The Effect Of Pre-k Early Intervention Duration On Academic Achievement And Socialization Opportunities Of 3rd Grade Students Who Were Eligible For Special Education Services At Ages 3 To 5: An Exploratory Study Of Children With Developmental Delays

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THE EFFECT OF PRE-K EARLY INTERVENTION DURATION ON ACADEMIC ACHIEVEMENT AND SOCIALIZATION OPPORTUNITIES OF 3RD GRADE STUDENTS WHO WERE ELIGIBLE FOR SPECIAL EDUCATION SERVICES AT AGES 3 TO 5: AN EXPLORATORY STUDY OF CHILDREN WITH DEVELOPMENTAL DELAYS

by

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A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the Department of Child, Family, and Community Sciences in the College of Education at the University of Central Florida Orlando, Florida

Summer 2005

Major Professor: Wilfred Wienke
ABSTRACT

The study focuses on young children with developmental delays (DD) in a large school district and explores the effects of Pre-Kindergarten Exceptional Student Education (Pre-K ESE) duration on 136 students’ 3rd grade academic achievement and socialization opportunities. This study specifically examines the 2003 statewide assessment (i.e. Florida Comprehensive Assessment Test, FCAT) results of children with DD and their 3rd grade special education status.

The literature review showed that providing early intervention services for young children ages 3 through 5 with special needs in the public school system has become the movement of both the federal and state educational policies. However, the empirical studies regarding the effects of Pre-K early intervention programs provided within the public school system are few. A multivariate analysis of covariance (MANCOVA) was conducted to examine the effect of the Pre-K duration (1 year vs. 2 years) on students’ 3rd grade performance as measured by FCAT Reading scores, FCAT Math scores, and socialization opportunities (i.e. weekly Non-ESE minutes) while controlling for students’ socioeconomic status (i.e. free/reduced price lunch status) and gender. Moreover, a paired sample t test was conducted to examine the difference of the Matrix of Services scores between Pre-K and 3rd grade evaluations.

The results of this study provide an insightful picture of Florida Pre-K intervention duration on the performance of children with special needs in public schools.
ACKNOWLEDGMENTS

The completion of this dissertation has been an unforgettable learning experience. Concentration, focus, patience, and enduring to the end, are key factors beyond the words seen in this dissertation. Special thanks should go to my family, Jennifer, Kiana, and Makana, for their company, support, and motivation to reach this achievement. I am always in debt to Dr. Wienke and Dr. Wallace for their enduring guidance and patience. I also thank Dr. Cross and Dr. Klein-Ezell for their advice and encouragement. In addition, I also thank Ruthie and her staff for their trust and confidence in me. Without their support and friendship, this dissertation would not be possible.

I would like to express my gratitude to Carmel L. Chen, who has read many of my academic papers, including a draft of this dissertation. I also acknowledge and honor my completion of this degree to my dear parents and in-laws for their unconditional love and support. Finally, I thank my Heavenly Father and His Son, my Savior, Jesus Christ, who have opened many doors for me in my schooling and guided me to places where I have the opportunities to prepare myself to love, to serve, and to learn from others, including exceptional children.
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CHAPTER ONE
INTRODUCTION

In the United States, the regulations for providing educational services to exceptional individuals are prescribed by the Individuals with Disabilities Education Act Amendments of 1997 (IDEA 97). The services for exceptional young children from birth through age two are addressed in Part C of the IDEA, which focuses more on medical interventions. As the required special services for young children extend from the medical setting to the educational setting at the age of three, their educational and related services needs are governed by Part B of the IDEA. According to this law, exceptional children from ages 3 to 21 are entitled to receive free appropriate public education (FAPE) and related services such as assistive technology and communication devices, special transportation, extended school year services, etc.

There are 13 separate categories of disabilities in IDEA (i.e. Autism, Deafblindness, Deafness, Emotional Disturbance, Hearing Impairment, Mental Retardation, Multiple Disabilities, Orthopedic Impairment, Other Health Impairment, Specific Learning Disability, Speech or Language Impairment, Traumatic Brain Injury, and Visual Impairment). Children who are identified with any of these categories of disabilities are eligible for special education services. However, in many instances, it is extremely difficult to identify the precise disability or disabilities a child has in his or her early years. Thus, a special category—Developmental Delays (DD) —is temporarily used for young children under age 6 or 9 to receive services if individual states and local educational agencies approve of using categorization and age limitation.
In addition to regulating educational services for exceptional children, both the FAPE and the IDEA prefer that exceptional children receive their education in a “least restrictive environment (LRE).” An environment is designed to provide services for students with disabilities in the most integrated setting, usually in schools. The Commission on Excellence in Special Education (2002) also recommended that “students with disabilities are best served with their non-disabled peers whenever possible and consistent with the individual needs of the child and the wishes of the parent” (p.41).

Because of FAPE and other related regulations, more young children under the age of 5 are enrolled in public schools. In 2002, U.S. Department of Education & Office of Special Education and Rehabilitative Services reported that 599,678 children ages 3 through 5 with disabilities were served under IDEA in the United States for the school year of 2001 to 2002. This number approximately equaled to 5% of the total population of this age group and indicated a 31.7% growth since 1992-93. In the state of Florida, 28,233 (about 4.77%) of children from this age group were served during the 1998-99 school year (U.S. Department of Education, & OSERS, 2002).

In 2001, the U.S. Department of Education & National Center for Education Statistics (2003) conducted a national survey focusing exclusively on pre-kindergarten (Pre-K) enrollment and detailed information in U.S. public elementary schools. The results of the survey indicated that approximately 822,000 children were enrolled in public elementary school Pre-K classes during the 2000-2001 school year. This number represented 9% of the total population of 3- and 4-year-old children. Among those 822,000 children, 79% were enrolled in general education classes and 21% were enrolled in special education classes. As of October 1, 2000, 20% of the those children were 3
years old, 68% were 4 years old, and 9% were 5 years or older. Overall, during the 2000-2001 school year, 30% of those 822,000 children had Individual Educational Plans (IEPs). In comparison to this national percentage, the data collected for this current study indicated 31% of Pre-K children with IEPs were served in general education Pre-K classes, and 69% were served in special education Pre-K classes in the state of Florida. It is observed that more and more young children from ages 3 to 5 with special needs are served in public school systems across the nation.

**The Pre-K ESE Program**

The initial Florida Pre-K Early Intervention program was established in 1987. The primary target population was three- and four-year-old children who were economically disadvantaged. Fifty percent of the children served by the school-based intervention programs had an economically disadvantaged status according to the federal poverty level. The other 50% of the children were educationally at risk. In 1987, there were 10 full-day school-based programs operating, serving 280 young children in participating school districts for 180 school days per year. A full-day program operated 10 hours a day with before and after school care provided. The teacher to students ratio was 1:10. Parents were required to participate and be involved in activities such as parent information areas in school, at-home activities, and family classes where parents attended school with the children (Florida Department of Education, 1989).

In 1999, the Florida Legislature created the School Readiness Act and implemented state partnership with School Readiness Coalitions at the local level to ensure that children were well prepared and ready to enter kindergarten (Council for Education
Policy Research and Improvement, 2002). In 2001, The Commission on the Study of Children with Developmental Delays (2001) highlighted the Florida Pre-K Early Intervention programs and reported the following:

[Pre-K early intervention programs serve] up to 25% of children [who] may be three- and four-year-old children with disabilities; economically disadvantaged three-year-old children; or non-economically disadvantaged migrant preschoolers. Enhancements of educational readiness and preventions of later school failure are specific program objectives. This includes the enhancements of the cognitive, social, physical, emotional, and language skills of the children served. (p. L-24)

From the above statement, it is ascertained that the primary goal and mission of the FL Pre-K Early Intervention Program is to help participating children to achieve school readiness and later succeed academically.

Since the implementation of the No Child Left Behind Act of 2002, documentation of the academic performance of each student with or without special needs is required and the accountability associated with his or her teachers, schools, and public programs is under scrutiny. In Florida, the Legislature had earlier passed Senate Bill 1264 (SB 1264), Study on Children with Developmental Delays Act (2000), to emphasize the critical needs of serving young children with developmental delays. This action focused on how the state can better identify and effectively serve those young children with or at high risk of developmental delays and disabilities and thus optimally minimize the adverse effects of later school failure.
The IDEA requires that each state must designate governmental agencies that provide evaluations to identify the appropriate disability categories for eligible children and place these children into appropriate intervention programs. In Florida, there are 67 counties/school districts, and each county/school district may name its service agencies differently. All the agencies use a statewide guideline called Matrix of Services to document all the provided services for funding purposes. In the state of Florida, 27,677 children ages three through five who were identified as having a disability were served in preschool disability programs for the school year of 1999-2000, and of these, 7,473 (27%) were identified as having Developmental Delays (The Commission on the Study of Children with Developmental Delays, 2001).

The value of providing Pre-K intervention in the public school system is not only a major interest of parents and legislators, but also a significant issue for educators and academic researchers in the fields of early childhood and early childhood special education. Providing adequate services and support for children with developmental delays was the primary reason for the State of Florida to pass the “Study on Children with Developmental Delays Act,” yet few empirical studies have been performed to assess the impact of public Pre-K intervention programs on children with DD. Thus, a purpose of this exploratory study is to investigate if there are performance differences between students with developmental delays who received one year Pre-K intervention with those who received two years Pre-K intervention. Another purpose of the current study is to examine if the amount of service required by students at 3rd grade differ from the amount of service required at ages 3 to 5. The amounts of required service are measured by the scores on the Matrix of Services.
**Definition of Terms**

The following terms are defined as they are used in this study.

1. **Exceptional Student Education (ESE)**
   
   ESE is the name given in Florida to educational programs and services for students with special learning needs (including those who have disabilities and those who are gifted). It is sometimes called “special education” (Florida Department of Education, 2001).

2. **Pre-Kindergarten (Pre-K)**
   
   The term “Pre-K” refers to programs housed in public schools and/or classes at public schools that primarily serve children ages 3 to 5 who have not yet entered Kindergarten. These children may be enrolled in either a program of general education (i.e. regular Pre-K or Title I Pre-K) or special education (i.e. Pre-K ESE in Florida).

3. **Developmental Delays (DD)**
   
   Each official definition of the 13 categories of disabilities is prescribed by the IDEA of 1997, but the specific eligibility of the Developmental Delay category is decided at the state level. Each state can set the eligibility standards differently based on the examination results of one or more of the following developmental areas: physical development, cognitive development, communication development, social or emotional development, or adaptive development. In the state of Florida, the term DD is defined as a 25% delay or 2 standard deviations...
(SD) below the mean in one or more developmental areas, or a 20% delay or 1.5 SD below the mean in two or more developmental areas (Shackelford, 2000).

4. Matrix of Services

Matrix of Services (see Appendix A) is a funding convention instrument used in the state of Florida to determine the ESE cost factors that apply to the services and support provided to students with disabilities (Florida Department of Education, 2004a).

5. Socialization opportunities

For this current study, socialization opportunities is defined as children with special needs having opportunities to have contact with their non-disabled peers in school settings. The socialization opportunities emerge from the number of activities in which the students engage and the surroundings where the contacts may take place (Snell & Janney, 2000).

6. Weekly Inclusive Minutes (Non-ESE Minutes)

Weekly Inclusive Minutes is defined as the total amount of time that a student with a disability is with non-disabled peers. This includes class time, lunch, recess, and time between classes if this time is spent with non-disabled peers (Florida Department of Education, 1997). The numbers are reported in minutes per week and should be consistent with the student’s Matrix of Services record. The terms “Weekly Inclusive Minutes” and “Non-ESE Minutes” are interchangeable in the current study.
Statement of Problems

Although there is a great amount of literature pertaining to the academic performances of low socioeconomic groups such as children enrolled in Head Start and children of African American and other minority groups (The Consortium for Longitudinal Studies, 1983; Schweinhart, Barnes, & Weikart, 1993; Haskins, 1989; Campbell & Ramey, 1994, and White, 1990), longitudinal follow-up studies on children who were identified with special needs have seldom been available. Moreover, prior research that investigated the usefulness of early intervention programs on students’ developmental and social-behavioral outcomes was limited to either small sample size or well-funded demonstration model programs. Clearly, as emphasized by Conyers, Reynolds, and Ou (2003), there is a lack of empirical research on the values of early intervention curriculum in “large-scale public programs.” They further recommended “more research is needed in this area [large-scale public programs] to provide a better understanding of the impact of long-term interventions, especially with respect to different types of disabilities” (p.78). The same recommendation was also forwarded by Barnett (1995) and Werthamer-Larsson (1994). They both advocated the needs of research focus on children with special needs and public school programs. Furthermore, very little research has been conducted on the long-term usefulness of public school district intervention programs, especially at the Pre-Kindergarten (Pre-K) level.
Assumptions of Early Intervention

The impact of early intervention services is based on the following two major assumptions:

1. Early intervention, in the form of Pre-K intervention in public schools, is assumed to be positively associated with academic achievement, increasing opportunities of socialization, and reducing the required special education services by students with disabilities in later school years.

2. In general, early intervention appears to be helpful as long as the participants receive an accurate diagnosis and appropriate treatments (intervention).

The impact of early intervention programs can be and has been studied from two main perspectives, namely medical model and educational model. The medical model is frequently characterized as a major approach for young children with special needs. Before reaching 3 years of age, those children and families are usually associated with health care personnel such as physicians, nurses and those who perform standardized tests and collect data to make a diagnosis and provide the most acceptable intervention.

For those children beyond the age of three, the focus of their early intervention shifts from medical model to educational model within the school district domain. School personnel, administrators, and teachers are most familiar with the developmental and behavioral perspectives for implementing the best educational practices and intervention. This current study focuses on the usefulness of public educational programs between transitional phases as young children extend their social circle from family, hospital, and community to public schools.
The Commission on Excellence in Special Education (2002), a President’s commission, recommended that educators consider children with disabilities as general education children first and focus on results and embrace a model of prevention. This recommendation appears to be one of the driving forces of early intervention that attempts to prevent future school failure and promotes the effectiveness of education in general. Guralnick (1997a) advocated the needs of “second-generation” research on the usefulness of early intervention and the major task of identifying specific program features that are associated with outcomes for children and families.

From a functional perspective, Heward (2003) pointed out “the fundamental purpose or essence of special education as instructionally based intervention is to prevent (early intervention instruction), eliminate (remedial instruction), or overcome (compensatory instruction) the obstacles that might keep an individual with disabilities from learning and from full and active participation in school and the larger society” (p.187). The academic performance and socialization situations are the focal factors of this current study.

**Research Variables**

**Academic achievement variables**

The participants’ academic achievement was measured by their reading and mathematics scores on the Florida Comprehensive Assessment Test (FCAT). The FCAT is a criterion-referenced achievement test based on the Sunshine State Standards
that contains traditional multiple-choice test questions and other reading passages and mathematics problems that require written answers (Florida Department of Education, 1998). Since those children (the participants) with special needs were significantly delayed in developmental areas, for the purposes of this study the 3rd grade scores of reading and mathematics from Florida standardized tests may indicate students’ current development in terms of academic performances. Their performance may indirectly reveal the effect of the intervention programs in which those students participated.

In 2003, the Florida legislature required that students at grade 3 must achieve level 2 or higher in Reading; students with a failing score would be held back. This statewide testing result may inform us how well Florida’s students meet the state requirements. On the other hand, students with special needs may or may not fully participate in this test due to special exemption or alternate assessment toward a special diploma. The results of this study may provide us with evidence regarding the effect of Pre-K early intervention on children with developmental delays through their 3rd grade academic achievement based on their statewide-standardized test results.

**Socialization opportunities variable**

The socialization opportunities variable for this current study is measured by weekly inclusive time (Non-ESE minutes). The total amount of time a student who attends school each week is called total school weekly time. This number is reported in minutes per week and is consistent with the information provided on the student’s Matrix of Services. For students who receive ESE services, the total amount of school weekly time can be divided into weekly intervention service minutes and weekly inclusive time.
For example, John’s school day begins at 7:30 in the morning and ends at 2:30 in the afternoon. The total amount of school weekly time is calculated based on John attending seven hours per day, five days per week. This equates to 2,100 minutes per week (7 X 5 X 60 = 2,100). If John receives a 60-minute session of ESE program in the resource room three days per week, then the weekly intervention service minutes would equate to 180 minutes (3 X 60 = 180). Then, the total weekly inclusive minutes or Non-ESE minutes for John are equated to 1,920 minutes (2,100 – 180 = 1,920) (Florida Department of Education, 1997). Students’ time for social contact in school was measured by their weekly inclusive minutes with non-disabled peers in general, which may indirectly reveal the influence of the intervention programs on their socialization opportunities.

Matrix of Services/cost indicator

According to the Florida Department of Education (2002a), services for exceptional education students were funded through the Florida Education Finance Program (FEFP) using weighted cost factors that were based on eligibility for a specific exceptional program from 1973 to 1997. In 1997, the Florida Legislature adopted the revised Exceptional Student Education/FEFP funding model for statewide implementation to meet the requirement of 1997 amendments of IDEA LRE/state funding mechanism provisions. Since the beginning of the 1997-98 school year, school districts have been required to complete a form called Matrix of Services (see Appendix A) for every exceptional student. Trained public school personnel are required to complete the Matrix of Services at the initial placement and change in services level. Public school personnel also review the information annually to ensure that the Matrix of
Services records are updated and appropriately reflect the actual service needs of the student.

The staffing/Individual Education Plan (IEP) team members may review all available records that a child has. Based on the current evaluation results, the team members are responsible for converting the results into Matrix of Services format for funding purposes under the FEFP. This matrix is based on the needs of individual students (i.e. goals of IEP, family support plan, or educational plan) and matches the needs with appropriate services. The Matrix of Services details a participating child’s special education request from level 1 (normally available) to level 5 (specialized support and assistance). The Matrix also records different descriptive items of accommodation and modification services or supports to be provided by the school district to the student. The total score of the Matrix of Services is added by rating the individual level of requirements in five domains: curriculum and learning environment, social/emotional behavior, independent functioning, health care, and communication and also weight scores in special considerations. According to a Cost Factor Scale, the total ratings number (range from 6 to 22 and above) will be converted into a cost factor range from 251 (lowest) to 255 (highest) for management and budget control. The positive relationship between the cost factor and the ranges of composite scores of all domains can be an indicator for a child’s severity of conditions (see Table 1).
Table 1

Matrix of Services /Cost Factor Scales

<table>
<thead>
<tr>
<th>Cost Factor</th>
<th>251</th>
<th>252</th>
<th>253</th>
<th>254</th>
<th>255</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Ratings</td>
<td>6-9</td>
<td>10-13</td>
<td>14-17</td>
<td>18-21</td>
<td>22+</td>
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</table>

For instance, if the required services for each of the five domains are rated as level 1 on the Matrix for a child, his/her total ratings equal 5 — below the lowest ratings range (6-9). As a result, this child is not eligible for special education services. Using the Matrix of Services in Florida to monitor the special educational needs of student and to allocate an appropriate funding is mandated by Florida legislation (Florida Department of Education, 2002b). This mechanism has been implemented across the State.

Florida Department of Education (2002b) conducted a telephone survey during August and September of 2001 regarding the completion of Matrix of Services in the state’s 67 school districts. The data indicated approximately 60% of the students were rated at the 251 level, 25% at the 252 level, 10% at the 253 level, and between 5% to 6% were at the two highest 254 & 255 levels. The findings from this survey also indicated that there are several other purposes for using the Matrix at the school district level: a) Allows the school districts to establish baseline data used for the allocation and distribution of funds; b) Keeps track of the funding stream to ensure that schools serving students with more intense needs are receiving a greater proportion of exceptional student
funding; c) Uses the Matrix data as a financial planning tool; and d) Uses the Matrix as a device of checks and balances for appropriate services recorded in the IEP. This cost factor serves as an overall required services indicator for each individual participant.

By tracking the changes of cost factor, such as from 255 at the age of three to 251 at 3rd grade or age nine, the reduction of services cost may indicate the effect of intervention. For this study, students’ scores of Matrix of Services Factor (MSF), pre-scores (at age 3 to 5) and post-scores (at current 3rd grade) were entered as the test variables to measure individual student needs of services/cost. In this study, those children who no longer needed any services were assigned an MSF score of 0.

**Purpose of Research/Research Questions**

The purpose of this study is to investigate the possible duration effect of Pre-K early intervention programs in public schools on the exceptional children who were developmentally delayed at ages three to five. Specifically, this study examines the following questions:

1. Is students’ third grade performance in academic achievement (measured by FCAT reading scores, FCAT math scores), and socialization opportunities (measured by weekly inclusive time with non-disabled peers) different between students with developmental delays who received one year Pre-K intervention and those who received two years such intervention at ages three to five, after removing the effects of socioeconomic status and participation in Part C early intervention?
2. Is the amount of required service funding (as measured by the Cost Factor Scale of Matrix of Services) for the exceptional students (with DD) at the Pre-K intervention stage different from the amount of service funding required at 3rd grade?

3. What was the students’ (current third grade) diagnostic labels distribution since they were identified with developmental delays at ages three to five?

4. When (in which grade) did students exit special education if they were no longer qualified for special education services?

5. What is the distribution of current educational settings among these children who were identified as DD?

**Pre-Analysis statistical techniques and data screening**

For question number one, Mertler and Vannatta (2002) provided a useful process — the decision-making tree for statistical tests to identify the appropriate multivariate techniques to be used. By identifying the purpose of a research question and the number and types of variables, a pre-analysis multivariate technique for the current study is constructed as shown in Table 2. All data screening and statistical analysis were implemented in the Statistical Package for the Social Science (SPSS) 10.0 edition.
### Table 2 Decision-Making Tree

<table>
<thead>
<tr>
<th>Number &amp; type of DV</th>
<th>Number &amp; type of IV</th>
<th>Test</th>
<th>Goal of Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1</td>
<td>MANCOVA</td>
<td>Create linear combo of DVs to maximize mean group differences</td>
</tr>
<tr>
<td>Quantitative, 3rd grade FCAT Reading, Math &amp; Non-ESE minutes</td>
<td>Categorical, DD with two levels (one year &amp; two years) Pre-K intervention</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


Before the actual statistical analysis takes place, Mertler and Vannatta (2002) list three basic assumptions: normality, linearity, and homoscedasticity to assess “the adequacy of fit” between the data and specific procedure for all variables (p.26). Prior to One-Way Multivariate Analysis of Covariance (MANCOVA) being conducted, examination of data for missing cases, outliers, and fulfillment of above assumptions must occur or transformations of the original data are considered. Moreover, the following list presents the assumptions for MANCOVA of this current study from Stevens (2002):

1. The observations are independent.
2. The distributions of scores on the DVs must be normal in the populations from which the data were sampled.
3. The distributions of scores on the DVs must have equal variances.
4. Linear relationships must exist between all DV-covariate pairs, i.e. FCAT Reading and the two covariates (the socioeconomic status and participation of Part C); FCAT Math and the two covariates; and Non-ESE minutes and the two covariates).

5. If two covariates are used, the regression plans for each group must be homogeneous or parallel.

6. The covariates are reliable and are measured without error.

A pre-analysis plan for conducting MANCOVA is following by a checklist, which was developed by Mertler and Vannatta (2002).

Research Design

The current study uses archival data in a quasi-experimental design (Campbell & Stanley, 1963; Shadish, Cook, & Campbell, 2002). A database is constructed mainly from the statewide data system (Customer Information Control System, CICS) and the master data files from the school district-designated evaluation agent.

Based on the study of Reynolds (2000), using much larger school district data to support the hypothesis “indicates that the effects of early intervention will be maintained to the extent that the post program schools that children attend are of sufficient quality to meet their scholastic and developmental needs” (p.15). By using multivariate statistical methods, this current study not only investigates the selected outcomes of children with special needs but also examines the relationship between dependent variables (i.e. FCAT reading and math achievements and weekly inclusive minutes). The research design is shown in Figure 1 for research question one.
Early identification & Early intervention

<table>
<thead>
<tr>
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<th>Students academic performances and Socialization Opportunities</th>
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<tr>
<td>At age 3 to 5</td>
<td>At 3rd grade</td>
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<tr>
<td><strong>IV Levels</strong></td>
<td><strong>DVs</strong></td>
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<td>DD with one year Pre-K</td>
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<td>DD with two years Pre-K</td>
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Figure 1. MANCOVA test for research question one.

For research question two, a paired t-test is used for investigating the changes of the Matrix of Services Factor (see Figure 2). Finally, descriptive analyses are conducted for investigating the changes between the Pre-K stage and 3rd grade for questions three to five.

<table>
<thead>
<tr>
<th>Children who were identified with DD during 1997-1998 school year</th>
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<tr>
<td><strong>Matrix of Service Cost factor</strong></td>
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<tr>
<td>at age 3 to 5</td>
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<td>at 3rd grade</td>
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Figure 2. Paired (pre and post) sample t test for research question two.
Significance of Research

This study provides several significant contributions to early childhood and special education literature. The value of early intervention programs is relevant to parents, educators, program administrators, lawmakers and academic researchers (Reynolds, Walberg, & Weissberg, 1999). This current study is one of the few large-scale studies investigating the usefulness of public school Pre-K intervention programs for developmentally delayed children in the State of Florida. The findings of this study may help us better understand the effect of Pre-K intervention on exceptional students’ third grade academic performance and socialization opportunities in public schools. In addition, as the State of Florida plans to implement voluntary universal Pre-K programs in 2005, the result of this study may provide a timely and valuable reference for individuals who are interested in the integration of regular and special Pre-K programs.

As mentioned in the introduction section, Developmental Delays (DD) is a temporary disability category that is only applied to exceptional children ages 3 to 6 or 9 depending on each state’s policy. In the past, the State of Florida required the label of Developmental Delays to be removed or replaced by the age of six. Currently, some have suggested extending the age range for using DD category from 6 to 9 years of age as is done in several other states (Greenberg & Schumacher, 2003). The appropriateness of using the DD label is a controversial topic among early intervention researchers. The results of this study may provide important information pertaining to this issue. Moreover, studying the needs of children with developmental delays and providing them with appropriate support is the main focus of the State of Florida under the Study on Children with Developmental Delays Act of 2000. This study is considered one of the
few academic studies that respond to this state’s legislative action and investigates the relationship between the efforts of the public school system and the performance of children with DD.

Currently, in the State of Florida children with DD are given different labels after they reach the age of 6. There is no document pertaining to how many children with DD have exited ESE programs after Pre-K intervention and how many of them have been given different disability labels. What are their new labels after they are reclassified at the age of 6? Understanding the precise disability of children with DD is of interest for practitioners and academic researchers that may have applications in developing more specific instruments for early assessments.

Finally, the funding availability for Pre-K ESE intervention programs is one of the major concerns for program administrators. In the State of Florida, the Department of Education required each ESE educator and administrator to be trained for completing a Matrix of Services report for each student enrolled in the program (Florida Department of Education, 2001). The purpose of this report is to manage and allocate funding under the Florida Education Finance Program. This is a statewide standard to document the cost of services provided to each individual ESE student. Some ESE educators and administrators perceive the Matrix of Services as a useful indicator for tracking required services and their costs, while others have questions as to its practical usefulness and view it as another form of paperwork. This exploratory study may verify their perception regarding the usefulness of this statewide tool.
**Organization of the Study**

This study is organized into five chapters. Chapter one provides an overview of the study including the statement of problem, purpose of research, significance of research, and the basic methodology of the study. Chapter two consists of a review of the literature in the area of early intervention in general and public schools. The historical and demographic information regarding Pre-K early intervention programs both in the U.S. and the State of Florida is described. Early intervention literature is reviewed, and research hypotheses are postulated. In chapter three, the research procedure and methodology of the study are detailed. The fourth chapter includes the data analysis and results of the study. Discussion of the results, contributions and implications of the study, limitations of the study, and suggestions for future research are presented in the fifth and final chapter.
CHAPTER TWO

REVIEW OF LITERATURE

This section is a review of literature in the area of early intervention. Initially, a historical background of early intervention is presented to highlight the changing of legal requirements and demographic information regarding providing Pre-K early intervention services in public schools. Second, a review of early intervention literature indicates the needs of research on children with special needs in large-scale (such as school district) early intervention programs embedded in public school systems.

Historical Background and Demographic Information

Federal Laws and Policies

In the United States of America, early intervention efforts were initiated by the investments of federal and state governments in early childhood care and education programs. During the 1960s, “War on Poverty” was the focus of many federal policies. In 1965, the government began Head Start, a federal early intervention program that aimed at alleviating the challenges of poverty for children (Ellsworth & Ames, 1998). This earliest federal intervention program provided major efforts for young children who were at risk of early school failure due to the disadvantage of low socioeconomic status but not for children with disabilities at the initiation stages.

The first federal law, the Handicapped Children’s Early Childhood Assistance Act of 1968 (P.L. 90-538), was enacted exclusively to provide services to preschoolers with
special needs. At that time, there were 24 experimental early intervention programs (Fewell & Oelwein, 1991). It was not until the passing of the Economic Opportunity and Community Partnership Act of 1974 that states were required to reserve 10% of enrollment slots of Head Start programs for children with disabilities (Hooper & Umansky, 2004). Federally funded early intervention programs for exceptional children were finally available across the nation.

Since then, the federal laws have been the leading force for providing legislative efforts and funding incentives to serve children with special needs. For instance, the Education for All Handicapped Children Act of 1975 (P.L. 94-142) was the first federal law that provided funding for state programs to serve preschoolers ages 3 to 5 years old with disabilities (Howard, Williams, Port, & Lepper, 2001). In 1986, the Act was amended and the name was changed to the Education for the Handicapped Act of 1986 (P.L. 99-457), which extended the services to infants and toddlers who had developmental delays or were at risk of developmental delays (Morgan & Madsen, 1994). This amendment may have had an influence on states’ choices of using Developmental Delays as a primary category in early intervention for children ages 0 to 5.

Moreover, the passing of the Individuals with Disabilities Education Act of 1990 (IDEA, P.L. 101-476) and the amendment to this Act in 1991 (IDEA, P.L. 102-119) has broadened intervention programs for exceptional children from federal model programs such as Head Start to state education systems. The IDEA of 1991 included a term called “free appropriate public education” (FAPE), which required special education and related services to be provided in preschool, elementary, or secondary school education at the state level (Taylor & Harrington, 2003). In addition, within Part H of the IDEA of 1991,
early intervention providers are required to make special services transition plans available for preschool and younger aged children as they transition into the public school system. Neuharth-Pritchett and Mantzicopoulos (1998) pointed out that the efforts and challenges of transferring Head Start children to public schools have led to a task known as the Head Start/Public School Transition Demonstration Project.

In 1997, Congress reauthorized IDEA and changed Part H to Part C for Infants and Toddlers with Disabilities (0 to 3 years old), and separated provisions of serving 3- to 21-year old children in Part B of Assistance for Education of All Children with Disabilities (3 to 21 years old). Moreover, Section 619 of Part B specifically stated federal funding (the Preschools Grants Program) was available for states that provide special education services to children with disabilities.

Additionally, Part B of IDEA emphasized that special education and related services should be delivered in the least restrictive environment (LRE) such as public schools (Turnbull & Turnbull, 1998). Sorrells, Rieth, and Sindelar (2004) stated the LRE requirement perceives that “the general education curriculum is presumed to be the appropriate beginning point for planning each student’s Individual Educational Plan (IEP)” (p.31). Other federal laws also provided legal support for serving young children with disabilities in public school settings such as the Americans with Disabilities Act (ADA) of 1992. These laws prohibit discrimination against individuals with disabilities and address public accommodations that specifically include child care centers and public school programs.

At age 3, children who have participated in Part C interventions need to transition to school district special education programs in which they are served under Part B of the
IDEA. A child-centered Individual Educational Plan (IEP) is constructed to ensure that the educational needs of the children are continually met and supported through the transition processes from early medical-oriented intervention (ages 0 to 3) to early educational intervention (ages 3 to 5). Schools and school districts may continually provide two more years of Pre-K early intervention services to children with special needs prior to entering the formal public school system.

Currently, students’ performance and educators’ accountability appear not only to be the concern of parents but also the focal point of many federal requirements such as the reauthorized IDEA of 1997 and the No Child Left Behind Act (NCLB) of 2002. These accountability movements use academic performances, such as standardized tests scores, to evaluate students’ progresses and educators’ responsibilities. Academic performances seem to be equally important to children with and without special needs, and the efforts to help children be ready for school begin as early as their entrance to Pre-K. Currently, several states have implemented and many states are in the process of providing early intervention programs within public school systems to young children at ages three to five years old such as, the proposed Voluntary Pre-K in Florida.

Demographic Information

Clifford, Early, and Hills (1999) estimated approximately one million children were served in the public school systems before kindergarten in the United States of America. These Pre-K settings include, but are not limited to, the public school Pre-Kindergarten Early Intervention Program (such as Pre-K ESE in Florida), community childcare and other delegate community agencies such as Head Start. They found that
public school systems are beginning to develop a “patchwork” of service for the needs of young children and their families. For instance, the quality of services varies widely, and the information on the extent of services is lacking. In order to provide reliable data for early intervention services, the IDEA Amendments of 1997 require each state to collect and report service information including disability categories used for children ages 3 through 5.

In 2002, the information of services provided to children ages 3 through 5 was finally available in the 24th Annual Report to Congress. According to the annual report, 599,678 children of this age group were served under IDEA in 2000-2001, which accounted for 5% of the total population of children ages 3 through 5 in the USA. Among these preschoolers, 55.2% were classified with speech or language impairment and 24.9% with developmental delays (U.S. Department of Education & OSERS, 2002).

This federal report also indicated that 40% of these exceptional preschoolers were served in typical early childhood settings, but a bipolar phenomenon was observed at the state level. On one hand, 11 states reported serving more than 50% of their young children in normal early childhood settings. On the other hand, 17 states reported serving fewer than 25% in such settings. Lerner, Lowenthal, and Egan (2003) presented national data collected by the U.S. Department of Education for serving children ages 3 to 5 years old with special needs in 2000. Their data indicated that 53% of the children were served in a general education class, 31% in a resource room, 8% in a separate class, and 8% were in other settings. In comparison to these national data, the settings for delivering special education for the same age group in the State of Florida seem different. According to a senior administrator of the participating agent for this current study,
approximately 74% of children with special needs are served in separate classrooms such as Exceptional Student Education (ESE) programs (personal communication, November 20, 2003). In addition, the Florida Department of Education, and Bureau of Exceptional Education and Student Services (2004) reported that only 7% of children with disabilities ages 3 through 5 are served in early childhood settings with their non-disabled peer, and this number is much lower than the national average of 37%. This practical difference suggests that early intervention efforts in Florida are different to national norm, and the impact of such practice on young children with special needs warrants investigation.

The notion of “earlier is better” (Kim, Innocenti, & Kim, 1996) pertaining to the effect of Pre-K early intervention programs seems to be widely accepted. The numbers of early intervention programs initiated by states are increasing. These intervention programs are available both for children with and without special needs such as Universal Pre-K, State Head Start, Title 1 Pre-K, State Funded Pre-K for at-risk, and locally funded Pre-K (deFosset, 2001).

Providing early intervention services for young children ages 3 through 5 with special needs in the public school system has become the focus of both the federal and state educational policies. The effectiveness of public early intervention programs is perceived to have an effect on students’ performance, but empirical studies regarding the effectiveness of early intervention programs provided within the public school system are few, especially in the State of Florida.

According to A new era: Revitalizing special education for children and their families, a report published by President Bush’s Commission on Excellence in Special Education, “current law has become overly procedural and complex. As a result, schools
and other education agencies cannot focus on the improvement of student performance and on student transition to independence and self-sufficiency after graduating from high school” (The Commission on Excellence in Special Education, 2002, p.11). This conclusion brought major frustration and challenge to all the stakeholders, and thus children’s learning performance and continuous progress has become the focus of special education. Researchers and educators in the field of Early Childhood/Early Childhood Special Education are interested in understanding the extent to which early intervention services affect students’ performance and long-term improvement.

**Effects of Early Childhood Intervention**

Many researchers have investigated the effects of early childhood intervention programs for young children from various perspectives. As mentioned in the historical background section, the initial purpose of providing early intervention was to reduce potential early school failures for socioeconomically disadvantaged children. As a result, the majority of research in the domain of early childhood intervention effects has focused primarily on at-risk children with low socioeconomic status. Although the results of these studies are not necessarily compatible because of the variation between study designs and the focus of each study, the overall findings indicate that early intervention participation has a positive effect on later school performance for at-risk children. A review of studies on early intervention programs for children with low social economical status is presented below.
Head Start Programs

As a part of the effort to fight poverty, Head Start has been the centerpiece of federal funded community based early intervention programs since 1965 (General Accounting Office, 1997). Consequently, the effects of Head Start intervention have received much research attention. Some studies reported positive results (Currie & Thomas, 1995; Nystrom, 1988; Ramey, Ramey, Phillips, Lanzi, Brezausek, Katholi, et al., 1999), some research showed negative results (Marcon, 2000), and some research findings were inconclusive (Van Horn & Ramey, 2003). The differences in measuring program effects and research designs (Epstein, 1995) could be considered as the main factors that led to these incompatible research findings.

When program effectiveness was measured by school readiness (Nystrom, 1988), academic achievements in reading and mathematics (Ramey, et al., 1999), cognitive attainment, and grade retention (Currie & Thomas, 1995), the results were most positive in Kindergarten. On the other hand, when program usefulness is measured using Head Start graduates’ third grade mean GPA compared with the average GPA of other Pre-K peers. Head Start participants had a lower GPA score and a lower achievement test score (Marcon, 2000). When academic achievement is measured by the Woodcock-Johnson Tests of Achievement at kindergarten level, the average test score of Head Start participants were significantly lower than other kindergarteners (Redden, Ramey, Ramey, Forness, & Brezausek, 2003).

Several review studies reported inconclusive results. Washington and Bailey (1995) reported the effects of Head Start participation and concluded that: (1) cognitive test score gains do not appear to continue over the long term, and (2) very few Head Start
students appear to be in grade retention or assigned into special education classes. The General Accounting Office (1997) reported that because of research design limitations, neither positive conclusions about Head Start (test scores) nor negative conclusions (effects disappearances in kindergarten) could be firmly drawn from research findings.

Public Schools Early Intervention Programs

Another well-known early childhood intervention program is the Child-Parent Center (CPC) Preschool Program in Chicago Public Schools. The CPC program was established in 1967 through funding from Title I of the landmark Elementary and Secondary Education Act of 1965 (Reynold, Miedel, & Mann, 2000). It is the second oldest federally funded preschool program in the United States following Head Start. The overall goals are to promote children’s academic success and facilitate parent involvement in children’s education. The majority of students served by CPC are from economically disadvantaged families.

The Chicago Longitudinal Study (2002a) reported its CPC follow-up study of 1,539 participants at age 22 and found that “youth who attended the CPCs for 5 or 6 years showed the highest levels of school achievement and educational attainment” (p.2). The Chicago Longitudinal Study (2000b) collected the participants’ data at age 20 and indicated, “the quality of the post-program school environment is crucial to maintaining the longer-term effects of early intervention” (p.13). In an earlier study, Reynolds (1995) investigated 757 CPC participants at age 3 or 4 through sixth grade and found “2-year participants began and ended kindergarten more academically competent that 1-year participants” (p.1). Conyers, Reynolds, and Ou (2003) investigated 1,377 children from
the same Chicago Longitudinal Study group and found its program’s long-term effects on special education outcomes for the following four types of disability: specific learning disability, speech or language impairments, mental retardation, and emotional or behavioral disorder. The findings indicated that using school readiness test scores could support their claim of CPC’s impact on special education outcomes and the cognitive advantage hypothesis. The current study was informed by this hypothesis in which the early cognitive and language stimulation experienced in center-based education may directly affect children’s cognitive functioning behavior in school achievement, academic outcomes, and social behavior (Conyers, Reynolds, & Ou, 2003; Reynolds, 2004).

Research contributions generated by CPC studies are twofold. First, this series of studies provided results of large-scale early childhood intervention research. Second, CPC follow-up studies provided a better understanding of long-term effects of public school early intervention programs in several perspectives, including parent involvement (Miedel & Reynolds, 1999), child maltreatment (Reynolds & Robertson, 2003), high school dropout (Temple, Reynolds, & Miedel, 1998, 2000), school mobility (Mehana & Reynolds, 1995; Temple & Reynolds, 1999), juvenile arrest and cost-benefit analysis (Reynolds, Temple, Robertson, & Mann, 2001a, 2001b).

Particularly relevant for the current study is the works by Reynolds (1995) and White (1986). Reynolds (1995) investigated the impact of one or two years of early intervention programs at age 3 or 4 on later school results through Grade 6 among 1,539 low-income, minority children (95% Black, 5% Hispanic). He found that the group having 2 years of participation in early intervention programs consistently performed better, but the effects were not significant. On the other hand, White (1986) reported
positive effects on programs of longer duration through his meta-analysis of 329 studies of early intervention. He also found that “22 of 52 reviews of early intervention cited longer intervention was better, at least for academic achievement” (p.3). Moreover, Kim, Innocenti, and Kim (1996) concluded their meta-analysis study with mild evidence to support that earlier interventions lead to better outcomes for children who are economically disadvantaged or disabled. Overall, there was no conclusive evidence of the benefit of a second year of preschool intervention for low socioeconomic students although longer duration programs do have valuable effects on a child’s later academic and social outcomes. Further research is needed to examine children with special needs subgroups in urban metropolitan areas regarding the duration of early intervention.

**High-Quality Model Programs**

**Carolina Abecedarian Project**

The other two well-known high-quality model programs, the Carolina Abecedarian project and the High/Scope Perry Preschool program, also conducted longitudinal follow-up research and contributed to the knowledge of the effects on early intervention programs.

In the Abecedarian project, in which 112 African-American children from low-income families received educational childcare and preschool intervention services from infancy through age 5, follow-up studies were conducted through age 21 (Masse & Barnett, 2004). The major findings of this experimental study indicated that a high quality and longer duration (5-year program) had long-lasting effects. The study reported the following.
First, young adults who received early educational intervention had significantly higher mental test scores from infancy through age 21 than the untreated control group. Second, enhanced language skills in the children seem to have mediated the effects of early intervention on the results of the mental test (i.e., cognitive skills). Third, reading achievement scores were consistently higher for individuals with early intervention. Treatment effect sizes remained large from primary school through age 21. Fourth, mathematics achievement showed a pattern similar to that for reading, with treated individuals earning higher scores. Effect sizes were medium in contrast to the larger effects for reading. Fifth, program participants were significantly more likely to attend a university (40%) in comparison to 20% of the control group. Finally, employment rates were higher (65%) for the treatment group than for the control group (50%), although the trend was not statistically significant.

The High/Scope Perry Preschool Program

The High/Scope Perry Preschool study examined the lasting program effects on 123 African Americans born in an impoverished area of the Ypsilanti (Michigan) area (Weikart, Deloria, Lawser, & Wiegerink, 1970). The longitudinal results of the Project provided the following conclusions. First, children who participated in high-quality preschool programs obtained significantly higher scores on measures of cognitive ability than control group children. As both groups progressed through school this superior level of functioning disappeared by 3rd grade.

Second, children who participated in preschool obtained significantly higher scores on achievement tests in elementary school than control group children. This
significant difference continued throughout the years of follow-up, including third grade. Third, children who participated in preschool received better ratings by elementary school teachers in academic, emotional, and social development than control group children. This difference continued throughout the follow-up years up to adulthood (Bracey, 1996; Schweinhart, 2003).

In sum, the above literature reviews of early childhood intervention programs focusing on at-risk children indicated that the program generally had positive effects on students’ later performance in various domains. Educational challenges for at-risk children, however, are different from the challenges triggered by disabilities. Thus, research results generated by studies focusing on at-risk children do not seem to be perfectly applicable to children with special needs. Therefore, several studies that concentrated on exceptional children were reviewed in the following section.

**Early Childhood Intervention Program for Children with Special Needs**

Buntaine and Costenbader (1997) investigated 90 pairs of Pre-K students who were matched on three variables: sex, date of birth, and developmental age. These students who has been categorized with “developmental immaturity” were placed either into one-year Pre-k or Non-Pre-K groups. No significant difference was found between the two groups of students on 2nd grade Stanford Achievement Test (SAT) Reading and Mathematics achievement and on 3rd grade norm-referenced achievement test (Pupil Evaluation of Progress).

Holahan and Costenbader, (2000) examined 30 preschool children with disabilities who were compatible with age, gender, functional level, related services
received, and school schedules in inclusive and self-contained classrooms. The results obtained from the Brigance Diagnostic Inventory of Early Development (Revised version) indicated that children with higher function performed better in inclusive setting and children with lower function performed equally well in both settings. Moreover, children in full-day classrooms performed better than their peers in half-day classrooms in the areas of social and emotional development and overall developmental scores.

Reynolds and Wolfe (1997) examined 1,150 children who were served in the Chicago Child-Parent Centers and found 15% of the children received special education service during elementary grades. They found that special education improves the performance of children with other disabilities except for those with learning disabilities. In 1999, they revisited and reanalyzed the same group of children with a better design and richer variety of control variables such as gender, race, parents’ education, number of siblings, and eligibility for free lunch. When using standardized test scores in Reading and Mathematics as the measurement between participants who were placed in special education and those who were not, the achievement gap tends to grow wider and further apart after 4th grade. They suggested that special education placements should target the earlier grades and also found that it was not effective on children with learning disabilities (Reynolds & Wolfe, 1999).

Gamel-McCormick and Amsden (2002) reported that the Delaware Early Childhood Longitudinal Study is a stratified random sample project with two groups (with and without early intervention) and a post-test only designed study on a percentage of exceptional students meeting or exceeding 3rd grade Delaware State Testing Program (DSTP) reading and math standards. They found that those students who were identified
early (3 or 4 years old) and participated in Preschool special education were more likely to meet or exceed the 3rd grade reading and math standard than those students who were identified with a disability after entering kindergarten.

According to the above literature reviews, research hypothesis H1a was formed.

H1a: At the age of 9 (3rd grade), students’ academic achievement (measured by FCAT Reading and Mathematics test scores) are different between students with developmental delays who received one year Pre-K early intervention at age three to five and those who received two years early intervention.

Exceptional Education and Second Generation Research

Guralnick (1993, 1997a) stated that prior research on the effects of early intervention has contributed little to the details of the design and implementation of early intervention programs and overlooked the heterogeneity of the populations involved in early intervention research. Thus, he advocated for a “second generation” research in early childhood intervention that focuses on the following three dimensions.

First, a major task for second-generation research is to identify those specific program features that are associated with optimal outcomes for children and families. Guralnick (1997a) emphasizes that it is this issue of specificity that ultimately informs practice, improves the cost-effectiveness of services, minimizes false expectations, provides a research framework for evaluating innovative approaches, and may even be of value in helping us understand the mechanisms through which interventions operate. This current study specifically concentrates on how Pre-K intervention programs
embedded in the public school system may have an effect on the outcomes of exceptional children.

Second, child characteristics, particularly the severities of the disability or risk status, in early interventions efficacy research have consistently been accounted for a substantial share of the variance in developmental outcomes (Guralnick, 1991; Shonkoff, Hauser-Cram, Krauss, & Upshur, 1992). Early intervention research should also be specified in its targeted population because we should not expect program features of an early intervention program to operate with equal effectiveness for children who have different disabilities. Conducting specified studies for a particular disabled children’s group is the movement for contemporary early intervention research. This current study gives attention to children who are developmentally delayed at ages 3 through 5.

Finally, evaluations of the effectiveness of early intervention vary with the outcome measures employed. Although, historically, selection of outcomes has been primarily developmental domain specific, considerable care must be taken to conduct a comprehensive assessment of the effects of early intervention because outcomes may be constrained by the domain evaluated. Importantly, outcome measures that extend beyond the primary domains of cognitive, language, and motor development to domains considered integrative, such as the development of children’s peer social networks, constitute other types of outcome measures that reflect a broader perspective of the goals of early interventions. Guralnick (1990, 1997a) emphasized that these integrative outcome measurements have been valued but historically neglected in the field of early intervention, which should be one of the main focuses of the “second generation” research. Guralnick (1997b) indicated that the peer social networks for children with
developmental delays and communication disorders is limited and is based primarily on the frequency of contacts with peers and linkages established across school and community settings. Following the suggestions for the “second generation” early intervention research, this current study also includes socialization opportunities in school settings as one of its dependent variables.

**Social Acceptance and Socialization Opportunities**

Vogtle (2000) suggested that the opportunity to meet with other children is a critical part of building social networks for children with special needs. She also pointed out that parents of children with disabilities see the benefit of this social relationship for their children’s typical peers as the opportunity for the typical peers to learn “tolerance and understanding” of those students who have different abilities (p.33). This may increase the proximity of peer and social acceptance in later school and social life since those children are growing together.

Buysse and Wesley (1993) advocated the effects of early intervention on social acceptance and social competency of exceptional children based upon the following rationalizations:

1. Young children have not formed negative stereotypes about individuals and the possibility of teasing and rejection is minimized and social acceptance is maximized during the early childhood ages.

2. Early interventions increase the possibility of later acceptance and interaction between children with/without disabilities.
3. The early placement of children with disabilities in regular educational settings with their typical development peers creates the expectation and better prepares those children to function in typical/natural environments.

Odom, McConnell, Mcevoy, Peterson, Ostrosky, Chandler, et al. (1999) also suggested that consistently provided positive playtime for children with and without special needs may affect the social acceptance of the children with disabilities. Based upon the above rationales, hypothesis H1b was postulated.

**H1b:** At the age of 9 (3rd grade), students’ socialization opportunities (measured by weekly inclusive time with non-disabled peers) are different between students with developmental delays who received one year Pre-K early intervention at age three to five and those who received two years Pre-K early intervention at the time.

**Rationale for Utilizing Development Delay Category**

Parents with a child who has special needs or suspected to be exceptional usually come to a school district designated agent at age 3 for special interventional services eligibility screening and diagnosis. Those children who are eligible for intervention services are given a specified label according to their disability. There are thirteen labels available from which the evaluating team may choose. Danaher (2001) pointed out the disabled label given at this stage, however, might not be as precise as it possibly can be
for the following reasons. First, a specific condition of disability is unclear, and young children are developing in a fast and uneven pace during this early childhood stage. Second, to avoid a negative and stigmatized label such as Emotional Disturbance and Mental Retardation, a more general label may be substituted, such as Developmental Delays. The current study is focused on the relationship between Developmental Delays and other Part B categories—especially which label will be used after the restriction of using DD. By IDEA 97 regulation, states can extend the DD label up to 9 years of age, but in Florida it requires that the DD label be removed or replaced through the reevaluation process by the age of six. The current study mainly investigated what happened to those children with DD after their participation in early intervention services and their changes into different special education categories and settings.

The rationale of using a general term such as Development Delays appears to be socially appropriate to avoid a more stigmatizing label at first sight. However, this practice may become problematic and contradict the belief of early intervention. In the field of early intervention, educators fundamentally believe the effectiveness of early intervention relies on *early appropriate diagnosis and treatments*. Therefore, investigation on the long-term effects of early intervention on students’ various performances, including their socialization opportunities appears to be necessary.

Reynolds, Temple, and Ou (2003) used cost-benefit analyses data from 1,539 African American children in the Chicago Longitudinal Study and advocated for studies assessing outcomes over time. The results also indicated preschool participation at ages 3 or 4 is positively related with better educational and social outcomes spanning ages 5 to 21 with lower rates of child maltreatment, juvenile delinquency, special education
placement and grade retention. Conyers, Reynolds, and Ou (2003) found the same effective results of 1,377 participants of the Chicago Longitudinal Study in the Child-Parent Center (CPC) preschool programs. They indicated, “the CPC preschool intervention group had a 32% lower rate of special education placement during the elementary grades than the comparison group” (p.87).

At age 3 to 5, children who are eligible for special services may be placed into three different intervention settings: (1) children attend Pre-K ESE Programs in public schools, which are in a separated classroom isolated from other typical peers; (2) children attend inclusive settings with other typical peers such as regular Pre-K or Head Start Programs, which are inclusive with other at-risk/low socioeconomic concerned peers; or (3) children attend private preschools or do not participate in any intervention programs for several reasons such as parents’ choice.

Children who are assigned or labeled as Developmental Delays (a less precise categorization) theoretically are as likely to receive appropriate intervention treatment as children whose disabilities are identified early and suitable treatments are prescribed. Without early precise identification and prevention such as Developmental Delays, Pre-K early intervention efforts may not be valid. Moreover, the current state legislative efforts may extend using Developmental Delays labeling up to 9 years old, which indicates that the gap of early identification and treatment can be wider from two years of Pre-K early intervention plus three more years of early childhood special education in the public school system. The current exploratory study hypothesizes the following:
H2: The cost of required services for students in 3rd grade is less than the cost required for the same students entering Pre-K intervention.

The research design to address these hypotheses is described in Chapter three.
CHAPTER THREE

RESEARCH PROCEDURE AND METHODOLOGY

The purpose of this study is to investigate the differences in students’ third grade performance (measured by FCAT reading and math scores), and socialization opportunities (measured by weekly inclusive time/Non-ESE minutes) for students with developmental delays who received different lengths of Pre-K ESE intervention (one year vs. two years). Literature (i.e. Barnett, 1995; F. A. Campbell & Ramey, 1994; Ramey & Ramey, 1999; U.S. Department of Education, 2002; Wasik, Ramey, Bryant, & Sparling, 1990) suggests that the variables of socioeconomic status and participation of Part C early intervention (age 0 to 3) may also affect the outcome variables and thus socioeconomic status (indicated by students’ participation of free or reduced fee lunch program) and participation of Part C early intervention are included as the covariates in the analysis. This study would address the following research questions:

1. Is students’ third grade performance in academic achievement (measured by FCAT reading scores, FCAT math scores), and socialization opportunities (measured by weekly inclusive time with non-disabled peers) different between students with developmental delays who received one year Pre-K intervention and those who received two years such intervention at ages three to five, after removing the effects of socioeconomic status and participation in Part C early intervention?

2. Is the amount of required service funding (as measured by the Cost Factor Scale of Matrix of Services) for the exceptional students (with DD) at the Pre-K
intervention stage different from the amount of service funding required at 3rd grade?

3. What was the students’ (current third grade) diagnostic labels distribution since they were identified with developmental delays at ages three to five?

4. When (in which grade) did students exit special education if they were no longer qualified for special education services?

5. What is the distribution of current educational settings among these children who were identified as DD?

**Quasi-Experimental Design**

This Quasi-experimental designed study has the common threats as its “almost true” experimental design. One of the threats is the difficulty to randomly form participants into the experimental and control groups (Mertens & McLaughlin, 2004). Another major concern of this design is called “experimental mortality” by D. T. Campbell & Stanley (1963) or “attrition” by Shadish et al. (2002). The differential dropout of participants over time from the groups may cause problems and sometimes jeopardize a study if the majority of participants’ failure to complete the outcome measures and the remaining participants may alter the outcomes.

Shadish et al. (2002) recommended three principles to reduce the above threats, and thus these principles were implemented in this current study:

1. The identification and study of plausible threats to internal validity such as lack of control group and high attrition rate. The school district program provides large amounts of data to overcome the threats. The attrition rate of this study is between
22% (excluded alternative assessments participation and FCAT exemption) to 45% (included only with 2003 FCAT participation).

2. The primacy of control by design. A multivariate statistic design in the current study may maximize the differences between groups and provides an opportunity to investigate the relationship between outcomes variables.

3. Coherent pattern matching. By using a nonequivalent group (i.e. one year Pre-K vs. two years Pre-K groups) a few alternative explanations can be generated.

**Dependent Variables and Covariance Selection**

Stevens (2002) provides suggestions regarding how many dependent variables are appropriated for multivariate tests. First and foremost, he stated that if several dependent variables are included without strong empirical and/or theoretical rationales, then the small differences on the majority of the variables may jeopardize the real differences on a few of the variables. The test results may indicate no reliable overall difference.

Secondly, power issues are related with the numbers of dependent variables selected. The higher number of dependent variables is associated with the lower power of multivariate tests. It is recommended to select a few reliable dependent measures rather than including a large number of less reliable variables. This current study closely follows Stevens’ (2002) recommendations on the selection of dependent variables. In this study only three dependent variables are selected: reading achievement, math achievement, and socialization opportunities measured by weekly inclusive minutes with typical peers in public schools.
Achen (1986) also stated “an accurate assessment of a quasi experiment depends on explicit modeling of both the behavioral outcome of the experiment and the assignment to treatment groups. When this has been done, statistical methods from the theory of simultaneous equations may then be used to give dependable estimates of the treatment’s impact” (p.37). A multivariate statistics procedure is appropriated for this quasi-experimental study to reveal and assess complex interrelationships among variables and further to keep the overall Type I error rate at some degree of confidence (Tabachnick & Fidell, 1996). For this exploratory study, careful selection of covariance can reduce bias especially when dealing with the quasi-experimental design in which random assignment is not possible (Stevens, 2002). In order to reach a valid conclusion from the data through multivariate statistics, the process of screening data and testing MANCOVA assumption (Mertler & Vannatta, 2002) are essential to the internal validity of the current study.

**Research Population**

This study focuses on school district Pre-K early intervention programs in Florida. Florida Department of Education (1999) issued 67 school district profiles for the school year of 1997-98. These profiles contained several student and staff demographic information including the participating school district of this current study. This current study focuses on a large urban school district, and statistical analyses indicate that the characteristics of the exceptional student population in this school district are similar to state data (see Table 3). Thus, the findings of this current study are probably
representative of districts with similar demographics regarding school district Pre-K early intervention programs and practices.
Table 3

Florida State and Focal School District Characteristics in 1997-1998

<table>
<thead>
<tr>
<th></th>
<th>Students in PreK-12 ESE (%)</th>
<th>Teachers in ESE (%)</th>
<th>Teacher/Students Ratios</th>
<th>Students with LEP (%)</th>
<th>Racial/ethnic distribution (%)</th>
<th>Students receive free/reduced price lunch (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>White</td>
<td></td>
</tr>
<tr>
<td>State</td>
<td>18</td>
<td>18</td>
<td>1:17</td>
<td>6</td>
<td>56</td>
<td>43</td>
</tr>
<tr>
<td>School District</td>
<td>18</td>
<td>16</td>
<td>1:16</td>
<td>7</td>
<td>49</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Black</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Hispanic</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Subject/Participants

The subjects of this current study were young children who participated and received evaluation and placement services in the target school district during the 1997-1998 school year. According to the primary data file of the school district agency, there were 808 children who received screening and evaluation services at the center during that particular school year. Although many early intervention researchers focused on economically disadvantaged children, this current study particularly concentrates on children with developmental delays.

Two hundred and seventy seven participants who had been identified with a primary disability category of Developmental Delays (DD) participated at the public school district evaluation process in 1997-98. At the time, the ages of these participants were between 33 months to 60 months old. After matching their names and birthdays from the 1997-98 primary data file with an on-line Customer Information Control System (CICS), 249 students’ records (90%) were found. Among these original 277 participants, 8 students (3%) did not participate in any Pre-K intervention program, and 20 students’ names (7%) could not be found in the CICS. The remaining 249 children were 75% male and composed of 42% Caucasian, 29% African American, 27% Hispanic, and 2% others. One hundred and ten students (43%) received free or reduced-price lunch, 8 children (3%) had participated in Part C programs, and 11 children (4%) were English for Speakers of Other Languages (ESOL) students.
Data Collection

Data for the current study were collected from the following two sets of resources: (a) the 1997-98 primary data file at the school district’s designated agency; and (b) the Florida State Exceptional Educational programs data system/Customer Information Control System (CICS). This online database is available to locate those 249 children with DD to identify their current active status in the 2003-2004 school year.

In order to protect students’ identities and other personal information, a research number (different from the public school student identification number) was assigned to each student. Only data that were relevant to the current study, such as students’ demographic information, history of intervention programs and academic test scores were recorded based on the research design. In addition, the status and length of each student’s school participation history was tracked and recorded, including other related information such as referral, evaluation, and staffing/eligibility dates, primary exceptionality, type of programs enrolled, years in the programs, free/reduced fee lunch program participation, and Part C program participation. Only research related information was recorded, and all other information was kept confidential.

Individual student’s school records and test scores were carefully examined, extracted and compiled into a separated DD only data set from the original primary data file. After confirming students’ school enrollments history for Pre-K intervention through the on-line data system, two groups were formed for the current study: one-year Pre-K and two-year Pre-K. Table 4 presents the available number of participants in the current study. Among those 115 children who received one year of Pre-K intervention, 72 of them had completed FCAT scores. Among those 134 children who received two
years of Pre-K intervention, 64 of them had valid FCAT test results.

Table 4 The Participants of the Current Study

<table>
<thead>
<tr>
<th>1997-1998 Children with Developmental Delays (DD)</th>
<th>One Year Pre-K</th>
<th>Two Years Pre-K</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-K Early Intervention Group</td>
<td>115 (46%)</td>
<td>134 (54%)</td>
<td>249</td>
</tr>
<tr>
<td>Have 3rd grade FCAT Scores</td>
<td>72 (53%)</td>
<td>64 (47%)</td>
<td>136</td>
</tr>
</tbody>
</table>

*Note.* See Appendix C for the detailed distributions of 3rd grade exceptionality categories and 2003 FCAT participation status.

**Instruments and Measurements**

**Pre-K diagnosis procedures**

The school district designated a center-based agent that children and families came to the center to receive screening, evaluation, eligibility, staffing, and transition services. This center provided multidiscipline evaluation teams to serve children with special needs who were primarily referred by other early intervention agents such as Child Found and Part C program providers. The evaluation team in the center mainly consists of a certified Speech/Language Therapist (SLT) or Speech Pathologist (SP) and an Educational Diagnostician (certified teacher with classroom teaching experiences and
have received special training in evaluation instruments). The speech therapist assesses
the child’s articulation and language skills. The educational diagnostician assesses the
child’s pre-academic skills, gross and fine motor skills, adaptive and social skills. The
evaluation reports include information such as family and child medical history, vision
and hearing screening, and other current updated psychological tests depending on the
special needs of the participants. The common assessment instruments used by the
evaluation teams can be found in Appendix B.

The major objective of the evaluation teams is conducting a developmental
screening to identify any sign of developmental delays in the area of social/emotional,
adaptive, gross/fine motor, communication and pre-academic skills. The primary
consideration is if the children have the necessary functional skills to be adaptive into
classroom settings. In addition, the evaluation teams also focus on how the individual
child’s educational needs are met and how they can be benefited from the Exceptional
Education programs (i.e. Pre-K Exceptional Student Education).

From time to time, the evaluation teams receive supports from other related
professional personnel, such as School Psychologist, Occupational Therapist (OT),
Physical Therapist (PT) and Social Worker, to perform more comprehensive evaluations.
Those multiple disciplinary teams are available to evaluate children and to consult with
their families according to the needs and severity of the condition (such as Autism) on a
case-by-case basis. Furthermore, bilingual diagnosticians and translators in Spanish and
other languages are also available to help control the potential effects of environment and
cultural differences on the assessment results. As of November 2003, there were 5
evaluation teams with 2 teams of bilingual diagnosticians who provided diagnostic and evaluation services.

At staffing meetings, the evaluation results, eligibility for special education services (i.e. Pre-K early intervention programs), are discussed among all related professionals and parents or legal guardians. Once they have come to a conclusion and reach a final consensus from every party, an Individual Educational Plan (IEP) was developed and the Matrix of Services was determined. The evaluation team members and the parents/ legal guardians are required to verify and sign on the documents. After the staffing meeting, parents can enroll the eligible child into the assigned Pre-K ESE programs and school. Subsequently, staff members transfer all legal documents and evaluation reports to the school district and eventually to the child’s school. A Referral Status Form and Eligibility for disability (such as Developmental Delay) record is transferred into an electronic data file within the school district agency, which is the data resource for the current study. The reevaluation processes at grade school were performed at children schools.

Matrix of Services

In the state of Florida, special education administrators use the Matrix of Services as a tool to meet the multiple disciplinary assessment requirements of IDEA, and the Matrix also serves as a funding record for special education supports. However, the inter-rater reliability for the evaluation teams is not available, which may affect the validity of using Matrix of Services as a measurement in this current study.
The content of the Matrix of Services is not entirely without merit because it follows closely to the legislation guideline both at the federal and state levels (Florida Department of Education, 2002b). The relationships among the areas of assessment required by federal IDEA 97, school district, and the domains of the Matrix of Services are presented in Table 5. In addition to providing information on educational supports to students with special needs, the content of the Matrix of Services also includes health care and special considerations such as for blind, or hospital/homebound situations and others. Thus, the results of this study may provide a primitive understanding of this administrative tool.

Table 5 Requirement Comparisons of Assessment Domains

<table>
<thead>
<tr>
<th>IDEA 1997</th>
<th>School District</th>
<th>Matrix of Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical</td>
<td>Gross and fine motor</td>
<td>Curriculum and Learning</td>
</tr>
<tr>
<td>Cognitive</td>
<td>Pre-academic skills</td>
<td>Communication</td>
</tr>
<tr>
<td>Communicative</td>
<td>Communication</td>
<td>Communication</td>
</tr>
<tr>
<td>Social or emotional</td>
<td>Social/emotional</td>
<td>Social/emotional behavior</td>
</tr>
<tr>
<td>Adaptive</td>
<td>Adaptive</td>
<td>Independent functioning</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Health care</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Special considerations</td>
</tr>
</tbody>
</table>
Florida Comprehensive Assessment Test (FCAT)

According to the Florida Department of Education (2003a), most students with disabilities are taught the knowledge and skills of the Sunshine State Standards in regular or special education classes. The standards outline what students should learn in general terms with benchmarks at four levels: from Pre-K to grade 2, grade 3 to 5, grade 6 to 8, and grade 9 to 12. Students take the Florida Comprehensive Assessment Test (FCAT) from grades 3 through 10 and must earn a passing score in reading, mathematics, and writing on the 10th grade FCAT to receive a standard diploma. The FCAT achievement levels (5 is the highest and 1 is the lowest) are indicators of students’ performance in relationship to the required standards. For instance, a record of level 3 and above is considered at or above grade level. The FCAT score is used to determine a student’s progress from grade to grade. For example, in order to pass the 3rd grade reading and math achievement level of 3, students have to earn a 284 FCAT Reading score and a score of 294 for Mathematics.

The FCAT was field tested in March 1997 and its 1998 FCAT administration data was used for the establishment of baseline test results. According to the Harcourt Educational Measurement (Florida Department of Education, 2002d), “In the spring of 2000, students in Grades 3, 5, 6, 7, and 9 took a field-test version of the reading assessment; and students in Grades 3, 4, 6, 7, and 9 took a field-test version of the mathematics assessment” (p.2). FCAT is a performance-oriented and criterion-referenced instrument that is administered annually in Florida. Classical reliability (both Cronbach Alpha and KR-20 over .87 in every grade level) and IRT marginal reliability (also above .87) for the FCAT reading and mathematics have been reported (Florida
Department of Education, 2004), along with substantial correlations (above .76) with Stanford-9 test. Greene, Winters, and Forster (2003) examined both high and low state (Stanford-9) tests in Florida, Virginia, and seven other states’ year-to-year score gains for accountability tests. They found that “the State of Florida had by far the strongest correlations, with a 0.96 correlation between high and low state test score levels, and a 0.71 correlation between the year-to-year gains on high and low state tests” (p.7).

**Multivariate Assumption and Reliability**

**Normal distribution of the dependent variables**

According to Florida’s Annual Performance Report for Part B of the IDEA (2004), 85% of 3rd grade students with disabilities participated in the 2003 FCAT Reading test and 86% of these students took the FCAT Math test. Among these students with special needs who participated in the tests, 34% of them achieved Level 3 or higher in reading and 38% in math. The detailed percentages of 3rd grade students with disabilities on each achievement level are shown in Table 6.
Table 6

2002-2003 FCAT Achievement Level Percentage of Students with Disabilities

<table>
<thead>
<tr>
<th>FCAT</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
<th>Level 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading</td>
<td>52 %</td>
<td>15 %</td>
<td>22 %</td>
<td>10 %</td>
<td>2 %</td>
</tr>
<tr>
<td>Math</td>
<td>41 %</td>
<td>21 %</td>
<td>25 %</td>
<td>11 %</td>
<td>2 %</td>
</tr>
</tbody>
</table>

This 2002-2003 performance distributions of 3rd grade students with disabilities on FCAT Reading and Math assessment both appear to be positive skewed. Although this current study focuses only on students who were developmentally delayed and had received one or two years of Pre-K early intervention within a particular school district when they were 3 to 5 years of ages, their FACT results distribution is also positive skewed. If this skewness of distribution between one year and two years Pre-K groups were violated normal distribution assumption of MANOVA (Stevens, 1996); thus, data transforming was performed to normalize the distribution. A variety of data transformations are available, depending on the shape of the original raw data (Stevens, 1996). For positive skewness, if the original data distribution is moderately skewed from normal, a square root transformation \([(X_j)^{1/2}]\) should be initially applied. If the deviation is more substantial, a log transformation (\(\log X_j\)) is used. For negative skewness, common transformations included reflect, inverse and the combination of all available techniques (Tabachnick & Fidell, 1996). The result of this current study regarding this issue is reported in Chapter 4.
Power and effect size

Stevens (1996) provided a useful table regarding the power/effect size estimation and sample size issues. However, it contains the range of sample size needed per group for adequate power (.70) at $\alpha = .05$ starting with three groups, but does not state the required sample size for this current study (two groups). Based on the available information, the sample size for a three-group study for a very large effect is ranged from 12 to 16; for a large effect is from 25 to 32; for a medium effect is from 42 to 54; and 92 to 120 for a small effect. The current study anticipated that the required sample size would be less than the range for a three-group study design (i.e. between 92 to 120).

Unfortunately, only 72 students from one year Pre-K and 64 students from two years Pre-K have valid 2003 FCAT Reading and Mathematics scores. Thus, there was a difference between the estimated sample sizes of 94 and 183 for the one year and the two years groups, respectively. Because of this sample size limitation, the interpretation of the study result, particularly for research question one, requires special caution.

In addition, the assumption of independent observation in this current study cannot be assured. Thus, the effect of intraclass correlation on Type I errors needs to be considered and was calculated based on the equation forwarded by Stevens (1996, p240).

\[
R = \frac{(MS_b - MS_w)}{(MS_b + (n-1)MS_w)}.
\]
In the formula, R is the intraclass correlation, MS\textsubscript{b} and MS\textsubscript{w} are the numerator and denominator of the \( F \) statistic and \( n \) is the number of subjects in each group. The results from the calculations of Type I error rate for correlated observation are \(-0.002, 0.01, \) and \(-0.012\) for FCAT Reading, Mathematics, and Non-ESE minutes respectively. The calculated intraclass rates were used to adjust the appropriated significant \( \alpha \) level of the current study. As an exploratory study, the \( \alpha \) level of .10 is considered acceptable, yet in order to control for the potential Type I error caused by intraclass correlation, the \( \alpha \) level used to test the hypothesis is reduced from .10 to .05 according to the calculated R values.

**Methodological limitations**

The interpretation of the findings from this exploratory study must take into account of several methodological limitations. First, the relatively new instruments, the FCAT and Matrix of Services (since 1997) are still in process of establishing their accuracy. Especially, no reliability or validity data is available on the Matrix of Services. Although the Matrix plays a vital role in assessing accountability and funding allocation in Florida, the results of this study requires caution in interpretations. It is important to understand the consequence of the instruments because the implementations of Matrix of Services and FCAT both affect the amount of funding allocated to students as well as the possibility of grade retentions. These decisions are relevant to and affect the judgment of many stakeholders (family, community, school, school district, and state) at different levels. Second, under the current quasi-experimental research design, it is difficult to assess the qualification of the evaluation teams and the degree of inter-rater reliability.
Third, students with developmental delays received a variety of instructional supports in
different educational settings. The results of this study reported the association between
Pre-K intervention duration and students’ 3rd grade performance and did not intend to
form a conclusion of causal effects. Further investigations on the effects of
characteristics of student, family, school and community on Pre-K intervention programs
are of academic interest and practically valuable. More comprehensive research designs
are required for future studies to achieve these objectives.

Modify research question one

It has become necessary to modify research question one when two unexpected
situation had occurred. As mentioned in the Chapter 1, the original research question one
investigates if students’ third grade performance in academic achievement (measured by
FCAT reading scores, FCAT math scores), and socialization opportunities (measured by
weekly inclusive time with non-disabled peers) is different between students with
developmental delays who received one year Pre-K intervention and those who received
two years of such intervention at age three to five, after removing the effects of
socioeconomic status (SES, measured by lunch status) and participation of Part C early
intervention programs before three years old. Unfortunately, after discovering that 113
(45%) participants of the original 249 children were without FCAT scores, this changes
the scope of the original research design. Thus, the results of research question one only
apply to students with valid FCAT scores.

Furthermore, there were only two Part C participants with complete data in the
current study, which affects the factor-covariate interaction analysis. However, including
two covariates instead of one in the current study would improve the power of rejecting a null hypothesis that is really false and increase the degree of error reduction with lower intercorrelations among covariates. Therefore, Part C participation variable was replaced by gender as another appropriate covariate for the current study (Tabachnick & Fidell, 1996). The rationale of using gender as another covariate is explained in several studies (Fuerst & Fuerst, 1993; Sprigle & Schaefer, 1985; Gullo, 1991). They found that gender of student is a significant variable affecting academic performance in early school years. From the above results, the original research question one was changed to:

After removing the effects of socioeconomic status and gender, does students who had available 3rd grade FCAT scores perform differently in academic achievement and socialization opportunities between these students with developmental delays who received one year Pre-K intervention and who received two years Pre-K intervention?

**Data Analysis**

A data set containing only information of children with DD was constructed from the participating agent’s primary data file and CICS on-line data system. For research question number one, the MANCOVA procedures were conducted according to the described pre-analysis plan, and any modifications in the data were performed accordingly prior to analyzing the results. For question number two, a paired sample $t$ test for pre and post Matrix of Services/Cost factor was analyzed on the changes of Matrix of Services/Cost Factor between the entering Pre-K year (1997-1998) to current 3rd grade year. For research question number three to number five, a descriptive analysis
was used to investigate the participants’ 3rd grade situation indicating the frequency of the diagnostic label changes, participation of special education and educational placement settings.

All analysis procedures were conducted by using SPSS 10.0 version on a personal computer and the criterion for statistical significance is established on the alpha level of $P < .05$ level.
CHAPTER FOUR

RESULTS

Participants

Complete data is available for 136 participants (55%) for the research question one. One hundred and thirteen (45%) participants out of the original 249 children were without FCAT scores. This high percentage is problematic in this study, and as a result, the reasons for missing FCAT scores were further analyzed: 24 participants (10%) were exempted from taking FCAT, 33 participants (13%) were taking alternate assessments; thus actually 56 participants (22%) were accounted for missing FCAT scores. To determine whether these 56 participants were different from the remaining children with FCAT scores, a simple independent samples t-test was performed. The results indicate that there are no significant mean differences in gender, lunch status, and Pre-K and current Matrix factors between students with or without FCAT scores. Thus the sample of this current study was considered relatively representative for the above-analyzed factors.

Research Question One

A multivariate analysis of covariance (MANCOVA) was conducted to examine the effect of the Pre-K duration (1 year vs. 2 years) on students’ 3rd grade performance as measured by FCAT Reading scores, FCAT Math scores, and socialization opportunities
(i.e. weekly Non-ESE minutes) while controlling for students’ socioeconomic status (i.e. free/reduced price lunch status) and gender.

Prior to the MANCOVA test, group mean values of the same FCAT performance levels (such as for performance level 1 on Reading and Math) were used to replace those missing values with the same performance levels. The missing FCAT test values were replaced for only one participant in each group. Additionally, three participants of missing values from dependent variable of Non-ESE minutes were replaced in the same fashion.

The MANCOVA test assumptions were examined. A Univariate test on each dependent variable was conducted, first for outliers, normality, and homoscedasticity, followed by an examination of multivariate outliers, normality, linearity, and homogeneity of variance-covariance. The results of those tests indicated that only one dependent variable (Non-ESE minutes) deviated from normality (negative skew, skewness = -1.005; Kurtosis = -.461). After several alternative attempts, such as square root, logarithm, and inverse transformation, were conducted, the skewness could not be corrected. According to Stevens (1996) and Tabachnick and Fidell (1996), this would not have much of an effect on power if only one variable deviated from normality.

In addition, an examination of the relationship between the dependent variables and the covariates was conducted, and the relationship was not statistically significant, $F(6, 244) = 1.214, p = .299$, using Wilks’ Lambda criterion, Eta Squared = .029. Consequently, using covariance (lunch status and gender) in the current study is not appropriate (Stevens, 1996). Therefore, a full MANOVA was then conducted.
The Box’s Test indicated that equal variances can be assumed, $F(6, 118654) = .613, p = .721$; therefore, Wilks’ Lambda is used as the multivariate statistic. The MANOVA results are presented in Table 7. The main effect of Pre-K duration (i.e. one year vs. two years Pre-K intervention), Wilks’ Lambda $= .984, F(3, 127) = .687, p = .561$, multivariate Eta Squared $= .016$, indicates no significant effect on the combined dependent variables. The MANOVA results indicated the research hypotheses (H1a and H1b), which were previously presented in Chapter 2, were not supported. Further discussion regarding Pre-K intervention duration and students’ academic performance is presented in Chapter 5.

Table 7 MANOVA Summaries

<table>
<thead>
<tr>
<th>Effect</th>
<th>Value</th>
<th>$F$</th>
<th>Hypothesis df</th>
<th>Error df</th>
<th>Sig.</th>
<th>Eta Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wilks’ $\Lambda$</td>
<td>.072</td>
<td>548.392ª</td>
<td>3</td>
<td>127</td>
<td>.0</td>
<td>.928</td>
</tr>
<tr>
<td>Intercept</td>
<td>.984</td>
<td>.687ª</td>
<td>3</td>
<td>127</td>
<td>.561</td>
<td>.016</td>
</tr>
</tbody>
</table>

*Note. Design: Intercept + Pre-K Group

ªExact statistic

Table 8 presents the group means for each dependent variable. A comparison of means show that the average FCAT Reading scores of the two years Pre-K group are 5 points higher than that of the one-year Pre-K intervention group. Conversely, the average FCAT Math scores of the two years Pre-K group scored are 8 points lower than one year.
Pre-K group. On average, one year Pre-K group has 56 more Non-ESE minutes than that of the two years Pre-K group in their 3rd grade settings. Although the mean scores between groups among the dependent variables were slightly different, the differences were NOT statically significant.

Table 8 Group Means for Dependent Variables

<table>
<thead>
<tr>
<th></th>
<th>One Year Pre-K</th>
<th>Two Years Pre-K</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCAT Reading</td>
<td>244.99</td>
<td>249.63</td>
</tr>
<tr>
<td>FCAT Math</td>
<td>253.78</td>
<td>246.17</td>
</tr>
<tr>
<td>Non-ESE Min.</td>
<td>1154.74</td>
<td>1097.53</td>
</tr>
</tbody>
</table>

**Research Question Two**

Research question number two examines if the amount of required service funding (as measured by Cost Factor Scale of Matrix of Services) for the exceptional students (with DD) at the Pre-K intervention stage differs from the amount of service funding required at 3rd grade.

A paired sample *t* test was conducted to examine the difference of Matrix of Services scores (i.e. 251 to 255) between Pre-K evaluation and 3rd grade evaluation. There was a statistically significant difference between Pre-K Matrix of Services score (*M* = 253.00, *SD* = .66) and 3rd grade Matrix of Services score (*M* = 252.13, *SD* = 1.27), *t* (149) = 8.482, *p* < .001. This results support the research hypothesis (H2): The cost of required
services for students at 3rd grade is less than the cost required for the same students at the entering Pre-K intervention.

**Research Question Three and Four**

Research question three explores what the students’ current (3rd grade) diagnostic labels distributions were since they were identified with having developmental delays at ages three to five. Research question four analyzes when (in which grade) students exited special education if they were no longer qualified for special education services.

Because Florida Department of Education required an age limitation of using Developmental Delay category (deFosset, 2001), children with DD were reevaluated and re-categorized by 1st grade or 6 years old. Only 15 (6%) of the children diagnosed with DD exited special education services at 1st grade. At 1st grade, the most common disability categories by their primary exceptionality were Language Impaired \((n = 77, 31\%)\), Specific Learning Disabled \((n = 71, 29\%)\) and Educable Mentally Handicapped \((n = 29, 12\%)\). At 3rd grade, classifications for those children, 33 students (13%, included 1st grade result) were no longer receiving special education services, and most common disability categories were similar to the 1st grade results with a different order: Specific Learning Disabled \((n = 83, 33\%)\), Educable Mentally Handicapped \((n = 23, 9\%)\), and Language Impaired \((n = 15, 6\%)\). However, at 3rd grade, 57 students’ (23%) classification data were unavailable, which is consistent with the missing number of students’ FCAT scores \((n = 56, 22\%)\). The descriptive statistics are presented in Table 9.
Table 9 Reevaluation Status of Children Identified with Developmental Delay

<table>
<thead>
<tr>
<th>Status</th>
<th>At 1&lt;sup&gt;st&lt;/sup&gt; grade</th>
<th>At 3&lt;sup&gt;rd&lt;/sup&gt; grade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Exit Special Education</td>
<td>15</td>
<td>6</td>
</tr>
<tr>
<td>Re-Category</td>
<td>At 1&lt;sup&gt;st&lt;/sup&gt; grade</td>
<td>At 3&lt;sup&gt;rd&lt;/sup&gt; grade</td>
</tr>
<tr>
<td>Language Impaired</td>
<td>77</td>
<td>31</td>
</tr>
<tr>
<td>Specific Learning Disabled</td>
<td>71</td>
<td>29</td>
</tr>
<tr>
<td>Educable Mentally Handicapped</td>
<td>29</td>
<td>12</td>
</tr>
<tr>
<td>Speech Impaired</td>
<td>20</td>
<td>8</td>
</tr>
<tr>
<td>Trainable Mentally Handicapped</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>Emotionally Handicapped</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Autistic</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Other Health Impaired</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Others</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Missing</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>249</td>
<td>100</td>
</tr>
</tbody>
</table>

**Research Question Five**

Research question five was designed to describe and understand the changes of participants’ educational settings between Pre-K and third grade. Table 10 shows the placement changes of children with DD. At Pre-K, 20% \( n = 50 \) of the children were
placed in inclusive classrooms, and 80% \((n = 199)\) of children were in separated ESE classrooms. At 3\(^{rd}\) grade, 49% \((n = 122)\) of the children were served in regular classrooms, 12% \((n = 29)\) in resource rooms, 28% \((n = 69)\) in separate classrooms, 4% \((n = 11)\) in separate schools, 2% \((n = 5)\) in alternative settings such as non-public schools or home instruction, and 5% \((n = 13)\) students’ placement information were missing from the data base (CICS).

Table 10 Placement Status of Children Identified with Developmental Delay

<table>
<thead>
<tr>
<th>At Pre-K (1997-1998)</th>
<th>Setting</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inclusive</td>
<td>50</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>ESE</td>
<td>199</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>249</strong></td>
<td><strong>100</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Current 3(^{rd}) Grade</th>
<th>Setting</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular Classroom</td>
<td>122</td>
<td>49</td>
<td></td>
</tr>
<tr>
<td>Resource Classroom</td>
<td>29</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Separate Classroom</td>
<td>69</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>Separate School</td>
<td>11</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>5</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>13</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>249</strong></td>
<td><strong>100</strong></td>
<td></td>
</tr>
</tbody>
</table>
According to 2003 Florida’s Annual Performance Report for Part B of the IDEA (2004), 85% of 3rd grade students with disabilities participated in the 2003 FCAT Reading test and 86% of these students took FCAT Math test. Among these students with special needs who participated on the 2003 FCAT, 34 % of them achieved Level 3 or higher in reading and 38% in math. Additional analyses on participants’ 3rd grade academic achievements scores were conducted and the results were compared with that of all children with disabilities, the school district and state. The percentages of participants’ 2003 FCAT Reading and Mathematics achievement levels on or above grade level (i.e. level 3, 4, and 5) varied between one year and two years Pre-K groups. Overall, more one-year Pre-K students achieved on or above grade level than two years Pre-K students (see Table 11).

When focusing on the average means of FCAT Reading, FCAT Mathematics, and FCAT National Norm-Referenced Test (NRT) scale scores in Reading Comprehension and Mathematics Problem Solving subtests, one year Pre-K group has a higher average mean scale scores in the area of FCAT Mathematics (254), NRT Reading (602), and NRT Mathematics (591) than two years Pre-K group with 246, 597, and 587 respectably. Conversely, the average FCAT Reading score (250) of the two years Pre-K group were slightly higher than that of the one year Pre-K group (245). (see Table 12)

In addition, children with developmental delays, regardless of their Pre-K intervention duration, the results of academic performance in this study indicated that the average FCAT Reading scores of these participants’ were 46 points below school district average and 51 points below the state average. The average FCAT Mathematics score of these participants was also 53 points below school district mean and 58 points under the
State’s average. For FCAT NRT, the average Reading scores of these participants’ were 26 points below school district average and 30 points below the state average. The average Mathematics score of these participants was also 30 points below school district mean and 34 points under the State’s average.
Table 11 Third Grade FCAT Achievement Level Comparisons

<table>
<thead>
<tr>
<th>FCAT Reading</th>
<th>Level</th>
<th>FCAT Mathematics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1 Year Pre-Kª</td>
</tr>
<tr>
<td>1 Year Pre-Kª</td>
<td></td>
<td>53</td>
</tr>
<tr>
<td>2 Years Pre-Kª</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>1 &amp; 2 Pre-Kª</td>
<td></td>
<td>21</td>
</tr>
<tr>
<td>All SPEDb</td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>School District</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>FL</td>
<td></td>
<td>32</td>
</tr>
</tbody>
</table>

*Note. School District and FL state data are for all students tested in all curriculum groups; Achievement levels 3 or higher is on or above grade level. Data resource from FL Department of Education Web site (http://fcat.fldoe.org/).*

*aData from the current study groups of students with developmental delays (DD).*

*bFor all children in Special Education (SPED), data from Florida’s Annual Performance Report for Part B of the IDEA (2004).*
Table 12 Third Grade FCAT Reading and Mathematics Mean Scores Comparisons

<table>
<thead>
<tr>
<th></th>
<th>Mean Scores of 2003 FCAT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 Year Pre-K(^a)</td>
</tr>
<tr>
<td>FCAT Reading</td>
<td>245</td>
</tr>
<tr>
<td>FCAT Mathematics</td>
<td>254</td>
</tr>
<tr>
<td>NRT(^b) Reading</td>
<td>602</td>
</tr>
<tr>
<td>NRT(^b) Mathematics</td>
<td>591</td>
</tr>
</tbody>
</table>

*Note.* School District and FL state data are for all students tested in all curriculum groups; data resource from FL Department of Education Web site ([http://fcat.fldoe.org/](http://fcat.fldoe.org/)).

*Data from the current study groups of students with developmental delays (DD).*

*The 2003 FCAT Norm-Referenced Test (NRT) is a custom form of the Stanford 9 in Reading comprehension and Mathematics problem solving (Florida Department of Education, 2003b).*
CHAPTER FIVE

CONCLUSIONS

The purpose of this study is to explore the effects of Pre-K early intervention duration on 3rd grade academic achievement and socialization opportunities for children with developmental delays (DD). This study specifically looks at the statewide assessment (FCAT) results of children with DD and their current special education status at the school district level. This exploratory investigation is different from other studies that primarily focused on at-risk students or model programs. Previous large-scale studies usually have relatively different participants’ characteristics and program features than this current study.

Before the legislation of No Child Left Behind (NCLB) was signed into federal law in 2001, the overall academic performance of children with special needs was perceived to be low. In general, children with special needs are consistently more deficient in their academic achievement than their non-disabled counterparts (Hettleman, 2004). Currently the law requires the accountability of improving the academic performance for children with and without special needs. The driving force of academic achievement not only changes the focus of special education in public schools, but also shifts the interests of educational research toward more scientific evidence. The research on school readiness of preschoolers through Head Start Quality Research Consortium by Administration for Children and Families (ACF, 2004), and the studies on infants, toddlers and preschoolers with disabilities and their families through the Pre-Elementary Education Longitudinal Study (PEELS) by National Center for Special Education Research (Early Childhood Outcomes Center, 2005) are examples of the interest in
evidence based research. Brooks-Gunn, Fuligni, and Berlin (2003) also described other early childhood development research initiatives for the current new wave of large-scale longitudinal studies.

Children with developmental delays were already behind typically developing children from the beginning of their early childhood years. Thus, early educational interventions are essential and perhaps one of the most cost effective investments that may mitigate their later academic underperformance in grade schools and effect their later lives (Ramey & Ramey, 1998a, 1998b; Reynolds, Temple, Robertson, & Mann, 2001a; Schweinhart, 2003).

Whether the academic performances of those Pre-K participants will justify the escalating costs of special education services is an interesting issue to many stakeholders (Andrews & Slate, 2001; Currie, 2000). Moreover, large-scale studies are needed in the area of Pre-K early intervention to provide a better understanding of the influence of long-term effects of special education services on students’ performance. Large-scale school district level investigation can provide information regarding the usefulness of investing public funding in programs for young children of three such as Pre-K Exceptional Students Education (ESE) and Voluntary Pre-K (VPK) programs in the state of Florida (Florida Department of Education, & Office of Early Learning, 2005).

This study examined 249 young children in two Pre-K early intervention groups (one year vs. two years of intervention) with the same primary exceptionality of Developmental Delays (DD) in 1997-98. This study compared their academic achievement in 3rd grade as well as the socialization opportunities with their non-disabled peers (measured by Non-ESE minutes). A multivariate analysis of variance (MANOVA)
was conducted to determine the influences of the Pre-K early intervention duration on students’ 3rd grade performances as measured by FCAT Reading scores, FCAT Math scores, and socialization opportunities (i.e. weekly Non-ESE minutes). In addition, this study also used a paired sample t test to explore the differences between Pre-K and 3rd grade funding request records, which was evaluated by the Matrix of Services. In the state of Florida, Matrix of Services is an administrative tool used to keep track on individual child’s special educational needs and to match the required funding with individual student’s special educational needs and related services.

**Pre-K Duration and Academic Achievement**

The results of research question one indicate that the Pre-K Early Intervention duration (one year vs. two years) does not have a statistically significant influence on participants’ 3rd grade FCAT academic performances (measured by FCAT Reading and Mathematics) and socialization opportunities (measured by weekly Non-ESE minutes). This finding is consistent with several previous studies that focused on the achievement of economically disadvantaged children (Gullo & Burton, 1992; Reynolds, 1995; Sprigle & Schaefer, 1985). These studies documented that the length of early intervention appeared to have no statistical effect on the reading and mathematic performance of children with social and economic disadvantages. Synthesizing from the findings of previous and current studies, early intervention duration seems not to be a factor that influences students’ school performance. This finding is understandable because academic achievement usually is not the primary focus of IEP under current practice. As
a result, the length of early intervention would not influence students’ school accomplishment, as measured by state standardized test scores.

However, using on or above grade proficiency levels (achievement level 3, 4, & 5) on statewide-standardized tests (FCAT Reading and Mathematics) to measure the performance gap between general and special education students is not uncommon (Gamel-McCormick & Amsden, 2002; Hettleman, 2004; Reynolds & Wolfe, 1999; Schweinhart & Smith, 2001). The results of 2003 FCAT Reading tests show that only 31% of the current study’s participants achieved at or above a level 3 reading proficiency, which is 3% below the result of all children with special needs statewide; 27% below the result of all 3rd graders in the school district level, and 32% below the result of all 3rd graders in the state level. The percentage achieving FCAT Mathematics proficiency was 31%, which is 7%, 28%, and 32% below the results of all ESE students, the school district, and the state respectively.

This finding is also consistent with a national pattern. Hettleman (2004) documented the performance gap between general and special education students’ academic differences typically ranges from 30% to 40% cross the nation. Table 11 presents the detailed information regarding the achievement percentages of children with developmental delays in each level. This information provided by this current study can serve as an academic reference for the usefulness of early intervention programs in Florida public schools.

The lack of early intervention duration effects for students with DD in 3rd grade may be due to the newly implemented mandatory test. The first time children with special education needs in Florida were required to take the statewide test in 2003.
Achieving state academic standards in 2003, however, may not likely be the primary focus of students’ IEPs. Furthermore, it was only in 2002, one year before the standard tests, that the Florida Department of Education (2002c) had established statewide course descriptions and performance objectives for exceptional student education. The poor academic performance and lack of significant differences between one year and two years Pre-K groups could be an indicator of lacking academic test exposure for students with disabilities who are not familiar with the contents of standardized tests. In addition, special education teachers may not have sufficient time (within one year frame) to focus on helping students to achieve their personalized goals (IEP) as well as preparing students for FCAT examinations.

Table 12 shows the difference in test results of children with developmental delays between FCAT and FCAT NRT. Generally, children with developmental delays have a better performance on FCAT NRT tests than on FCAT tests. The achievement differences between these two sets of test can be attributed to the differences in test content. For example, the content of the FCAT test is more comprehensive and possible demands different cognitive skills than that of FCAT NRT. However, Holahan and Costenbader (2000) suggested that when assessing children’s developmental progress, the results of norm-referenced tests such as FCAT NRT is more suitable than the result of criterion tests such as FCAT. They explained that the achievement levels set by criterion referenced test indicate whether or not students reach the target level of proficiency such as level three for FCAT in Florida. On the other hand, the results of norm-referenced tests merely represent the students’ overall development. Thus, examining participants’ FCAT NRT test results seems to be meaningful for this current study design.
The above findings suggest that it may be beneficial to use FCAT NRT scores for
students with DD until better instrument became available. Currently, FCAT Norm
Referenced Test is an acceptable alternative assessment measure in the state of Florida
(Florida Department of Education, 2004b). In order to facilitate students with special
needs in the assessment processes, alternative test formats seems to be necessary since
taking the FCAT is required for all students. For instance, grouping similar types of tests
together, and allow students to take only one subtest at a time may be a feasible
alternative. Reformatting one comprehensive FCAT Reading test into several subtests
may assist students with special needs to maximize their achievement.

Consequently, further studies on test preparation in the areas of special education
curricula, instructional approaches or school readiness in Pre-K ESE programs at urban
metropolitan areas are needed. Other variables such as “school mobility”
(Mantzicopoulos & Knutson, 2000; Mehana & Reynolds, 1995; Temple & Reynolds,
1999) and the impact of mobility on academic achievement may also influence study
results. The high transfer rate in this metropolitan area of Florida and data missing
between schools transitions may also have influenced study findings. Thus future studies
could include these factors in research designs.

**Matrix of Services**

Research question number two explored the effects of Pre-K intervention on
required special services funding between Pre-K and 3rd grade for children with
developmental delays (DD). The amount of required special education services was
measured by the level of Matrix of Services. The results indicate that the required service
level of children with DD at 3rd grade ($M = 252.13, SD = 1.27$) is less than that at Pre-K ($M = 253.00, SD = 0.66$), and the effect is statistically significant ($p < .001$) with a standard error mean of .10. The standard deviation at third grade is 1.27, which is higher than that of Pre-K (0.66). This situation appears to be consistent with the reevaluation results of identifying students’ specific disabilities. At Pre-K, all the participants were identified, as having developmental delays, which required a similar interventional service. At third grade, the individual’s disability was more precisely distinguished, and as a result, the required services were not as similar as that of Pre-K. This result appears to support the usefulness of Pre-K Early Intervention that is manifested by the reduction of participants’ requested special educational services at 3rd grade. However, further research on the effects of different domain areas of the Matrix and the impact of inclusive practices may be warranted.

**Socialization Opportunities and Reclassification**

Although, on average one year Pre-K group has 57 more Non-ESE minutes per week than the two years Pre-K group (1154.74 vs. 1097.53), this difference in minutes did not reach a level of statistical significance in socialization opportunities with their non-disabled peers while combined with academic performances. The lack of a desirable group academic performance of students with developmental delays (DD) indicated by the results of this study is not unusual. Most people expect children with special needs will always have low level of academic achievement. However, the results of question number three and four did reveal, at individual level, that 15 participants (6%) exited special education at 1st grade, and up to 31 students (12.4%, included 1st grade result) no
longer required special education services in 3rd grade. Future studies should include the academic performance of these exited students, which may better reflect the usefulness of Pre-K ESE programs. The composition changes of the students with DD are dynamic among initial evaluations at Pre-K and reevaluations around 1st grade and at 3rd grade in this study. For example, the most common exceptional category changes from language impaired (31%) at 1st grade to specific learning disabled (33%) and the positive association between all 20 participants (8%) who were speech impaired at 1st grade disappeared and dramatically increased to 19% non-available category at 3rd grade. Did these children “recover” from the disability due to the maturity of age associated with the development of speech functions? Or was their disability condition too mild to be considered “special needs” and thus they were dismissed (miss) from the monitoring list without an official dismissal record. This finding is consistent with the study of Ysseldyke and Bielinski (2002). They advocated that “failure to account for these [composition] changes could result in misinterpretation of the effectiveness of special education services” (p.191).

The results of question number five indicate that 20% of children with developmental delays were served in inclusive Pre-K settings, compared with 49% at 3rd grade in regular classroom (total inclusive) and 12% in resource room (partial inclusive). As reported by the Florida Department of Education (2005), only 7% of children with disabilities between ages three to five and 48% of students with disabilities between ages 6 to 21 were placed into public school inclusive settings with their non-disabled peers in the school year of 2002-2003. These inclusive percentages are very different from that of the national norm. The U.S. Department of Education (2003a) reported that 79% of Pre-
K children were enrolled in general education classes, and 21% were served in special education classes. Therefore, the Pre-K placement for young children with developmental delays in the state of Florida is different from national practices. This inclusive setting difference certainly does not imply that the practices of one and two years Pre-K ESE interventions did not meaningfully contribute to children’s basic school socialization function. The majority of Pre-K ESE students in the state of Florida were placed in separated classrooms, and thus using Non-ESE minutes may not be an ideal indicator of their socialization opportunities with their non-disabled peers. Further investigations on the contents of Non-ESE minutes such as the frequency and quality counts toward the actual social contact are worth determining.

**Suggestions for Future Studies**

Due to the attrition and missing FCAT test results data, this quasi-experimental study may have insufficient observations and low statistical power. As a result, the research findings failed to support the hypothesized group differences. A better research design, such as including more participants from other school districts and also implementing a control group, may improve the statistical results and re-examine the effects of Pre-K ESE duration. The other main limitation of this study is the bias of self-selection into the Pre-K ESE groups. This remains a threat to the research results and also a common challenge for other quasi-experimental studies. Moreover, according to a special report by the Florida Legislature, Office of Program Policy Analysis and Government Accountability (2003), recording errors were found in the school districts’ data reporting system, and thus more accurate student data are needed. The recoding
error may explain the high attrition rate and large number of missing FCAT tests results in the current study. Thus, results from this study should be interpreted cautiously, and further verification with other samples is also needed.

In response to the “second generation” research (Guralnick, 1993, 1997a), the findings of this study provide an insightful understanding of Pre-K interventions duration on the performance of children with developmental delays through a large scale, government-funded program. Academic achievement of students with special needs could be important, but should not be the only focus of early intervention. Further studies on Pre-K Early Intervention effects on nonacademic outcomes deserve investigation and should be addressed in more robust research design and studies. Other sub groups of children with special needs should be targeted. Synthesizing the results of different research may provide us with a better understanding of this complex task of early intervention and may reduce the controversial debate over the cost-and-effect issues regarding Pre-K ESE practices.
APPENDIX A

MATRIX OF SERVICES
Florida Department of Education
Matrix of Services
For funding under the Florida Education Finance Program

Student Information

District: 
Date Completed: 
Student Name: 
Student ID: 
Date of Birth: Grade: 
School: 
Total Minutes in School Week: 
Minutes per Week with Non-ESE Persons: 
Names of Persons Completing Matrix: 

Areas of Eligibility (Put a "P" next to the primary exceptionality. Check all others that apply.)

Data Entry Code

- Autistic ................................................................. P
- Deaf or Hard of Hearing ........................................... H
- Developmentally Delayed (Age: 0-5) ......................... T
- Dual-Sensory Impaired ............................................. O
- Educable Mentally Handicapped ................................. A
- Emotionally Handicapped ......................................... J
- Established Conditions (Age: 0-2) .............................. U
- Gifted ...................................................................... L
- Hospital/Homebound ................................................ M
- Language Impaired ................................................... G
- Occupational Therapy .............................................. D
- Orthopedically Impaired .......................................... C
- Other Health Impaired ............................................... V
- Physical Therapy ........................................................
- Profoundly Mentally Handicapped ............................ N
- Severely Emotionally Disturbed ............................... Q
- Specific Learning Disabled ...................................... K
- Speech Impaired ...................................................... F
- Traimitable Mentally Handicapped ......................... B
- Traumatic Brain Injury ........................................... S
- Visually Impaired ................................................... E

Instructions
1. Check services or supports to be provided by school district to student in Domains A through E.
2. Mark appropriate level 1 through 5 for each domain and record level at bottom of each domain.
3. Check applicable special considerations if any, and record total special considerations rating.
4. Total the five domain ratings, sum the total of domain ratings and special considerations rating, and record total in box at top of this page.
5. Determine cost factor using cost factor scale on the final page and record it in box at top of this page.
(Note: For more information, see the Matrix of Services Handbook.)

ESE 9291
### Matrix of Services

#### Domain A—Curriculum and Learning Environment

<table>
<thead>
<tr>
<th>Level 1</th>
<th>Requires no services or assistance beyond that which is normally available to all students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 2</td>
<td>Adaptation to the general curriculum</td>
</tr>
<tr>
<td></td>
<td>Curriculum compacting</td>
</tr>
<tr>
<td></td>
<td>Electronic tools (e.g., tape recorders, word processors)</td>
</tr>
<tr>
<td></td>
<td>Adapted textbooks, materials (e.g., large print, Braille, audio-visual)</td>
</tr>
<tr>
<td></td>
<td>Modified assessment procedures/materials</td>
</tr>
<tr>
<td></td>
<td>Specially prepared notes, materials</td>
</tr>
<tr>
<td></td>
<td>Referrals to agencies</td>
</tr>
<tr>
<td></td>
<td>Consultation on a monthly basis with teachers, family, agencies, or others</td>
</tr>
<tr>
<td>Level 3</td>
<td>Differentiated curriculum</td>
</tr>
<tr>
<td></td>
<td>Modifications to curriculum context, process, product</td>
</tr>
<tr>
<td></td>
<td>Specialized instructional approaches</td>
</tr>
<tr>
<td></td>
<td>Low-stress aids or use of electronic tools with assistance</td>
</tr>
<tr>
<td></td>
<td>Assistive technology, materials, assessments, or equipment</td>
</tr>
<tr>
<td></td>
<td>Special assistance in mainstream requiring weekly consultation</td>
</tr>
<tr>
<td></td>
<td>Assistance for some learning activities</td>
</tr>
<tr>
<td></td>
<td>Direct, specialized instruction and/or curriculum for some learning activities</td>
</tr>
<tr>
<td></td>
<td>Collaboration with teachers, family, agencies, or others</td>
</tr>
<tr>
<td>Level 4</td>
<td>Extensive creation of special materials</td>
</tr>
<tr>
<td></td>
<td>Direct, specialized instruction and/or curriculum for the majority of learning activities</td>
</tr>
<tr>
<td></td>
<td>Instruction delivered within the community</td>
</tr>
<tr>
<td></td>
<td>Assistance for the majority of learning activities (e.g., low pupil-teacher ratio)</td>
</tr>
<tr>
<td></td>
<td>Use of assistive technology with supervision for majority of learning activities</td>
</tr>
<tr>
<td>Level 5</td>
<td>Instruction in reading braille</td>
</tr>
<tr>
<td></td>
<td>Intensive curriculum or instructional approach for most learning activities (e.g., supported employment, very small class, or one-on-one assistance)</td>
</tr>
<tr>
<td></td>
<td>Group instruction at home or hospital (e.g., televised)</td>
</tr>
<tr>
<td></td>
<td>Individual instruction at home or hospital</td>
</tr>
<tr>
<td></td>
<td>Ongoing, continuous assistance for participation in learning activities</td>
</tr>
</tbody>
</table>

**Domain A Rating:**

#### Domain B—Social/Emotional Behavior

<table>
<thead>
<tr>
<th>Level 1</th>
<th>Requires no services or assistance beyond that which is normally available to all students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 2</td>
<td>Consultation on a monthly basis with teachers, family, agencies, or others</td>
</tr>
<tr>
<td></td>
<td>Specialist training in self-advocacy and understanding of exceptionality</td>
</tr>
<tr>
<td></td>
<td>Special education services in general class</td>
</tr>
<tr>
<td></td>
<td>Monthly counseling or guidance</td>
</tr>
<tr>
<td></td>
<td>Monthly assessment of behavior or social skills</td>
</tr>
<tr>
<td>Level 3</td>
<td>Small group training in social skills, self-regulation, behavior, self-advocacy, conflict resolution, dealing with authority, and socialization</td>
</tr>
<tr>
<td></td>
<td>Weekly counseling or guidance</td>
</tr>
<tr>
<td></td>
<td>Behavior contract, including behavior outside the classroom (e.g., lunch, bus, home)</td>
</tr>
<tr>
<td></td>
<td>Weekly family counseling, assessment, interventions</td>
</tr>
<tr>
<td></td>
<td>Referral and follow-up for transitions to and from community-based programs</td>
</tr>
<tr>
<td></td>
<td>Weekly assessment of behavior as part of special education program</td>
</tr>
<tr>
<td></td>
<td>Collaboration with teachers, family, agencies, or others</td>
</tr>
<tr>
<td>Level 4</td>
<td>Highly structured behavior management plan infused throughout the school day</td>
</tr>
<tr>
<td></td>
<td>Daily counseling or specific instruction in social or emotional behavior (e.g., self-regulation, behavior, self-advocacy, conflict resolution, dealing with authority, and socialization)</td>
</tr>
<tr>
<td></td>
<td>Daily reports to family, agencies, or others</td>
</tr>
<tr>
<td>Level 5</td>
<td>Intensive, individualized behavior management plan that requires very small class or one-on-one assistance</td>
</tr>
<tr>
<td></td>
<td>Therapeutic treatment infused throughout the educational program</td>
</tr>
<tr>
<td></td>
<td>Wraparound services for up to 24-hour care</td>
</tr>
</tbody>
</table>

**Domain B Rating:**

---

**Student Name:**
### Matrix of Services

**Domain C—Independent Functioning**

| Level  | | |
|--------|------------------|
| 1      | Requires no services or assistance beyond that which is normally available to all students |
| 2      | Requires periodic personal assistance, monitoring, and/or minor intervention |
  - Monthly personal assistance with materials or equipment |
  - Consultation on a monthly basis with teachers, family, therapists, service coordinator, or others |
  - Organizational strategies or adaptations for independent functioning |
  - Special equipment, furniture, strategies, or adaptations for motor control in the classroom |
| 3      | Requires weekly personal assistance, monitoring, and/or intervention |
  - Specialty designed organizational strategies or adaptations for independent functioning |
  - Supervision to ensure physical safety during meal times |
  - Weekly training in self-monitoring of independent living skills |
  - Weekly monitoring or assistance with independent living skills, materials, or equipment |
  - Collaboration with teachers, family, agencies, or others |
| 4      | Requires daily personal assistance, monitoring, and/or intervention |
  - Supervision to ensure physical safety during meal times |
  - Personal assistance or supervision in activities of daily living, self-care, and self-management for most or all of the day |
  - Special equipment for assistive technology for personal care with frequent assistance |
  - Regularly scheduled occupational therapy, physical therapy, or orientation and mobility training |
| 5      | Requires continuous personal assistance, monitoring, and/or intervention |
  - Continuous supervision to ensure physical safety |
  - Personal assistance or supervision in activities of daily living, self-care, and self-management for most or all of the day |
  - Occupational therapy, physical therapy, or orientation and mobility training more than once a week |
  - Multiple therapies and services (physical therapy, occupational therapy, or orientation and mobility training) |

**Domain D—Health Care**

| Level  | | |
|--------|------------------|
| 1      | Requires no services or assistance beyond that which is normally available to all students |
| 2      | Requires periodic personal assistance, monitoring, and/or minor intervention |
  - Monthly personal health care assistance |
  - Consultation on a monthly basis with teachers, family, agencies, or others |
  - Monthly monitoring of health status, procedures, or medication |
  - Specialized administration of medication |
  - Monthly assistance with agency referrals/coordination |
| 3      | Requires weekly personal assistance, monitoring, and/or intervention |
  - Weekly monitoring or assessment of health status, procedures, or medication |
  - Weekly counseling with student or family for related health care needs |
  - Weekly communication with family, physician, agencies, or other health-related personnel |
  - Intravenous or specialized administration of medication (e.g., inhaler, injections) |
  - Collaboration with family, physicians, agencies, or others |
| 4      | Requires daily personal assistance, monitoring, and/or intervention |
  - Daily assistance with or monitoring and assessment of health status, procedures, or medication |
  - Daily assistance with or monitoring of equipment related to health care needs |
  - Administration of peripheral medication |
  - Daily communication with family, physician, agencies, or other health-related personnel |
| 5      | Requires continuous personal assistance, monitoring, and/or intervention |
  - Daily assistance with procedures such as catheterization, suctioning, tube feeding, or other school health services |
  - Continuous monitoring and assistance related to health care needs |

**Domain C Rating:** ___

**Domain D Rating:** ___

**Student Name:** ___
## Matrix of Services

**Domain E—Communication**

<table>
<thead>
<tr>
<th>Level</th>
<th>Requirements/Interventions</th>
<th>Special Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level 1</strong></td>
<td>- Requires no services or assistance beyond that which is normally available to all students</td>
<td>— Add 13 points for students eligible for the hospital/homebound program who are receiving individual instruction at home or at a hospital.</td>
</tr>
</tbody>
</table>
| **Level 2** | - Monthly assistance with communication  
  - Occasional assistance with personal amplification or communication system  
  - Consultation on a monthly basis with teachers, family, agencies, or others | — Add 13 points for pre-kindergarten children with disabilities who are being served in the home or hospital on a one-to-one basis. |
| **Level 3** | - Weekly intervention or assistance with language or communication  
  - Weekly speech/language therapy or instruction  
  - Weekly assistance with personal amplification or communication system  
  - Weekly supervision of augmentative or alternative communication systems  
  - Collaboration with teachers, family, agencies, or others | — Add 3 points for pre-kindergarten students earning less than .5 FTE during an FTE survey period.  
— Add 3 points for students identified as visually impaired or dual-sensory impaired.  
— Add 1 point for students who have a score of 17 total points and who are rated Level 5 in three of the five domains.  
— Add 1 point for students who have a score of 21 total points and who are rated Level 5 in four of the five domains. |
| **Level 4** | - Daily assistance and/or instruction with communication equipment (e.g., augmentative or alternative communication systems)  
  - Daily integrated intervention and assistance related to communication needs  
  - Instruction in sign language for use as the primary method of communication  
  - Interpreting services for part of the school day | — Special Considerations Rating: — |
| **Level 5** | - Continuous assistance and/or instruction with communication equipment (e.g., augmentative or alternative communication systems)  
  - Interpreting services for most or all of the school day  
  - Multiple, continuous interventions to replace ineffective communication (e.g., selective mutism, echolalia) and establish appropriate communication | — Special Considerations Rating: — |

**Domain E Rating:** —

### Cost Factor Scale

<table>
<thead>
<tr>
<th>Total of Domain Ratings: —</th>
<th>Cost Factor Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total of Ratings</td>
</tr>
<tr>
<td>Special Considerations Rating: —</td>
<td>6 - 9 = 251</td>
</tr>
<tr>
<td>Total of Ratings: —</td>
<td>10 - 13 = 252</td>
</tr>
<tr>
<td></td>
<td>14 - 17 = 253</td>
</tr>
<tr>
<td></td>
<td>18 - 21 = 254</td>
</tr>
<tr>
<td></td>
<td>22 + = 255</td>
</tr>
</tbody>
</table>
APPENDIX B

LIST OF COMMON MEASUREMENTS USED BY THE EVALUATION TEAMS
<table>
<thead>
<tr>
<th>Instruments</th>
<th>Authors</th>
<th>Purpose</th>
<th>Population</th>
<th>Publisher</th>
<th>Reliability</th>
<th>Reliability Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battelle Developmental Inventory (BDI)</td>
<td>Newborg, Stock, Wnek, Guidubaldi, &amp; Svinicki, 1984</td>
<td>To identify the developmental strengths and weaknesses</td>
<td>Birth to age 8</td>
<td>Riverside</td>
<td>Test-retest</td>
<td>Oehler-Stinnett (1989); Paget (1989)</td>
</tr>
<tr>
<td>Brigance Preschool Screen (BPS)</td>
<td>Brigance, A. H., 1985</td>
<td>To screen a child’s basic skills and behavior</td>
<td>Ages 3-4</td>
<td>Curriculum Associates, Inc.</td>
<td>NA</td>
<td>Heil (1989); Turco (1989)</td>
</tr>
<tr>
<td>Test</td>
<td>Author(s)</td>
<td>Purpose</td>
<td>Age Range</td>
<td>Publisher</td>
<td>Measure</td>
<td>References</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>-----------------</td>
<td>------------------------------------------------------------------------</td>
<td>--------------</td>
<td>---------------------</td>
<td>-------------------------------</td>
<td>-----------------------------------------</td>
</tr>
<tr>
<td>Fluharty Preschool Speech and Language Screening Test</td>
<td>Fluharty, N. B., 1978</td>
<td>To measure early speech and language performance</td>
<td>Ages 2-6</td>
<td>PRO-ED</td>
<td>Intertester &amp; Intratester .87-1.0</td>
<td>Bankson (1985); Peterson (1985)</td>
</tr>
<tr>
<td>Test Name</td>
<td>Authors</td>
<td>Purpose</td>
<td>Age Range</td>
<td>Publisher</td>
<td>Internal Consistency</td>
<td>Additional Information</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>--------------------------</td>
<td>-------------------------------------------------------------------------</td>
<td>-----------</td>
<td>------------</td>
<td>----------------------</td>
<td>----------------------------------------------</td>
</tr>
<tr>
<td>Receptive-Expressive Emergent Language Test, 2\textsuperscript{nd}, (REEL-2)</td>
<td>Bzoch &amp; League, 1971-1991</td>
<td>To identify children who have specific language problems</td>
<td>Birth to Age 3</td>
<td>PRO-ED</td>
<td>.92</td>
<td>Internal consistency May be used in conjunction with direct observation.</td>
</tr>
</tbody>
</table>

*Note.* Test Instruments information resource from *Tests in Print V: An index to tests, test reviews, and the literature on specific tests (Vol. I)*, edited by L. L. Murphy, J. C. Impara, and B. S. Plake, 1999, Lincoln, NE: Buros Institute of Mental Measurements of the University of Nebraska Lincoln.
APPENDIX C

THE DISTRIBUTIONS OF 3^{RD} GRADE EXCEPTIONALITY CATEGORIES
AND 2003 FCAT PARTICIPATION STATUS
<table>
<thead>
<tr>
<th>Pre-K Intervention</th>
<th>2003 FCAT Participation</th>
<th>Alternate Assessments</th>
<th>FCAT Exemption</th>
<th>Missing FCAT</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PK 1</td>
<td>PK 2</td>
<td>PK 1</td>
<td>PK 2</td>
<td>PK 1</td>
</tr>
<tr>
<td>Exit Special Education Services</td>
<td>10</td>
<td>12</td>
<td>0</td>
<td>1</td>
<td>0</td>
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<tr>
<td>Language Impaired</td>
<td>8</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Specific Learning Disabled</td>
<td>33</td>
<td>31</td>
<td>7</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Educable Mentally Handicapped</td>
<td>3</td>
<td>7</td>
<td>1</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Speech Impaired</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Trainable Mentally Handicapped</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Emotionally Handicapped</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Autistic</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Other health Impaired</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

95
<table>
<thead>
<tr>
<th>Category</th>
<th>6</th>
<th>1</th>
<th>1</th>
<th>1</th>
<th>0</th>
<th>0</th>
<th>2</th>
<th>11</th>
<th>4.4%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unavailable</td>
<td>9</td>
<td>6</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>24</td>
<td>15</td>
<td>57</td>
</tr>
<tr>
<td>Sub Total</td>
<td>72</td>
<td>64</td>
<td>11</td>
<td>22</td>
<td>4</td>
<td>20</td>
<td>28</td>
<td>28</td>
<td>249</td>
</tr>
<tr>
<td></td>
<td>29%</td>
<td>26%</td>
<td>4%</td>
<td>9%</td>
<td>2%</td>
<td>8%</td>
<td>11%</td>
<td>11%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>136</td>
<td>33</td>
<td>24</td>
<td>56</td>
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<td></td>
<td></td>
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<td>100%</td>
</tr>
<tr>
<td></td>
<td>(55%)</td>
<td>(13%)</td>
<td>(10%)</td>
<td>(22%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. PK1 = One Year Pre-K Group, PK2 = Two Years Pre-K Group
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