed the Lanham Act to bring about new funding for the education of young children during World War II. Families were in need of support for the care of young children while husbands were away from home fighting the war. Unlike most half-day programs, the Lanham centers were open 12 hours a day, six days a week (Roopnarine & Johnson, 1993). Lack of teacher preparation contributed to lower standards in the quality of education. Therefore, universities continued to research issues relating to child care and quality education. One of the issues researched was early childhood curriculum and parent education.

Hall's Child Study Movement (as cited in Puckett & Diffily, 1999), a child-centered psychodynamic model, as well as psychoanalytic ideas about education were beginning to emerge in the early childhood curriculum. Hall gave validity to the study of young children within natural contexts. He trained teachers to use anecdotal records in

their observations. He believed that young children's reasoning was inadequate and felt that the emotional life of the young child was more fundamental than the intellectual. Hall was a well-known advocator of parent education (as cited in Puckett & Diffily, 1999).

Hymes (as cited in Roopnarine & Johnson, 1993) also acknowledged the need to address the emotional health of young children. Hymes discussed the need to counsel children and parents specifically during times of grief and stress, but the attitudes toward education in early childhood were short-lived. By the end of the war, funds for early childhood education were suspended except for the states of California and New York, both successful in lobbying for state funding for programs to maintain service. Women were encouraged to return home and discouraged from pursuing employment outside of the home (as cited in Roopnarine & Johnson, 1993).

The influence of the Child Study Movement, focusing on the motor and social development of the child, and Freud's (as cited in Roopnarine & Johnson, 1993) emphasis on the emotional development of the child led teachers and researchers to use university laboratory schools to study these important issues in the field of early childhood education. Freud's work on the fears and behaviors of an unconscious child brought new meaning to the educational importance and therapy of a child in play. Erikson (as cited in Roopnarine & Johnson, 1993) added to this theory by stating that the idea of play can be used as experimentation and mastery over situations and conflicts. Freud's psychodynamically oriented nursery schools, characterized by a child-centered environment with a high degree of permissiveness, used raw materials such as paint, clay and sand to offer children free expression. Unlike the WPD nursery schools, the

psychodynamically oriented nursery schools placed less emphasis on eating and sleeping routines that were made and gave more attention to the assisting of children in expressing their innermost feelings. The teacher's passivity gave parents the initiative to insist that schools provide educational structures and opportunities to their children (Roopnarine & Johnson, 1993).

During the 1920s and 1930s, the Progressive Movement in education was led by leaders such as Dewey, Temple, Hill, Parker, and Kilpatrick (Roopnarine & Johnson, 1993). They proposed a child-centered curriculum for young children, which changed the views of the nineteenth-century "rote learning" and emphasized skill instruction. Dewey's (1966) views involved a classroom as a miniature community wherein occurred purposeful learning related to the society in which children lived (Wortham, 1998). Children took responsibility for their own learning, and teachers planned for instructional experiences. Dewey's vision became fragmented when teachers, unfamiliar with the implementation of the program, began to lead creative self-expression classroom into chaos and over-permissiveness. By the end of World War II, schools which had utilized Dewey's methods were often viewed as chaotic and in need of traditional educational structures (Roopnarine & Johnson, 1993).

The 1957 launching of Sputnik by the Soviet Union exacerbated the decline of Progressive ideas in the United States and raised concerns about the performance of the nation's children and the performance of World War II enlisted men on achievement tests (Roopnarine & Johnson, 1993; Teale & Sulzby, 1994). Sputnik became a symbol of the nation's decline in skills and a perceived threat to the national security, prompting a quick

return to the basic rigorous academics in schools. The publication of Flesch's 1955 book, Why Johnny Can't Read, only supported the immediate return to phonics and basic skills instruction. Educational practices in skill-based instruction remained on the far side of the educational pendulum until the influence of constructivism.

Beginning in the 1950s, continuing in the 1960s to the present, research in child development and early childhood education were influenced by the works of Piaget (1969) and Vygotsky (1977). Both theorists influenced educational practices in the 1970s and 1980s, emphasizing the value of play in the individual development of young children. Children's own objects, interactions, and activities with peers are the basic elements of the curriculum to be considered as valuable learning experiences in preparation of the environment by the teacher.

The constructivist viewpoint assumes that children mentally construct their own knowledge as an active architect of learning (Kamii, 1985). DeVries and Kohlberg (1987) express the constructivist theory as an idea of "forming the mind, not just furnishing it" (p. 17). Unlike the behaviorist's view of a passive receptor of knowledge acquired through processes of reward and punishment (Kamii, 1985), Piaget (1969) believed that children progress through a period of stages in cognitive development. Vygotsky (1977) added to this theory by emphasizing his belief in the importance of the social context in children's learning. Both theorists recognized the importance of play as a means of developing symbolic abstract thought. Vygotsky added tools of the environment to include skilled peers or adults who assist children in learning new skills for abstract thinking. Moral development also played a role in children's play, emphasizing the understanding of rules

and the roles of society (Roopnarine & Johnson, 1993).

The constructivist program, like Montessori and Dewey, stresses an environment that offers choices in play. Centers, prepared with materials for exploration, are available to children to select as an individual or for group play. The Mitchell's Bank Street model (as cited in Puckett & Diffily, 1999) and the Weikart, Rogers, Adcock and McClelland's (1971) High/Scope curriculum, part of the Head Start program, were examples of the constructivist theory.

The Bank Street approach evolved in the post-World War I era and was devised initially to educate children belonging to families whose value structures were consistent with education. This program provides an environment arranged to include a variety of interest centers where students can pursue special projects and have access to materials for distinct areas of the room, including a reading library, musical instruments and art materials. Classroom rules are well-defined and structured to help children function autonomously. Learning occurs when children become masters of their environment, participate in classroom chores, care for plants and pets, cook, construct materials and use blocks to discern relationships using rudimentary mathematical and scientific concepts (Roopnarine & Johnson, 1993).

Field trips are used to deepen children's understanding of concepts in an active, exploratory way. Language, science, and math are part of the curriculum, emphasizing language and critical thinking and problem-solving skills. The fundamental premise of Bank Street is that children learn by example, and teachers serve as a model to demonstrate critical thinking skills, communication skills and interpersonal relationship

skills. Children's progress is evaluated to plan for instruction, typical for constructivist programs (Roopnarine & Johnson, 1993).

High/Scope, a "high-quality" constructivist model developed in the 1960s, viewed children as active learners who learn best from planning, participating and reflecting on their own experiences. High/Scope provided educational ideas and practices based on the natural development of young children. This language-based model uses two key principles in implementing this model. First, children construct their understanding of the world from their own active involvement with people, materials, and ideas. Second, adults (parents and teachers) can effectively foster children's acquisition of knowledge and understanding of the world by supporting the children's active involvement with people, materials, and ideas. Primary emphasis is placed on problem solving and independent thinking, allowing children to make choices or express intentions about their activities as part of the daily routine. Teachers are required to (1) attend training sessions in order to participate as partners in the learning process of children and to evaluate children's developmental progress by taking anecdotal records and planning the environment to foster individual growth in children; (2) assist and guide children in their development and self-control, responding quickly and directly to the needs and desires, including signs of stress; (3) allow and promote age-appropriate independent behavior and utilize systematic instruction within the context of children's play; and (4) plan activities and experiences to foster developmentally appropriate skills and to meet individual needs of children. The High/Scope model was part of Head Start programs that included parent education components. Most High/Scope programs, like other constructivist programs, do not

include parent education programs (Roopnarine & Johnson, 1993).

The cognitive interactionist "high-quality" program, based on the constructivist theory of Piaget, resembled the traditional nursery school with an emphasis on play and a child-centered curriculum which trained teachers to use questioning strategies to challenge children's thinking and mathematical skills (Roopnarine & Johnson, 1993). Montessori (1912) provided experiences similar to traditional and cognitive programs. Montessori viewed children as active explorers, discoverers, and manipulators of the environment as well as social beings. Learning was thought to occur in an inquiring, cooperative, nurturing atmosphere, where materials were needed to be manipulatable, three-dimensional, concrete and open-ended to assist children in understanding abstract ideas.

The Montessori curriculum, developed for "mentally deficient" students, was designed to imitate the family daily living experiences (Lillard, 1972). Materials selected for the environment are based on their relevance to nature of the children, the growth and development of children, and the impact of the environment and heredity on children. Play, considered as children's work, offers an opportunity for children to organize information and ideas in order to turn natural curiosities into learning patterns.

In the early 1960s, the works of Hunt (1961) and Bloom (1964) brought about debate concerning the intellectual preparedness of American children. Hunt, in his book, Intelligence and Experience, argued that intelligence was not a fixed characteristic; rather, its dependence was greatly influenced by the stimulation that occurred in the early childhood years (Roopnarine & Johnson, 1993). Bloom (1964) concluded that the first five years of a child's life were optimal in promoting intellectual development (Bloom,

1964). These works in psychology, coupled with the civil rights movement and the War on Poverty, led to the creation of the Head Start program (Roopnarine & Johnson, 1993).

The civil rights movement had as one of its goals a return of power to poverty-stricken minority communities (Barnett & Boocock, 1998). Consistent with this goal was limiting the minorities' reliance upon welfare. The Kennedy and Johnson administrations viewed the problems and conditions of poverty as so widespread that they threatened the nation's social and economic well-being. The War on Poverty embodied a basic belief that education would help children break out of the cycle of poverty (Barnett & Boocock, 1998).

In 1965, project Head Start was initiated as an eight-week pilot program for children in over 2,600 communities (Barnett & Boocock, 1998). Unique features of Head Start include its operation in non-traditional public school administrative structures and its multidisciplinary team approach to education (Barnett & Boocock, 1998). Professionals from many disciplines (classroom teachers, speech pathologists, occupational therapists, physical therapists, administrators and the special education teachers) consult with each other to develop plans and strategies to meet individual children's needs. Head Start emphasizes "on-site" parental involvement as a significant factor in child development (Barnett & Boocock, 1998).

Head Start tested several models of early education on a population that was different from laboratory schools and private nurseries. The behaviorist model, represented by the Distar program (Bereiter & Englemann, 1966), emphasized that children who lived in poverty lacked basic skills due to the home and community

environments (Kamii, 1985). The Distar program emphasized skills of standard English, including the recognition of symbols, which were considered to be essential for success in elementary school (Barnett & Boocock, 1998).

The second model, the traditional play-based model of nursery school education funded by Spelman Rockefeller funds, emphasized play as a centerpiece to the curriculum, including field trips and other activities planned around the child's experiences, using natural materials and real objects (Roopnarine & Johnson, 1993). The program emphasized all aspects of a child, including social and emotional development, in addition to the intellectual growth of the child (Roopnarine & Johnson, 1993).

The third model, the cognitive interactionist model, based on the constructivist theory of Piaget (1970), emphasized a prepared environment, rich in opportunities for play (Kamii, 1985). Teachers were trained to use a curriculum that included questioning strategies to challenge children's thinking specifically in introducing logical-mathematical concepts (Roopnarine & Johnson, 1993). A Montessori model was also included in the Head Start program, similar to both the traditional and cognitive interactionist programs, centered on child development (Roopnarine & Johnson, 1993).

The federal government evaluated the models implemented by the Head Start program and found that the behaviorist program had short-range goals that addressed the development of the whole child in less structured programs (White & Buka, 1987). In the 1970s, Zigler (as cited in Roopnarine & Johnson, 1993) led efforts to improve child development education for Head Start by emphasizing the role of play in a child-centered environment. Also, the Westinghouse study (Westinghouse Learning Corporation, Ohio

University, 1969) indicated that the early gains in intelligence scores of Head Start children reported to be completely dissipated by third grade (Roopnarine & Johnson, 1993). Longitudinal data published by the Perry Preschool Project and the Age 19 Study (Schweinhart, Weikart, & Larner, 1986) suggested that Head Start children showed a significant increase in the number of high school graduates and a corresponding increase in the number of students enrolled in post-secondary education programs (Schweinhart et al., 1986). It also showed that significantly fewer students were enrolled in special education courses compared to a control group whose members had not participated in preschool education (Roopnarine & Johnson, 1993). Also, students who had participated in the Head Start program showed lower rates of juvenile arrests, teenage pregnancy, and welfare dependence, and higher rate of employment than the control group (Schweinhart et al., 1986).

The Perry Preschool Project impacted the field of early childhood education and brought about a rapid change in American society (Roopnarine & Johnson, 1993). Children were viewed as competent learners often performing beyond expectations (Elkind, 1986). Funding for programs relating to the elderly were soon overshadowed by the concerns for young children (Roopnarine & Johnson, 1993). One of the major social changes in America was the increase in the number of working women, a factor that influenced a growing need for child care. The number of single-parent families doubled during the decade of 1970-1980 (Hymes, 1991; Washington & Oyemade, 1985). Single-parent families, dependent upon women as financial providers for families, constituted over half of all families living below the poverty level in the United States (Hymes, 1991;

Washington & Oyemade, 1985).

In the 1970s, child care became a major political issue (Roopnarine & Johnson, 1993). Efforts were made to pass child-care legislation, which were vetoed by President Nixon and conservative groups. The 1970s and 1980s brought about private enterprise in early education, as did an increased number of family day-care homes. The income and status of teachers in a child-care setting continued to decline, following the pattern started by the Work Projects Administration (WPA) nurseries, Lanham centers, and Head Start (Roopnarine & Johnson, 1993). The 1980s captured media attention as child care became a major part of the rhetoric for the candidates during the 1988 presidential election (Roopnarine & Johnson, 1993). Funding debates focused on the effects of quality care and teacher education on the welfare of children in care outside of the home (Hymes, 1991; Washington & Oyemade, 1985). During the late 1980s, the Child Care Employee Project (1989) released the results of a study conducted in 227 child-care centers across the country, documenting exceptionally low wages for teachers, nearly all women (Child Care Employee Project, 1989). The wages were lower in relation to comparably educated women and considerably lower than educated men (Hymes, 1991; Washington & Oyemade, 1985). In addition, the Child Care Employee Project (1989) examined the effects of low-quality care of young children, finding that low-quality programs produce high employee turnover rates, and student performance lagged behind children who attended high-quality programs (Child Care Employee Project, 1989).

Efforts to professionalize the field of early childhood education and to raise standards of teacher preparation continued throughout the 1980s and 1990s (Roopnarine

& Johnson, 1993). The Child Development Associate Program (CDA), begun in 1973, continues in spite of meager funding (Roopnarine & Johnson, 1993). The National Association for the Education of Young Children (NAEYC) published position statements regarding teacher preparedness and curriculum assessment guidelines in an effort to improve the quality of care for young children (Bredekamp & Copple, 1997). Also, NAEYC has created a National Academy for Early Childhood accreditation, a self-study process for early childhood education programs to evaluate the appropriateness of the curriculum for young children (Bredekamp & Copple, 1997). This accreditation process is designed to improve the quality of early childhood programs that service children from infants to primary grades (Bredekamp & Copple, 1997). By 1991, over 1,797 programs had been accredited throughout the United States (Bredekamp & Copple, 1997).

In the 1990s, other professional organizations, such as the Association for Childhood Education International (ACEI), the International Kindergarten Union, and others, continued their efforts to advocate children's rights and provide professional colleagueship to teachers of young children. Also, organizations formerly dedicated to elementary education such as the Association for Supervision and Curriculum (ASCD) and the National Association of Elementary School Principals (NAESP) have joined forces with early childhood advocates to express concern over the "academic pushdown" of the curriculum (Blank, 1985; Morgan, 1985; Mitchell & Modigliani, 1989). Academic pushdown refers to curriculum and instruction that is appropriate for older children being taught in kindergarten and pre-kindergarten classrooms. Elkind's books, entitled The Hurried Child (Elkind, 1981) and Miseducation (Elkind, 1987), caution educators to

refrain from using a structured curriculum (Bredekamp & Copple, 1997).

A 1986 survey in California (Smith, 1986) revealed that nearly two-thirds of kindergarten teachers listed an overemphasis on academic skills as a major concern (Roopnarine & Johnson, 1993). Position statements were used by early childhood organizations to combat this trend. The NAEYC (Bredekamp, 1987), the Association for Childhood Education International (1986), the National Association of State Boards of Education (1988), the National Black Child Development Institute (1987), and the National Association of Early Childhood Specialists in the State Departments of Education (1987) are among those who have published statements concerning an overemphasis on skills in early education (Hymes, 1991).

In summary, in spite of the influx of information in curriculum methods and materials brought into early education programs from federal funds and research, differences in philosophy and methodology continue to exist among programs for children under the age of six (Wortham, 1998). Such differences impact how problems are addressed in public school education. Poverty's effect upon the education of young children can no longer be ignored. Changing demographics in the family economy have brought about new issues for early childhood education and have introduced an increasing need for early childhood education in the public school. Children living in families of poverty need more than child care; they are considered at-risk of school failure (Garber, 1988). Early childhood program research in the development of young children is an integral part of the funding of early intervention programs and addresses the special learning needs of children who are at-risk of school failure.

Early Intervention and Socio-Economically Disadvantaged Students

Nearly one-fourth of America's children currently live in poverty, and the numbers are increasing (Eggebean & Lichter, 1991). According to the official measure of poverty, more than 20% of the nation's 67 million children are poor (Betson & Michael, 1997). Poverty among American children has been on the rise, reversing a downward trend that occurred in the 1950s to the 1970s. In 1985, 20% of all children lived in families with incomes below the official poverty level; 41% of all African American children and 37% of all Hispanic children lived in poverty (U.S. Department of Education, 1994).

By 1988, the rate dropped to 19.2 % for all children; among children under the age of 3, it was 23% (Children's Defense Fund, 1995). In more recent years, children are experiencing higher rates of poverty than are adults or the elderly adult population (Smeeding, 1988). In 1992, the poverty rate among children was 21.9%, much higher than the 14.4% among adults (Betson & Michael, 1997). The rate of poverty for children is almost double that of adults because children living with adults rely upon the adults for economic well-being. Children are poor because they live with adults who are poor.

Poverty is more prevalent in the United States than for those in other industrialized nations. This is almost an incomprehensible fact in a country filled with tremendous resources and opportunities. African American, Hispanic, and other minority children are at a greater risk for growing up poor. In 1990, almost 50% of African American children were living in homes in which the current income was below the federal poverty line of 1989 (Ramey & Ramey, 1990). Thirteen million children lack minimal resources essential to support normal growth and development.

Tragically, the condition of poverty is chronic and emerges as intergenerational. According to Landesman and Ramey (1989), there are four patterns that contribute to the widespread intergenerational dysfunctions: (1) delay in young children's developmental achievements, especially in their language, their independent reasoning abilities, and the quality of their social interactions with peers and teachers; (2) lowered aspirations and increased apathy among family members, sometimes accompanied by increased hostility toward the mainstream society that has excluded them from equal opportunities; (3) failure and ultimate withdrawal of many capable children from schooling and vocational education; and (4) extremely limited entry of adolescents and young adults into stable competitive employment and into sociopolitical groups that influence policy and the distribution of resources within the mainstream of society (Landesman & Ramey, 1989). Despite the trends toward improving these indicators, the reality is that intergenerational dysfunction is the leading cause of suboptimal development in children (Landesman & Ramey, 1989).

Children living in economically disadvantaged homes experience social, cognitive, physical and emotional deficits. These deficits are often related to the lack of health care in families who are poor. A child who experiences an environment that does not adequately provide for his physical and emotional needs is less able to overcome health problems, leading to a negative influence in his growth and development. Poverty is synonymous with poor nutrition, poor health care, poor self-esteem, and poor educational opportunities (Ramey & Ramey, 1990). Duncan and Brooks-Gunn (1997) state that children living in poverty suffer higher incidences of adverse health, development, and

other outcomes than other children including the following five specific dimensions: (1) physical health (low birth weight, growth stunting, and lead poisoning), (2) cognitive ability (intelligence, verbal ability, and achievement test scores), (3) school achievement (years of schooling, high school completion), (4) emotional and behavioral outcomes, and (5) teenage out-of-wedlock childbearing. The 1988 National Health Interview Survey conducted by parents reported that children who are poor were only two-thirds as likely to be in excellent health and almost twice as likely to be in fair or poor health as children who are not poor. Low birth weight (2,500 grams or less) is also associated with poor health and poor children. Serious physical disabilities, grade repetition, and learning disabilities are more prevalent among children who were low birth weight infants, as are lower levels of intelligence and of math and reading achievement (Duncan & Brooks-Gunn, 1997, pp. 57-59).

Klerman (1991) stated that children living in poverty are at risk of illness and dying from a wide range of causes. Infant mortality due to short gestation periods, low birth weight, and sudden infant death syndrome are higher risk factors in poor children than in other children. These problems become related to low maternal weight gain, obstetrical complications, infections, smoking, drugs, and the lack of prenatal care. Higher rates of congenital anomalies are also more prevalent in children who are poor than in other children.

Additionally, indigent children have a relatively high rate of infectious diseases, chronic conditions, and injuries from accidents and child abuse (Huston, 1991). These health problems are related to the environmental living conditions of poverty, particularly

persistent poverty. Families living in poverty lack money to obtain goods and services needed to avoid infections, accidents and injuries, leaving families to feel a loss of control over their lives. This lack of control to care for basic needs of health causes many families to lead unhealthy lifestyles due to low levels of self-esteem. Smoking, alcohol use, drug abuse, and lack of safety precautions such as smoke detectors and seat belts are common factors leading to unhealthy lifestyles. The lack of personal health care was caused by many factors relating to indigence. High costs, lack of transportation, limited language and literacy skills and limited hours of operation for health care centers become barriers for the accessibility for families (Huston, 1991).

Health problems of children living in poverty have long-range effects on the cognitive, social and emotional development of young children. Children living in stressful environments, particularly those in chronic poverty conditions, can be at risk for developmental delay due to common or easily treated problems of childhood that are left untreated, creating barriers in the important developmental steps in the growth process. Left untreated, otitis media, which is common in young children, can lead to permanent hearing loss and delayed language development. Measles and other childhood diseases, without immunizations, can produce permanent damage to sensory organs and neurological functioning (Huston, 1991).

Abuse and neglect of children is greater in families living in poverty (Huston, 1991). Injuries attributing to abuse are more likely to be serious or fatal in poor children. Also, the amount of physical, educational, and emotional neglect of children is greater in homes of low incomes (National Center on Child Abuse and Neglect, 1988). According

to Harrington (1971), homes without fathers, early pregnancies, and fewer marriages are consequences that millions of children in poverty face. These children may never know stability and normal affection (Payne, 1998).

The National Longitudinal Survey of Youth (NLSY) showed that differentials in height for age between poor and nonpoor children are larger for families in poverty than for families who are not experiencing chronic poverty conditions (using long-term rather than short-term data) (Miller & Korenman, 1994). Harmful effects of lead exposure is also related to poverty. According to the Department of Health and Human Services, lead exposure during early years is linked to stunted growth, hearing loss, vitamin D metabolism damage, impaired blood production and toxic effects on the kidneys in children (Duncan & Brooks-Gunn, 1997).

The Panal Study of Income Dynamics (PSID), the NLSY, and the Children of the NLSY research data found that poverty status impacts high school graduation and years of school attainment. The observed relationship between income and schooling appears to be related to a number of factors such as parental education, family structure, and neighborhood characteristics (Haveman & Wolfe, 1995). A recent study attempted to evaluate how the timing of income might affect school attainment. The study found that family income averaged from birth to age 5 had a much more powerful effect on the number of school years a child completes than family income measured either between ages 5 and 10 or between ages 11 and 15 (Duncan, Yeung, Brooks-Gunn, & Smith, 1994). A $10,000 increase in mean family income between birth and age 5 was associated with nearly a full-year increase in completed schooling (Duncan & Brooks-Gunn, 1997,

p. 62). Small increments to family income later in childhood had no significant impact, suggesting that income may be only an important determinant of completed schooling during the early childhood years (Duncan & Brooks-Gunn, 1997).

Children living in poverty suffer from more frequent emotional and behavioral problems than children who are not living in poverty (Table 1.1). Emotional outcomes are often grouped by external behaviors (aggression, fighting, and acting out) or internal behaviors (anxiety, social withdrawal, and depression). One study (Duncan & Brooks-Gunn, 1997) used NLSY data and found that for four- to eight-year-olds, living in chronic poverty was positively related to the presence of internalizing symptoms (dependence, anxiety, and unhappiness) even after controlling for current poverty status, mother's age, education, and marital status. In contrast, current poverty (not chronic) was associated with more externalizing problems (hyperactivity, peer conflict, and stubborn behavior) (Duncan & Brooks-Gunn, 1997). The study also found that children experiencing only a year of poverty had more behavioral problems than children who had lived in long-term poverty (Miller & Korenman, 1994). The effects of poverty on social outcomes are not as large as its effect on cognitive achievement. A recent study using PSID data indicated that the duration and timing of poverty had no effect on the probability of teen out-of-wedlock birth. These findings are somewhat different for cognitive outcomes and school achievement (Duncan & Brooks-Gunn, 1997).

The timing of poverty is important in the life of a young child. Low income during the preschool and early school years exhibits a stronger correlation with low rate of high school completion as compared with low income during the childhood and adolescent

Table 1.1

Selected Population-Based Indicators of Well-Being for Poor and Nonpoor Children in the United States

Indicator	Percentage of Poor Children (unless noted)	Percentage of Nonpoor Children (unless noted)	Ratio of Poor to Nonpoor Children
Physical Health Outcomes (for children between 0 and 17 years unless noted)			
Reported to be in excellent health	37.4	55.2	0.7
Reported to be in fair to poor health	11.7	6.5	1.8
Experienced an accident, poisoning, or injury in the past year that required medical attention	11.8	14.7	0.8
Chronic asthma	4.4	4.3	1.0
Low birth weight (less than 2,500 grams)	1.0	0.6	1.7
Lead poisoning (blood lead levels 10μ/dL or greater)	16.3	4.7	3.5
Infant mortality	1.4 deaths per 100 live births	0.8 deaths per 100 live births	1.7
Deaths during childhood (0 to 14 years)	1.2	0.8	1.5
Stunting (being in the fifth percentile for height for age for 2 to 17 years)	10.0	5.0	2.0
Number of days spent in bed in past year	5.3	3.8	1.4
Number of short-stay hospital episodes in past year per 1,000 children	81.3	41.2	2.0
Cognitive Outcomes			
Developmental delay (includes both limited and long-term developmental deficits) (0 to 17 years)	5.0	3.8	1.3
Learning disability (defined as having exceptional difficulty in learning to read, write, and do arithmetic) (3 to 17 years)	8.3	6.1	1.4

Table 1.1 (continued)

Indicator	Percentage of Poor Children (unless noted)	Percentage of Nonpoor Children (unless noted)	Ratio of Poor to Nonpoor Children
School Achievement Outcomes (5 to 17 years)			
Grade repetition (reported to have ever repeated a grade)	28.8	14.1	2.0
Ever expelled or suspended	11.9	6.1	2.0
High school dropout (percentage 16- to 24-year-olds who were not in school or did not finish high school in 1994)	21.0	9.6	2.2
Emotional or Behavioral Outcomes (3 to 17 years unless noted)			
Parent reports child has ever had an emotional or behavioral problem that lasted three months or more	16.4	12.7	1.3
Parent reports child ever being treated for an emotional problem or behavioral problem	2.5	4.5	0.6
Parent reports child has experienced one or more of a list of typical child behavioral problems in the last three months (5 to 17 years)	57.4	57.3	1.0
Other			
Female teens who had an out-of-wedlock birth	11.0	3.6	3.1
Economically inactive at age 24 (not employed or in school)	15.9	8.3	1.9
Experienced hunger (food insufficiency) at least once in past year	15.9	1.6	9.9
Reported cases of child abuse and neglect	5.4	0.8	6.8
Violent crimes (experienced by poor families and nonpoor families)	5.4	2.6	2.1

Table 1.1 (continued)

Indicator	Percentage of Poor Children (unless noted)	Percentage of Nonpoor Children (unless noted)	Ratio of Poor to Nonpoor Children
Other (continued)			
Afraid to go out (percentage of family heads in poor and nonpoor families who report they are afraid to go out in their neighborhood)	19.5	8.7	2.2

Source: Brooks-Gunn, J., & Duncan, G. (1977, Summer/Fall). The effects of poverty on children. The Future of Children, 7(2), 59-60.

years. These findings suggest that early childhood interventions may be critical in reducing the impact of low income on children's lives (Duncan & Brooks-Gunn, 1997, p. 68). Children from poor and ethnic minority families do worse on tests and examinations than do rich or middle-class children (Connell, 1994). In the United States, the performance of low-income children on standardized tests is considered to be average at infancy and declines gradually during the early and middle childhood years (Burchinal, Campbell, Bryant, Wasik, & Ramey, 1997). Many such children are considered to be performing at low-normal or borderline range at kindergarten age (Ramey & Campbell, 1991). Children at-risk are likely to experience adjustment problems in a typical classroom, poor motivation, and poor self-expectations resulting in continued poor achievement and delinquency, and many of these students drop out (McLoyd, 1990).

Researchers debate issues relating to achievement and the extent to which

intelligence tests accurately reflect children's abilities. Many psychologists view intelligence tests as instruments that assess important skills. The American Psychological Association (APA) appointed a task force to complete a comprehensive review of the literature on intelligence, noting that cognitive test scores adequately predict school achievement and that schooling is a variable that clearly affects cognitive performance (Neisser et al., 1996). The task force also found that attending educational intervention programs or quality schools is consistently linked to better cognitive performance (Burchinal et al., 1997). Parents' cognitive performance is another variable clearly having an impact on their children's cognitive performance, indicating the inheritability of cognitive skills as shown in numerous studies (Neisser et al., 1996). Child factors and the role of other family influences were less demonstrated in test scores (Burchinal et al., 1997). However, the task force did find that intelligence is the joint product of genetic and environmental influences, urging that further research be conducted to identify which environmental factors influence cognitive performance over time (Neisser et al., 1996).

Huston, McLoyd, and Garcia-Coll (1994) argue that development is a process in which the child changes in response to interactions in the environment itself. Locke (as cited in Black & Puckett, 1996), one of the first people advocating the humane treatment of young children, suggested that the environmental experience of a child influences the development of the child, describing a newborn's mind as a blank slate in which knowledge is written based on the child's sensory experiences in his environment (Black & Puckett, 1996). Vygotsky (1978) believed that cognitive development occurs through interactions that a child has with more capable members of the culture, such as adult and

more able peers. The interactions in a child's social context are essential to cognitive growth. Dewey (1910) also emphasized the influences of a child's experiences with conceptual learning.

Hunt (1961) states, "impoverishments of experience during the early months can slow up the development of intelligence ... it may result not only in permanently reduced IQ but in a failure of the basic criterion capacities of individuals to develop to the degree that they might have developed under another ... appropriately matched to the intellectual structures developing within the child" (p. 346). Universal free education, beginning in kindergarten, has been the nation's cornerstone to help establish equality of educational opportunity. While there is increasing evidence that a child's early years of development are vital in determining his subsequent educational opportunities, the nation now considers education in the preschool years as enhancing the well-being and future contributions of children whose lives are handicapped by environmental poverty (Ramey & Ramey, 1990).

Research in the mid-1960s addressed the issue of preschool compensatory education and early intervention for poverty-level children. Summaries of this research (i.e., Garber, 1988; Lazar, Darlington, Murray, Royce, & Snipper, 1982; Barnett & Boocock, 1998; Schorr, 1988; Zigler, 1987a) are remarkably encouraging and specific: systematic and targeted educational interventions significantly improve the intellectual development of children who live in poverty (Ramey & Ramey, 1990, p. 4).

There were two important qualifications in the research findings. First, scientific evidence indicates that positive results are not likely to be obtained when educational programs are of lesser intensity and shorter duration than the high-quality model described

by a child-centered, developmentally appropriate program (Phillips, McCartney, & Scarr, 1987; Zaslow, 1991; Barnett & Boocock, 1998; Bredekamp & Copple, 1997). In a review of the preschool compensatory education literature, Ramey and others (as cited in Barnett & Boocock, 1998) concluded that there was a preponderance of evidence (Ramey & Ramey, 1990; White & Casto, 1985; Barnett & Boocock, 1998) suggesting that programs are of high quality and are likely to have a direct and positive relationship to the degree of intellectual benefit derived by children participating in such programs. Second, early educational interventions, delivered with other needed services (related to health, housing, social services, and parental support) and later followed by supplemental educational supports to children after they enter elementary school, produce the strongest and most lasting benefits (St. Pierre, Swartz, Murray, Deck, & Nickel, 1993; Roberts et al., 1989). The data do not just support the assumption that weak programs produce weak benefits. Weak programs do not produce any benefits (Ramey & Ramey, 1990).

There are six useful guidelines provided by research (Garber, 1988; Lazar et al., 1982; Barnett & Boocock, 1998; Schorr, 1988; Zigler, 1987b) for implementing effective intervention programs. First, a variety of educational curricula has been shown to be effective with disadvantaged children (Roberts et al., 1989; Wasik, Ramey, Bryant, & Sparling, 1990). Communities may use a particular program to meet their perceived needs. Second, it is beneficial to offer intensive educational intervention programs to three- and four-year-olds, even when infant programs are not provided (Burchinal, Lee, & Ramey, 1989). Third, intensive educational intervention can actually prevent some forms of mental retardation (Berrueta-Clement et al., 1984). Fourth, children who participate in

intensive educational programs within the first five years of life are less likely to fail a grade in school or be placed in a special education program (White & Casto, 1985; Barnett & Boocock, 1998; Holloway & Reichart-Erickson, 1988; Charlesworth, Hart, Burts, & DeWolf, 1993; Hyson, Hirsh-Pasek, & Rescorla, 1990). Fifth, programs with structured educational curricula (adapted to children's developmental level and sensitive to other perceived needs) lead to better cognitive outcomes than unstructured programs (good quality daycare) (Van de Reit & Resnick, 1973). Sixth, intensive educational intervention is cost-effective and can return at least a threefold benefit for every dollar invested (Berrueta-Clement et al., 1984). These economic benefits are attributed to a reduction in the need for special education, a reduction in delinquency rate, and a reduction in the frequency of other costly social pathologies (Berrueta-Clement et al., 1984) (Table 1.2).

Intensive scientifically guided educational interventions, from infancy on, can have both immediate and lasting benefits to disadvantaged children and society as a whole. Business leaders have drawn explicit connections between high-quality preschool education and a well-prepared workforce. As global competition in the marketplace intensifies, the United States can ill-afford to sustain a substantial segment of the adult population as being socially or economically unproductive (Boyer, 1985). Intensive educational intervention has been proposed as an important vehicle for social equity to expand the opportunities and benefits for children experiencing intergenerational poverty. Programs such as Head Start were ultimately tied to the new emphasis on doing something about environmental factors early in the child's life so the development in an

Table 1.2

Present Value of Costs and Benefits Per Child Discounted at 3 Percent

Cost or Benefit[a]	Recipients of Costs and Benefits		
	Whole Society	Preschool Participants	General Public
Measured Benefits			
Child Care	738	728	0
K-12 education	6,872	0	6,872
Adult education	283	0	283
College[b]	-868	0	-868
Earnings[b]	14,498	10,270	4,229
Crime	49,044	0	49,044
Welfare	219	2,193	2,412
Benefit subtotal	70,786	8,815	61,972
Projected Benefits			
Earnings	15,833	11,215	4,618
Crime	21,337	0	21,337
Welfare	46	-460	506
Projected Subtotal	37,216	10,755	26,461
Total Benefits	108,002	19,511	88,433
Preschool Cost	-$12,356	0	-$12,356
Net Benefits	$95,646	$19,511	$76,077

[a] Cost and disbenefits appear as negative numbers.

[b] Some small portion of college costs are likely to have been borne by the participants, but these could not be estimated from the available information.

[c] The benefits reported under earnings include all costs paid by the employer to hire a participant. Allocation between participants and taxpayers assumes a 25% marginal tax rate, that the value of fringe benefits to the employee equals 10% of salary, and that other costs to the employer equal 10% of salary.

Source: Barnett, W. (1996). Lives in the balance: Benefit-cost analysis of the High/Scope Perry Preschool program through age twenty-seven. Monographs of the High/Scope Educational Research Foundation. Ypsilanti, MI: High/Scope Press.

area like reading could be facilitated (Teale & Sulzby, 1994).

The need for early intervention with young children has become a public issue in the past 20 years. Educators and legislators have worked together to devote a considerable amount of financial and human resources to the early intervention with young children. Funds are also available to provide supplemental services early in children's schooling, intensive enough to quickly bring at-risk children to a level in which they can profit from high-quality instruction (Madden et al., 1991). The United States government, instrumental in this process, provided funding for the research, development and maintenance of early intervention programs, and mandating free public intervention in all states for all children with disabling conditions between the ages of 3 and 18, regardless of socio-economic, cultural, or disabling condition (Public Law 94-142).

United States government agencies are actively promoting early childhood programs. According to Knight (1991), the Federal government allows funds for the following incentives: Tax Credit of Dependent Care, Child Care Insurance Credit, Omnibus Budget Reconciliation Bill (child-care provisions), Head Start, Even Start, Early Education Lobby, and the National Test For Three-Year-Olds to assist low-income families in providing early childhood care for young children.

First, Tax Credit of Dependent Care allows parent to deduct from their gross income a portion of child-care expenses on their federal returns (a total of $3.895 billion in 1990). This program allows parents to choose any kind of child care, including religious affiliated facilities, except for in-home care (Knight, 1991).

Second, the Child Health Insurance Credit assists families in buying health

insurance for children (a $5.2 billion program). In 1994, the maximum credit allowed was $483 per family. "Wee Tots" Supplemental Tax Credit provides families with a child under one year a supplemental credit ($403 in 1994) or allows them to choose the Dependent Tax Credit (a $700 million program). Options for Dependent Care Tax Credit are (a) The Earned Income Tax Credit: projected to reduce federal tax revenues by $12.4 billion over five years, giving a small measure of tax relief to poor families with children ($953); (b) Child Care and Development Block Grant: estimated sum of $4.45 billion over five years, giving money to states based on the number of low-income children in the state under five; some 75% of the money can be used for services to children and the other 25% targeted for early childhood, day care for latch-key children; (c) Title IV Family Support Ways and Mean Grant: allocated $1.5 billion over five years, giving money to poor working families to keep parents off the welfare system; and (d) Standards and Training Ways and Means Grant: estimated cost of $250 million, to help states to improve standards for child care, monitor compliance, and provide training for child-care providers (Knight, 1991).

Third, Head Start, which began in 1960, is the largest federally funded early childhood developmental program providing children ages three to five years old from low-income families with educational, social, medical, dental, nutritional, and mental health services. During the 1990 school year, more than 488,000 children were enrolled at an estimated average cost of $2,767 per child. Fourth, Even Start is a program that provides $60 million in the 1992 federal budget to assist eligible local educational agencies in "providing family-centered education projects to help parents become full partners in the education of young children, to assist children in reaching their full potential as

learners, and to provide literacy training for their parents" (Federal Register, Vol. 56, No. 23, Feb. 4, 1991). Fifth, Early Education Lobby is a campaign to increase the federal support for early childhood development programs. One of these efforts is "Excellence in Early Childhood Education: Defining Characteristics and Next-Decade Strategies" (Kagan, 1990). Support was garnered for other early childhood organizations such as Child Care Action Network, Children's Defense Fund and the National Association for the Education of Young Children. Finally, National Test for Three-Year-Olds: Special Study Panel on Education Indicators, mandated by the Hawkins-Stafford Elementary Secondary School Improvement Act of 1988, explores ways to test children as young as three to determine the "skills and attitudes of the school-entering population." This is a first step in the formation of compulsory schooling for young children (Federal Policies on American Culture, 1991, pp. 2-13).

In 1995, recognizing a need for quality care in lower income children, states expanded their role in early care and education to envision a "Quality 2000." This plan included licensing and regulation, a professional training system, and standard subsidies in subsidized programs, building and maintenance of facilities, linkages with public schools and other services, financing, and an evaluation of all the needs necessary to produce a family-friendly, accessible system for all children who need it. Care for school-aged children has also become increasingly important as parents work long or unusual hours and still want to maintain a productive engagement with the child. Grants became available to ensure that child-care sites were used for quality improvements including the appropriate training of staff.

In 1998, the trend to increase the quality of child care continued as the government provided the following grants for the improvement of the child-care system:

(1) Care for Children, Inc. (formerly Save the Children) provides $37,000 for a cost-effective delivery of high-quality child care for low income neighborhoods.

(2) Center for Law and Social Policy (CLASP) provides $25,000 in support toward activities designed to educate policymaker, advocates and nonprofit organizations for the enhancing of child-care support to families receiving assistance under the Temporary Assistance for Needy Families Block grant for low-income families.

(3) Child Care Group (RC3) provides $35,000 for the education of young children in "mixed-age family groups" within child-care centers. Children's Defense Fund provides $25,000 to support initiatives dedicated to building high-quality early care and an education system in connection with organizations to help distribute diverse materials to federal and state policymakers.

(4) Food Research and Action Center provides $40,000 to support children and adults in child-care centers with critical nutritional support.

(5) National Association for the Education and Care of Young Children (NAEYC) provided $50,000 to test the initial field test of NAEYC's accreditation system. This accreditation has proved to be an effective tool for improving child-care quality. Many states now subsidize child care in accredited centers.

(6) National Black Child Development Institute, Inc. (NBCDI) provides $50,000 to increase the number and effectiveness of African American leaders in the field of

early care and education.

(7) National Center for Children in Poverty provides $40,000 to support research and outline an agenda to strengthen care provided by caregivers and suggest strategies to help poor children.

(8) National Council of La Raza provides $35,000 to address the under-representation of Hispanic-American children and families in publicly-funded early education programs, particularly Head Start.

(9) National Governors' Association: Center for Best Practices provides $35,000 to support the development of a resource notebook to inform governors and their staff about "brain research."

(10) National Women's Law Center Child Care Project provides $25,000 to improve the affordability, availability, and quality of child care while articulating the dual interest that women have as consumers and providers.

(11) Weelock College Sowing the Seeds of Head Start and Child Care Professional Development Partnerships provides $41,500 to improve the quality of early care and education services for children by establishing a career development system for practitioners.

(12) Yale University, The Bush Center in Child Development and Social Policy Financing Universal Early Care and Education for American Children provides $75,000 to develop a computer model that will enable states to explore various way in which a system of high-quality child care for all young children could be financed.

(13) Zero to Three Research to Practice provides $50,000 to support research that addresses the informational needs of parents and other caregivers. (A. L. Mailman Family Foundation, July 31, 1999, pp. 1-18)

In summary, if preschool intervention, Head Start, Title I, child care and other programs are to benefit children, then steps need to be taken to ensure the quality of early childhood programs. State and policy makers have established regulatory standards defining the legal expectations of the type of care that can be provided. Funding is also available for curriculum development and staff training. Research can serve policy and practice by identifying the areas in which new approaches are needed, guiding the development of these approaches, and assessing the impacts of innovations in practice (Barnett & Boocock, 1998). Research can be instrumental in identifying ways a high-quality curriculum can support effective teaching strategies. It can examine the continuities and discontinuities of child development across the contexts of the home, the classroom and the child-care environment, while assessing for the impact of teacher training on child growth.

Federal funding for early childhood programs is at an all-time high. The combined efforts are needed by policy makers, practitioners, and researchers to support the continued progress that will extend the benefits of high-quality early childhood programs to all children who need them (Barnett & Boocock, 1998).

Short-Term and Long-Term Benefits Findings

The contributions of early care to the cognitive development and school success of

economically disadvantaged children is a vital public issue. Hundreds of studies examining the short-term and long-term benefits of early care on the cognitive development of children have been performed. Initially, the research on child care focused on the effects of the mother-child relationship on social development and focused less attention on the possible effects of cognitive development. Presently, research examines early care and its effects on cognitive development relating to the quality of care and the interaction of the child's home environment and family involvement with school (Barnett & Boocock, 1998). Research in child care (Lamb & Sternberg, 1990; Zaslow, 1991) presents no consistent evidence that child care is harmful to child development regardless of the age at which the child begins to attend out-of-home child care (Barnett & Boocock, 1998).

Short-Term Benefits

Research (Berrueta-Clement et al., 1984; Lazar et al., 1982) examined the effects of early education on all children and then examined the effects of early education intervention on economically disadvantaged children. Variations in the quality of care appear to determine the impact of care. High-quality care has been associated with better cognitive results (Phillips et al., 1987; Zaslow, 1991; Barnett & Boocock, 1998). A child-care study (Early Child Care Research Network, 1996) found evidence that the frequency of insecure attachment increased by poor-quality child care, an instability of child-care arrangements, and an increase in the amount of hours the child was in child care, but only when the child's mother was rated as "insensitive" in her interactions to the child (Barnett & Boocock, 1998, p. 13).

Another investigation (Caughy, DiPietro, & Stobino, 1994) found that the age at entry or years of experience and type of care (child's own home, other home, or center) during the preschool years influenced the reading and math achievement of children at ages five and six (Barnett & Boocock, 1998). Effects were positive for children from impoverished homes. The children with earlier entry/more years in child care produced a larger effect on reading scores, and center-based care had a larger effect on math scores (Caughy et al., 1994). Conversely, children from highest income families had negative effects (Barnett & Boocock, 1998). The quality of home environment, rather than the income of the family, appears to be the difference in the interactions between the child and the effect of the scores (Caughy et al., 1994). The children whose home environments were relatively poor (as measured by Caldwell's HOME scale) produced higher cognitive gains, while the home environments that were highly supportive of cognitive development and socialization had lower scores, if the child had been in other care than the home (Caughy et al., 1994). However, two other studies (Baydar & Brooks-Gunn, 1991; Desai, Chase-Lansdale, & Michael, 1989) failed to find positive effects of ordinary child care on IQ scores (Barnett & Boocock, 1998).

Efforts in research (Bredekamp, 1987; Bredekamp & Rosegrant, 1995) to identify or describe a measure of quality in care have been made by professional organizations, e.g., the National Association for the Education of Young Children (NAEYC), as defined in the Guidelines for Developmentally Appropriate Practice (Bredekamp & Copple, 1997). These guidelines form the criteria for a nationwide accreditation system for programs that serve young children in a classroom setting (Barnett & Boocock, 1998). The criteria

developed for the accreditation process were used in studies on children in programs in kindergarten, preschool and child-care settings to determine the effect of developmentally appropriate practice (DAP) on young children (Charlesworth et al., 1993).

Research (Holloway & Reichart-Erickson, 1988; Charlesworth et al., 1993; Hyson et al., 1990) using different groups of children across many classroom settings indicates that developmentally appropriate programs promote better child-development outcomes (Barnett & Boocock, 1998). One set of studies (Charlesworth et al., 1993) on young children found an interaction between children of low socio-economic status (SES) and the developmental appropriateness of kindergarten. Children of low SES and African American backgrounds placed inappropriately in kindergartens experience more stress and scored lower on achievement tests than did their counterparts in DAP programs (Barnett & Boocock, 1998). Holloway and Reichart-Erickson (1988) found children who attended developmentally appropriate programs performed slightly better on achievement tests and had more positive interactions among children in child-care classrooms than did other children. Researchers also found that low-income parents have fewer choices regarding the type of care for their children. For middle-class parents, there was a relationship between parental beliefs and practices and the type of center their child attended. Children from low-income families who attended developmentally appropriate programs were more likely to achieve academically and socially in elementary school (Barnett & Boocock, 1998).

Research on interventions for disadvantaged children has emphasized the potential for positive effects on cognitive development, using both intelligence testing (IQ) and

standardized achievement tests. Intelligence testing is used to measure gains in the child's potential to perform in the classroom, and the achievement tests measured actual classroom performance. The quality of child care appears to be the important determinant in the impact of child care, though the quality varies from child and family characteristics (Lamb & Sternberg, 1990; Zaslow, 1991). Intervention research (White & Casto, 1985; Barnett & Boocock, 1998) reports that programs designed for disadvantaged children, including public programs, can produce an immediate effect in IQ and in achievement scores (0.5 standard deviations in achievement scores, equivalent to about 8 IQ points) (Barnett & Boocock, 1998). Socioemotional outcomes such as self-esteem, academic motivation, and social behavior were less prominent in affecting IQ (White & Casto, 1985; Barnett & Boocock, 1998). Research (as cited in Barnett & Boocock, 1998) found some programs to produce sizable gains for IQ, such as achievement, grade retention, and special education placement persisting into the school years.

One difficulty noted (Barnett & Boocock, 1998) in interpreting the results of research data is that most studies relied on natural variation in participation in early childhood education, making it difficult to separate the effects of early education enrollment decisions (e.g., parents' income, socio-economic status, education and attitudes toward education and child rearing). Experiments in which children are randomly assigned to specific designated programs are valuable in terms of results because they make it easier to separate program effects from family background effects.

The Carolina Abecedarian study (Table 1.3) randomly assigned children (N=57) to three conditions: a high-quality, full-day year-round early childhood education (ECE)

program with home visits for parent education shortly after birth to age five, home visits alone, and a control group (Roberts et al., 1989; Wasik et al., 1990). Children at the age of five in the ECE plus home visits group had higher IQs and better language skills without increases in reading scores than the other two groups that participated in community child care. No effects were found on parenting (Roberts et al., 1989; Wasik et al., 1990).

An Even Start study (St. Pierre et al., 1993) provided parenting education, adult education, and early-childhood education and a variety of supporting services. The extent and duration of services varied widely across families although all children were reported as having some early childhood education. Children ages three to four years old were investigated at five experimental sites (N=164). Small positive effects were found on a measure of school readiness skills at one half year after program entry, and small effects on one aspect of the home environment (reading materials) on parents' expectations for child's success (St. Pierre et al., 1993).

In summary, early childhood education has impacts on cognitive development and the abilities typically associated with school success in the short term (Barnett & Boocock, 1998). Effects appear to depend on the quality of the early childhood program and the child's home environment and are larger for intensive early childhood intervention programs than for ordinary child care or programs focused on educational services. Some studies report that effects may decline after children leave the early childhood program (Barnett & Boocock, 1998).

Table 1.3

Early Childhood Programs

Early Childhood Programs (Years of Operation)	Program Description	Ages of Participation	Research Design Methodological Concerns	Initial Sample Size Follow-up Sample Size	Time of Follow-up	School Outcomes
Early Training Project (1962-1967)	Home Visits Summer part-day preschool program	Entry: 4-5 yrs. Exit: 6 yrs.	Randomized school-administered tests	I = E = 44 C = 21 F = E = 36 C = 16	Post high school	Achievement Tests: E = C Special Education: E < C, grade 12, E = 5%, C = 29% Grade Retention: E = 58%, C = 61% High School Grad: E = C E = 68%, C = 52%
High/Scope Perry Preschool Project (1962-1967)	Home Visits Part-day preschool program	Entry: 3-4 yrs. Exit: 5 yrs.	Randomized	I = E = 58 C = 65 F = E = 58 C = 65	Post high school	Achievement Tests: E > C Grades: E > C Special Education: E = C, grade 12, E = 37%, C = 50% Grade Retention: E = C, grade 12, E = 15%, C = 20% High School Grad: E > C E = 67%, C = 49%
Philadelphia Project (1963-1964)	Home Visits Part-day preschool program	Entry: 4 yrs. Exit: 5 yrs.	Matched comparison group from same Kindergarten class Not randomized School- administered tests	I = E = 60 C = 53 F = E = 44 C = 37	Post high school	Achievement Tests: E = C, but positive trend Special Education: E = C, grade 12, E = 5%, C = 6% Grade Retention: E = C, grade 12 E = 38%, C = 58%

Howard University Project (1964-1966)	Part-day preschool program	Entry: 3 yrs. Exit: 5 yrs.	Comparison group from neighboring tracks Not randomized	I = E = 38 C = 69 F = E = 30 C = 69	Not measured	Grade Retention: E = C E = 33%, C = 47%
Harlem Training Project (1966-1967)	One-to-one tutoring or child-directed play	Entry: 2-3 yrs. Exit: 4 yrs.	Comparison group recruited from children born 1 to 2 months later	I = E = 244 C = 68 F = E = 168 C = 51	Grade 7	Math Achievement: E > C Reading Achievement: E < C Grade Retention: E < C, grade 7, E = 30%, C = 52%
Milwaukee Project (1968-1978)	Full-day child care Job and academic training for mothers	Entry: 3-6 mos. Exit: 5 yrs.	Groups of 3 to 4 children assigned alternately to E and C groups	I = E = 20 C = 20 F = E = 17 C = 24	Grades 4 and 8	Achievement Tests: E = C, but positive trend Grades: E = C Special Education: E = C E = 41%, C = 89% Grade Retention: E = C, grade 4, E = 29%, C = 56%
Cincinnati Title I Preschool (1969-1970, 1970-1971)	Title I Preschool	Entry: 4-5 yrs. Exit: 6 yrs.	Compared children who attended full-day Kindergarten and mostly had preschool with children who attended half-day Kindergarten and mostly had no preschool. Not randomized/no pretests School-administered tests	I = E = 688 C = 524 F = E = 410 C = 141	Grade 8	Achievement Tests: E > C for grades 1, 5, 8 Special Education: E = C, grade 8, E = 5%, C = 11% Grade Retention: E = C, grade 8, E = 9%, C = 12%
Detroit Head Start and Title I Preschool (1972-1973)	Title I Preschool	Entry: 4 yrs. Exit: 5 yrs.	Compared children who attended Head Start or Title I preschool with children who were eligible but did not attend. Not randomized/no pretests School-administered tests	I = Unknown F = Unknown	Grade 4	Achievement Tests: E > C, grade 4

Carolina Abecedarian Intervention (1972-1985)	Preschool age; full-day child care School-age: parent program	Entry: 6 wks. - 3 mos. Exit: 5-8 yrs.	Randomized	I = E = 57 C = 54	Age 8 E = 48 C = 42 Age 15 E = 48 C = 44	Achievement Tests: E > C at age 15, E = C in grades 1 to 3, E < C in grade 4 Special Education: E = C E = 25%, C = 25% Grade Retention: E = C E = 3%, C = 3%
Florida Pre-Kindergarten Early Intervention Cohort 2	Pre-Kindergarten Early Intervention	Entry: 4 yrs. Exit: 5 yrs.	Compared Pre-K early-intervention children with children from same schools who qualify for free/reduced lunch	I = Unknown F = E = 350 C = 352	Grades 3 and 4	Achievement Tests: E > C in Kindergarten, E = C in grades 1 to 3, E < C in grade 4 Special Education: E = C E = 25%, C = 25% Grade Retention: E = C E = 3%, C = 3%
Maryland Extended Elementary Pre-Kindergarten (1977-1980)	Extended Pre-Kindergarten	Entry: 4 yrs. Exit: 5 yrs.	Compared attenders including only children continuously enrolled in school district to grade 5	I = Unknown F = E = 356 C = 306	Grade 8	Achievement Tests: E > C for grades 3, 5, 8 Special Education: E < C, grade 8, E = 15%, C = 22% Grade Retention: E < C, grade 8, E = 31%, C = 45%

E = Experimental Group
C = Control Group
I = Initial Sample Size
F = Follow-up Sample Size

Source: Barnett, W., & Boocock, S. (1998). Early care and education for children in poverty (pp. 18-25). Albany: State University Press.

Long-Term Benefits

Program and study characteristics. Studies on the review of the long-term effects were based on a set of four criteria:

(1) children entered programs before the age of five, with the exception of Head Start, which serves primarily children ages three and four (and five-year-olds under certain circumstances);

(2) programs serve socio-economically disadvantaged children;

(3) at least one measure of cognitive development, school progress and socialization was collected at or after the age of eight (third grade); and

(4) the design of the research provided a no-treatment comparison to a comparable group or made adjustments for socio-economic differences.

This set of criteria excluded studies of children who were not economically disadvantaged, studies of kindergarten, case studies of individual children, simple before-and-after comparisons of children in early childhood education programs, and studies that compared disadvantaged children to more advantaged children with statistical adjustments made for the differences in family backgrounds. The requirement for a follow-up investigation at the third grade allowed for sufficient time to observe fade-out effects (Caldwell, 1987). Some programs were characterized as family-support programs in which parents were involved in some way.

Twelve studies were selected for the examination of preschool and public school programs, including the Head Start studies (Table 1.3) (Barnett & Boocock, 1998). Some programs had advantages made possible by higher levels of funding than are available to

Head Start and public school programs. In all studies, the majority of children were African American. The average level of mother's education was under twelve years. The Harlem Training Project serviced only boys in the program. The Perry Preschool Study selected children based on low IQ scores (its sample had substantially lower IQs at age three than children in other studies). The Milwaukee study selected children whose mothers had IQs below 75. As seen from Table 1.3, programs varied in entrance, services provided, age, duration, and historical context from 1962 to 1985. Most of the comparison children attended preschool or child-care programs with the exception of Head Start and public school preschool programs. In the Abecedarian study, which enrolled newborns between 1972 to 1980, two thirds of the control group attended an early childhood program for twelve months or more before the age of five (Burchinal et al., 1989). The examination of the results could indicate an underestimation of the effects of early childhood education programs (Barnett & Boocock, 1998).

The Head Start and public school early childhood education programs did not enroll children before the age of three, and most served children part-day for one school year at age four (Table 1.3). Class sizes and child-teacher ratio tended to be higher in Head Start than in the public school programs. Head Start programs have broader goals that include improving health and nutrition and providing services to parents and the community (Zigler & Syfco, 1993). Public school programs generally served children who are economically disadvantaged (Barnett & Boocock, 1998). In the Cincinnati Title I study, most full-day kindergarten students had attended preschool and most half-day kindergarten students had not.

Three program studies selected formed comparison groups by randomly assigning children to experimental and control groups from the potential pool of participants or by using procedures that approximated random assignment (Barnett & Boocock, 1998). These increases in the estimated effects within the studies are due to the program rather than to preexisting differences between program and comparison groups (Barnett & Boocock, 1998). However, the benefits of random assignment can be lost as the result of severe attrition (loss of study participants over time), or a small sample size can severely limit the power of a study to detect important effects (Barnett & Boocock, 1998). Only two of the experimental studies (Abecedarian and Perry Preschool Project) began with sample sizes larger than 30 per group and later indicated low attrition throughout follow-up studies. Two other experimental studies (Milwaukee and the Early Training Project) began with extremely small sample sizes, less useful for random assignment which rendered very little power to detect even fairly large effects. The Harlem Training Project indicated that attrition occurred during a waiting period prior to entry at age of three. This may have introduced differences in IQ scores favoring the later entry group as having higher IQs prior to treatment than the control group (Lazar et al., 1982).

All large-scale, public program studies used quasi-experimental designs. Some constructed comparison groups from waiting lists or other groups of children thought to be similar to children used in the program design. Other studies relied on natural variation in program attendance within a sample. Both strategies raise questions about the comparability of the groups due to self-selection and administrative selection (Barnett & Boocock, 1998). Self-selection occurs when parents exert more effort in obtaining

educational opportunities for their children in early childhood education programs and select good educational neighborhood school groups, effective teachers within schools, and good educational experiences outside of the school. The educational success of these children is unlikely to be comparable even without the benefit of preschool (Barnett & Boocock, 1998). The results of administrative selection design are less clear. Programs may seek to enroll the most needy, those who are the easiest to recruit, or those thought to gain the most from a program (Barnett & Boocock, 1998). The Head Start and public school program studies are at a distinct disadvantage dealing with this problem compared to other program studies. Not only was random assignment not used, but also the comparison groups were not identified prospectively, and no pretest measures were give to children to offer evidence of cognitive abilities to groups who were initially the same or to use for later measures (Barnett & Boocock, 1998).

Findings of long-term studies. Most long-term research (White & Casto, 1985; Barnett & Boocock, 1998; Holloway & Reichart-Erickson, 1988; Charlesworth et al., 1993; Hyson et al., 1990) has focused on the effects of early childhood education on cognitive ability and school success. Outcome measures included IQ, achievement, grade retention, special education placement, and high school graduation. Results of the findings are summarized and reported for socialization and parent outcomes. All twelve of the program studies found that their early childhood education programs produced IQ gains at some point (exceptions include the Detroit Head Start, Florida preschool, and Maryland extended pre-kindergarten, which did not obtain IQ scores at school entry). The Milwaukee study reported a gain of 25 points. The two experimental studies

(Milwaukee and Abecedarian) that enrolled infants in full-day educational child-care programs reported the largest initial effects and found that some IQ gains persisted into adolescent years (Table 1.3) (Barnett & Boocock, 1998). Three of the twelve studies with achievement test data found positive effects beyond grade three. Evidence of increased effects was strongest in studies using randomized assignment to programs groups. The Abecedarian and Perry Preschool Project found achievement effects that persisted to ages fourteen and fifteen. The Florida Parent Education study found effects through grade four. The Milwaukee study found effects that were statistically significant through grade two.

A naive interpretation of the results of these studies may suggest that most early childhood education programs have failed to produce long-lasting gains in achievement for disadvantaged children (Barnett & Boocock, 1998). Based on this conclusion, one may seek to identify certain characteristics of successful programs or find explanations for the fade-out (disappearance in effects) in subsequent school experiences (e.g., schools serving disadvantaged children, especially inner cities) (Barnett & Boocock, 1998). However, this conclusion may be incorrect (Barnett & Boocock, 1998).

The subsequent search for sources causing fade-out may be premature. Instead, the evidence of fade-out may be the result of flaws in the research design in which high attrition rates have occurred for the achievement test data, thereby reducing the sample size and decreasing the statistical power to detect the effects (Barnett & Boocock, 1998). Studies resulting in no effects or fade-out were vulnerable to selective attrition because achievement test data obtained from schools' routine testing programs may have suffered

from other design flaws that produced similar problems even though schools have administered their own achievement tests (Barnett & Boocock, 1998).

The most common source of achievement test data in studies is standardized tests, routinely administered by schools (Barnett & Boocock, 1998). Standardized tests provide data at a low cost, with several unfortunate consequences (McGill-Franzen & Allington, 1993). First, the quality and uniformity of the test administration may result in lower expectation when testing is done for entire classes by teachers rather than administered individually by well-trained specialists. Second, data may be lost simply because tests used vary from school to school and year to year. Third, schools' testing programs administer tests by grade so children who are retained in a grade are not tested with their own age cohort. Also, data on children behind grade level may be added later; then the scores would not be comparable because they were obtained at different ages (McGill-Franzen & Allington, 1993). Fourth, children who are expected to perform poorly are often exempted from school testing. The use of routine testing to hold schools accountable for test results, places pressure on school administrators to remove children from the test pool who typically perform poorly at each grade level (McGill-Franzen & Allington, 1993). Also, many schools do not test children in special education classes. Students who consistently perform poorly on tests are more likely to be absent on test days or likely to miss portions of the test (sometimes because they have been encouraged to miss them) (McGill-Franzen & Allington, 1993).

Studies relying on school-administered tests have test scores with lower reliability and smaller sample sizes, both of which reduce the ability to detect accurate results

(Barnett & Boocock, 1998). Differences between program and comparison groups are gradually "erased" as grade level rises (when children who perform poorly on tests are systematically exempted from taking achievement tests, along with special education class placements) and the children for whom the tests are available become more similar across the two groups (McGill-Franzen & Allington, 1993).

School success was primarily measured by rates of grade retention, special education, and high school graduation. Across all studies, the findings constitute overwhelming evidence that early childhood education programs can produce sizable improvements in school success (Barnett & Boocock, 1998). All studies reported the same or lower rates of retention and special education placements for the program group (Table 1.3). The Perry Preschool Project found significant effects for the number of years of placement in special education. The Cincinnati Title I study did not find a statistically significant effect on either the retention or special education placement, but the base rates for both were relatively low. In the Florida pre-kindergarten studies, one found significant difference, and the other did not. This limited the lack of comparability between program and comparison groups.

The Early Training Project and the Head Start study (Perry Preschool Project) provided data on high school graduation. Both studies produced large estimates of effects on the graduation rate. Further support for positive effects of early childhood education programs on high school graduation can be drawn from two other studies (Natriello, McDill, & Pallas, 1987; Roderick, 1994) finding effects on achievement, grade retention, and special education placement—all predictive of high school graduation.

A critical issue for early childhood education policy is the extent to which cognitive development and school success can be enhanced by public programs on a large scale and not just by quality programs provided to small numbers of children (Barnett & Boocock, 1998). Two types of information can be used to address this issue: cross-study comparisons and within-study comparisons (in which a single study examines more than one type of program. Clearly, both high-quality and public preschool programs have been found to produce positive effects, but the size of the effects produced by the two programs may not be the same. Size comparisons preclude IQ and achievement-test effects by the omission of IQ scores in Head Start and public school studies. However, it is still possible to compare the size of effects on school success (Barnett & Boocock, 1998).

Cross-study comparisons. Effects on grade retention, special education, and high school graduation are summarized across studies as differences in cumulative percentages of program and comparison groups (Table 1.4). Average effects are substantial for both high-quality early childhood education (ECE) programs and public school programs, but the effects on special education are much larger for high-quality programs with smaller sample sizes. There is no statistically significant difference in the effects on grade retention. It is size of the estimated difference that is potentially important. Effects are comparable for high school graduation, but the smaller sample size of the high-quality ECE programs limits the value of the comparison.

Potential explanations for the differences in results between the high-quality ECE programs and the public school programs were investigated with regression analyses that

controlled for the design (random or assigned), length of follow-up, age at entry (prior to age three or not), and the comparison group's rate of grade retention or special education placement. The comparison group's rate had a statistically significant difference ($p < .01$) positive effect—the higher the comparison group's rate, the larger the effect. After adjusting for the control group's rate, there was no significant difference in the effects of special education and grade retention between the two types of groups.

Table 1.4

Percentage Point Change in Students Retained in Grade in Special Education and Graduating from High School by Type of Program

	High-Quality Programs				Head Start/Public School			
Outcome Measure	Median	Mean	s.d.	N	Median	Mean	s.d.	N
Grade Retention	-14.5	-14.9	9.8	14	-10.0	-9.5	-6.4	11
Special Education	-24.0	19.6*	14.6	11	-5.0	-4.7*	5.3	9
H.S. Graduation	16.0	16.0	2.0	3	15.0	15.0	2.8	2

Note. The estimate of Head Start's effect on grade retention was calculated as a weighted average of effects estimated by ethnicity.

* $p < .05$

Source: Barnett, W. S. (1996). Lives in the balance: Benefit-cost analysis of the High/Scope Perry Preschool program through age twenty-seven. Monographs of the High/Scope Educational Research Foundation. Ypsilanti, MI: High/Scope Press.

Conclusions may be made from these results that Head Start and public school programs are about as effective as high-quality programs when the population served is taken into account, despite differences shown in the average effects (Table 1.4) (Barnett & Boocock, 1998). High-quality programs may produce larger effects on the average because the programs studied served disadvantaged children who were more likely to be retained or be placed in special education. Head Start, for example, may be in an area in which schools strongly avoid grade retention and special education placement as a matter of policy, limiting the potential of reducing these outcomes (Barnett & Boocock, 1998).

There are reasons to be wary of accepting that high-quality ECE programs and public school programs are equally effective (Barnett & Boocock, 1998). High-quality ECE programs could have larger effects because they are more careful in targeting services to children who are seriously disadvantaged. Few studies of the two types of programs overlap in the degree in which disadvantaged children are served. It would be much more difficult to produce gains for the more highly disadvantaged children so that the higher-quality ECE programs are required to produce the same results. Program quality and intensity were represented crudely in the analysis since their true values may be highly correlated with the degree to which the population of children were disadvantaged. Results from studies of high-quality ECE programs and public school programs serving the same population would be more persuasive.

Within-study comparisons. The Abecedarian study investigated the effects of the comparison group's participation in other forms of ECE programs (children who attended community ECE programs that met the federal guidelines for quality child care). The

comparison group that attended community-based programs were found to have higher IQ scores than the comparison group with minimal ECE experience. The estimated effect at school entry was estimated to be half the size of the effect of the Abecedarian program. Entrance into these programs was based on a self-selection process which would account for parents selecting higher-quality, community-based programs, accounting for the upper-bound estimate. The Abecedarian program provided greater quality and quantity of child care (Burchinal et al., 1989).

An additional study (Van de Reit & Resnick, 1973) randomly assigned four- and five-year-old children from families in poverty to either a high-quality ECE program or Head Start and Title I public school classrooms. High-quality program children entered the Learning-to-Learn program at age four (N=22) or five (N=23) and continued the ECE program through first grade. The control group entered Head Start at age four (N=22) or a public school Title I classroom at age five (N=23) and continued in Title I classroom through first grade.

Children who attended the high-quality program scored higher on IQ and achievement tests from the end to the preschool year through grade three (Van de Reit & Resnick, 1973). A follow-up study was conducted to examine grades, grade retention, and special education placements in grades fourth through sixth grade. The high-quality group had higher reading grades in fourth and fifth grade, and fewer grade retentions and special education placements through sixth grade (Van de Reit & Resnick, 1973).

A key question for public policy is the extent to which evidence of a positive economic return for early education programs can be generalized to Head Start and the

public school programs (Barnett & Boocock, 1998). The only benefit-cost analysis study conducted to date is based on data for the High/Scope Perry Preschool study through age 27 (Schweinhart, Barnes, Weikart, Barnett, & Epstein, 1993). The results are summarized in Table 1.2. (Barnett & Boocock, 1998). Although studies of Head Start and public school programs do not provide all the data needed for a comparable cost-benefit analysis, comparisons can be made on several outcome measures. The Perry Preschool project indicates positive effects on grade retention and high school graduation (Table 1.4) (Barnett & Boocock, 1998). Since public ECE programs are less expensive than Head Start, it seems fair to conclude that public ECE programs are likely to be a sound economic investment (Barnett & Boocock, 1998).

The belief that intervention for disadvantaged students must continue into the elementary school years if the effects of ECE programs on children's achievement and school success are to be sustained stems from the belief that positive effects will fade-out.

Studies (Allington & Walmsley, 1995; Entwisle, 1995) show that the belief about fade-out may be incorrect. High-quality programs, Head Start programs, and public school programs have been bound to produce long-term effects on achievement and school success without school-age intervention (Roberts et al., 1989; Wasik et al., 1990; Schweinhart et al., 1993). Persistence in the effects even when the quality of subsequent education is fairly low is consistent with the view that children play an active role in their own learning in and out of school. Even poorly run schools offer greater learning opportunities for children who begin kindergarten and each subsequent grade with greater abilities (Allington & Walmsley, 1995; Entwisle, 1995).

Two studies compared the effects of extended elementary programs with the effects of ECE programs alone. The Abecedarian study (Roberts et al., 1989; Wasik et al., 1990) randomly assigned half of the program and control groups to a special school-age program at age five to compare the effects of ECE alone, ECE plus an enriched school-age program, the school-age program alone, and no intervention. The school-age program alone was provided for the first three years of elementary school, consisting of biweekly home visits by teachers who provided individualized supplemental activities to use with children and parents. These supplemental activities were developed by the classroom teacher. Home visits by teachers provided other social supports for families. ECE alone produced substantial effects on IQ, achievement, and school progress (Barnett & Boocock, 1998). The school-age program alone was largely ineffective, and the additional enrichment had no effect on IQ and mixed effects on school success and achievement (Barnett & Boocock, 1998).

Other research on elementary education and disadvantaged students (Allington & Walmsley, 1995; Barnett & Boocock, 1998; Haynes & Comer, 1993; Levin, 1987; Purkey & Smith, 1983; Ross, Smith, Casey, & Slavin, 1995) indicate that previous shortcomings in the quality of education have substantially improved. The question arises whether the improvements in elementary education for disadvantaged children may prevent the need for high-quality ECE programs. Although the evidence is sparse, it appears that ECE and elementary education improvements together produce large benefits for disadvantaged children rather than elementary education alone (Slavin, Karweit, & Wasik, 1994).

Conclusions of Studies

In conclusion, early childhood education (ECE) programs for economically disadvantaged children substantially improve cognitive development during early childhood years and produce long-term increases in achievement and school success. The evidence of long-term effects is provided by twelve studies and generalizes information across a wide range of programs and communities. Although many studies fail to find persistent achievement effects, it is plausible to assume that flaws in the study design and follow-up procedures may be to blame. Positive effects on grade retention and special education placements are found in the majority of the studies, and evidence for positive high school graduation is strong through a few studies.

Head Start and public school programs produce the same types of effects as the high-quality ECE programs, but the effects, on the average, are smaller. High-quality ECE programs began at earlier ages, lasted longer, and were more intense and better implemented than the school programs. There is some evidence that a combination of factors may influence the effectiveness of the program. Comparison group rates of grade retention and special education placement were much higher in high-quality ECE program studies than in Head Start and the public school programs.

This evidence substantiates the belief that every child living in poverty in the United States should be provided with at least one year of ECE. The only comprehensive cost-benefit analysis conducted to date (Perry Preschool Project) shows gains in rates of achievement, school success, and high school graduation. This evidence suggests that society would gain greatly by extending federal funds to increase the number of current

public ECE programs in order to serve all disadvantaged children. A conservative strategy would be to increase the quality of public school programs to approach the levels of the high-quality programs found to be effective in experimental studies and to gradually increase the number of years of ECE public programs provided in conjunction with evaluations of the effects.

Reliability of Standardized Tests Used to Measure Achievement

A review of the literature indicates that achievement test data are obtained most commonly by standardized tests routinely administered by schools (Barnett & Boocock, 1998). This strategy provides data at a low cost, but it has unfortunate consequences. First, testing administered by teachers for entire classes instead of using trained testing specialists may show a lack of quality and uniformity in test results. Second, the possibility of lost data exists because tests vary from school to school and year to year. Third, students who are at risk of grade retention may not be tested with their peer age group, and many schools do not test students who receive special education services. Fourth, relying on school-administered tests may reflect scores with lower reliability due to smaller sample sizes. While intelligence tests are used to measure children's learning potential prior to school entrance, achievement tests are used to compare the extent of similarity in achievement scores of children with other children of the same school-age cohort (Barnett & Boocock, 1998). This information helps to gauge students' performance and progress toward achievement growth in acquiring knowledge from the school curriculum.

Achievement tests are used in early intervention studies. The Milwaukee Project study used the Metropolitan Achievement Test (Hildreth, Griffiths, & McGauvran, 1969) to assess school readiness at the end of intervention. The Perry Preschool Project study and the Abecedarian Project study used the California Achievement Test (Tiegs & Clark, 1963) to assess academic performance as a measure additional to intelligence testing.

Instrument Used in the Study

The instrument used in this study was the Indiana Statewide Testing for Educational Progress (ISTEP+), published by CTB/McGraw-Hill. The purposes of ISTEP+ are twofold. First, it is intended to compare the achievement of students in Indiana to the achievement of students on a national basis. Second, it is intended to diagnose individual student knowledge relative to the Indiana Academic Standards. The first purpose calls for a comparison of student achievement in Indiana to that of a national group and ISTEP+ provides scores that are norm-referenced against a representative national population. The second purpose requires information about the mastery level of individual students in both content areas, English/language arts and mathematics, and provides information that is criterion-referenced against Indiana Academic standards (Indiana Department of Education, 1999-2000).

The usefulness of the ISTEP+ is based on its reliability. Reliability is a measure of accuracy. The research indicated the reliability can be demonstrated by producing similar results in student test scores when the test has been administered to the same student over and over again. The ISTEP+ is not administered in this fashion. It is administered in third

grade, sixth grade and eighth grade. Also, a test is considered reliable when the student is given the test to measure the observed score with the true score. The ISTEP+ uses the alpha reliability measure to indicate that a student's score is an accurate reflection of his knowledge-base for the norm-referenced section and the criterion-referenced section. Also, the alpha is used to determine the score on the multiple choice section and the short-answer section of the ISTEP+ as one value (Indiana Department of Education, 1999-2000). It should be noted that for the purposes of this study, ISTEP+ Total Battery norm-referenced (TB NCE) test scores were used as the criterion variable. The ISTEP+ items have been tested for their reliability by the Department of Education (Table 2.1).

Table 2.1

ISTEP+ Test Reliabilities: English/Language Arts and Mathematics

	ELA		Mathematics	
Grade	N	alpha	N	alpha
3	7514	0.901	7515	0.894
6	6792	0.941	8840	0.933
8	6648	0.945	6709	0.933
10	6685	0.918	6651	0.931

Source: Indiana Department of Education. (1999-2000). ISTEP+ program manual. Room 229, State House, Indianapolis, IN: Reed, Suellen.

Content validity measures the accuracy of the test items. It indicates whether the test is really testing what it claims to test. The ISTEP+ is striving to measure more accurately that which is important and valued by Indiana educators and experts. The ISTEP+ Program Manual (Indiana Department of Education, 1999-2000) reports that the criterion-referenced component tests critical knowledge, identified by the Indiana State Board of Education as academic standards, and corresponds to the English/language arts and mathematics proficiency guides of the Indiana curriculum.

Requirements for ISTEP+, as stated by law in 1995, are to provide criterion-referenced scores based on questions that measure student achievement relative to the academic standards established by the State Board of Education in addition to the nationally norm-referenced scores. One of the focuses of ISTEP+ is the criterion-referenced component. The criterion-referenced questions, designed specifically to match Indiana's curriculum as defined by the English/language arts and mathematics standards, measure material that Indiana students should have been taught and mastered by the beginning of grades 3, 6, 8, and 10. The norm-referenced test questions, designed to allow for comparisons of Indiana student achievement to that of students across the nation, measure a wide range of material that Indiana students might or might not have been taught covering a broader range of difficulty.

The content of the September 1999 version of the ISTEP+ consisted of two components. First, a single ISTEP+ Basic Skills Assessment including the Criterion-Referenced Test (CRT), the Norm-Referenced Test (NRT), and the Test of Cognitive Skills, is given in Grades 3, 6, and 8. Second, a single ISTEP+ Applied Skills Assessment,

given to Grades 3, 6, and 8, contains multiple-choice questions, short-answer essay questions, and problem-solving questions in arithmetic or mathematics. Passing scores and remediation funds are exclusive to the criterion-referenced ISTEP+ scores for English/language arts and mathematics. High, low, and passing scale scores are listed by grade level and subject tested (Table 2.2).

Table 2.2

High, Low, and Passing Scale Scores by Grade Level and Subject

Grade Level	Subject Tested	Lowest Possible Score	Pass Score	Highest Possible Score
3	English/language arts	300	475	790
3	Mathematics	300	479	720
6	English/language arts	300	480	825
6	Mathematics	300	479	740
8	English/language arts	300	466	830
8	Mathematics	300	486	820
10	English/language arts	300	466	800
10	Mathematics	300	486	720

Source: Indiana Department of Education. (1999-2000). ISTEP+ program manual. Room 229, State House, Indianapolis, IN: Reed, Suellen.

As stated in the ISTEP+ Program Manual 1999-2000, students who score at or above the Indiana Academic Standard in English/language arts or mathematics demonstrate a mastery of the content standards. Students who do not score at or above the Indiana Academic Standard in all likelihood need remedial assistance to be successful at the current grade level. Passing scores, set by the State Board of Education, are reflective of recommendations received by Indiana teachers and the State Standards Task Force, a body representing education, business, and labor. It is intended that all students pass the ISTEP+ and thus meet Indiana's Academic Standards. Indiana law does not require students to demonstrate passing scores on the Graduation Qualifying Examination (GQE) in order to receive a high school diploma. Rather, the law requires that students demonstrate mastery of Grade 9 standards as tested on the GQE (Indiana Department of Education, 1999-2000).

According to the Indiana Department of Education, the ISTEP+ meets a variety of educational needs. First, the program is fundamentally designed to permit inferences to be made about student achievement in skills and knowledge areas critical to the success of Indiana students. Second, the content of classroom instruction should address critical learning areas defined in the Academic Standards of the State Board of Education in both the Indiana Mathematics Proficiency Guide and the Indiana English/Language Arts Proficiency Guide. The ethical test preparation section of the ISTEP+ cautions educators not to teach the curricula to match the content of a test. Rather, educators should teach curricula to match the standards mandated by the Indiana State Board of Education. Quality education leads to better learning, reflected in higher ISTEP+ scores. Scoring

rubrics for the ISTEP+ are available to teachers through the Indiana Department of Education.

Summary

Chapter 2 presented a review of literature and research to support the rationale that participation in Title I pre-kindergarten affects ISTEP+ scores. The first section reviewed the historical aspects of early childhood education programs. The second section discussed early intervention and socio-economically disadvantaged students. The third section examined the short-term and long-term benefits findings of early childhood education. The fourth section examined the reliability of standardized tests used to measure achievement, and the fifth section discussed the instrument used in this study.

A brief history of early childhood education noted two revolutionary events beginning in the 1800s that changed the family economy and the need for education for young children. Nursery school education became an important service for all young children, not just for wealthy families. University laboratory schools were developed and used to allow teachers and researchers to study important issues in the field of early childhood education, namely the educational importance of play in child development. Theorists such as Erikson, Freud, and Dewey focused on the motor and social development of the child by emphasizing how play can be used for experimentation and mastery over situations and conflicts.

The Progressive Movement led by Dewey, Temple, Smith-Hill, Parker, and Kilpatrick proposed a "child-centered" curriculum in which skill instruction, purposeful

learning, and instructional planned experiences made children take responsibility for their own learning. The works of Piaget and Vygotsky influenced educational practices by introducing the constructivist theory as a "high-quality" early educational model in which children mentally construct their own knowledge as an active architect of learning (Kamii, 1985). Early childhood programs used approaches such as Bank Street or High/Scope as examples of the constructivist model.

The "cognitive interactionist" model, based on the constructivist theory of Piaget, was also considered a "high-quality" program. The Montessori approach, an example of the cognitive interactionist model, allowed children to be active explorers, discoverers, and manipulators of the environment as well as social beings.

Works in psychology of Hunt (1961) and Bloom (1964) concerning the intellectual preparedness of American children brought about change in education for disadvantaged young children. Head Start was initiated to help children who lacked basic skills due to the indigent conditions of the home and community environments.

In the 1970s and 1980s, efforts were made to pass child-care legislation to improve the quality of care and teacher education for programs that serviced disadvantaged young children. Nearly one-fourth of America's children are currently living in poverty (Eggebean & Lichter, 1991). Poverty is more prevalent in the United States than in other industrialized nations. African American, Hispanic, and other minority children are at a greater risk for growing up poor.

The timing of poverty is important in the life of a young child. Low income during the preschool and early school years exhibits stronger negative correlations with rate of

high school completion as compared with low income during the childhood and adolescent years (Duncan & Brooks-Gunn, 1997). These findings suggest that early childhood interventions may be critical in reducing the impact of low income on children's lives (Duncan & Brooks-Gunn, 1997, p. 68).

The United States government mandated free public intervention in all states for all children with disabling conditions between the ages of 3 and 18, regardless of socio-economic, cultural, or disabling conditions (Public Law 94-142). United States government agencies are actively promoting early childhood programs. Funding, combined with the efforts needed by policy makers, practitioners, and researchers supports continued progress and extends benefits to high-quality early childhood programs to all children who need them (Barnett & Boocock, 1998).

Short-term and long-term benefits findings suggest that early care and the interaction of the child's home environment and family involvement in school contribute positively to cognitive development and school success.

Holloway and Reichart-Erickson (1988) found that children who attended developmentally appropriate programs performed slightly better on achievement tests and had more positive interactions among children in child-care classrooms than other children. Children from low-income families who attended developmentally appropriate programs were more likely to achieve academically and socially in elementary school (Barnett & Boocock, 1998).

Intervention research (White & Casto, 1985; Barnett & Boocock, 1998) reports that programs designed for disadvantaged children, including public programs, can

produce an immediate effect in IQ and in achievement scores.

Twelve studies examined the effects of early education on cognitive ability and school success and found that all twelve of the early childhood education programs produced IQ gains at some point (exceptions include the Detroit Head Start, Florida preschool, and Maryland extended pre-kindergarten, which did not obtain IQ scores at school entry). Three of the twelve studies with achievement test data found positive effects beyond grade three. The Abecedarian and Perry Preschool Project found achievement effects persisting to ages fourteen and fifteen. The Florida Parent Education study found effects through grade four. The Milwaukee study found effects through grade two. School success was measured by rates of grade retention, special education placement, and high school graduation. All studies produced sizable improvements in school success.

The cross-study comparisons suggest that high-quality early childhood programs and public school programs are equally effective. The within-study comparisons suggest that children who attended community-based programs were found to have higher IQ scores than children with minimal early childhood experience. Children from families living in poverty who attended a high-quality early childhood program scored higher on IQ tests and achievement tests from the end of preschool to grade three than those in Title I public pre-kindergarten or Head Start. The high-quality group had higher reading grades in fourth and fifth grade and fewer grade retentions and special education placements through sixth grade than the Title I public school and Head Start children. Problems in the gathering of the data may account for differences in the effects.

The benefit-cost analysis study based on the High/Scope Preschool study through age 27 suggests Head Start has a positive effect on grade retention and high school graduation. Since public school early childhood programs are less expensive than Head Start, it seems fair to conclude that public school early childhood programs are likely to be a sound investment. This evidence suggests that society would gain greatly by extending federal funds to increase the number of current public early childhood programs to serve all disadvantaged children.

The instrument used in this study was the Indiana Statewide Testing for Educational Progress (ISTEP+). The ISTEP+ is considered reliable and accurate. A student who scores at or above the Indiana Academic Standard has demonstrated a mastery of the content standards. The ISTEP+, according to the Indiana Department of Education, meets a variety of educational needs.

Chapter 3

METHODOLOGY

Introduction

This chapter describes and explains the procedures used in this study. Included in this section are the following: a discussion of the research questions, hypotheses, subjects, descriptors of the variables, procedures used in the study, data collection, and statistical analysis.

Research Questions

The research questions proposed for this study were:

1. Do combined factors (program factor and personal attributes) predict FWCS students' achievement battery scores measured by the ISTEP+?

2. Does the program factor (participation in Title I pre-kindergarten) predict FWCS students' achievement battery scores measured by the ISTEP+?

3. Do the combined personal attributes (parental status, sex, retention, socio-economic status (SES) measured by paid, reduced, and free lunch, and race) affect FWCS students' achievement battery scores measured by the ISTEP+?

4. Does each individual personal attribute (parental status, sex, retention, socio-

economic status (SES) measured by paid, reduced, and free lunch, and race) affect FWCS students' achievement battery scores measured by the ISTEP+?

Hypotheses

This study seeks to test whether "early intervention" can predict achievement measured by the Indiana Statewide Testing for Educational Program (ISTEP+) battery scores of third grade students. "Early intervention" was measured by student participation in the Fort Wayne Community Schools (FWCS) Title I pre-kindergarten program. The criterion variable was defined as the ISTEP+ battery scores of third grade students. The predictor variables were examined in two set categories—the program factor and personal attributes. Based on research findings, variables selected in this category were chosen because of their relevance in predicting student participation in the FWCS Title I pre-kindergarten program. For example, reasonable assumptions could be made, based on research findings (Madden et al., 1991), that achievement battery scores measured by the ISTEP+ would be significantly different in participants of the FWCS Title I pre-kindergarten program from the scores of the non-participants in the FWCS Title I pre-kindergarten program, indicating an effect of "early intervention" on achievement (Pedhazur, 1982). Hypotheses testings were used in all four research questions. The hypotheses that were tested are as follows.

Hypothesis 1

H1: The combined factors of the program factor (participation in Title I pre-

kindergarten) and personal attributes (parental status, sex, retention, socio-economic status (SES), race) account for a significant amount of variance as positive predictors in predicting achievement measured by the ISTEP+ battery scores of third grade students in the Fort Wayne Community Schools who attended the Title I pre-kindergarten program.

This hypothesis can be represented by $Y' = \text{constant} + a_1X_1 + a_2X_2 + a_3X_3 + a_4X_4 + a_5X_5 + a_6X_6 + a_7X_7 + a_8X_8 + E$, where Y' = the criterion variable and $X_1 + X_2 + X_3 + X_4 + X_5 + X_6 + X_7 + X_8$ are scores on the personal attributes belief statement of early intervention and the program factor, respectively.

constant = the point where the regression line crosses the y axis

X_1 = participation versus non-participation in Title I pre-kindergarten

X_2 = parental status

X_3 = sex of students

X_4 = retention of grade

X_5 = socio-economic status of "no poverty" (full-pay lunch)

X_6 = socio-economic status of "low poverty" (reduced-pay lunch)

X_7 = socio-economic status of "high poverty" (free lunch)

X_8 = race code

a_1—a_8 are regression weights

E = error vector (Y-Y')

Hypothesis 2

H2: The program factor (participation in Title I pre-kindergarten) accounts for a

significant amount of variance as positive predictors in predicting achievement measured by the ISTEP+ battery scores of third grade students in the Fort Wayne Community Schools who attended the Title I pre-kindergarten program.

This hypothesis can be represented by $Y` = \text{constant} + a_1X_1 + E$, where $Y`$ = the criterion variable.

constant = the point where the regression line crosses the y axis

X_1 = participation in Title I pre-kindergarten

a_1 is the regression weights

E = error vector $(Y-Y`)$

Hypothesis 3

H3: Combined personal attributes which include parental status, sex, retention, socio-economic status (SES) measured by meal code status, and race account for a significant amount of variance as positive predictors in predicting achievement measured by the ISTEP+ battery scores of third grade students in the Fort Wayne Community Schools who attended the Title I pre-kindergarten program.

This hypothesis can be represented by $Y` = \text{constant} + a_2X_2 + a_3X_3 + a_4X_4 + a_5X_5 + a_6X_6 + E$, where $Y`$ is the criterion variable.

constant = the point where the regression line crosses the y axis

X_2 = parental status (0 parents = child is provided care by a guardian other than a parent—foster care, shelter, or other; 1 parent, or 2 parents).

X_3 = sex

X_4 = retention of grade

X_5 = Socio-economic status of "no poverty (full-pay lunch)

X_6 = Socio-economic status of "low poverty" students (reduced-pay lunch)

X_7 = Socio-economic status of "high poverty" (free lunch)

X_8 = race code

a_2—a_8 are regression weights

E = error vector (Y-Y`)

Hypothesis 4

H4: Parental status accounts for a significant amount of variance as positive predictors in predicting achievement measured by the ISTEP+ battery scores of third grade students in the Fort Wayne Community Schools who attended the Title I pre-kindergarten program.

This hypothesis can be represented by Y`= constant + $a_2X_2$ + E, where Y` is the criterion variable.

constant = the point where the regression line crosses the y axis

X_2 = parental status

a_2 is the regression weight

E = error vector (Y-Y`)

Hypothesis 5

H5: Sex of students accounts for a significant amount of variance as positive

predictors in predicting achievement measured by the ISTEP+ battery scores of third grade students in the Fort Wayne Community Schools who attended the Title I pre-kindergarten program.

This hypothesis can be represented by $Y' = \text{constant} + a_3X_3 + E$, where Y' is the criterion variable.

constant = the point where the regression line crosses the y axis

X_3 = sex of students

a_3 is the regression weight

E = error vector (Y-Y')

Hypothesis 6

H6: Retention status of students accounts for a significant amount of variance as positive predictors in predicting achievement measured by the ISTEP+ battery scores of third grade students in the Fort Wayne Community Schools who attended the Title I pre-kindergarten program.

This hypothesis can be represented by $Y' = \text{constant} + a_4X_4 + E$, where Y' is the criterion variable.

constant = the point where the regression line crosses the y axis

X_4 = retention of students

a_4 is the regression weight

E = error vector (Y-Y')

Hypothesis 7

H7: Socio-economic status (SES) of "no-poverty" students accounts for a significant amount of variance as positive predictors in predicting achievement measured by the ISTEP+ battery scores of third grade students in the Fort Wayne Community Schools who attended the Title I pre-kindergarten program.

This hypothesis can be represented by $Y` = \text{constant} + a_5X_5 + a_6X_6 + a_7X_7 + E$, where Y` is the criterion variable.

constant = the point where the regression line crosses the y axis

X_5 = SES of students of "no poverty" or students with full-pay lunches

X_6 = SES of students of "low poverty" or students with reduced-pay lunches

X_7 = SES of students of "high poverty" or students with free lunches

a_5-a_7 are regression weights

E = error vector (Y-Y`)

Hypothesis 8

H8: Socio-economic status (SES) of "low poverty" students accounts for a significant amount of variance as positive predictors in predicting achievement measured by the ISTEP+ battery scores of third grade students in the Fort Wayne Community Schools who attended the Title I pre-kindergarten program.

This hypothesis can be represented by $Y` = \text{constant} + a_6X_6 + a_7X_7 + E$, where Y` is the criterion variable.

constant = the point where the regression line crosses the y axis

X_6 = SES of students of "low poverty" or students with reduced-pay lunches

X_7 = SES of students of "high poverty" or students with free lunches

a_6 and a_7 are regression weights

E = error vector (Y-Y`)

Hypothesis 9

H9: Socio-economic status (SES) of "high-poverty" students accounts for a significant amount of variance as positive predictors in predicting achievement measured by the ISTEP+ battery scores of third grade students in the Fort Wayne Community Schools who attended the Title I pre-kindergarten program.

This hypothesis can be represented by $Y` = \text{constant} + a_7X_7 + E$, where Y` is the criterion variable.

constant = the point where the regression line crosses the y axis

X_7 = SES of students of "high poverty" or students with free lunches

a_7 is the regression weight

E = error vector (Y-Y`)

Hypothesis 10

H10: Race of students accounts for a significant amount of variance as positive predictors in predicting achievement measured by the ISTEP+ battery scores of third grade students in the Fort Wayne Community Schools who attended the Title I pre-kindergarten program.

This hypothesis can be represented by $Y` = \text{constant} + a_8X_8 + E$, where Y` is the criterion variable.

constant = the point where the regression line crosses the y axis

X_8 = race of students (minority = African American, American Indian/Eskimo, Asian, Hispanic, Multi Ethnic; and majority = Caucasian)

a_8 is the regression weight

E = error vector (Y-Y`)

Data Collection Procedure

All student data used in this study were collected through Fort Wayne Community Schools records from the 1993-1994 school year to 1999-2000 school year. Parents reported personal attributes of their children on student "family data forms" (Appendix A). Data such as parental status, sex of the student, number of times student was retained, and family income based on the qualifications of the free and reduced lunch program were also obtained from FWCS. There were 425 subjects who participated in this study.

Sample Selection of Descriptors

The population in this study was identified as third grade students in the Fort Wayne Community Schools System during the 1999-2000 school year. Of the 425 participants used in this study, there were 222 males and 203 females. Table 3.1 represents a distribution of the children involved in this study: (a) African American, n=155; (b) American Indian/Eskimos, n=2; (c) Asian, n=8; (d) Caucasian, n=205;

Table 3.1

Racial Distribution of 3rd Grade Title I Students in FWCS during 1999-2000 School Year

Schools	Minority					Majority	Males	Females	Parent Status			Meal Codes		
	African American	Asian	Hispanic	American Indian	Multi Ethnic	Caucasian			0	1	2	Paid	Reduced	Free
Abbett	18	1	6	0	1	24	29	21	0	0	50	10	6	34
Adams	10	0	3	1	0	15	16	13	0	1	28	6	4	19
Bloomingdale	20	0	3	0	0	41	33	31	0	1	63	19	6	39
Fairfield	34	6	11	1	0	23	35	40	0	0	75	13	3	59
Nebraska	17	1	3	0	0	27	26	22	0	2	46	15	5	28
Southern Heights	16	0	7	0	4	15	21	21	0	1	41	8	6	28
South Wayne	18	0	8	0	1	28	27	28	0	2	53	12	2	41
Study	8	0	4	0	0	10	13	9	0	0	22	1	2	19
Washington	14	0	4	0	0	22	22	18	0	2	38	7	5	28
TOTAL	155	8	49	2	6	205	222	203	0	9	416	91	39	295

(e) Hispanic, n=49; and (f) Multi Ethnic, n=6. Table 3.2 represents a distribution of meal codes for third grade students by race.

Table 3.2

Meal Code Status of 3rd Grade Title I Students in FWCS by Race during 1999-2000 School Year

	Minority					Majority	
Meal Code	African American	Asian	Hispanic	American Indian	Multi Ethnic	Caucasian	Total
Full-pay lunches	18	3	8	0	1	61	91
Reduced-pay lunches	6	0	3	0	0	30	39
Free lunches	131	5	38	2	5	114	295
Total	155	8	49	2	6	205	425

Among the 425 participants in this study, 295 students (69.4%) qualified for the federal free lunch program. Thirty-nine students (9.2%) qualified for reduced priced meals, and 91 students (21.4%) paid the full price for lunches. For the purposes of this study, the categories of paid lunch, reduced lunch, and free lunch were used as indicators of poverty. The full-pay category represented children who are not living in poverty,

reduced pay represented children who are living in low poverty, and free lunch represented children who are living in high poverty.

According to estimates provided by Fort Wayne Community Schools, students in this study were provided all benefits entitled under state and federal laws regarding Title I. The population identified as Title I pre-kindergarten students during the 1999-2000 school year was 425 students. The population of third grade students in buildings which housed Title I pre-kindergarten during the 1999-2000 school year is as follows: Abbett, n=50; Adams, n=29; Bloomingdale, n=64; Fairfield, n=75; Nebraska, n=48; Southern Heights, n=42; South Wayne, n=55; Washington/Study (schools once combined in population, are now separated for the first year in 1999), Washington, n=40; Study, n=22 (Table 3.3).

Table 3.3

FWCS Title I Schools

School	3rd Grade Population for 1999-2000 School Year
Abbett	50
Adams	29
Bloomingdale	64
Fairfield	75
Nebraska	48
Southern Heights	44
South Wayne	55
Study	22
Washington	40

The separation of the Washington/Study population will not have an impact in determining the predictability of Title I pre-kindergarten participants and non-participants in this study. Also, the elimination of Northcrest as a Title I school—between the school years of 1993 and 2000—is due to the lack of eligibility under Title I guidelines. As a result, students who attended Northcrest were not included in the study (Table 3.4).

Table 3.4

Pre-K Classes

School	Beginning Date	Ending Date
Abbett	August 1993	NA
Adams	August 1991	NA
Bloomingdale	August 1995	NA
Fairfield	August 1993	June 1999
Nebraska	August 1994	NA
Northcrest	August 1994	June 1999
South Wayne	August 1995	NA
Southern Heights	August 1993/94	NA
Washington/Study	August 1994	Schools separated in June 1999

Criteria used in this sample are representative of the following:

1. The individuals were students participating in the FWCS system as third grade students during the 1999-2000 school year.

2. Students who had participated in a FWCS Title I pre-kindergarten program attended one of the following schools: Abbett, Adams, Bloomingdale, Fairfield, South Wayne, Southern Heights, Washington, or Northcrest elementary during the 1994-1995 school year.

3. The individuals participating in the Title I pre-kindergarten program were students subject to no particular theory of instruction since these programs were in the initial year of operation. A High/Scope (Weikart et al., 1971) curriculum was introduced as a method of instruction, but many teachers were receiving the beginning training during the initial year of the pre-kindergarten program.

4. The individuals were students taught by certified teachers, licensed by the State of Indiana during the 1993-2000 school years. Pre-kindergarten teachers during the 1994-1995 school year held at least a bachelor's degree in elementary education with an additional endorsement in kindergarten, and/or licensure in early childhood or early childhood special education, and/or an associate's degree in early childhood.

The sources for personal attributes of the subjects were obtained by the following: (a) the 1994-1995 school year "family data forms" provided by parents in the FWCS system, and (b) the 1999-2000 FWCS database (Appendix A).

Descriptors of the Variables

In this study, there is one criterion variable (achievement as measured by the ISTEP+ battery scores of third grade students) and eight predictor variables, one of which is the program factor (participation in the Title I pre-kindergarten program), and seven of which are identified as personal attributes (parental status, sex, retention, socio-economic status defined by reduced-pay lunches and socio-economic status defined by free lunches, race).

Criterion Variable

The criterion variable is achievement: Total Battery Normal Curve Equivalent score (TB NCE) of third grade Fort Wayne Community Schools (FWCS) students measured by the Indiana Statewide Testing for Educational Progress (ISTEP+).

Predictor Variables

Program factor.

1. Participation in the FWCS Title I pre-kindergarten program during the 1994-1995 school year.

Personal attributes.

2. Parental Status: number of parents living in the home.
3. Sex: male or female students.
4. Retention: number of times a student was retained.

5. Socio-economic status (SES) of "no poverty" measured by full-pay lunch status.
6. SES of "low poverty" measured by reduced-pay lunch status.
7. SES of "high poverty" measured by free lunch status.
8. Race: Minority (African American, American Indian/Eskimo, Asian, Hispanic and Multi Ethnic) and Majority (Caucasian).

Purpose of the Study

This research was designed to examine whether participation in Fort Wayne Community Schools (FWCS) Title I pre-kindergarten program predicted ISTEP+ battery scores of third grade students while controlling for the program factor (participation in Title I pre-kindergarten) and personal attributes. An ex post facto design was selected because data were collected by FWCS prior to this study. Ex post facto can be used effectively to identify a small set of variables from a large set of variables that are related to the dependent variable (Newman & Newman, 1977).

The instrument used in this study is the Indiana Statewide Testing for Educational Progress (ISTEP+), published by the California Testing Bureau (CTB)/McGraw-Hill. Data collection was provided by FWCS. The ISTEP+ testing materials were delivered to all the FWCS sites between August 12, 1999 and September 3, 1999 (Indiana Department of Education, 2000-2001). Children in grades three, six, eight, and ten were tested by their classroom teachers between September 15, 1999 and October 1, 1999 of the 1999-2000 school year. The Indiana State Board of Education established in 1995 that

beginning in the 1996-1997 school year, the ISTEP+ would be administered to grades three, six, eight and ten during the fall semester rather than the spring semester (Indiana Department of Education, 2000-2001). This change enables schools to implement instructional approaches and programs and remedial programs to students during the school year as well as in the summer.

The structure and content of the Fall 1999 version of the ISTEP+ for grades three, six, and eight consists of a single Basic Skills Assessment booklet which includes the following:

(1) The Criterion-Referenced Test (CRT) containing multiple-choice questions,

(2) the Norm-Referenced Test (NRT), allowing comparisons of Indiana student achievement with national norms, and

(3) the Test of Cognitive Skills and the Applied Skills Assessment (four subtests) containing short answer or essay questions and solving arithmetic and mathematical problems (Indiana Department of Education, 2000-2001) (Tables 3.5, 3.6).

The multiple choice portion of the ISTEP+ is machine scored by CTB/McGraw-Hill (Indiana Department of Education, 2000-2001). Passing scores in the English/language arts and mathematical sections and the allocation of remediation funds are based exclusively on the criterion referenced ISTEP+ questions (Indiana Department of Education, 2000-2001). Nationally norm-referenced scores are separate and distinct, having no direct relationship with the criterion referenced scores.

The ISTEP+ test required that only professional educators administer the test. A

Table 3.5

Suggested Testing Times for ISTEP+ - Grade 3: Practice Tests

Test Session	Number of Questions	Instruction Time*	Working Time*	Total Time*
Basic Skills Assessment Book				
Basic Skills:				
Test of Cognitive Skills				
Memory Learning Pairs+	--	--	--	10**
Test 1 Sequences	20	3	9	12
Test 2 Memory	20	--	--	6**
-Optional Break-				
Test 3 Analogies	20	2	7	9
Test 4 Verbal Reasoning	20	4	9	13
Basic Skills:				
English/Language Arts				
Test 5 Vocabulary	20	7	15	22**
Test 6 Reading and				
Language Arts, Part 1	19	5	25	30**
-Break-				
Language Arts, Part 2	26	5	35	40**
Test 7 Reading and				
Language Arts	25	5	32	37**
Test 8 Language Mechanics	20	5	15	20
Basic Skills:				
Mathematics				
Test 9 Mathematics				
Computation	20	5	21	26
Test 10 Mathematics	26	5	35	40**
Test 11 Mathematics	28	3	38	41**

Table 3.5 (continued)

+ The Memory Learning Pairs and Test 3 Memory must be administered in the same test session, with an interval of about 25 minutes between the two parts.
* Time in minutes
** Test is read by the examiner; therefore, times shown are approximate.

Note. Breaks appropriate for the group being tested should be provided at the discretion of the examiner. For Grade 3, it is suggested that a break follow every 30 to 40 minutes of testing. Time for breaks is not indicated above. Remember to add additional time to your testing schedule for breaks.

Source: Indiana Department of Education. (1999-2000). ISTEP+ program manual. Room 229, State House, Indianapolis, IN: Reed, Suellen.

professional educator needed a valid teacher's license in instruction, administration, or school services. Certified staff (e.g., teachers' aides, secretaries, parents, or substitute teachers) are allowed to make accommodations for special education students. Any other deviations from standardized conditions (e.g., sudden onset of illness, school or classroom emergencies) were to be documented by examiners and reported to the ISTEP+ Test Coordinator or school principal (Indiana Department of Education, 2000-2001).

According to the ISTEP+ Manual 1999-2000 procedures, the last day for public school sites to call for the pick up of answer documents was October 8, 1999. Scored reports were received by January 5, 2000. Any person violating testing procedures knowingly or carelessly is in violation of ethical security. Therefore, it was strongly recommended that materials or testing documents were in strict control of the testing administrator until the tests were sent to CTB/McGraw-Hill (Indiana Department of Education, 2000-2001).

Results of the ISTEP+ Total Battery Normal Curve Equivalent (TB NCE) for the

Table 3.6

Suggested Testing Times for ISTEP+ - Grade 3: Applied Skills Assessment

Test Session	Number of Questions	Instruction Time*	Working Time*	Total Time*
Applied Skills Assessment Book I				
Session 1: English/Language Arts: Writing	**	5	55	60
Session 2: Mathematics	11	5	55	60
Applied Skills Assessment Book II				
English/Language Arts	***	5	55	60
OR				
Applied Skills Assessment Book II				
Mathematics	***	5	55	60

* Time in minutes
** Writing Time
*** The number of questions varies between tests

Note. Breaks appropriate for the group being tested should be provided at the discretion of the examiner. For Grade 3, it is suggested that a break follow every 30 to 40 minutes of testing.

Source: Indiana Department of Education. (1999-2000). ISTEP+ program manual. Room 229, State House, Indianapolis, IN: Reed, Suellen.

Title I third grade students in the Fort Wayne Community Schools were formatted in an EXCEL database to be used for research and instructional purposes. Minitab software was used for data manipulation. Students were identified by an identification number for privacy purposes. Personal attributes, the program factor, and achievement battery scores

as measured by the ISTEP+ of Title I third grade students in the FWCS were variables used in this study. Personal attributes of these students relating to achievement battery scores, measured by the ISTEP+ test, were used in examining the variables of the study.

Procedure Used in Study

A multiple linear regression was used in this study. First, all predictor variables (program factor and personal attributes) were tested to determine if combined factors account for a significant amount of variance in predicting the criterion variable (achievement as measured by the ISTEP+ Total Battery Normal Curve Equivalent (TB NCE) battery scores of third grade students). Second, the program factor (participation in Title I pre-kindergarten in the FWCS system) was tested to determine if participation in Title I pre-kindergarten accounted for a significant amount of variance in predicting the criterion variable. Third, combined personal attributes (parental status, sex, retention, socio-economic status as defined by paid, reduced or free lunches, and race) were tested to determine if personal attributes account for a significant amount of variance in predicting the criterion variable. Fourth, each individual personal attribute was tested to determine if any personal attribute accounts for a significant amount of variance in predicting the criterion variable.

Statistical Analysis

A multiple linear regression was used in this study to analyze the variance in the prediction of participants in Title I pre-kindergarten programs in the Fort Wayne

Community School system (FWCS) from the criterion variable (achievement measured by the ISTEP+ TB NCE scores of third grade students in the FWCS system) while controlling for multiple predictor variables (program factor and personal attributes). This method of analysis identifies the variables contributing significantly to the prediction of the dependent variable. A multiple regression was selected over the traditional analysis of variance because of its flexibility in testing the relationship between categorical variables, continuous variables and categorical and continuous variables (Newman & Newman, 1977).

The multiple regression analysis is used in designs consisting of a single dependent variable and two or more independent variables (Pedhazur, 1973). A multiple linear regression allows the researcher to analyze the variance in the criterion dependent variable while controlling for two or more sets of multiple predictor independent variables.

Subject population in this study is N=425. The p level, indicating significance in this experimental design, was set at $< .05$. Because this is an ex post facto study, students were not harmed in any way. Using a p level of $< .05$ in this study is a generally accepted practice for research of this type (Pedhazur, 1982). The F test, a very robust statistical measure, was used to test the statistical significance of the proposed relationships in the hypotheses.

A one-tailed test was used to test the relationships of the variables because the direction of the correlation was assumed to be positive. ISTEP+ scores should be positively influenced by participation in Title I pre-kindergarten. Similarly, the absence of poverty reflects a positive correlation with participation in early education. The 0.05 level

of significance was used since the consequences of rejecting the directional null (and making type 1 error) were not serious enough to warrant a more stringent confidence level.

Summary

Chapter 3 was introduced with the research questions, followed by a section of the hypotheses used in this study. A presentation of data, sample selection of descriptors, descriptors of variables, and procedures were discussed. Finally, statistical analysis of the data was identified. There are four research questions proposed for this study: 1) Do combined factors (program factor and personal attributes) predict FWCS students' achievement battery scores measured by the ISTEP+? 2) Does the program factor (participation in Title I pre-kindergarten) predict FWCS students' achievement battery scores measured by the ISTEP+? 3) Do the combined personal attributes (parental status, sex, retention, socio-economic status (SES) measured by paid, reduced, and free lunch, and race) predict FWCS students' achievement battery scores measured by the ISTEP+? and 4) Does each individual personal attribute (parental status, sex, retention, socio-economic status (SES) measured by paid, reduced, and free lunch, and race) predict FWCS students' achievement battery scores measured by the ISTEP+? Ten hypotheses were stated. The presentation of data included racial distribution of third grade students in the Title I pre-kindergarten program. The reliability and validity of the ISTEP+ instrument used in the study was discussed. Statistical treatment of data by FWCS and limitations concluded the chapter.

Chapter 4

RESULTS OF THE STUDY

Introduction

The findings from the collected data are presented in this chapter. The results of the study are organized into four major sections. First, the data gathering process is discussed. Second, the results of the descriptive data are reported. Third, the results of the research hypotheses related to the relationship between the Indiana Statewide Testing for Educational Progress (ISTEP+) and the program factor are reported. Fourth, results of the research hypotheses related to the relationship between the ISTEP+ and the personal attributes are reported.

In order to facilitate a review of results presented in this chapter, a racial distribution of the Title I third grade children in the Fort Wayne Community Schools (FWCS) during the 1999-2000 school year is presented in Table 3.1. This chapter provides a statistical analysis of the hypothesis tested. Four hypotheses were not found to be statistically significant, and mean scores were provided to indicate the distance between the mean scores of variables. The correlation coefficient appendix is provided to determine strengths or weaknesses in the relationship between the variables tested.

Data Gathering Process

The 1999-2000 ISTEP+ test results from the Fort Wayne Community Schools' Planning and Assessment department were obtained for research. Data were downloaded into an electronic file where they were subjected to analysis using Minitab software. The data were grouped by the identifying school numbers. Each student was assigned to a four-digit identification number (ID) instead of the typical Fort Wayne Community School student ID number used to identify students. The following data were included for each Title I third grade student: ISTEP+ norm-referenced test scores, current school number, sex, race, parent status, meal code (full-pay, reduced, free), identification number, school attended during the 1998-1999 school year, grade during the 1998-1999 school year, school attended during the 1997-1998 school year, grade during the 1997-1998 school year, school attended during the 1996-1997 school year, grade during the 1996-1997 school year, school attended during the 1995-1996 school year, grade during the 1995-1996 school year, school attended during the 1994-1995 school year, and grade during the 1994-1995 school year. The following Title I schools were identified by an assigned number: Abbett, Adams, Bloomingdale, Fairfield, Nebraska, South Wayne, Southern Heights, Study, and Washington.

Students were categorized according to race, parental status, and meal code as provided by parents on "family data forms" (Appendix A). The FWCS race code included two categories: majority (Caucasian) and minority (African American, Asian, Hispanic, Native American, Multi Ethnic). Parent Status included students who live with both parents, live with guardian, live with one parent, have one biological parent, live with one

step-parent, live with spouse of parent, live alone, or other. Meal code status included full-pay meals, reduced-pay meals, and free meals (Table 3.2). Grade codes were identified as grade three, grade two, grade one, special education ungraded, kindergarten, pre-kindergarten regular education, and pre-kindergarten special education.

The ISTEP+ score listed is representative of the Total Battery Normal Curve Equivalent Score (TB NCE). Students who did not participate in the ISTEP+ testing during the 1999-2000 school year for any reason were not included in the study.

Descriptive Data

Of the 425 students participating in this study, the minority students (African American, Asian, Hispanic, Native American, Multi Ethnic) comprised over half (52%) of the FWCS Title I population. The majority (Caucasian) students comprised less than half (48%) of the total Title I population. Among the minority status, African Americans dominated the minority population (155 students). The second most populous group of students were the Hispanics with a population of 49 students. Very few Asian (eight students) and American Indian (two students) were reported. Only six students were reported as Multi Ethnic. Over one half (69%) were reported to have free lunch status, and nine percent (9.2%) reported reduced-pay lunches. Less than 22 percent (21.4%) reported to have full-pay lunch status (Table 3.2). Data indicated that most students lived in households with both parents (97.8%). Abbett, Fairfield and Study schools reported that all third grade students were living in households with both parents. Schools such as Nebraska, South Wayne and Washington reported only two students living in one-parent

families. The remaining Title I schools (Adams, Bloomingdale and Southern Heights) reported only one student living with a single parent. Students living with one parent was less than three percent (2.1%). The student population consisted of approximately equal divisions of males and females (52% and 47% respectively). The mean scores for variables are located in Appendix C.

Results of Research Hypotheses Related to the Program Factor and Personal Attributes (H1)

Hypothesis 1

This research study determines whether combined factors (program factor and personal attributes) predict students' achievement battery scores as measured by the Indiana Statewide Testing (ISTEP+). The hypothesis stated below was found to be significant. The combined factors (program factor and personal attributes) are positive predictors of student achievement.

H1: Combined factors (program factor determined by participation in pre-kindergarten and personal attributes determined by parent status, sex, retention of grade, socio-economic status, and race) account for a significant amount of variance as positive predictors in predicting the ISTEP+ battery scores of third grade students. The results of the R^2 value was eight and nine-tenths percent (8.9%) in predicting the score. The F ratio for this hypothesis equaled 5.84, which is significant at the 0.05 alpha level.

The results of this analysis (data regarding the program factor and personal attributes) can be found in Table 4.1. The finding related to the testing of Hypothesis 1, shown in Table 4.1, indicates a significant relationship between combined factors

Table 4.1

Results of Hypothesis 1

Hypothesis and Models	R-Square	df1/total df	Alpha	F	P	S
Hypothesis 1: Combined factors (program factor and personal attributes) account for a significant amount of variance as positive predictors in predicting achievement measured by the ISTEP+ battery scores of third grade students in the Fort Wayne Community Schools (FWCS) Title I pre-kindergarten program.	. 089	7/424	.055	5.84	0.000	S

Full-Model: $Y = 59.6 + \text{constant} + 1.53X_1 - (11.6)X_2 - (2.05)X_3 - (9.82)X_4 - (7.02)X_6 - (11.54)X_7 + 3.26X_8$

Restricted Model: aU + E

Note. N = 425
Y = achievement measured by the ISTEP+ battery scores of third grade students in the Fort Wayne Community Schools pre-kindergarten program.

Independent Variable	Significance Level (+)
X_1 = participation in Title I pre-kindergarten	0.585
X_2 = parent status	0.081
X_3 = sex	0.388
X_4 = retention of grade	0.008
X_6 = socio-economic status (SES) determined by reduced-pay lunches	0.000

(program factor and personal attributes) and ISTEP+ battery scores of third grade students in the FWCS who attended the Title I pre-kindergarten program. Therefore, the

students with combined factors scored higher on the ISTEP+ TB NCE. The combined factors (program factor and personal attributes) account for a significant amount of variance as positive predictors in predicting ISTEP+ battery scores of third grade students in the FWCS who attended the Title I pre-kindergarten program.

Hypothesis 2

The second question is whether the program factor, pre-kindergarten participation, is predictive of students' ISTEP+ scores. Hypothesis 2 tests the relationship between the program factor (participation in pre-kindergarten) and achievement as measured by the ISTEP+ battery scores of third grade students in the FWCS who attended the Title I pre-kindergarten program. The results indicate that the R^2 value was 0.0% in predicting the ISTEP+ scores. Hypothesis 2 indicates no significant relationship in the program factor of students and achievement. Although the hypothesis was not significant, it should be noted that the TB NCE mean score for children who participated in pre-kindergarten was 51.58 and 50.91 for non-participants. The statistical results indicate that participation in pre-kindergarten alone does not predict achievement.

H2: Program factor (participation in Title I pre-kindergarten) accounts for a significant amount of variance as positive predictors in predicting ISTEP+ battery scores of third grade students in FWCS who attended the Title I pre-kindergarten program. The F ratio for this hypothesis was 0.07, and the p level equaled 0.796, which exceeded the set alpha level of 0.05 (see Table 4.2). The results indicate no significant relationship between students participating in Title I pre-kindergarten and student achievement. The correlation

coefficient is presented in Appendix B. The mean scores table can be found in Appendix C.

Table 4.2

Results of Hypothesis 2

Hypothesis and Models	R-Square	dfl/total df	Alpha	F	P	S
Hypothesis 2: Program factor (participation in pre-kindergarten) accounts for a significant amount of variance as positive predictors in predicting achievement measured by the ISTEP+ battery scores of third grade students in the Fort Wayne Community Schools (FWCS) Title I pre-kindergarten program.	0.00	1/424	.05	0.07	0.796	NS
Full-Model: $Y = (50.9) + (0.66)X_2 + E$						
Restricted Model: $Y = aU + E$						

Note. N = 425
Y = achievement measured by the ISTEP+ battery scores of third grade students in the Fort Wayne Community Schools pre-kindergarten program.

Independent Variable	Significance Level (+)
X_2 = participation in the Fort Wayne Community Schools Title I pre-kindergarten program	0.796
Constant	0.001

Hypothesis 3

The third question is whether a combination of personal attributes such as parent status, sex, retention, socio-economic status (SES) (no poverty/full-pay lunch, low poverty/reduced-pay lunch, high poverty/free lunch), and race are predictors of students' ISTEP+ scores. Hypothesis 3 states that there is a significant relationship between combined personal attributes (parent status, sex, retention, socio-economic status (SES) of "no poverty"/full-pay lunch, "low poverty"/reduced-pay lunch, or "high poverty"/free lunch, and race) and achievement measured by the ISTEP+ TB NCE battery scores of third grade students in FWCS who attended the Title I pre-kindergarten program. This hypothesis was found to indicate a relational difference. These factors predict only eight and nine-tenths percent (8.9%) of the variance.

H3: Combined personal attributes (parent status, sex, retention, SES measured by full-pay, reduced-pay and free lunches, and race) account for a significant amount of variance as positive predictors in predicting ISTEP+ battery scores of third grade students in FWCS who attended the Title I pre-kindergarten program. These factors contribute weakly by predicting eight and nine-tenths percent (8.9%) of the variance. The F ratio for this hypothesis was 6.77, and the p level equaled 0.001, which is significant at the alpha level of 0.05 (see Table 4.3).

The testing of Hypothesis 3 indicates a significant relationship among combined personal attributes (parent status, sex, retention, SES measured by full-pay lunches, reduced-pay lunches, free lunches, and race), which account for a significant amount of variance as positive predictors in predicting achievement measured by the ISTEP+ battery

Table 4.3

Results of Hypothesis 3

Hypothesis and Models	R-Square	dfl/total df	Alpha	F	P	S
Hypothesis 3: Combined personal attributes account for a significant amount of variance as positive predictors in predicting achievement measured by the ISTEP+ battery scores of third grade students in the Fort Wayne Community Schools (FWCS) Title I pre-kindergarten program.	.089	6/424	.05	6.77	0.001	S

Full-Model: $Y = 59.8 - 11.62X_2 - 1.97X_3 - 10.1X_4 - 6.97X_6 - 11.5X_7 + 3.19X_8 + E$

Restricted Model: $aU + E$

Note. N = 425
Y = achievement measured by the ISTEP+ battery scores of third grade students in the Fort Wayne Community Schools pre-kindergarten program.

Independent Variable	Significance Level (+)
X_1 = participation in Title I pre-kindergarten	0.585
X_2 = parent status	0.081
X_3 = sex	0.388
X_4 = retention of grade	0.008
X_5 = socio-economic status (SES) determined by full-pay lunches	0.000
X_6 = socio-economic status (SES) determined by reduced-pay lunches	0.437
X_7 = socio-economic status (SES) determined by free lunches	0.000
X_8 = race	0.043

scores of third grade students in the FWCS who attended the Title I pre-kindergarten program. The statistical results indicate that combined personal attributes contribute significantly to the ISTEP+ battery scores of third grade Title I students.

The data related to the testing of Hypothesis 3 are presented in Table 4.3, which shows the regression models and the results for this hypothesis.

Results of the Research Hypotheses Related to Personal Attributes

Research hypotheses 4-10 are found in Table 4.4. As can be noted from the composite overview in Table 4.4, four tests (H6, H7, H9, H10) were statistically significant. The results of testing hypotheses 4, 5, and 8 were not significant.

Hypothesis 4

The fourth question is whether parent status is predictive of students' ISTEP+ scores. Hypothesis 4 states that there is no significant relationship between parent status and achievement as measured by the ISTEP+ battery scores of third grade students in the FWCS who attended the Title I pre-kindergarten program. The results predicted six tenths of one percent (.6%) of the variance. The F ratio was 2.69, and the p level equaled 0.102, which exceeded the alpha level set at 0.05 and therefore was not significant.

H4: Parent status did not account for a significant amount of variance as positive predictors in predicting the ISTEP+ battery scores of third grade students. The results of the hypothesis tested on parent status can be found in Table 4.4. The findings related to the testing of Hypothesis 4, shown in Table 4.4, indicate that there was no significant

relationship between parent status and the ISTEP+ battery scores of third grade students in the FWCS who attended the Title I pre-kindergarten program. Therefore, the statistical analysis does not support this hypothesis. Although this hypothesis was not significant, it should be noted that students who lived in homes with both parents had a mean score of 51.28, while students living in one-parent homes had a mean score of 39.89. The Total Battery Normal Curve Equivalent table is located in Appendix E.

Table 4.4

Summary of Results of Hypotheses

	Hypotheses	R-Square	dfl/total df	F	P	S
H_4	Parental status accounts for a significant amount of variance as positive predictors in predicting achievement measured by the ISTEP+ battery scores of third grade students in the Fort Wayne Community Schools Title I pre-kindergarten program.	.006	1/424	2.69	0.102	NS
H_5	Sex of students accounts for a significant amount of variance as positive predictors in predicting achievement measured by the ISTEP+ battery scores of third grade students in the Fort Wayne Community Schools Title I pre-kindergarten program.	.004	1/424	1.86	0.173	NS

Table 4.4 (continued)

	Hypotheses	R-Square	dfl/total df	F	P	S
H_6	Retention status of students accounts for a significant amount of variance as positive predictors in predicting achievement measured by the ISTEP+ battery scores of third grade students in the Fort Wayne Community Schools Title I pre-kindergarten program.	.013	1/424	5.68	0.018	S
H_7	Socio-economic status (SES) of no poverty (full-pay status) students accounts for a significant amount of variance as positive predictors in predicting achievement measured by the ISTEP+ battery scores of third grade students in the Fort Wayne Community Schools Title I pre-kindergarten program.	.056	1/424	25.13	0.001	S
H_8	Socio-economic status (SES) of low poverty (reduced-pay status) students accounts for a significant amount of variance of positive predictors in predicting achievement measured by the ISTEP+ battery scores of third grade students in the Fort Wayne Community Schools Title I pre-kindergarten program.	.001	1/424	0.60	0.437	NS

Table 4.4 (continued)

	Hypotheses	R-Square	dfl/total df	F	P	S
H_9	Socio-economic status (SES) of high poverty (free lunches) accounts for a significant amount of variance of positive predictors in predicting achievement measured by the ISTEP+ battery scores of third grade students in the Fort Wayne Community Schools Title I pre-kindergarten program.	.055	1/424	24.61	0.001	S
H_{10}	Race of students accounts for a significant amount of variance as positive predictors in predicting achievement measured by the ISTEP+ battery scores of third grade students in the Fort Wayne Community Schools Title I pre-kindergarten program.	.020	1/424	8.66	0.003	S

Hypothesis 5

The fifth question is whether sex of students is predictive of students' ISTEP+ scores. The hypothesis states that there is not a significant relationship between sex and student achievement as measured by the ISTEP+ battery scores of third grade students in the FWCS who attended the Title I pre-kindergarten program. The results indicate that the R^2 value was four tenths of one percent (.4%) in predicting ISTEP+scores. The F ratio for this hypothesis was 1.86, and the p level equaled 0.173, which exceeded the alpha

level set at 0.05 and therefore was not significant. The test result indicates no relational difference between the sex of students and achievement. Appendix C reports a mean score of 52.46 for female students and a mean score of 49.73 for male students. The score differed by approximately three points. The statistical analysis does not support the hypothesis. The logical interpretation is that the sex of students does not predict achievement.

H5: Sex of students indicated no relationship in the amount of variance as positive predictors in predicting the ISTEP+ battery scores of third grade students who attended the Title I pre-kindergarten program.

Hypothesis 6

The sixth question is whether retention status of students is predictive of students' ISTEP+ scores. The hypothesis states that there is a significant difference in the retention status of students when accounting for variance as positive predictors in predicting achievement measured by the ISTEP+ battery scores of third grade students in the FWCS who attended the Title I pre-kindergarten program. The statistical percentage of variance in retention status of students in achievement was one and three-tenths percent (1.3%). The F ratio for this hypothesis equaled 5.68, and the p level equaled 0.018, which exceeded the 0.05 alpha level. The statistical analysis suggests that the retention status of students predicts achievement scores. The TB NCE mean score for students who were not retained at grade level was 51.55. Students who were retained had a mean score of 40.05. The Total Battery Normal Curve Equivalent table is located in Appendix E.

H6: Retention status of students indicates that there is a relationship between grade retention and the ISTEP+ TB NCE battery scores of third grade students in FWCS who attended the Title I pre-kindergarten program. Students who were retained at grade level did not score as well on the ISTEP+ as students who were not retained. The regression model and results of the testing of Hypothesis 6 are presented in Table 4.4.

Hypothesis 7

The seventh question is whether full-pay lunch status (no poverty) is predictive of students' ISTEP+ scores. The data related to the testing of socio-economic (SES) of students with full-pay lunch status presented in Table 4.4 indicate that there is a relational difference in "no-poverty" students and achievement as measured by the ISTEP+ battery scores of third grade students in the FWCS who attended the Title I pre-kindergarten program. The percentage of variance in socio-economic status of students with full-pay lunches was five and six-tenths percent (5.6%). The F ratio for this hypothesis equaled 25.13, and the p level equaled 0.001, which is significant at the 0.05 alpha level. Therefore, the test results indicate that socio-economic status of students with full-pay lunches (no poverty) tends to predict achievement scores. The Total Battery Normal Curve Equivalent (TB NCE) mean score for SES/full-pay lunch status was 60.40. The TB NCE mean score for SES/reduced-pay lunch status was 53.49. The TB NCE mean score for SES/free lunch status was 47.82. The Total Battery Normal Curve Equivalent table is located in Appendix E.

H7: Socio-economic status of students with full-pay lunches (no poverty)

indicates that there is a relationship in the amount of variance as positive predictors in predicting the ISTEP+ battery scores of third grade students in FWCS who attended the Title I pre-kindergarten program. The results of the hypothesis tested on socio-economic status of full-pay students (no poverty) are found in Table 4.4.

Hypothesis 8

The eighth question is whether reduced-pay lunch status (low poverty) is predictive of students' ISTEP+ scores. The SES of students with reduced-pay lunches (low poverty) indicated no relationship in the amount of variance as positive predictors in predicting ISTEP+ scores of third grade students in the FWCS who attended the Title I pre-kindergarten program. The results indicate that the R^2 value was one tenth of one percent (.1%) in predicting ISTEP+ scores. The F ratio was 0.60, and the p level was 0.437, which exceeded the alpha level set at 0.05. Hypothesis 8 indicates no relational difference between the socio-economic status of reduced-pay lunches (low poverty) of students and achievement. The TB NCE score of "low-poverty" students was 53.49. The data do not support this hypothesis. The logical interpretation is that the socio-economic status of "low-poverty" students does not predict achievement.

H8: Socio-economic status of students with reduced-pay lunches (low poverty) indicates no relationship in the amount of variance as positive predictors in predicting the ISTEP+ battery scores of third grade students in the FWCS who attended the Title I pre-kindergarten program. There is no relational difference between SES of students with reduced-pay lunch status and the ISTEP+ TB NCE scores. A Correlation Coefficient

table is found in Appendix B. The results of the hypothesis tested can be found in Table 4.4. The mean score table is located in Appendix C.

Hypothesis 9

The ninth question is whether free lunch status (high poverty) is predictive of students' ISTEP+ scores. The hypothesis states that there is a significant relationship between the socio-economic status of students with free lunches (high poverty) and achievement as measured by the ISTEP+ battery scores of third grade students in the FWCS who attended the Title I pre-kindergarten program. The results indicate a R^2 value of five and five-tenths percent (5.5%) of the variance. The F ratio was 24.61, and the p level was 0.001, which is significant for the alpha level of 0.05. The data related to the testing of Hypothesis 9 are presented in Table 4.4.

H9: Socio-economic status of students with free lunches (high poverty) account for a significant amount of variance as positive predictors in predicting ISTEP+ battery scores of third grade students in the FWCS who attended the Title I pre-kindergarten program. This hypothesis was found to be significant. Therefore, the data support the hypothesis that students living in "high poverty," measured by free lunch status, contribute significantly to the ISTEP+ battery scores of third grade students. The regression model and results of the testing of Hypothesis 9 are presented in Table 4.4. The mean score table is located in Appendix C.

Hypothesis 10

The tenth question is whether race of students is predictive of students' ISTEP+ scores. Hypothesis 10 indicates that there is a relationship between the race of students and achievement as measured by the ISTEP+ scores of third grade students in FWCS who attended the Title I pre-kindergarten program. These factors predict two percent (2%) of the variance. The F ratio for the hypothesis tested was 8.66, and the p level equaled 0.003, which is significant at the alpha level of 0.05 (see Table 4.4). Therefore, the data support the hypothesis that race is a significant contributor to determining the ISTEP+ battery scores of Title I third grade students in the FWCS system. The TB NCE mean score of minority race students was 48.21. The TB NCE mean score of majority race students was 54.06.

H10: Race of students accounts for a significant amount of variance as positive predictors in predicting achievement measured by the ISTEP+ battery scores of third grade students in the FWCS who attended the Title I pre-kindergarten program. The data related to the testing of Hypothesis 10 are presented in Table 4.4, which shows regression models and the results for this hypothesis. The mean score table is located in Appendix C.

Summary

Chapter 4 reviewed the data gathering process. Descriptive data for third grade Title I students in the Fort Wayne Community Schools (FWCS) during the 1999-2000 school year, as shown in Tables 3.1 and 3.2, indicate how students were categorized according to race (majority/minority), sex, parent status (0, 1, 2) and meal code status

(full-pay, reduced-pay and free). This study tested ten hypotheses and the results were presented. Each of the ten hypotheses was tested utilizing multiple linear regression. All hypotheses were examined at the 0.05 alpha level. The probability levels for research hypotheses 2, 4, 5 and 8 were greater than five hundredths (.05) and the hypotheses were therefore not accepted.

The research findings indicate that the testing of the six hypotheses of this study was statistically significant at the five hundredths (0.05) level in the prediction of achievement measured by the ISTEP+ battery scores of third grade students in the FWCS who attended the Title I pre-kindergarten program. The statistical analyses support hypotheses 1, 3, 6, 7, 9, and 10. The results of a multiple regression analysis indicate that eight independent variables—participation in the Title I pre-kindergarten program, parent status, sex, retention of grade, socio-economic status (full-pay meals, reduced-pay meals, free meals), and race combine to form the best model (combination of factors) that accounts for a significant amount of variance as positive predictors in predicting achievement as measured by the ISTEP+ battery scores of third grade students in FWCS who attended the Title I pre-kindergarten program.

Chapter 5

SUMMARY

Introduction

This chapter is divided into four major sections:

1. Research questions, statement of the problem, procedures used, and hypotheses tested.

2. Summary of the descriptive data and the conclusions derived from research pertaining to the relationship between the program factor, personal attributes, and achievement measured by the ISTEP+ battery scores of third grade students in the Fort Wayne Community Schools (FWCS) Title I program and the best predictor variables or combination of predictor variables.

3. Review of the overall pattern of significance and non-significance of the hypotheses.

4. Discussion of the implications of this study and suggestions for further research.

Research Questions

Specifically, the study was designed to answer the following questions:

1. Do combined factors (program factor and personal attributes) predict FWCS

students' achievement battery scores measured by the ISTEP+?

2. Does the program factor (participation in Title I pre-kindergarten) predict FWCS students' achievement battery scores measured by the ISTEP+?

3. Do the combined personal attributes (parental status, sex, retention, socio-economic status (SES) measured by paid, reduced, and free lunch, and race) affect FWCS students' achievement battery scores measured by the ISTEP+?

4. Does each individual personal attribute (parental status, sex, retention, socio-economic status (SES) measured by paid, reduced, and free lunch, and race) affect FWCS students' achievement battery scores measured by the ISTEP+?

Statement of the Problem

The study was designed to examine the relationship between achievement, measured by the ISTEP+ battery scores of third grade students in the FWCS Title I program, and two groups of variables—program factor (participation in the FWCS Title I pre-kindergarten program) and personal attributes (parent status; sex of students; retention status; socio-economic status of students with full-pay lunches as "no poverty," reduced-pay lunches as "low poverty," and free lunches as "high poverty"; and race code). Ten hypotheses were formulated to test these relationships. Hypothesis 1 examined the relationship between achievement, as measured by the ISTEP+ battery scores of third grade students in the Title I program, and combined factors (program factor and personal attributes). Hypothesis 2 examined the relationship between achievement and program factor (participation in the FWCS Title I pre-kindergarten program). Hypothesis 3

examined the combined personal attributes of parent status; sex; retention; socio-economic status of full-pay lunches, reduced-pay lunches, and free lunches; and race among FWCS Title I third grade students. Hypotheses 4-10 examined each individual personal attribute (parent status; sex; retention; socio-economic status of full-pay lunches, reduced-pay lunches, and free lunches; and race) among FWCS Title I third grade students.

Statement of Procedures

This study used an ex post facto design in which data (ISTEP+ test scores) were gathered and stored for later manipulation and research. A review of the literature revealed that predictors such as early intervention, poverty, race, and family environment may have been related to achievement scores of students. The research hypotheses were derived by logical and empirical data findings.

Multiple linear regression models for the hypotheses were generated and tested. The criterion variable for the study was achievement measured by the ISTEP+ battery scores of third grade students in the FWCS Title I program. The predictor variables included the program factor (participation in the FWCS Title I pre-kindergarten program) and personal attributes of students. The program factor and seven individual personal attributes were included in the study. A multiple linear regression was used to test for the significance of the program factor and personal attributes of third grade students in the FWCS Title I pre-kindergarten program.

Each predictor was tested for statistical significance by using multiple linear regression procedures. The predictor variables were divided into two sets. The set

labeled program factor was defined as participation in the FWCS Title I pre-kindergarten program. The other set, referred to as personal attributes, included parental status, sex, retention of grade, socio-economic status of "no poverty" (full-pay lunch), socio-economic status of "low poverty" (reduced-pay lunch), socio-economic status of "high poverty" (free lunch), and race. For this study, a combination of both the program factor and personal attributes were also tested to select the best predictors.

Conclusions

This section will discuss the descriptive data, the relationship between the data and student achievement, and the research findings as they relate to the ten hypotheses of this study. The summary of all hypotheses tested is presented in Table 5.1.

Summary of the Descriptive Data

Table 3.1 in Chapter 3 provides information regarding the racial distribution of third grade Title I students in FWCS during the 1999-2000 school year. These descriptive data indicated that 425 students participated in the study, including 222 males and 203 females. Data were gathered from these children who attended any of the nine schools: Abbett, Adams, Bloomingdale, Fairfield, Nebraska, Southern Heights, South Wayne, Study, and Washington. The range in the number of students enrolled was 22 (Study), fewest students, to 75 (Fairfield). Data, such as parental status, sex of the student, number of times student was retained, and family income based on the qualifications of the free and reduced lunch count, were reported by parents on student "family data forms."

All student data used in this study were collected through FWCS records from the 1993-1994 school year to the 1999-2000 school year.

Table 5.1

Summary Table of Hypothesis Tested, F, and Significance Levels

Hypothesis Number	R-SQUARE	df1/df2	F	P	S/NS
H1 (all)	.089	7/424	5.84	0.000	S*
H2 (program factor—Pre-K)	.000	1/424	0.07	0.796	NS
H3 (personal attributes)	.089	6/424	6.77	0.001	S*
H4 (parental status)	.006	1/424	2.69	0.102	NS
H5 (sex of students)	.004	1/424	1.86	0.173	NS
H6 (retention of students)	.013	1/424	5.68	0.018	S
H7 (SES/full-pay lunch)	.056	1/424	25.13	0.001	S*
H8 (SES/reduced-pay lunch)	.001	1/424	0.60	0.437	NS
H9 (SES/free lunch)	.055	1/424	24.61	0.001	S*
H10 (race)	.020	1/424	8.66	0.003	S*

Note. See pages 130, 132, 134, 136-137 for complete statements of the research hypotheses tested. All hypotheses were examined at the 0.05 alpha level of significance, using a two tail test. Hypotheses 1, 3, 7, 9, and 10 were significant at the .01 alpha level using a two tail test.

S/NS= Significant or Non-significant.
* Significant at < .01.

Among the 425 participants in this study, 91 students paid full price for school lunches, 39 students qualified for reduced price meals, and 295 students qualified for free lunches. For purposes of this study, the researcher used categories of paid lunch, reduced-pay lunch and free lunch status as indicators of poverty. Full-pay category operationally defined as children who are not living in poverty, reduced-pay operationally defined as children who are living in low poverty, and free lunch operationally defined as children living in high poverty. According to the literature, children living in poverty are most at risk for academic failure (Huston, 1991).

The literature on children living in poverty noted that an increased number of preschool children were living below the poverty level during the year 1985 (National Center for Family Literacy, 1996). The poverty line for a family of four during the year 1994 was $14,340 (Payne, 1998). One out of four individuals (25%) under the age of 18 was living in poverty in the United States during the year 1996. The poverty level of the FWCS service area rose to 39.2% during the 1999-2000 school year (FWCS records).

The literature on early intervention programs noted that Title I and education programs funded under the Goals 2000: Educate American Act were designed to become even more effective in making a contribution to narrowing the achievement gap between children in high poverty and low poverty (Title I—Helping Disadvantaged Children Meet High Standards, 1994). This study noted that children living in high poverty have lower TB NCE scores than children who do not live in poverty. Meal code status of students (Table 3.2) indicating levels of poverty revealed that 67% of students with full-pay lunches were of majority status. Students with free lunches were primarily minority status (61%).

A further review of the descriptive data (Table 3.1) reveals that minority students dominated the FWCS Title I third grade population (52%). There were 155 African American students, 49 Hispanic students, 8 Asians students, 6 Multi Ethnic students, and 2 American Indian students. There were free lunches for 131 African American students, 38 Hispanic students, 5 Asian students, 2 American Indian students, and 5 Multi-Ethnic students. The data confirmed the findings of literature, revealing that minority children tend to live in homes in which the current income is below the poverty line (Ramey & Ramey, 1990). According to the official measure of poverty, more than 20% of the nation's 67 million children are poor (Betson & Michael, 1997).

The literature on minority children living in poverty reported that during the year 1985, 41% of all children living below the poverty line were African American children and 37% were Hispanic (U.S. Department of Education, 1994). In 1990, almost 50% of African American children were living in homes in which the income level was below the federal poverty line of 1989 (Ramey & Ramey, 1990). Rates of children living in poverty (21.9%) almost doubled that of adults in 1992 (Betson & Michael, 1997). Parents of 13 million children lack minimal resources essential to support their child's normal growth and development (Ramey & Ramey, 1990). The findings in this study indicated that minority students had a TB NCE mean score on the ISTEP+ approximately 6 points lower than majority students (Appendix C).

The next section will discuss the results of the research hypotheses analysis in the study. The summary of all hypotheses is presented in Table 5.1.

Conclusions Derived from the Research Hypotheses Related to Achievement, the Program Factor, and Personal Attributes (H1)

Hypothesis 1 was designed to investigate the relationship between achievement, the program factor (participation in pre-kindergarten), and personal attributes (parent status, sex, retention of grade, socio-economic status, and race) of third grade students in the Fort Wayne Community Schools' (FWCS) Title I program. Achievement was measured by the Indiana Statewide Testing for Educational Progress (ISTEP+) battery scores of third grade students in the Title I program in the FWCS. Combined factors (program factor and personal attributes) were found to be significant in predicting achievement in the ISTEP+ battery scores of third grade students in the FWCS who attended the Title I pre-kindergarten program.

The literature on achievement regarding ISTEP+ battery scores and the combination of the program factor (Title I pre-kindergarten) and personal attributes of third grade students was not conclusive. There is no literature to support the notion that combined factors of early intervention (Title I pre-kindergarten programs) and the personal attributes of students (parent status, sex, retention of grade, socio-economic status, and race) predict achievement scores of third grade students. However, literature on early intervention and achievement test scores to measure the cognitive performance of students was reviewed. Studies, reported in Table 1.3, on Title I pre-kindergarten on achievement (Cincinnati Title I study, Detroit Head Start study, the Florida Pre-Kindergarten Early Intervention study and the Maryland Extended Elementary Pre-Kindergarten study) used achievement tests to assess academic performance of students in early intervention programs as an additional measure to intelligence testing.

This study used the ISTEP+ instrument, published by the California Testing Bureau (CTB)/McGraw-Hill, to predict achievement of students using battery scores in the content areas of English/language arts and mathematics with other factors that influence achievement. These factors include early intervention (program factor) and personal attributes of third grade students (parental status, sex, retention of grade, socio-economic status measured by lunch status, and race). Appendix B suggests that there are correlations among variables (personal attributes and program factor). It is reported in Table 5.1 that the combined sets of variables (program factor and personal attributes of third grade students) predict ISTEP+ achievement battery scores. Hypothesis 1 was significant at the 0.05 alpha level. This significance leads the researcher to believe that the combined factors of early intervention and personal attributes of students predict achievement.

Conclusions Derived from the Research Hypotheses Related to Achievement and the Program Factor (H2)

Hypothesis 2 was designed to test the relationship between achievement, measured by the ISTEP+ battery scores of third grade students in the FWCS Title I program, and the program factor (participation in the FWCS Title I pre-kindergarten program). This study considered whether the program factor (participation in FWCS Title I pre-kindergarten program) accounted for a significant amount of variance as positive predictors in predicting achievement as measured by the ISTEP+ battery scores of third grade students in the FWCS Title I program. The findings did not support the literature that suggests that early intervention during the preschool years positively influenced

reading and math achievement scores of students. The data are not consistent with the literature on early intervention and its effect on achievement.

Literature on the program factor (early intervention) was reviewed. Literature regarding early intervention programs and achievement is conclusive. The American Psychological Association (APA) task force found that attending educational intervention programs or quality schools was linked consistently to a higher level of cognitive performance (Burchinal et al., 1997). Summaries of research on early intervention (i.e., Nieman & Gastright, 1981; Clark, 1979; Eckroade, Salehi, & Wode, 1991) indicated that systematic and targeted educational intervention programs significantly improved the intellectual development of children who lived in poverty (Table 1.3).

It is reported in Table 5.1 that Hypothesis 2 is not significant. It is possible that the data findings suggest that the FWCS Title I pre-kindergarten program was in its initial year and may not have been operating according to the standards provided by the National Association for the Education of Young Children regarding high-quality early intervention educational programs. Therefore, the researcher concludes that the Title I pre-kindergarten in FWCS did not produce the same results as the literature findings regarding high-quality public school early intervention programs.

Conclusions Derived from the Research Hypotheses Related to Achievement and Combined Personal Attributes (H3)

Hypothesis 3 was designed to test the relationship between achievement, measured by the ISTEP+ scores of third grade students in the FWCS Title I program, and combined personal attributes of students: parental status, sex, retention of grade, socio-economic

status (SES) of no poverty identified by full-pay lunch, SES of low poverty identified by reduced-pay lunch, SES of high poverty identified by free lunch, and race. There is a relationship between combined personal attributes of third grade students and achievement. However, there is no literature to support the notion that combined personal attributes are related to achievement scores. Literature on the environmental influences on achievement was reviewed. Table 5.1 indicates that Hypothesis 3 had significance at a 0.05 alpha level. Appendix B reported weak correlations between sex of students, parental status, socio-economic status, and pre-kindergarten.

Literature on the effects of the environment (personal attributes) on achievement was reviewed. The literature suggested that interactions in a child's context are essential for cognitive growth (Dewey, 1966). A child who experiences an environment that fails to provide for his physical and emotional needs is less likely to overcome health problems, negatively influencing his growth and development (Ramey & Ramey, 1990). Parental status is also a factor influencing the child's environment. It should be noted that only nine students were reported as living in homes without both parents, while 416 students were reported as living with both parents, leading the researcher to conclude that there are insufficient data to support any literature on parental status.

Literature on socio-economic status (SES) and achievement was reviewed. Literature on SES and family income suggests that these factors may have a greater impact on school attainment during the early years of development than during the child's adolescent years. Literature findings on socio-economic status, race, and achievement scores suggests that children from poor and ethnic minority families perform worse on

tests and examinations than wealthy or middle-class children (Connell, 1994). Performance of low-income children on standardized tests is considered to be average at infancy and declines gradually during the early and middle childhood years (Burchinal et al., 1997). These findings suggest that early childhood interventions are critical in reducing the impact of poverty on children's lives (Duncan & Brooks-Gunn, 1997, p. 68).

Overall Pattern of Significance and Nonsignificance

Conclusions Derived from the Research Hypotheses Related to Achievement and Individual Personal Attributes (H6, H7, H9, H10)

Four of the eight research hypotheses related to achievement and individual personal attributes were significant: Hypotheses 6, 7, 9, and 10 (retention status of students, SES of no poverty identified by full-pay lunch, SES of high poverty identified by free lunch, and race). The results of this study supported the literature.

Hypothesis 6. Retention status of students accounted for 1.3% of the variance as positive predictors in predicting achievement scores of third grade students in the FWCS Title I program. The results of this study supported the literature on early intervention and grade retention of students. Literature on grade retention of students noted 12 program studies (Table 1.5). Grade retention status was lower in four programs: the Early Training Project (Gray, Ramsey, & Klaus, 1982), the Perry Preschool Project (Weikart et al., 1978; Schweinhart et al., 1993), the Harlem Training Project (as cited in Barnett & Boocock, 1998) by grade seven, and the Maryland Extended Elementary Pre-Kindergarten (Eckroade et al., 1991). Programs such as the Howard University Project (as cited in Barnett & Boocock, 1998) and the Florida Pre-Kindergarten (King, Cappellini,

& Rohani, 1995) found that grade retention was equal among the experimental and control groups during grade one through grade three. The Milwaukee Project (Garber, 1988) had equal grade retention status with the control group by grade four. The Cincinnati Title I Preschool (Nieman & Gastright, 1981) had equal grade retention status with the control group by grade eight.

Data findings of this study are consistent with literature findings. Retention of grade has a relationship to achievement. Appendix C reports a mean score of 51.55 for students who were never retained and 40.05 for students who were retained at grade level. Scores differed by approximately 11 points. Appendix D indicates that Hypothesis 6 was significant at a 0.05 alpha level. Appendix B reveals weak correlations between retention and other variables (program factor and personal attributes). Grade retention status of students was significant in predicting achievement as measured by the ISTEP+ battery of third grade students who attended the FWCS Title I pre-kindergarten program. It can be concluded that students who have been retained have lower TB NCE scores than students who were not retained.

Hypothesis 7. Socio-economic status of no poverty (identified by full-pay lunch count) was tested for statistical significance. The results of this study support literature findings on socio-economic status of students not living in poverty. The literature suggests a relationship between parental beliefs and practices and the type of center chosen by the parents for their child to attend. Middle-class parents may have more choices in the type of care for their child. Also, parents who exert more effort in obtaining educational opportunities for their children in early childhood education programs tend to

select good educational neighborhood school groups, effective teachers within schools, and good educational experiences outside of the school (Barnett & Boocock, 1998). Parents who are not living in poverty may have more educational opportunities to gain insight and knowledge in the area of child development.

Data findings related to this study support the literature that early education tends to predict achievement. These findings indicate a significant relationship between socio-economic status of no poverty, indicated by full-pay lunch count, and achievement as measured by the ISTEP+ battery scores of third grade students in the FWCS Title I program. Table 5.1 reports Hypothesis 7 to have significance at a 0.05 alpha level. Appendix C reports that SES/full-pay lunch status mean score differs from SES/reduced-pay lunch status by approximately seven points and from SES/free lunch status by approximately 13 points.

Hypothesis 9. Socio-economic status of students living in high poverty, indicated by free lunch count, accounts for 5.5% of the variance in predicting achievement scores of third grade students in the FWCS Title I program. The literature suggests that interventions for disadvantaged children may produce positive effects on cognitive development, using both intelligence testing and standardized achievement tests.

Intervention research (White & Casto, 1985; Barnett & Boocock, 1998) suggests that programs designed for disadvantaged children, including public programs, can produce an immediate effect in intelligence scores and achievement scores. Research (as cited in Barnett & Boocock, 1998) found some programs produced sizable gains in intelligence scores, achievement scores, grade retention, and special education placement

persisting into the school years.

Data findings related to this study support literature findings. Table 5.1 reports that Hypothesis 9 had significance at a 0.05 alpha level. Title I students in FWCS living in high poverty (measured by free lunch count) had significantly lower battery scores on the ISTEP+. Total Battery Normal Curve Equivalent mean score for SES/free lunch status is reported in Appendix C.

Hypothesis 10. Race of students accounts for 2% of the variance in predicting ISTEP+ battery scores of third grade students in the Title I pre-kindergarten program. Descriptive data (Table 3.1) indicated that 220 students in this study were reported to be minority status (African American, Asian, Hispanic, American Indian, and Multi Ethnic) and 205 students were reported to be majority status (Caucasian). Appendix C reveals the Total Battery Normal Curve Equivalent mean scores of race. Students of the minority race status had a mean score on the ISTEP+ of approximately six points less than students of the majority status. The results of this study support literature findings that race and achievement are related.

Race of students was significant in predicting ISTEP+ battery scores of third grade students who attended the Title I pre-kindergarten program. The literature suggests that African American, Hispanic, and other minority children are more likely to grow up in poverty (Ramey & Ramey, 1990). Appendix B suggests that there are correlations between race and poverty.

African American children and other minority children need help to overcome the disadvantages due to poverty (Wortham, 1998). The goal of early intervention programs

is to address the special learning needs of children who are at-risk of school failure (Garber, 1988).

Conclusions Derived from the Research Hypotheses Related to Achievement and Individual Personal Attributes (H4, H5, H8)

Three of the eight research hypotheses related to achievement and individual personal attributes were not significant: Hypotheses 4, 5, and 8 (parental status, sex of students, SES of low poverty identified by reduced-pay lunch count). The results of this study supported the literature. The results for parental status of students, sex of students, and socio-economic status of low poverty (identified by reduced-pay lunch count) can be found in Table 4.4 in Chapter 4.

Hypothesis 4. Parental status of students accounts for .6% of the variance in predicting achievement, measured by the ISTEP+ battery scores of third grade students who attended the Title I program. This variable was statistically non-significant, and no further testing was required. It should be noted that for the 425 students in this study, only nine came from single-parent families, leading the researcher to conclude there there are insufficient data to support any findings.

However, literature on parental status was reviewed. Literature on the role of other family influences on test scores (Burchinal et al., 1997) indicates that intelligence is the joint product of genetic and environmental influences (Neisser et al., 1996). Vygotsky (1978) believed that cognitive development occurs through interactions that a child has with more capable members of the culture, such as adults or more capable peers. These interactions in a child's context are essential to cognitive growth (Vygotsky, 1978).

Appendix C reports the Total Battery Normal Curve Equivalent mean score (TB NCE) of students living in households with both parents to have been 51.28, while students living with one parent or fewer (i.e., foster care) scored 39.89. Students living with both parents scored approximately 11 points higher than students living with one parent or fewer (i.e., foster care).

Descriptive data from this study indicate that 97.8% of all Title I third grade students in FWCS were living in households with both parents (as indicated by parents on student "family data forms") during the 1999-2000 school year. Table 5.1 indicates that Hypothesis 4 did not have significance at a 0.05 alpha level. Literature on two-parent families suggests that students living in a two-parent household may be more likely to engage in social interactions with other members of the family, influencing the child's conceptual learning. There are insufficient data to support this finding.

Hypothesis 5. Sex of students accounts for .4% of the variance in predicting achievement measured by the ISTEP+ battery scores of third grade students who attended the Title I pre-kindergarten program. The finding showed no significant relationship between sex and achievement. The sex of students participating in this study was approximately equal (222 males and 203 females). Additionally, the correlation between achievement and sex is reported in the correlation table in Appendix B. Also, Appendix C reports that female students scored approximately three points higher than male students. There is no literature to support further testing of this hypothesis. The researcher concludes that the sex of students has little or no relationship to achievement as measured by the ISTEP+ battery scores in the FWCS Title I program.

Hypothesis 8. Socio-economic status of low poverty identified by reduced-pay lunch count accounts for .1% of the variance in predicting achievement measured by the ISTEP+ battery scores of third grade students who attended Title I pre-kindergarten in FWCS. Socio-economic status of "low-poverty" children was statistically non-significant. Hypothesis 8 was not found to be significant at the 0.05 alpha level. Appendix C reports that the TB NCE mean score of SES/reduced-pay lunch status of students was approximately seven points lower than SES/full-pay lunch status of students. Also, it is reported that students with reduced-pay lunch status scored approximately six points higher on the TB NCE mean score. These findings suggest that all levels of poverty tend to predict achievement.

Implications

Early intervention compensatory programs such as Title I pre-kindergarten tend to predict achievement scores of third grade children who live in poverty. The best predictor of achievement was a combination of factors (program factor and personal attributes) in this study. Combined factors of personal attributes (parental status, sex, SES of full-pay lunch count, SES of reduced-pay lunch count, SES of free lunch count, and race) were also significant in predicting achievement measured by the ISTEP+ battery scores of third grade students who attended FWCS Title I pre-kindergarten programs. This significance implies that early intervention compensatory programs tend to predict achievement scores for economically disadvantaged students at the third grade level.

The program factor (participation in Title I pre-kindergarten) was considered in

this study to predict achievement without other variables (personal attributes). The program factor (participation in Title I pre-kindergarten) was not found to be a significant factor in predicting achievement. These findings are inconsistent with literature on compensatory Title I programs and other high-quality early education programs. Some studies reviewed suggested that compensatory Title I programs have the same effect on achievement as high-quality early education programs. However, this study did not support literature findings.

It should be noted that the Title I pre-kindergarten programs used in this study were in initial year of offering early education in a public school setting. Teachers were hired with varied early education backgrounds, and a high-quality curriculum was selected (High/Scope) as teachers began extensive training. This program had not been accredited by the National Association for the Education of Young Children (NAEYC) during the initial year of this study.

Combined personal attributes of students (parental status, sex of students, retention of grade, SES of "no poverty"/full-pay lunch status, SES of "low poverty"/reduced-pay lunch status, SES of "high poverty"/free lunch status, and race) were also tested for significance on achievement. This set of variables was significant in predicting achievement in this study. This implies that combined personal attributes of students predict achievement scores at the third grade level. These findings are not present in literature. Personal attributes of students as a combined set of variables to predict achievement scores of third grade students studied had not been previously reviewed. Literature on family influences such as parental status and environmental

factors indicate that genetic factors and environmental influences affect test scores. Descriptive data of students used in this study indicated that 97.8% of the students participating in this study were living in households with both parents, and the sex of students participating in this study was approximately equal (222 male students and 203 female students). There were insufficient data regarding parental status to support literature findings that parental status may affect achievement positively. Literature suggests that children living in two-parent families have more opportunities to interact with members of their culture, adults, or capable peers, contributing to the child's social context and cognitive growth.

The sex of students is not a contributing factor to achievement in this study. Descriptive data on students used in this study reported 222 males and 203 females. The correlation between sex of students and achievement scores was weak (Appendix B). Literature on sex of students and its effect on achievement of third grade students was not found and was therefore inconclusive. These findings imply that sex does not predict achievement in this study.

Grade retention of students negatively impacts achievement scores of students in this study. Students who were retained at grade level had a Total Battery Normal Curve Equivalent mean score of approximately 11 points lower than students who were not retained at grade level. These data imply that grade retention negatively predicts student achievement.

Socio-economic status (SES of "no poverty"/full-pay lunch status, SES of "low poverty"/reduced-pay lunch status, SES of "high poverty"/free lunch status) as a set of

variables was found to be significant at the 0.05 alpha level. SES of "no poverty"/full-pay lunch status was also significant, implying that students living in families that are not in poverty score higher on achievement tests than students who are living in families who are economically disadvantaged. SES of "low poverty"/reduced-pay lunch status was not found to be a statistically significant factor in predicting achievement. It should be noted that the TB NCE mean score of SES/reduced-pay lunch status of students was approximately seven points lower than SES/full-pay lunch status of students (Appendix C). Also, it is reported that students with reduced-pay lunch status scored approximately six points higher on the TB NCE mean score. This implies that SES of students tends to predict achievement. Literature on compensatory early intervention programs supports the data found in this study. Early intervention has a positive effect on achievement scores of economically disadvantaged students.

Race status of students was found to be statistically significant. Descriptive data (Table 3.1) indicated that 220 students in this study were reported to be minority status (African American, Asian, Hispanic, American Indian, and Multi Ethnic), and 205 students were reported as majority status (Caucasian). Appendix C reveals the Total Battery Normal Curve Equivalent mean scores of race. Students of minority race status had a mean score of approximately six points less than students of majority status on the ISTEP+. The results of this study support literature findings that race affects achievement. Literature suggests that compensatory early intervention programs positively affect achievement scores of African American and other minority students who live in poverty.

Several implications can be found from this study. First, the combined factors of the program factor (participating in Title I pre-kindergarten) and personal attributes of students (parental status, sex, retention, SES of high poverty, SES of low poverty, SES of no poverty, and race) affect achievement measured by the ISTEP+ scores of third grade students who participated in the FWCS Title I pre-kindergarten program. This implies that early intervention compensatory programs are effective in producing achievement gains with students from high-income (no poverty) and severely economically disadvantaged (high poverty) families. Children living in high-income (no poverty) families do not experience the severity of negative influences that impoverished environments may have on school performance.

Second, participating in substandard early intervention programs may not produce any cognitive benefits to a child. Highly structured programs are worse than not having a program at all (Ramey & Ramey, 1990, p. 4). Compensatory early intervention programs need to be made available to enhance the educational opportunities of economically disadvantaged children.

The factors that affect achievement scores of students relating to participation in Title I pre-kindergarten programs have not been studied in literature extensively. There is an abundance of literature on the topic of early education programs and their effect on intelligence testing scores of students. However, few studies have addressed compensatory Title I pre-kindergarten and its effect on achievement scores of third grade students in Title I programs. These efforts alleviate school performance deficits that result from disadvantaged or impoverished environments. Compensatory preschooling can

offset these deprivations by increasing the level of performance in children by the time they reach school age (Garber, 1988). These benefits are directly related to school performance as indicated on achievement tests, namely the Indiana Statewide Testing for Educational Progress (ISTEP+).

Suggested Further Research

Research is recommended using multiple compensatory early intervention programs (Title I pre-kindergarten) across the nation. Without additional research in Title I pre-kindergarten programs, it would be difficult to generalize long-term benefits and cost-benefit analyses. It is further recommended that a variety of assessments be studied as appropriate measures of school success. Most studies relating to the benefits of early education programs use intelligence tests as a factor to indicate a child's cognitive potential relating to school success. Intelligence testing is only one indicator of cognitive performance. Achievement testing is an additional indicator of school success. Also, similar instruments to the ISTEP+ may be used in studies across the nation, aligning state standards and proficiencies to test school achievement.

It is recommended that other program factors be included in future studies. For example, the methodology of programs (type of early childhood curriculum model/approach) may be tested as positive predictors in predicting achievement. In this study, all Title I pre-kindergarten programs were required to use the High/Scope curriculum. Examples of other curricula used in early childhood programs are models/approaches such as Montessori, Distar, or Reggio Emilia. Another program factor

to be studied is half-day/full-day kindergarten enrollment, testing as positive predictors in predicting achievement. Students who attended full-day kindergarten programs (i.e., the Milwaukee Project and the Carolina Abecedarian Study) may differ in achievement scores from those who attended half-day kindergarten programs (i.e., Howard University Project and High/Scope Perry Preschool) (Barnett & Boocock, 1998).

It is recommended that student "family data forms" provide additional programmatic information regarding the child's experiences in child care or day care prior to school entry. Students participating in Title I programs are likely to have had experiences in Head Start or other educational intervention programs. Further studies that predict achievement scores of students may show a difference in the population who previously attended early intervention programs, day care or home care programs, or had nursery school experience prior to school entry. Also, if the name of the day care or child-care facility is provided by the parent with the accurate dates/years in which the child attended, the researcher could gather information regarding accreditation status of the program with the NAEYC guidelines. These data would enable the researcher to make comparisons between accredited programs and non-accredited programs. This study lacked such an analysis, as parents were not asked to provide information about early educational experiences of the children prior to the 1993-1994 school year.

It is further recommended that other parental attributes be used as factors in predicting achievement. Methods other than lunch count status may be used to indicate levels of poverty. Census reports may prove to be more accurate indicators of a family's income level than parent responses on a "family data form" provided by the school system

upon program entry. Also, other surveying techniques may be employed to gather descriptive data beyond the "family data form." Responses regarding parental status may not be an accurate reflection of the number of parents living in the home after school entry. The "family data form" should provide for other parental choices such as "single-parent household," "both parents unmarried," and other variables. Most parents do not notify the school corporation of changes regarding parental status during the school year or any other year beyond the child's entry to the school corporation. Also, parents who are in need of supplemental financial services may exaggerate the number of adults living in the home as an explanation of family income status.

This study found six statistically significant predictors of achievement as measured by the ISTEP+ battery scores of third grade students (H1: combined factors of program factor and personal attributes, H3: combined personal attributes, H6: retention status, H7: SES/full-pay lunch, H9: SES/free lunch, and H10: race) who attended the FWCS Title I pre-kindergarten program. It is recommended that the search for additional predictors (i.e., other assessment tools to measure achievement; curriculum models/approaches; half-day, full-day, or extended-day programs; other early learning experiences prior to school entry or after Title I pre-kindergarten) be continued to better understand the effects of compensatory early intervention programs on school performance relating to achievement test scores.

Summary

Chapter 5 includes a brief statement of the research problem, the procedure

employed in the study, and the research hypotheses used. The conclusions section discussed the research findings as they related to each of the ten hypotheses of the study, examined the overall pattern of significance and non-significance, and discussed implications of the significant findings.

The significant research results indicated that combined factors of the program factor (participation in Title I pre-kindergarten) and personal attributes (parental status, sex, retention, SES of no poverty indicated as full-pay lunch count, SES of low poverty indicated as reduced-pay lunch count, SES of high poverty indicated as free lunch count, and race) of students accounted for a significant amount of variance as positive predictors in predicting achievement measured by the ISTEP+ battery scores of third grade students who attended the FWCS Title I program. Combined personal attributes accounted for a significant amount of variance in predicting ISTEP+ battery scores of third grade students who attended FWCS Title I pre-kindergarten programs. Retention of grade, SES of no poverty (full-pay lunch count), SES of high poverty (free lunch count), and race of students were sufficient to predict achievement as measured by the ISTEP+ battery scores of third grade students who attended the FWCS Title I pre-kindergarten program.

The implications related the findings of the study to the review of the literature and discussed practical applications for the results. The findings suggest that high-quality compensatory early intervention programs provide a solid base for continued high-quality education for economically disadvantaged children, producing positive results on students' achievement scores through third grade. This chapter concluded with recommendations for further research.

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APPENDICES

APPENDIX A

Fort Wayne Community Schools Family Data Form

THE FOLLOWING INFORMATION *IS A MUST* AT TIME OF ENROLLMENT. THE STUDENT WILL NOT BE ABLE TO START SCHOOL UNTIL THIS INFORMATION IS PROVIDED.

Today's Date: _____ Enrollment Date: _____

Student Number: _____ Family Number (if applicable): _____

Special Education: In your child's previous school, were they in a Special Education class? If "YES" for what abilities? _____

Language: Do you consider English to be your child's primary language? ___Yes ___ No

Student Name:
Last: _____
First: _____
Middle: _____
Nickname: _____

Residence:
Street Address: _____
City, State, Zip: _____
Home Phone Number: ( ) _____
Unlisted: ___ Yes ___ No

If your mailing address is different than the residence address, please indicate that address information below.

_____
_____

Sex: ___ Male ___ Female

Birthdate: _____
Birthplace: _____
Current age: _____

Grade child enrolling in:
___K ___1
___2 ___3
___4 ___5

School student is transferring from:
Name: _____
Address: _____
Phone #: ( ) _____

Has your child ever attended a Fort Wayne Community School? ___ Yes ___ No
If "YES" what year _____ Which school _____

Ethnic Data:
___01 American Indian/Eskimo
___02 African American
___03 Asian American/Pacific Islander
___04 Hispanic
___05 Caucasian
___06 Multi Ethnic

(Circle one)
Father/Guardian

_____
Last First Middle

Number you can be reached at during the day:
( ) _____

(Circle one)
Mother/Guardian

_____
Last First Middle

Number you can be reached at during the day:
( ) _____

Parent Status:
___00 Both Parents
___01 Guardian
___02 One Parent (Divorced)
___03 One Parent (Deceased)

If you are guardian of the student, do you have Court approved documentation?
___ Yes ___ No

APPENDIX B

Correlation and Simple Statistics

Correlation Table

	Sex of Students	Minority/ Majority	Parental Status	SES/ Free-pay	SES/ Reduced-pay	SES/ Full-pay	TB NCE	Pre-School
Minority/ Majority	-0.048 0.324							
Parental Status	0.042 0.382	-0.011 0.819						
SES/ Free-pay	-0.021 0.660	-0.289 0.000	-0.009 0.857					
SES/ Reduced-pay	0.076 0.120	0.182 0.000	0.010 0.839	-0.479 0.000				
SES/ Full-pay	-0.029 0.550	0.196 0.000	0.003 0.952	-0.786 0.000	-0.166 0.001			
TB NCE	-0.066 0.173	0.142 0.003	-0.079 0.102	-0.234 0.000	0.038 0.437	0.237 0.000		
Preschool	0.063 0.196	-0.067 0.166	0.013 0.793	0.058 0.230	-0.007 0.884	-0.061 0.213	0.013 0.796	
Retention	0.093 0.056	-0.049 0.310	-0.032 0.513	0.045 0.357	-0.029 0.547	-0.030 0.542	-0.115 0.018	-0.075 0.122

APPENDIX C

Total Battery Normal Curve Equivalent

Variable	N	Mean	Minimum Value	Maximum Value	Standard Deviation
Non-participation in Pre-K	345	50.91	1.00	99.00	20.45
Participation in Pre-K	80	51.58	3.00	99.00	21.65
Parental status - both parents	416	51.28	1.00	99.00	20.70
Parental status 1 or fewer	9	39.89	15.00	62.00	15.64
Sex - Female	203	52.46	1.00	99.00	21.41
Sex - Male	222	49.73	4.00	99.00	19.90
Never retained	406	51.55	1.00	99.00	20.66
Retained	19	40.05	8.00	86.00	17.74
SES/Full-pay lunch status	91	60.40	23.00	99.00	19.82
SES/Reduced-pay lunch status	39	53.49	3.00	95.00	22.98
SES/Free lunch status	295	47.82	1.00	99.00	19.71
Race - Minority	220	48.21	7.00	99.00	20.42
Race - Majority	205	54.06	1.00	99.00	20.53
All students	425	51.04	1.00	99.00	20.66

APPENDIX D

Summary of Hypotheses Tested

Hypothesis and Variable	R^2	df1/df2	Alpha	F	Prob	Sig
H1: All	.089	7/424	0.05	5.84	0.000	S*
H2: Program Factor (Pre-K)	.000	1/424	0.05	0.07	0.796	NS
H3: Personal Attributes	.089	6/424	0.05	6.77	0.001	S*
H4: Parental Status	.006	1/424	0.05	2.69	0.102	NS
H5: Sex of Students	.004	1/424	0.05	1.86	0.173	NS
H6: Retention Status	.013	1/424	0.05	5.68	0.018	S
H7: SES/Full-pay lunch	.056	1/424	0.05	25.13	0.001	S*
H8: SES/Reduced-pay lunch	.001	1/424	0.05	0.60	0.437	NS
H9: SES/Free lunch	.055	1/424	0.05	24.61	0.001	S*
H10: Race	.020	1/424	0.05	8.66	0.003	S*

* Significant at < .01.

APPENDIX E

Letter to Fort Wayne Community Schools

January 29, 2000

Dr. Thomas Fowler-Finn
Superintendent
Fort Wayne Community Schools
Grile Administration Center
1200 South Clinton
Fort Wayne, Indiana 46802

Dear Dr. Fowler-Finn:

Dr. Betty Steffy, during her tenure at both Indiana University-Purdue University Fort Wayne (IPFW) and Fort Wayne Community Schools (FWCS), asked me to conduct an assessment on the effectiveness of FWCS Chapter I pre-kindergarten programs. I selected this topic for my dissertation at Indiana State University (ISU) and would like to pursue it using FWCS's data. Dr. Douglas Coutts may have mentioned this to you during the dean's search and screening committee meeting.

This experimental study will test the theory that early intervention can predict students' achievement measured by the Indiana Statewide Testing for Educational Program (ISTEP) battery scores of 3rd grade students. "Early intervention" will be measured by student participation in the FWCS Chapter I pre-kindergarten program. The independent variable will be defined as the participation or lack of participation in the Chapter I pre-kindergarten program. The dependent variable will be defined generally as achievement, and the intervening variables will be parental status, readiness, sex, enrollment in half-day/full-day kindergarten, enrollment in Head Start, and retention status will be statistically controlled in the study.

As agreed upon by my dissertation committee, I would need access to the following information of 3rd graders for the 1998-1999 school year:

- ISTEP battery scores--3rd grade students
- parent status
- sex
- enrollment in half-day/full-day kindergarten

- enrollment in readiness program
- enrollment in FWCS Chapter I pre-k program during the 1994-1995 school year
- enrollment in Head Start during the 1993-1994 school year or the 1994-1995 school year (indicated on student "family data form")
- free/reduced lunch
- indication of student retention
- building codes

I assure you that the privacy of individual student subjects will be maintained and protected by the guidelines in the Institutional Guide to DHEW Policy on Protection of Human Subjects, U.S. Department of Health, Education, and Welfare, Publication No. 72-102 using informed consent when necessary and required. The rights and welfare of students involved in the study will be protected. Benefits to FWCS will be considerable, as certainly I will share my data and conclusions with your Administration.

Please respond by writing a letter of approval as an insert to the appendix of my dissertation and submission to members of my dissertation committee. Additionally, please refer me to the appropriate personnel to create the database necessary for this study. You may contact me regarding any of these issues at (219) 481-6442.

Very Truly Yours,

Janice Schroeder
Visiting Faculty
School of Education
Indiana University-Purdue University Fort Wayne

cc: Dissertation Committee Members:
Dr. Karen Liu, *Chair*
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Dr. Beth Whitaker
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