



**AN EVALUATION OF THE IMPLEMENTATION  
OF GEORGIA'S PRE-K PROGRAM:  
REPORT OF THE FINDINGS FROM  
THE GEORGIA EARLY CHILDHOOD STUDY (2002-03)**

**Gary T. Henry, Bentley D. Ponder, Dana K. Rickman  
Andrew J. Mashburn, Laura W. Henderson, and Craig S. Gordon**

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**Table of Contents**

<u>Section and Title</u>	<u>Page</u>
Executive Summary .....	v
<b>Section 1</b>	
<b>Study Background</b>	
Background on the Georgia Pre-K Program .....	1
The Georgia Early Childhood Study .....	2
Research Questions.....	3
<b>Section 2</b>	
<b>Study Methods: Sample, Measures, and Analyses Techniques</b>	
Sample.....	5
Measures .....	6
Study Analysis Methods .....	10
<b>Section 3</b>	
Descriptive Findings .....	11
<b>Section 4</b>	
The Impacts of Pre-K Program Implementation on Children’s Outcomes .....	17
<b>Section 5</b>	
Conclusions.....	28
References.....	32

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## **EXECUTIVE SUMMARY**

### **AN EVALUATION OF THE IMPLEMENTATION OF GEORGIA'S PRE-K PROGRAM: REPORT OF THE FINDINGS FROM THE GEORGIA EARLY CHILDHOOD STUDY (2002-03)**

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After ten years, Georgia continues to lead the nation in providing full day, publicly subsidized Pre-K to four-year-olds whose parents choose to enroll them. In this report, we assess the extent to which differences in the way Pre-K is implemented affect children's development. Do teachers with higher levels of education have more positive impacts on children's development? Do teaching styles make a difference in terms of children's outcomes by the end of kindergarten? Do children taught using certain curricula fare better than those taught using others? Answers to questions such as these can assist Pre-K administrators in refining Georgia's program and inform those in other states who are developing or expanding their prekindergarten programs.

#### **Summary of Major Findings**

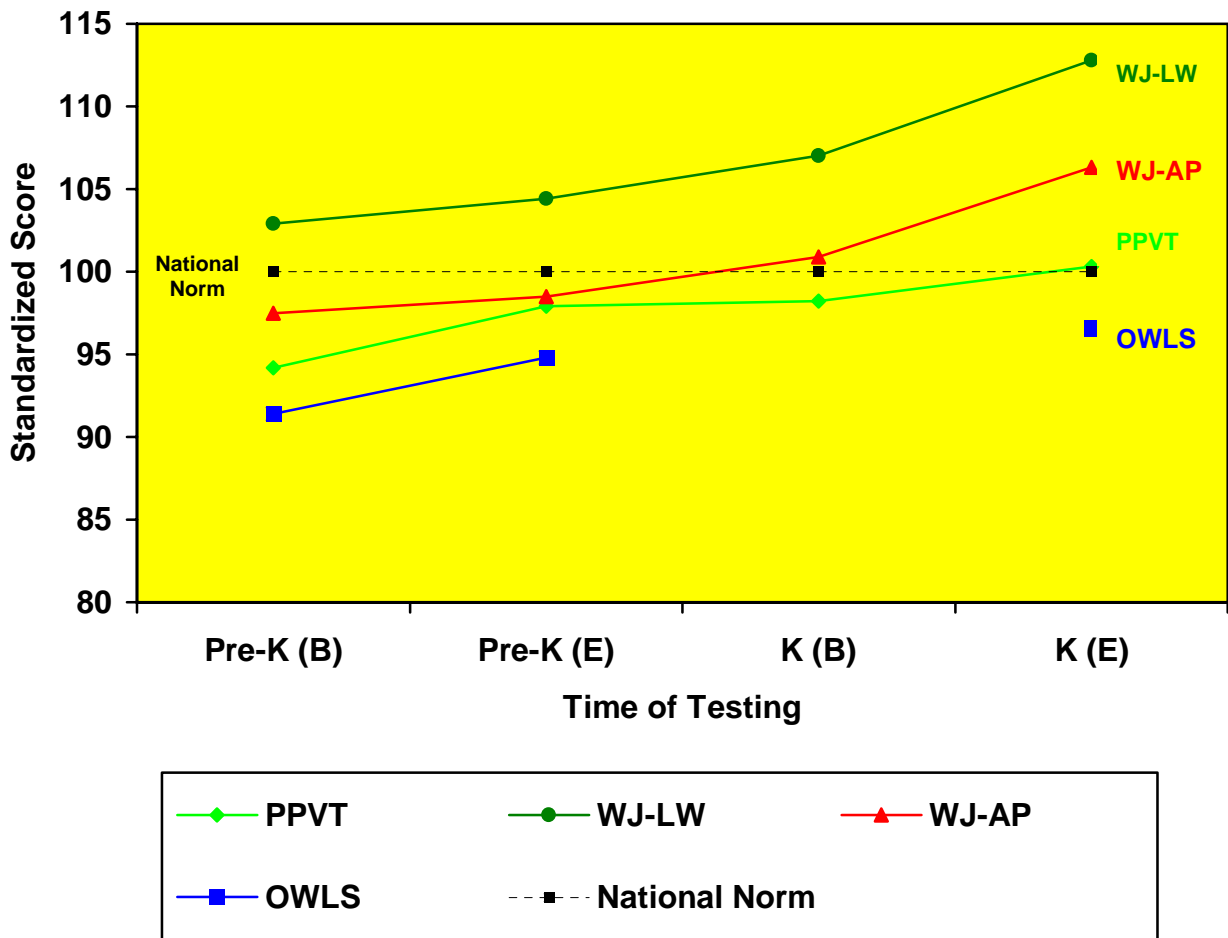
Based on the outcomes of a sample of children who attended Georgia's Pre-K Program drawn from the Early Childhood Study (Henry, Henderson, Ponder, Gordon, Mashburn, & Rickman, 2003), we examined the effects of teacher education, teaching styles, and curricula on children's development at the end of kindergarten. In addition, we assessed the extent to which attending Pre-K in local school settings affected their outcomes when compared with attending centers operated by private or not-for-profit agencies. Finally, we examined the extent to which peer effects occurred, testing to see if the concentration of economically disadvantaged children within a Pre-K class affected the children's development.

#### Overall Findings about Georgia's Preschools Serving Four-year-olds

By the end of kindergarten, children who attended the Georgia Pre-K Program had more than made up their below average performance on standardized assessments at the beginning of Pre-K. On average, children who attended Pre-K equaled or surpassed national norms for their age group on eight out of nine standardized assessments. Only in expressive language did the averages for these children not exceed the norms for their age group by the end of kindergarten. Even though the

children lagged behind national norms for expressive language, they gained over five points since beginning Pre-K and reduced the deficit from nearly nine points to approximately three points. The following figure illustrates the gains made by the Pre-K children on all four of the standardized assessments that were measured both at the beginning of Pre-K and at the end of kindergarten.

### Gains on Standardized Test



The children’s performance on these tests is truly impressive, but systematic differences occur for some groups of children. On seven of nine standardized assessments, a racial gap between the scores of White and Black children became pronounced. It is worth noting that the gap did not emerge on letter and word recognition or sound matching, two skills that frequently are directly taught in Pre-K and kindergarten classrooms. It is not clear how much of this is due to differences in family income and education, but these factors definitely explain part of the differences.

Clearly, children gain a performance advantage when their mother has more education. On three assessments, children whose mothers did not complete high school scored significantly lower than children whose mothers had a college degree. On the other hand, recognizing letters and words is a skill often practiced in Pre-K and kindergarten classrooms and one where mother's education is not related to systematic differences at the end of kindergarten. Family income also makes a difference in the children's performance, most consistently in cognitive and math related assessments. Living with both parents continuously since birth was positively associated with children's performances on four of seven assessments.

### Implementation of Georgia's Pre-K Program

Georgia Pre-K Program classrooms differ from other classrooms serving four-year-olds in several ways, including the teachers' credentials and their attitudes toward learning, the curriculum, the program setting, and peer characteristics. Some of these differences are directly affected by policies and regulations, but others are influenced by parental choice and decisions made by providers in communities across Georgia. We address five sources of variation and examine whether these differences affect the literacy, cognitive, or social development of the children who experienced the differences. All findings presented below control for family and child characteristics, baseline skills, and the other implementation variations.

*Teachers' Qualifications.* Research supports that teacher qualifications, particularly a four-year college degree and specialized training, are related to classroom quality and children's development (Barnett 2003). Most of the preschool programs for which positive effects have been rigorously documented from the Perry Preschool Project (Barnett 1992) to the Chicago Parent-Child Centers (Reynolds 2000) to the Oklahoma Prekindergarten Program in Tulsa (Gormley & Gayer 2003) have employed teachers who are college educated and certified to teach preschool.

At a minimum, Pre-K teachers in Georgia are required to have a technical diploma related to early childhood education or an associate's degree, which approximately 20 percent do. Most, however, have bachelor's degrees in related fields but are not certified to teach (20 percent) and about 60 percent are certified teachers. In this study, no differences were found in children's outcomes when taught by teachers with bachelor's degrees when compared with teachers holding associate's degrees or technical diplomas. On two math skill assessments, children taught by certified teachers performed less well than their peers from classes taught by teachers' with associate's degrees. Because of the loss of 421 certified teachers from Pre-K classrooms, probably due to the increases in kindergarten teachers required by state law, these teacher credential findings should be considered within the context of a changing labor market for Pre-K teachers.

*Teaching Style.* As is consistent with prior research, we found that the *middle of the road* teaching style was not as effective as a child-centered teaching style. Children who had Pre-K teachers with a middle of the road style were more frequently withdrawn,

had a less positive attitude toward school and learning, and performed less well in math than children whose teachers used a child-centered approach. Kindergarten teachers rated the classroom behaviors of children who had adult-directed teachers in Pre-K worse than those of children in child-centered classes.

*Curriculum.* Children's outcomes were compared based on the type of curriculum used in their Pre-K classroom. In 42 out of 45 comparisons, children taught using the High Reach curriculum performed less well than children taught using other curricula; only in 13 comparisons did the difference reach significance, including recognizing letters and words, applied problem solving, and positive attitudes toward school and learning. On average, children who were taught using the High/Scope curriculum performed better at the end of kindergarten in nine of these comparisons. In addition, children taught using Creative curriculum were insignificantly different than High/Scope but better than High Reach in four comparisons. In only one other curriculum comparison was the difference in the kindergarteners' performance statistically different: children taught using High/Scope outperformed children taught using Creative curriculum on sound matching skills.

*Organization Type.* On 4 comparisons of 15, children who attended a Pre-K operated by their local school system performed better than other children. Children from public school Pre-K programs appeared to be less aggressive, performed better on math calculations, and recognized more letters and words. In contrast, these same children performed worse in one comparison -- expressive language skills.

*Peer Effects.* Considerable research supports the finding that children who attend schools with more affluent peers perform better academically regardless of the socio-economic background of the children being studied. In this study, the results are largely mixed. Being in Pre-K classes with more impoverished classmates has negative effects on math skills but positive effects on attitudes and behaviors. There is little difference on the directly assessed language and literacy skills, but communication ratings are higher for children who have attended classrooms with higher concentrations of impoverished children.

We conclude that children served by Georgia's Pre-K Program are making significant gains in skills and exhibit positive attitudes and behaviors in kindergarten. Since expressive language skills are the only skills where Georgia's Pre-K participants lag the national norms, it may be important to provide teachers with more techniques to improve those skills through continuing professional development. Also, it appears that the emphasis placed on encouraging child-centered instruction by Bright from the Start: The Department of Early Care and Learning should be continued. Finally, even though peer effects are mixed, our evidence suggests that it is important to maintain open access to Georgia Pre-K.

# IMPACTS OF GEORGIA'S PRE-K PROGRAM

## 1. Study Background

### Background on the Georgia Pre-K Program

Funded by earmarked proceeds from the Georgia Lottery, the Georgia Pre-K Program began as a means tested program in the 1993-94 school year. Beginning with the 1995-96 academic year, Georgia became the first state in the nation to offer voluntary Pre-K for all four-year-olds regardless of household means. By 1996-97, the program served over 57,000 four-year-olds annually. In 2001-02, the program had expanded to serve 63,613 children, 25,711 of whom were classified as at-risk (Georgia Office of Educational Accountability, 2002). The state expended approximately \$216.3M to operate the program.

The Pre-K Program is administered at the state level, but the providers may be local public schools, not-for-profit organizations, or private for-profit firms. Each provider must receive approval from the state's Bright from the Start: Department of Early Care and Learning (DECAL) to offer one or more Pre-K classes. Children may attend any of the 3,152 Pre-K classes offered by 1,683 providers at no tuition cost to the children's family for the entire school year. Private-for-profit providers offer the largest number of classes (1,460), but are followed closely by local public school systems (1,325), which together comprise 88 percent of the classrooms. In this study, we assess whether attending Pre-K in a local school setting results in different outcomes for children when compared with the other settings.

In addition to health, safety, and nutritional regulations, the state agency that administers Georgia Pre-K also regulates instructional services. To qualify as lead teachers, current regulations require a technical diploma, an associate's degree, or a college degree in a field related to child development or education. Each classroom can enroll between 18 and 20 students, and must have a lead teacher and teacher's aide in the classroom whenever the children are present. Instruction must be based on a state-approved curriculum, including national curricula such as High/Scope, Creative, High Reach, and Montessori, or a locally developed or proprietary curriculum that must be pre-approved by DECAL. In this study, we examine the extent to which outcomes vary systematically with differences in teachers' education and curriculum choice.

In exchange for a flat payment per student from DECAL, providers must agree to offer full-day services (at least 6.5 hours) during the same term as the local school calendar (180 days). However, the flat payment, which ranges from \$2,200 to \$3,475 per student, varies based on program location and lead teacher credentials. For example, payments for students in a classroom with a teacher certified in early childhood education are larger than payments for students who have a lead teacher with lesser credentials. In addition, DECAL funds transportation subsidies (\$165 per student per year) for providing transportation to children classified as economically disadvantaged.

### The Georgia Early Childhood Study

In 2001, the Early Childhood Study began to examine the development of four-year-olds in early childhood programs, preschools and child care centers in Georgia. Purposes for the overall study included:

- following the development of young children attending publicly funded and private preschools;
- ascertaining the quality of the children's educational experiences; and
- estimating the effects of Georgia's Pre-K Program on children's development.

Probability samples of three groups of children attending preschool were included in the study: 1) children enrolled in Georgia's Pre-K Program; 2) children attending Head Start as four-year-olds; and 3) children attending private preschools or child care centers who were eligible for the Georgia Pre-K Program. During the first year of the study, 353 children attending Georgia Pre-K were sampled and participated in the study. Twenty-six of these children did not attend Pre-K for the entire year and one family withdrew a child; this led us to exclude them from our analysis and focus exclusively on a subset of 326 children who attended a *full year* of Georgia Pre-K (Table 1.1). By including only children who participated in Pre-K for a full year, we gain a better understanding about how differences in the program's implementation may affect children's outcomes. In fall 2002 when the children were beginning kindergarten, 264 (81 percent) were located. Of the 326 children originally sampled, 264 were directly assessed in fall 2002, followed by 262 in spring 2003. For purposes of analysis, missing data for the 326 children were imputed to reduce potential attrition bias and increase efficiency (King et al., 2001).

Table 1.1  
Sample of Pre-K Children in the Early Childhood Study

<b>Pre-K Sample</b>	<b>2001-02</b>	<b>2002-03</b>
Children Located	353	264
Children Assessed (Fall)	353	264
Children Assessed (Spring)	313	262
Children Dropped <sup>1</sup>	0	26
Parent Withdrawals	0	1
<b>Total</b>	<b>353</b>	<b>326</b>

<sup>1</sup> Twenty-six children were dropped from the Early Childhood Study after it was determined that they had not participated in a full year of Pre-K.

Study measures included: a) direct assessments of children at the beginning of preschool, end of preschool, beginning of kindergarten, and end of kindergarten; b) performance ratings by preschool and kindergarten teachers; c) surveys of teachers' attitudes and practices; d) surveys of parents' attitudes and involvement; and e) observations and quality ratings of classroom activities.

## Research Questions

Georgia's Pre-K Program offers considerable flexibility to teachers and program directors as long as they adhere to the program's requirements. For example, all classes must be taught using a curriculum approved by Bright from the Start, but program directors can choose from among the approved curricula. In addition, while all lead teachers must have at least a technical diploma or an associate's degree in early childhood, the degree can come from several different related fields. Many directors choose to hire teachers with bachelor's degrees in early childhood or a related field or those who have received state teaching certificates related to early childhood education.

Understanding which characteristics of Georgia's Pre-K Program have a systematic affect on children's development can assist program administrators in refining implementation and in providing technical assistance on specific "points of emphasis" as they work with teachers and program directors. In addition, administrators and policy advocates elsewhere can use these findings as a basis for developing or improving their own Pre-K programs.

In this report, we address five research questions about the Georgia Pre-K Program implementation:

1. Does the education of Pre-K teachers influence the developmental outcomes of children at the end of kindergarten?
2. Does the teaching style employed by Pre-K teachers influence the developmental outcomes of children at the end of kindergarten?
3. Does the preschool curriculum influence the developmental outcomes of children at the end of kindergarten?
4. Does the type of organization operating the Pre-K class influence the developmental outcomes of children at the end of kindergarten?
5. Do the peers of the prekindergarteners influence the developmental outcomes of children at the end of kindergarten?

It is common in research that addresses how preschool affects children's development to include program quality among the measures of implementation. The quality of the Pre-K classes in this study was measured through direct observation using three previously validated instruments: the Early Childhood Environmental Rating Scale-Revised (ECERS-R; Harms, Clifford & Cryer, 1998), the Assessment Profile (AP; Abbott-Shim & Sibley, 1998), and the Caregiver Interaction Scale (CIS; Arnett, 1989). Because the Pre-K classes were of consistently high quality, they did not vary significantly in terms of the measures of quality (See Appendix, Table A.1). In fact, none of these measures registered consistent, significant impacts on developmental outcomes for the Pre-K sample, although they did when comparing Pre-K with other preschool programs. Since this report focuses solely on the Pre-K Program, analyses of these quality measures are not included in this report but can be found in a previously released report (Henry, Henderson, Ponder, Gordon, Mashburn, & Rickman, 2003).

Developmental outcomes include three groups of outcome variables which are directly related to the learning and developmental goals for Georgia's Pre-K Program. The first

group relates to children's language and literacy skills and includes both standardized assessments and kindergarten teacher ratings. The second group covers children's math and academic skills, again measured using direct assessments and teacher ratings. Finally, the third group added several measures of children's attitudes and behaviors, including social skills in the classroom and measures of withdrawn behavior, aggressive behavior, and positive attitudes toward school and learning.

One of the unique features of this study is that many of these skills were directly assessed at the beginning of Pre-K, thus providing baseline data from which we can assess the children's growth and rate of development. Since we conducted the analyses using the skills at the beginning of Pre-K as control variables, the coefficients represent "value-added" by the specific implementation variable. While all of the analyses are conducted this way, several outcome measures were not measured at the baseline, for example, attitudes toward school and learning and therefore, are not strictly "value-added" but they control for the skills measured at Pre-K entry.

This report is organized into five sections, including this background section. In the second section we present more detail concerning the study methods, including a description of the Pre-K children and classes in the sample, the developmental outcomes, and the methods used for analysis. In the third section, we describe children's performance on the developmental outcomes at entry into preschool (baseline) and during the kindergarten year. In the fourth section, we present results of analyses that addressed the five research questions. The estimates of the systematic influence of program implementation on children's outcomes control for the other classroom characteristics included in the analysis, differences in child and family characteristics, and baseline estimates as noted above. While the analyses provide evidence about the extent to which differences in program implementation explain variations in children's outcomes, as with any research not all other potential causes of the differences in outcomes can be ruled out. Keeping this in mind, we draw conclusions from these systematic relationships and discuss our findings in the fifth and final section of the report.

## **2. Study Methods: Sample, Measures, and Analysis Techniques**

### Sample

For this report, we utilized a probability sample of children who participated in a full year of Georgia's Pre-K Program during the 2001-2002 school year. The population in this multi-year study includes children who lived in Georgia and who were born on or between September 2, 1996 and September 1, 1997. In 2001-2002, approximately 120,000 children in Georgia met the age criteria and were thereby eligible to participate in the Early Childhood Study. We identified study participants using a four-stage sampling approach selecting (1) counties stratified by number of four-year-olds within the state, (2) Pre-K sites within counties, (3) classes within Pre-K sites, and (4) children within classes.

The sample includes 326 children, nearly evenly split between boys and girls (Table 2.1). Consistent with Georgia population estimates for young children, approximately 39 percent are Black and a slight majority is White (53 percent). Most of the children have mothers who earned a high school diploma, and about one quarter of the children's mothers earned a college degree or more. The economic risk of the families of these children was measured in one of two ways: 1) by consulting the state Temporary Assistance for Needy Families (TANF) database that indicates recipients of direct cash assistance, and 2) by consulting Pre-K Program records that indicate a Category 1 designation for children who are eligible for free and reduced lunch. Almost half (47 percent) of the children were from families considered at relatively severe risk because they are recipients of TANF. Twelve percent of the children were from families that were living on the edge of poverty but not receiving TANF (Category 1 status). Approximately 41 percent of the children experienced minimal levels, if any, of economic risks. Perhaps surprisingly, 73 percent of the children had lived with both parents continuously since birth.

Table 2.1  
 Characteristics of Children and Families in Pre-K Sample

Demographic Characteristic	n (%)
Sex	
Female	164 (50%)
Male	162 (50%)
Race	
White	173 (53%)
Black	126 (39%)
Other	27 (8%)
Mother's Education	
Less than High School	23 (7%)
High School	217 (67%)
College	65 (20%)
Advanced	21 (6%)
Economic Risk	
No Risk	133 (41%)
Category 1 TANF	40 (12%) 153 (47%)
Lived Continuously With Both Parents	
Yes	237 (73%)
No	89 (27%)

## Measures

### *Pre-K Program Characteristics*

**Teachers' Qualifications.** During the 2001-2002 school year, Georgia Pre-K teachers held one of four teaching credentials. The most common type of credential among these teachers was "Certified", which was earned by teachers with a bachelor's degree or higher in the fields of early childhood, elementary, or special education (58 percent). Nineteen percent of the Pre-K teachers were considered "Degreed", meaning that they had a bachelor's degree in a field related to children's development but were not certified in an approved area. At the time the ECS began, teachers could also receive their teaching credential by earning a certificate as a Child Development Associate (CDA) or Child Care Professional (CCP), credentials that are no longer valid for new lead teachers. Because there were few teachers with CDA/CCP certificates in our sample, teachers with either of these types of teaching credentials were included with teachers holding a postsecondary technical institute diploma or associate's degree, or Montessori credential. For purposes of this study, this third group was labeled as having an "Associate's" credential (20 percent).

**Teaching Style.** Teachers adopt varying styles for educating young children. To characterize teaching styles of Pre-K teachers, we analyzed teachers' responses to the Teacher Survey of Beliefs and Practices (Marcon, 1992, 1999), a measure of their

beliefs and practices regarding educating young children. Teachers responded to items using a ten-point rating scale that is anchored at each end by opposing theoretical views regarding educating young children. Responses to this survey were analyzed using hierarchical cluster analysis that grouped teachers into one of three teaching styles: child-centered, adult-directed, and middle of the road (Marcon, 1999). Marcon (1999) found that children taught by child-centered instructors demonstrated greater mastery of basic skills than did children in programs that were more adult-directed. In addition, compared with children in either the child-centered or adult-directed models, children in the middle of the road classes did less well on all measures except self-help and development of social coping skills. As noted in Table 2.2, 18 teachers did not return or complete this portion of their surveys and, therefore, could not be classified.

**Curriculum.** The state has approved a number of curricula for use in Georgia Pre-K classes. Within our sample of classes, the most frequently used curriculum was High/Scope (33 classes), followed by Creative (18 classes) and High Reach (11 classes). Locally Developed curricula as well as Montessori curriculum were used in very few classrooms in this study. Despite different approaches employed by the latter types of curricula, both were grouped together and labeled “Other” (7 classes).

**Organization Type.** The Pre-K Program is administered at the local level by one of three organization types: local school systems, not for-profit agencies, and for-profit firms. Among this sample of Pre-K Programs, only five agencies were non-profits, so organization type was classified as either local school system (26 classes) or non-school system (43 classes). Thus, comparisons relating to the organization type also concern the setting of the Pre-K Program and whether it was located within a local school.

**Peer Effects.** Variations in the composition of students within a class may affect children’s development. One characteristic of classroom peers that may impact development is the economic backgrounds of the students. In our study, this characteristic was measured as the percentage of students in the Pre-K class who were classified as eligible for means tested benefits or free or reduced price lunch. Of the classes in the study, 27 (39 percent) had half or fewer children meeting this criteria.

Table 2.2 presents descriptive characteristics of the Pre-K Programs participating in this study. It is important to note that these characteristics are not entirely independent of each other. For example, one combination of organization type, curriculum, and teacher credential type was present in many of the sampled classrooms; 19 of the 26 classes within local schools use the High/Scope curriculum and are taught by “Certified” teachers. However, because some of the not for-profit and private sites also employ certified teachers and use High/Scope, valid comparisons of the variations in children’s outcomes associated with these characteristics can be made.

Table 2.2  
Descriptive Characteristics of Georgia Pre-K Classes (n=69)

Descriptive Characteristic		n	%
Teaching Credential	Certified	40	58.0
	Degreed	13	18.8
	Associate's	14	20.3
	Missing	2	2.9
Teaching Style	Child-Centered	24	34.8
	Middle of the Road	19	27.5
	Adult-Directed	8	11.6
	Missing	18	26.1
Curriculum Type	High/Scope	33	47.8
	High Reach	11	15.9
	Creative	18	26.1
	Other	7	10.1
Organization Type	Local School System	26	37.7
	Private (For-Profit and Not For-Profit)	43	62.3
Peer Economic Background	0-25% Category 1	16	23.2
	26-50% Category 1	11	15.9
	51-75% Category 1	20	29.0
	76-100% Category 1	22	31.9

*Developmental Outcomes*

Table 2.3 presents the outcomes assessed at the end of kindergarten that measure concepts related to Language and Literacy, Math and Academic Skills, and Behavior. Language and Literacy outcomes were measured through direct assessments using norm-referenced, standardized instruments, as well as through a composite index of kindergarten teachers' ratings of children's communication skills. Math skills were measured using three sub-scales of the Woodcock-Johnson Test of Achievement and a composite scale comprising all three of these math tests. Children's academic skills were measured using a composite index of kindergarten teachers' ratings of children's math, reading, counting, science, and writing skills. Children's behaviors and attitudes were measured using teachers' ratings, including a composite of children's attitudes toward school, task persistence, and curiosity; a composite index of teachers' ratings of the child's respect for authority, ethical behavior, and refusal skills; a composite of

measures indicating the frequency with which the child was withdrawn; and a composite of measures indicating the frequency with which the child behaved aggressively.

Table 2.3  
Developmental Outcomes Measured at the End of Kindergarten (Spring 2003)

<b>Developmental Area</b>	<b>Instrument</b>	<b>Method</b>
<b>Language and Literacy</b>	Receptive Language (vocabulary): Peabody Picture Vocabulary Test-III, Form A (Dunn & Dunn, 1997)	Direct Assessment
	Expressive Language: Oral and Written Language Scales (Carrow, 1995; Oral Expression subscale)	Direct Assessment
	Recognition of Letters and Words: Woodcock Johnson Test of Achievement-III (Woodcock, McGrew & Mather, 2001; Letter-Word Identification subtest)	Direct Assessment
	Sound Matching: Comprehensive Test of Phonological Processing (Wagner, Torgesen, & Rashotte, 1999)	Direct Assessment
	Elision: Comprehensive Test of Phonological Processing (Wagner, Torgesen, & Rashotte, 1999)	Direct Assessment
	Communication Skills	Kindergarten Teacher Ratings
<b>Math and Academic Skills</b>	Applied Problems Woodcock Johnson Test of Achievement-III (Woodcock, McGrew & Mather, 2001)	Direct Assessment
	Math Fluency Woodcock Johnson Test of Achievement-III (Woodcock, McGrew & Mather, 2001)	Direct Assessment
	Calculations Woodcock Johnson Test of Achievement-III (Woodcock, McGrew & Mather, 2001)	Direct Assessment
	Academic Skills (Based on Georgia's Quality Core Curriculum)	Kindergarten Teacher Ratings
<b>Attitudes and Behaviors</b>	Positive Attitude toward School and Learning	Kindergarten Teacher Ratings
	Social Behaviors	Kindergarten Teacher Ratings
	Withdrawn Behavior	Kindergarten Teacher Ratings
	Aggressive Behavior	Kindergarten Teacher Ratings

## Study Analysis Methods

For this study, multiple regression analysis was used with adjustments to the standard errors due to the stratification and cluster sampling. To control for systematic differences that are not attributable to program implementation differences, child and family characteristics were included in the models. For example, if programs run by local school systems served more girls than the other programs, and girls do better on the assessment of expressive language skills, the higher scores of girls in school run programs could be attributed to the effects of those programs rather than having more girls attend school-based programs, if the children's characteristics were not controlled in the analysis. Baseline scores on standardized tests were also included in the models to account for the children's skills and abilities upon preschool entry, thereby enabling us to assess the value added by differences in program implementation. All of the coefficients on the program implementation characteristics control for the other implementation characteristics in the model but not unmeasured characteristics of the classrooms. The goal of the analysis is to explain differences in children's outcomes that are systematically related to differences in preschool program implementation, while controlling for the children's background and their language and cognitive skills that they possessed when they entered Pre-K.

### **3. Descriptive Findings**

Children attending the Pre-K Program made across the board gains on all of the standardized assessments from preschool to the end of their kindergarten year (Table 3.1). The gains range from 5.2 points in expressive language to 10 points in recognizing letters and words. These increases are all that much more impressive considering the fact that they are adjusted for age. That means that the standards to receive the same score have increased as the children have gotten older. In only one skill assessment do the Pre-K children lag behind the norms for their age at the end of kindergarten: expressive language. Despite this lag, however, the children gained over five points on the national norms on this assessment during the time they spent in preschool and kindergarten. Two of the more advanced literacy skills, elision and sound matching, did not allow accurate measurements for preschoolers. Based on their kindergarten assessments, though, the children who attended Pre-K made significant gains during this year, scoring at or above the norms for their age. The averages for teachers' ratings of communication skills, academic skills, social behaviors, and positive attitude toward school and learning were all above "good" for the kindergarteners who had attended Georgia's Pre-K Program. Finally, neither withdrawn nor aggressive behaviors occurred very frequently among the children attending Pre-K according to kindergarten teachers.

Table 3.1  
Means on Developmental Outcomes during Pre-K and Kindergarten

		Fall 2001	Spring 2002	Fall 2002	Spring 2003
Language and Literacy	Receptive Vocabulary (PPVT) (avg=100, sd=15)	94.2	97.9	98.2	100.3
	Expressive Language (OWLS) (avg=100, sd=15)	91.4	94.8	--	96.6
	Letter-Word (WJ-III) (avg=100, sd=15)	102.9	104.4	107.0	112.8
	Elision (CTOPP) (avg=10, sd=2)	--	--	9.0	9.9
	Sound-Matching (CTOPP) (avg=10, sd=2)	--	--	9.5	10.3
	Communication Skills Ratings (range: 1-7)	--	--	--	5.4
	Math and Academic Skills	Applied Problems (WJ-III) (avg=100, sd=15)	97.5	98.5	100.9
Calculations (WJ-III) (avg=100, sd=15)		--	--	--	107.1
Math Fluency (WJ-III) (avg=100, sd=15)		--	--	--	100.0
Math Composite (WJ-III) (avg=100, sd=15)		--	--	--	104.5
Academic Skills Ratings (range: 1-7)		--	--	--	5.8
Attitudes and Behaviors	Positive Attitude Toward School and Learning (range: 1-7)	--	--	--	5.4
	Social Behavior (range: 1-7)	--	--	--	5.4
	Withdrawn Behavior (range: 1-3)	--	--	--	1.2
	Aggressive Behavior (range:1-3)	--	--	--	1.4

### Standardized Assessment Outcomes by Children and Family Characteristics

The children's performance on these tests is truly impressive, but systematic differences occur for some groups of children. On seven of nine standardized assessments, a racial gap between the scores of White and Black children is evident at the end of

kindergarten. It is not clear how much of this is due to differences in family income and education, but these factors definitely explain some of the differences. It is important to note that the assessments where scores do not differ significantly by race are recognition of letters and words and sound-matching (Table 3.2). These assessments most closely resemble activities found in Pre-K and kindergarten classrooms, which may explain why there is no apparent gap between them. The math assessments may reflect differences in the extent to which teachers introduce math content (Table 3.3). It is somewhat inconsistent that none of the teachers' ratings show evidence of a racial gap, but the standardized assessments do. This cannot be explained from these data.

Children clearly gain a performance advantage when their mother has more education. On four assessments, children whose mothers did not complete high school scored significantly lower than children whose mothers had a college degree. Again, few differences occur on letter and word recognition, perhaps because these skills are frequently practiced in Pre-K and kindergarten classrooms. Differences in social behaviors, attitudes toward school and learning, academic ratings, and communication are also related to their mothers' education. Family income also makes a difference in the children's performance, most consistently in vocabulary, expressive language, and math related assessments.

Children benefit from living with both parents continuously since birth. Living within a stable, two-parent household was positively associated with children's performances on expressive language, vocabulary and sound matching (Table 3.2), all math skills (Table 3.3), as well as the children's positive attitudes toward school and learning, more positive social behaviors, and fewer aggressive behaviors (Table 3.4).

Table 3.2  
Language and Literacy Skills at the End of Kindergarten by Child and Family  
Characteristics

	PPVT	OWLS	Letter- Word	Elision	Sound Matching	Commun- ication Ratings
<b>Sex <sup>a</sup></b>						
Female	99.5	97.9	114.1	10.2	10.5	5.7
Male	101.5	95.7	111.8	9.7	10.1	5.2
<b>Race <sup>b</sup></b>						
White	104.0	100.4	113.4	10.7	10.5	5.5
Black	95.6	91.8	112.1	8.9	9.9	5.2
Other	100.9	96.7	113.9	10.4	11.1	5.8
<b>Economic Risk <sup>c</sup></b>						
TANF	97.1	92.8	111.6	9.6	10.0	5.3
Category 1	99.8	97.5	112.6	9.7	10.4	5.5
No Risk	104.6	101.1	114.5	10.4	10.6	5.6
<b>Mother's Education <sup>d</sup></b>						
Less than high school	92.2	87.6	107.6	9.0	9.8	5.4
High school diploma	99.5	94.9	112.4	9.7	10.1	5.3
Bachelor's degree	102.7	102.3	114.6	10.4	10.6	5.8
Advanced degree	113.5	109.6	119.5	12.0	11.3	6.1
<b>Lived continuously with both parents since birth <sup>e</sup></b>						
No	97.6	94.7	112.7	9.8	10.1	5.4
Yes	102.6	98.6	114.4	10.4	10.6	5.6

<sup>a</sup> Group differences were non-significant for all outcomes except communication ratings.

<sup>b</sup> Black children scored significantly lower than White children on the PPVT, OWLS, and CTOPP-Elision.

<sup>c</sup> Children whose families received TANF scored significantly lower on PPVT, OWLS, CTOPP-Elision, and communication ratings than children whose families had no economic risks. Category 1 children scored significantly lower on the PPVT than children without any economic risk.

<sup>d</sup> Children whose mothers had less than a high school diploma scored significantly lower than children whose mothers had an advanced degree on PPVT, OWLS, WJ-LW and CTOPP-Elision; and they scored significantly lower than children whose mothers had a bachelor's degree on PPVT and OWLS. Finally, they scored significantly lower than children whose mothers who had a high school diploma on the PPVT. Children whose mothers had a high school diploma scored significantly lower than children with mothers who had advanced degrees on the PPVT, OWLS, CTOPP-Elision, and communication ratings. These children also scored significantly lower on the OWLS and had lower communication ratings than children whose mothers had bachelor's degrees. On the PPVT, children whose mothers had a bachelor's degree also scored significantly lower than children whose mothers had an advanced degree.

<sup>e</sup> Children who did not live with both parents continuously since birth scored significantly lower on PPVT, OWLS, CTOPP-Sound Matching, and communication ratings.

Table 3.3  
Math and Academic Skills at the End of Kindergarten by Child and Family  
Characteristics

	Applied Problems	Calculation	Math Fluency	Math Composite	Academic Ratings
<b>Sex<sup>a</sup></b>					
Female	105.7	107.1	100.8	104.6	5.9
Male	107.3	107.4	99.3	104.7	5.6
<b>Race<sup>b</sup></b>					
White	110.0	109.8	101.1	107.0	5.8
Black	101.1	102.4	97.8	100.4	5.7
Other	109.0	113.2	103.9	108.7	5.9
<b>Economic Risk<sup>c</sup></b>					
TANF	103.5	104.9	98.7	102.4	5.7
Category 1	106.7	106.7	100.0	103.7	5.7
No Risk	110.1	110.4	101.6	107.4	5.9
<b>Mother's Education<sup>d</sup></b>					
Less than high school	98.0	103.6	95.6	99.1	5.7
High school diploma	105.7	106.1	99.5	103.8	5.7
Bachelor's degree	109.7	109.0	101.4	106.7	5.9
Advanced degree	113.9	117.4	106.9	112.7	6.5
<b>Lived continuously with both parents since birth<sup>e</sup></b>					
No	103.5	103.1	97.9	101.5	5.6
Yes	107.6	108.9	100.9	105.8	5.8

<sup>a</sup> Academic ratings were significantly lower for males than females. There were no significant differences on the four standardized math outcomes.

<sup>b</sup> Black children scored significantly lower than White children on the four standardized math outcomes. There were no significant group differences for academic ratings. Black children scored significantly lower than children from other races on the WJ-AP.

<sup>c</sup> Children whose families received TANF scored significantly lower on the four standardized math outcomes than children whose families had no economic risks. There were no significant group differences for academic ratings.

<sup>d</sup> Children whose mothers had less than a high school diploma scored significantly lower than children whose mothers had advanced degrees on all five measures. They also scored significantly lower than children whose mothers had bachelor's degrees on the WJ-Applied Problems and the WJ-Math Fluency. Finally, these children scored significantly lower than children of mothers with high school diplomas on the WJ-Applied Problems. Children whose mothers had a high school diploma scored significantly lower than children whose mothers had advanced degrees on the WJ-Applied Problems, WJ-Calculations, WJ-Math Fluency, and the academic rating.

<sup>e</sup> Group differences were significant for all outcomes.

Table 3.4  
Behavior and Attitude Ratings at the End of Kindergarten by Child and Family Characteristics

	Positive Attitude Toward School and Learning	Social Behavior	Withdrawn Behavior	Aggressive Behavior
<b>Sex <sup>a</sup></b>				
Female	5.7	5.8	1.1	1.3
Male	5.1	5.1	1.2	1.5
<b>Race <sup>b</sup></b>				
White	5.5	5.5	1.2	1.4
Black	5.3	5.3	1.1	1.4
Other	5.5	5.7	1.2	1.3
<b>Economic Risk <sup>c</sup></b>				
TANF	5.2	5.2	1.2	1.5
Category 1	5.5	5.5	1.2	1.4
No Risk	5.6	5.6	1.1	1.4
<b>Mother's Education <sup>d</sup></b>				
Less than high school	5.4	5.4	1.2	1.4
High school diploma	5.2	5.3	1.2	1.4
Bachelor's degree	5.7	5.7	1.1	1.4
Advanced degree	6.0	6.1	1.2	1.2
<b>Lived continuously with both parents since birth <sup>e</sup></b>				
No	5.0	4.8	1.2	1.6
Yes	5.5	5.6	1.2	1.4

<sup>a</sup> Boys are significantly more likely to be rated lower than girls on all items except withdrawn behavior.

<sup>b</sup> Significant differences were not found between any of the different racial groups.

<sup>c</sup> Children from families who received TANF were more likely to be rated lower on curiosity, behavior and withdrawal than children from families that had not received economic assistance.

<sup>d</sup> Children with mothers having a high school diploma were significantly more likely to be rated lower on attitudes toward school and learning and social behavior than mothers with a bachelor's degree and mothers with a graduate degree.

<sup>e</sup> Children who have not lived continuously with both parents since birth were more likely to be rated lower on all four items except withdrawal than children who have lived continuously with both parents since birth.

#### 4. The Impacts of Pre-K Program Implementation on Children's Outcomes

An important objective of many evaluations of educational programs is to examine the extent to which variations in program implementation explain differences in children's outcomes. For administrative purposes and for parents to make wise choices about their children's preschool, it is important to identify characteristics of educational programs that affect children's development of skills and positive attitudes and behaviors. In this study, five variations in program implementation were analyzed:

1. Curriculum;
2. Teachers' qualifications;
3. Teaching style;
4. Organization type providing services;
5. Peer effects related to socio-economic background of the students.

In each case, the study utilizes naturally occurring variation in these characteristics and assesses the extent to which this variation explains differences in children's skills, attitudes, and behaviors at the end of kindergarten. The analyses control for language and problem solving skills of the children when they entered Pre-K as well as child and family characteristics. However, the analyses do not control for unmeasured factors that may have influenced children's presence in a particular type of Pre-K class and their outcomes.

One approach to illustrate the magnitude of the effects of different curricula, for example, is to estimate how a student would, on average, score on the individual outcomes measures with no differences in the student or other classroom characteristics. To calculate this estimate the characteristics of a specific student must be chosen, but the differences between one curriculum and another are the average differences that could be expected for an "average" child.<sup>1</sup> With regard to language and literacy, children enrolled in a program with a High/Scope or Creative curriculum generally scored the highest on the direct assessment. In terms of math and academic outcomes, children enrolled in a program using the High/ Scope curriculum scored consistently higher across all math assessments. Finally, for behavior outcomes, the children enrolled in the "other" curriculum showed to be more positive toward school and less withdrawn and aggressive. However, it is important to note that not all of these differences are statistically significant, a topic that we will explain more fully when we present a second way of examining differences in the children's developmental outcomes.

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<sup>1</sup> The estimates in Table 4.1 were computed for a student with the following characteristics: 1) African-American female, 2) lived continuously with both parents in the home, 2) mother had achieved a bachelor's degree, 3) family's economic level was not considered at-risk, and 4) Pre-K teacher had received a bachelor's degree.

Table 4.1  
 Estimates of Outcomes at End of Kindergarten Associated with Different Curricula  
 (Controlling for student characteristics, other implementation differences and baseline skills)\*

		High/ Scope	Creative	High Reach	Other
Language and Literacy	Receptive Vocabulary (PPVT)	101.80	102.12	101.28	99.71
	Expressive Vocabulary (OWLS)	103.36	103.25	99.99	101.85
	Letter-Word (WJ-III)	113.56	111.90	109.47	110.43
	Elision (CTOPP)	9.47	8.93	8.74	9.41
	Sound-Matching (CTOPP)	10.97	10.30	10.61	10.29
	Communication Rating	5.64	5.91	5.34	5.80
Math and Academic Outcomes	Applied Problems (WJ-III)	102.77	101.45	99.44	100.77
	Calculation (WJ-III)	115.51	112.37	111.01	115.01
	Math Fluency (WJ-III)	104.60	103.51	102.79	104.45
	Composite Math (WJ-III)	108.55	106.69	105.33	107.66
	Academic Skills Rating	5.83	5.83	5.45	5.63
Behavior Outcomes	Positive Attitude Toward School & Learning	5.82	5.87	5.38	5.96
	Withdrawn Behavior	0.98	0.99	1.07	0.95
	Aggressive Behavior	1.33	1.25	1.40	1.23
	Social Behaviors	6.16	6.20	5.80	6.18

\* Estimates are computed using the following characteristics: 1) African-American female, 2) lived continuously with both parents in the home, 2) mother had achieved a bachelor's degree, 3) family's economic level was not considered at-risk, and 4) Pre-K teacher had received a bachelor's degree, and controlling for other program characteristics.

Another approach to presenting how differences in program implementation relate to variations in children's outcomes is to employ linear regression to the outcomes for children served in one type of program to children served by each of the other program types. We used this approach to analyze four of the five characteristics. Each

comparison group was chosen for particular reasons. For teachers' qualifications, teachers with an associate's degree or less were compared to teachers with bachelor's degrees and certified teachers to assist program administrators in determining whether raising the educational requirements for teachers would improve children's outcomes. Teachers with child-centered teaching styles were compared to both adult-directed and middle of the road teachers because prior research has identified the child-centered teaching style as most effective. With regard to curriculum, High Reach was compared to the other curricula types because our initial analysis showed that children who participated in High Reach classes systematically scored lower than children in classes using High/Scope. Local schools were compared with other organization types for two reasons: a) some national groups have proposed that Pre-K programs be operated solely by the local public school system and, b) in some states, pre-kindergarten is exclusively school-based.

Findings from the analysis are displayed for each of the three areas of developmental outcomes, language and literacy, math and academic skills, and attitudes and behaviors (Tables 4.2, 4.3 and 4.4, respectively). The findings for each of the five variations in Pre-K Program implementation are summarized below. All analyses reported for a specific implementation variable also control for children's background characteristics, their baseline scores, and other classroom characteristics as described previously.

*Curriculum.* In 42 out of 45 comparisons, children taught using the High Reach curriculum performed less well than children taught using other curricula, but only in 13 comparisons were the differences significant. On average, children who were taught using the High/Scope curriculum performed significantly better at the end of kindergarten than children taught using High Reach in nine comparisons (expressive language, letter word recognition, elision, applied problems, composite math, academic skills ratings, positive attitude toward learning, withdrawn behavior, and behavior ratings); those taught using Creative curriculum performed significantly better than children taught using High Reach in four comparisons (communication ratings, academic skills ratings, positive attitude toward learning, and behavior ratings). There were no statistical differences in children's performance on the 15 outcome measures between children in High Reach classrooms and children in classrooms using "other" curricula.

In only one other case was the difference in the kindergarteners' performance statistically different: children in High/Scope classrooms outperformed children taught using Creative curriculum on sound-matching.

*Teachers' Qualifications.* Research supports that teacher qualifications, particularly a four-year college degree and specialized training, are related to classroom quality and children's development (Barnett 2003). Most of the preschool programs whose effect has been rigorously documented from the Perry Preschool Project (Barnett 1992) to the Chicago Parent-Child Centers (Reynolds 2000) to the Oklahoma Prekindergarten Program in Tulsa (Gormley & Gayer 2003) have employed teachers who are college educated and certified to teach in preschool. None of these studies isolated the effects

of teachers' credentials from the overall effects of the program, since all of the teachers were certified.

At a minimum, Pre-K teachers in Georgia are required to have a technical diploma related to early childhood education that requires at least a year of full-time college study. Most, however, have bachelor's degrees in related fields, and about 60 percent were certified teachers in the year that the children in this study were in Pre-K. In this study, no differences were found in children's outcomes when taught by teachers with bachelor's degrees when compared with teachers holding associate's degrees or technical diplomas. On two math skill assessments, children taught by certified teachers performed less well than their peers from classes taught by teachers' with associate's degrees. The apparent lack of difference between children taught by teachers with different levels of education may have been affected by the loss of Pre-K teachers to teach in public school kindergartens in order to meet Georgia's class-size reduction requirements and the number of courses that the current teachers had taken in early childhood education and children's development. In the year that this study was conducted, 421 fewer certified teachers were teaching in Georgia Pre-K classrooms than in 1997-98. In addition, measures of educational attainment may not measure teacher competence as accurately as their more recent training and the technical assistance they have received and the ways in which they use individual assessments of the children.

*Teaching Style.* As is consistent with prior research, we find that the middle of the road teaching style is not as positive for children's development as a child-centered teaching style. Children who had Pre-K teachers with a middle of the road teaching style are more frequently withdrawn, had a less positive attitude toward school and learning, and performed less well in math than children whose teachers applied a child-centered style. There were no statistical differences between these two groups in terms of language and literacy skills. The social behaviors of children who had adult-directed teachers in Pre-K were rated lower than those of children in child-centered classes. No other differences were significant, although math scores were slightly lower for the children in classrooms with adult-directed teachers.

*Local Schools.* On four comparisons of fifteen, children who attended a Pre-K operated by their local school system performed better than other children. In only one comparison did these children perform worse. Children in public school Pre-K classes appeared to be less aggressive, perform better on math calculations, and recognize more letters and words. However, children attending public school Pre-K performed less well in terms of expressive language skills.

*Peer Effects.* Considerable research suggests that children who attend schools with more affluent peers perform better academically regardless of the socio-economic background of the children being studied. In this study, the results are largely mixed. Being in Pre-K classes with more impoverished classmates has negative effects on math skills but apparently has positive effects on attitudes and behaviors. There is little difference on language and literacy skills, but communication ratings are higher for

children who have been in classrooms with higher concentrations of impoverished children.

Most of the influence attributable to the children's background appears to be accounted for by the baseline measures observed at Pre-K entry. Few of the children's family or individual characteristics are systematically related to their end of kindergarten developmental outcomes when the baseline scores are included in the analysis as controls. However, children who have lived continuously with both parents since birth exhibit more positive attitudes toward school and learning, appear to be less aggressive, and demonstrate better social behaviors than children who have not lived with both parents since birth. Children whose families receive TANF demonstrate less positive attitudes toward school and learning and are not rated as high in terms of social behaviors as other children.

Table 4.2

## Program Implementation influences on Language and Literacy Outcomes at the End of Kindergarten

		Receptive Vocabulary (PPVT)	Expressive Vocabulary (OWLS)	Letter-Word (WJ-III)	Elision (CTOPP)	Sound Matching (CTOPP)	Communi- cation Ratings
Teacher Characteristics	<b>Teaching Credential</b>						
	Certified=1, Associates=0	-0.76	-1.41	0.65	-0.21	0.01	0.13
	Degreed=1, Associates=0	2.93	2.12	0.41	0.35	0.58	0.02
	<b>Teaching Style</b>						
	Middle of the road=1, Child-centered=0	-0.56	1.40	-0.82	0.24	-0.16	-0.06
Adult-directed=1, Child-centered=0	-0.35	-0.78	0.51	0.52	-0.19	0.14	
Curriculum Type	<b>Curriculum</b>						
	High Scope=1, High Reach=0	0.52	<b>3.37</b>	<b>4.09</b>	<b>0.73</b>	0.36	0.30
	Creative=1, High Reach=0	0.84	3.26	2.43	0.19	-0.31	<b>0.57</b>
	Other=1, High Reach=0	-1.57	1.86	0.96	0.67	-0.32	0.46
Preschool Context	<b>Located in Local School System</b>	0.67	<b>-2.79</b>	<b>3.79</b>	0.29	-0.09	0.13
	<b>% Students who are Category 1</b>	1.40	4.81	-4.01	-0.29	-0.77	<b>0.84</b>
Family Characteristics	<b>Economic Risk</b>						
	TANF=1, No risk=0	-1.37	-2.84	-0.10	0.52	0.27	-0.25
	Category 1=1, No risk=0	-0.54	<b>-3.04</b>	-2.10	-0.67	0.22	-0.04
	<b>Mother's Education</b>						
	Less than HS=1, Advanced=0	<b>-6.68</b>	-1.29	0.32	-0.44	0.19	0.03
	High school=1, Advanced=0	<b>-5.47</b>	-1.78	2.82	-0.53	0.02	-0.30
	Bachelor's degree=1, Advanced=0	<b>-4.82</b>	1.27	1.87	-0.47	0.12	-0.02
<b>Lived continuously with both parents</b>	0.24	-0.06	0.17	0.14	0.02	0.10	
Child Characteristics	<b>Sex</b>						
	Boy=1, Girl=0	<b>3.88</b>	-0.12	-0.02	0.09	-0.05	<b>-0.37</b>
	<b>Race</b>						
Black=1, White=0	-0.87	-2.04	2.02	<b>-1.58</b>	-0.01	-0.16	
Other=1, White=0	2.76	1.36	2.16	-0.87	0.67	0.33	
Baseline	<b>Receptive Vocabulary (PPVT)</b>	<b>0.34</b>	<b>0.10</b>	<b>-0.19</b>	-0.02	0.00	<b>0.02</b>
	<b>Expressive Vocabulary (OWLS)</b>	<b>0.24</b>	<b>0.48</b>	0.14	<b>0.05</b>	<b>0.02</b>	0.01

Scores	<b>Letter-Word Identification (WJ-III)</b>	-0.01	0.05	<b>0.33</b>	<b>0.04</b>	<b>0.04</b>	0.01
	<b>Applied Problems (WJ-III)</b>	0.05	<b>0.19</b>	<b>0.20</b>	0.03	0.02	0.00
<b>R<sup>2</sup></b>		.60	.61	.35	.35	.27	.36

Note: Values are unstandardized regression coefficients. Bold indicates the coefficient is significantly different than zero ( $p \leq .05$ )

Table 4.3

## Program Implementation influences on Math and Academic Outcomes at the End of Kindergarten

		Applied Problems (WJ-III)	Calculation (WJ-III)	Math Fluency (WJ-III)	Composite Math (WJ-III)	Academic Skills Ratings
Teacher Characteristics	<b>Teaching Credential</b>					
	Certified=1, Associates=0	-1.62	<b>-4.40</b>	-0.57	<b>-2.19</b>	0.18
	Degreed=1, Associates=0	2.88	3.05	1.60	2.51	-0.03
	<b>Teaching Style</b>					
	Middle of the road=1, Child-centered=0	-0.18	<b>-5.09</b>	<b>-3.06</b>	<b>-2.78</b>	-0.14
	Adult-directed=1, Child-centered=0	0.29	-2.49	-1.78	-1.32	0.17
Curriculum Type	<b>Curriculum</b>					
	High Scope=1, High Reach=0	<b>3.33</b>	4.50	1.81	<b>3.22</b>	<b>0.38</b>
	Creative=1, High Reach=0	2.01	1.36	0.72	1.36	<b>0.38</b>
	Other=1, High Reach=0	1.33	4.00	1.66	2.33	0.18
Preschool Context	<b>Located in Local School System</b>	-0.83	<b>4.17</b>	<b>2.37</b>	1.90	-0.01
	<b>% Students who are category 1</b>	<b>-7.93</b>	<b>-7.93</b>	<b>-7.70</b>	<b>-7.85</b>	<b>0.78</b>
Family Characteristics	<b>Economic Risk</b>					
	TANF=1, No risk=0	2.60	2.97	1.73	2.43	-0.06
	Category 1=1, No risk=0	-0.01	-1.26	1.19	-0.03	-0.08
	<b>Mother's Education</b>					
	Less than HS=1, Advanced=0	-1.47	1.80	-3.72	-1.13	-0.28
	High school=1, Advanced=0	1.47	-1.23	-1.16	-0.31	<b>-0.51</b>
	Bachelor's degree=1, Advanced=0	0.17	-0.49	-1.47	-0.60	<b>-0.45</b>
	<b>Lived continuously with both parents</b>	0.60	2.30	0.19	1.03	0.17
Child Characteristics	<b>Sex</b>					
	Boy=1, Girl=0	<b>2.70</b>	1.94	-0.50	1.38	-0.17
	<b>Race</b>					
	Black=1, White=0	-2.80	-1.82	1.00	-1.21	-0.03
	Other=1, White=0	1.69	3.51	<b>5.19</b>	<b>3.46</b>	0.11
Baseline	<b>Receptive Vocabulary (PPVT)</b>	-0.07	-0.05	-0.06	-0.06	<b>0.02</b>
	<b>Expressive Vocabulary (OWLS)</b>	<b>0.26</b>	0.14	0.08	<b>0.16</b>	-0.00

Scores	<b>Letter-Word Identification (WJ-III)</b>	<b>0.19</b>	<b>0.20</b>	<b>0.13</b>	<b>0.17</b>	<b>0.01</b>
	<b>Applied Problems (WJ-III)</b>	<b>0.25</b>	<b>0.19</b>	<b>0.16</b>	<b>0.20</b>	0.01
<b>R<sup>2</sup></b>		.50	.33	.40	.47	.37

Note: Values are unstandardized regression coefficients. Bold indicates the coefficient is significantly different than zero ( $p \leq .05$ )

Table 4.4  
 Program Implementation influences on Attitudes and Behaviors at the End of Kindergarten

		Positive Attitude Toward Learning	Withdrawn Behavior	Aggressive Behavior	Behavior Ratings
Teacher Characteristics	<b>Teaching Credential</b>				
	Certified=1, Associates=0	0.22	0.01	0.01	0.13
	Degreed=1, Associates=0	-0.13	-0.03	0.09	-0.05
	<b>Teaching Style</b>				
	Middle of the road=1, Child-centered=0	<b>-0.30</b>	<b>0.10</b>	0.01	-0.11
	Adult-directed=1, Child-centered=0	-0.03	-0.04	0.00	<b>-0.27</b>
Curriculum Type	<b>Curriculum</b>				
	High Scope=1, High Reach=0	<b>0.44</b>	<b>-0.09</b>	-0.07	<b>0.36</b>
	Creative=1, High Reach=0	<b>0.49</b>	-0.08	-0.15	<b>0.40</b>
	Other=1, High Reach=0	0.58	-0.12	-0.17	0.38
Preschool Context	<b>Located in Local School System</b>	0.19	0.01	<b>-0.11</b>	0.16
	<b>% Students who are category 1</b>	<b>1.08</b>	<b>-0.17</b>	<b>-0.25</b>	<b>0.78</b>
Family Characteristics	<b>Economic Risk</b>				
	TANF=1, No risk=0	<b>-0.31</b>	0.06	0.10	<b>-0.41</b>
	Category 1=1, No risk=0	-0.05	0.04	0.01	-0.19
	<b>Mother's Education</b>				
	Less than HS=1, Advanced=0	0.19	0.01	-0.05	0.14
	High school=1, Advanced=0	-0.19	-0.01	0.03	-0.15
	Bachelor's degree=1, Advanced=0	-0.01	-0.09	0.02	-0.06
<b>Lived continuously with both parents</b>	<b>0.42</b>	0.01	<b>-0.19</b>	<b>0.60</b>	
Child Characteristics	<b>Sex</b>				
	Boy=1, Girl=0	<b>-0.49</b>	0.02	<b>0.28</b>	<b>-0.70</b>
	<b>Race</b>				
	Black=1, White=0	0.00	-0.02	-0.02	0.11
	Other=1, White=0	-0.00	0.03	-0.07	0.21
Baseline	<b>Receptive Vocabulary (PPVT)</b>	<b>0.03</b>	-0.00	<b>-0.01</b>	<b>0.02</b>
	<b>Expressive Vocabulary (OWLS)</b>	-0.01	-0.00	<b>0.00</b>	-0.00

Scores	<b>Letter-Word Identification (WJ-III)</b>	<b>0.01</b>	0.00	-0.00	0.01
	<b>Applied Problems (WJ-III)</b>	0.00	0.00	-0.00	0.00
<b>R<sup>2</sup></b>		<b>.43</b>	<b>.15</b>	<b>.32</b>	<b>.45</b>

Note: Values are unstandardized regression coefficients. Bold indicates the coefficient is significantly different than zero ( $p \leq .05$ )

## **5. Conclusions**

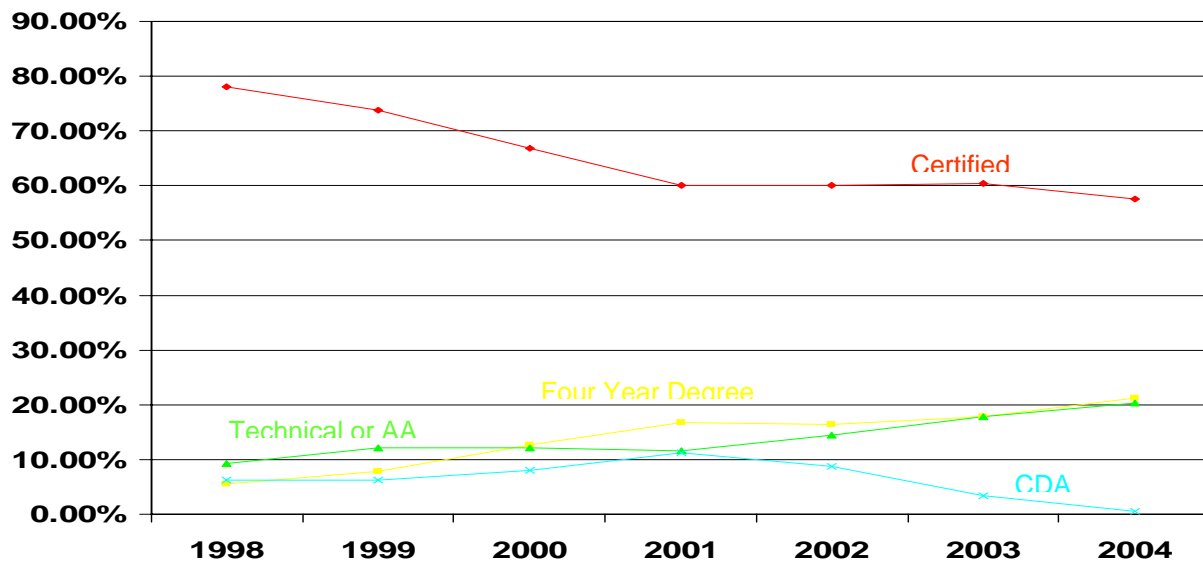
The children served by Georgia's Pre-K Program have made great strides in attaining the national norms for their age on eight of nine standardized assessments including all of the math assessments and all of the language and literacy assessments, other than expressive language. Given the fact that their skills lagged the national norms at the beginning of preschool, Georgia's Pre-K Program has contributed to a new and higher plateau of school readiness. For both Pre-K and kindergarten years, this report presents overwhelmingly positive news.

The findings presented in the previous section indicate that the implementation of Pre-K can make significant differences in the developmental outcomes for the children. The differences, while in many cases are not large, have the potential to affect children's success in school. Other studies have found support that small increases in cognitive skills are an important mechanism through which the benefits of preschool are translated into long-term positive outcomes for children (Reynolds, 2000). With this in mind, we believe that several issues should be raised from these findings that could translate to enhancing the measurable improvements in children's developmental outcomes found in this study.

In this study we do not find that differences in teachers' credentials relate to differences in children's developmental outcomes at the end of kindergarten. However, other research supports that credentialed teachers who have been trained to work with young children have a positive effect on young children (see Barnett, 2003 for a summary). Moreover, most early childhood education programs that have been shown to be effective in rigorous evaluations have been staffed by certified teachers. The apparent lack of difference in the Georgia Pre-K Program may be due to several factors. First, all teachers in the Georgia Pre-K program receive training and on-site technical assistance to improve the quality of instruction within their classrooms. Secondly, all of the teachers have some college level education or training specifically geared to supporting the development of young children, with the minimum qualification being a technical diploma requiring a full year of college study or an associate's degree.

In addition, as Figure 5.1 shows, the mix of teachers' credentials was changing in the 2002 school year when the study sample was chosen. Probably due to the need for more certified teachers to staff K-3 classrooms that were required to meet class size reduction mandates for public schools, the percentage of certified Pre-K teachers has dropped from over 78 percent in 1998 to approximately 60 percent in 2002, the study year, and has continued to fall since then. The loss of 421 certified teachers from Pre-K classrooms between 1998 and 2002 may have pulled some of the best and most highly qualified teachers from the Pre-K program and into kindergarten and primary school classes. It is unclear if these teachers would have had a more positive effect, but the lack of differences in effects associated with certified teachers should be further studied, given the changes in Georgia and the other evidence that is available.

Figure 5.1: Trend in Teachers' Credential in the Georgia Pre-K Program



Our findings support previous research that child-centered beliefs and practices benefit children. Therefore, to increase teachers' child-centered beliefs and instructional practices, informing teachers about existing research (Marcon, 1999) as well as the findings from this study could persuade them to become more child-centered. Teachers are likely to be more positive about allowing children to initiate more of their own activities when they know the children benefit developmentally. Gordon, Henderson, and Henry (2004) found allowing children to initiate their activities to be most beneficial in small group activities. However, even if teachers accept that child-centered instruction is beneficial, this attitude may not be sufficient to lead teachers to use these approaches effectively. Training for teachers and directors as well as ongoing technical assistance could reinforce these beliefs and enable teachers to transfer them into practice.

In this study, curriculum type was associated with differences in student skills, attitudes, and behaviors. Children from classes taught using the High Reach curriculum did not perform as well, behave as positively, or have as positive attitudes about school and learning as children from two other curricula, High/Scope and Creative. But children from classes taught using other curricula that have been approved were neither significantly better off nor significantly worse off than children from High Reach classes. Implementing a curriculum effectively involves more than selecting wisely. Initial training, technical assistance, ongoing professional development, and selecting capable teachers can be critical to achieving the full benefits that a curriculum can deliver. Ultimately, these factors may influence the outcomes of the children.

These systematic differences lead us to recommend a review of the curricula that have been approved for use in the Pre-K Program and the curriculum approval process.

Bright from the Start: The Department of Early Care and Learning may want to consider assembling an independent, expert review panel to assemble available evidence about the effects of Pre-K curricula, including specialized curricula for literacy or math skills, and to make recommendations to the Department concerning curricula.

Finally, the findings relative to peer effects raise some concern. Higher concentrations of economically disadvantaged students may reduce the positive effects of Pre-K on certain skills but appear to improve children's attitudes toward school and learning and classroom behaviors. Parental choice and equal access to Pre-K appear to be very important attributes of the Program. Pre-K policies require that schools do not limit enrollments to students living in a public school's attendance zone. These policies should be affirmed in the policies of the schools and school districts that operate Pre-K programs funded by Georgia Pre-K. To make it easier for parents to understand the enrollment procedures and act in the best interests of their children, consideration should be given to having a consistent sign-up period used by all Pre-K providers throughout a county or even the entire state. The sign-up dates should be well-publicized so that parents have fair access to all publicly funded Pre-K programs. Single day and first come-first served procedures for awarding slots could result in unfair advantages for some parents with flexible work schedules or other means to secure a space for their child. Multiple day sign-up periods or other mechanisms that do not result in unfair advantages should be considered.

**Appendix Table A.1**  
**Overall Quality of Preschools by Program Type**

<b>Overall Quality</b>	<b>Georgia Pre-K n=69</b>	<b>Head Start n=27</b>	<b>Private n=30</b>	<b>Overall n=126</b>
<b>Assessment Profile (range=0-48)</b>				
Overall Score <sup>d</sup>	35.2	37.0	25.3	33.2
Standard deviation	5.07	6.19	5.83	7.07
Minimum	24	21	15	15
Maximum	46	48	37	48
% Classes with < 24	0%	3.7%	43.3%	11.1%
% Classes with 24-36	60.9%	37.0%	53.4%	54.0%
% Classes with > 36	39.1%	59.3%	3.3%	34.9%
<b>ECERS-R (range=1-7)</b>				
Mean <sup>d</sup>	4.7	4.5	3.5	4.3
Standard deviation	.668	.852	.975	.928
Minimum	2.97	1.74	1.34	1.34
Maximum	5.83	5.69	5.12	5.83
% Classes with Mean <3	1.4%	7.4%	36.7%	11.1%
% Classes with Mean 3 - 3.99	14.5%	14.8%	26.6%	17.5%
% Classes with Mean 4 - 4.99	49.3%	51.9%	33.4%	46.0%
% Classes with Mean 5 or more	34.8%	25.9%	3.3%	25.4%

<sup>d</sup> The ratings of private preschool differ significantly from the ratings for Georgia Pre-K and Head Start.

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