DOCUMENT RESUME

ED 482 164 PS 030 930

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TITLE	Investing in Better Outcomes: The Delaware Early Childhood Longitudinal Study.
SPONS AGENCY	Delaware State Dept. of Education, Dover.
PUB DATE	2002-04-00
NOTE	19p.; Produced by Delaware University, College of Human Services, Education, and Public Policy, Center for Disabilities Studies.
AVAILABLE FROM	Center for Disabilities Studies, College of Human Services, Education, and Public Policy, University of Delaware, 166 Graham Hall, Academy Street, Newark, DE 19716-7355. Tel: 302-831-6974; Fax: 302-831-4690; Web site: http://www.udel.edu/cds.
PUB TYPE	Reports - Evaluative (142)
EDRS PRICE	EDRS Price MF01/PC01 Plus Postage.
DESCRIPTORS	Academic Achievement; Comparative Analysis; Disabilities; *Early Intervention; *Elementary School Students; Longitudinal Studies; Low Income Groups; *Mathematics Achievement; *Outcomes of Education; Poverty; Preschool Education; Program Effectiveness; *Reading Achievement; Special Education; Special Needs Students; Standardized Tests; *Young Children
IDENTIFIERS	*Delaware; Project Head Start

ABSTRACT

This report details the outcomes for children enrolled in two types of early intervention programs in Delaware: those serving young children with disabilities and those serving young children living in poverty. The Delaware Early Childhood Longitudinal Study was designed as a retrospective, two-group, posttest-only design. Participating in the study were 717 kindergarten students entering school in the Fall of 1997 in 8 of Delaware's school districts. The sample was stratified according to socioeconomic level and presence of disability, and included 217 kindergartners with active Individualized Education Plans, 250 students qualifying for free lunch at the start of the school year, and 250 students from the general student population who did not have a disability or quality for free lunch. Forty-nine students had received early childhood or Head Start services, and 89 had received preschool special education services. Because only 5 children had received services from the birth-to-3 early intervention system, there was no analysis of this program's impact on child outcomes. Findings revealed that students who received services through the state funded programs, Head Start, or the special education preschool programs showed significantly better academic outcomes than students who did not receive these early intervention services. Children living in poverty who received early childhood education and Head Start services performed better academically 4 years after receiving these services than those children living in poverty who did not participate in the services. Students with disabilities who were identified during their preschool years and who received special services when they were 3 and 4 years old performed better academicallv 4 years after receiving those services than children who were not identified as needing special education services until they entered kindergarten or later. (Contains 11 references.) (KB)

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Investing in Better Outcomes:

The Delaware Early Childhood Longitudinal Study

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April 2002

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Prepared for the Delaware Interagency Resource Management Committee
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Department of Education,
Department of Health and Social Services, and the
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About the *Center for Disabilities Studies*

The *Center for Disabilities Studies* at the University of Delaware is one of the 62 University Centers for Excellence in Developmental Disabilities Research, Education, and Service (UCDD) in the United States. The *Center* was established in 1993 and works in conjunction with individuals with disabilities to better their lives. The *Center* staff and affiliated faculty teach both pre-service and in-service courses for teachers, social service workers, and other service providers working with individuals with disabilities and their families. The *Center* operates state-of-the-art programs and assists both public and private organizations in adopting the procedures developed to implement those programs. *Center* staff and affiliated faculty also serve on state and national policy boards and commissions that address housing, transportation, education, advocacy, child care, health care, and other service areas. *Center* staff also conducts program evaluations with programs serving individuals with disabilities and assist in policy development at both the local and state levels. The *Center for Disabilities Studies* is located in 166 Graham Hall at the University of Delaware in Newark. The Director of the *Center* is Dr. Michael Gamel-McCormick.

About the *Interagency Resource Management Committee*

The *Interagency Resource Management Committee (IRMC)* is a Delaware state-level governmental committee that includes the Secretaries of the Departments of Education, Health and Social Services, and Services for Children, Youth and Their Families as well as the state Budget Director and Controller General. The Committee makes both policy and budgetary decisions for three major early intervention programs: the Birth to Three Early Intervention System of Part C of the Individuals with Disabilities Education Act; the state Early Childhood Assistance Programs, educational programs for four-year-olds and their families; and the Program for Children with Disabilities, programs for three- and four-year-olds with mild disabilities and speech and language delays. The Committee also oversees a statewide data management system for child and family support services. The Chair of the IRMC is Ms. Valerie Woodruff, Secretary of Education. The Policy Coordinator during this project was Ms. Peg Bradley, Coordinator of the Delaware Early Care and Education Office.

Investing in Better Outcomes:
The Delaware Early Childhood Longitudinal Study

Introduction

There is no longer much controversy about the effectiveness of early intervention services for children with disabilities and children living in poverty (Guralnick, 1997). Two decades of research has indicated that high quality early intervention services can have positive impacts on both groups of children. Two significant reviews of research, the National Research Council's report *Neurons to Neighborhoods* (Shonkoff & Phillips, 2000) and RAND's analysis of early childhood interventions, *Investing in Our Children* (Karoly et al., 1998) indicate that high quality early intervention programs can have very positive results for those children who receive services. Those results can include such benefits as increases in both short and long term academic achievement, reductions in grade retention rates, reductions in special education referrals, and even reductions in such risk as teen-age pregnancy.

Some studies of the highest quality programs such as the *Perry Preschool Program* of Ypsilanti, Michigan show that early intervention programming can have long-term positive outcomes (Schweinhart & Weikart, 1980). The Perry Preschool study found that participation in the early intervention program was related to increased high school graduation rates, increased levels of income earnings as young adults, and decreased welfare program participation (Schweinhart, Barnes, & Weikart, 1993). However, even the best early intervention programs, sometimes show mixed results. An earlier review of the Perry Preschool program found that the early intervention services were not related to reduction of grade retention rates for children living in poverty.

This report details the outcomes of children enrolled in two different types of early intervention programs serving young children with disabilities and young children living in poverty when compared to their peers. The results are striking and encouraging.

Delaware's Early Intervention Efforts

Delaware has been providing early intervention services to young children since the early 1980s. However, widespread availability of comprehensive early intervention services, in the form of programming for infants and toddlers with disabilities, preschoolers with disabilities, both mild and moderate, and four-year-olds living in poverty occurred in the 1990s. In the early part of the decade, Delaware legislated the Programs for Children with Disabilities and began serving three- and four-year-olds with mild delays in addition to preschoolers with moderate and severe disabilities, who had been served since the 1980s. The programs for Children with Disabilities (PCD) differed from the traditional preschool special education programs in that there was more flexibility in how children could be served. Services were provided by each school district or could be provided through a contractor arranged for by school districts. With the institution of these changes, preschool special education (PSE) programs now provided intervention programming for children with disabilities as wide ranging as Down syndrome, cerebral palsy, spina bifida, fragile X syndrome, communication disorders, and developmental delays.

In the mid-1990s, Delaware began to provide comprehensive early childhood programming for all children aged four who were living in poverty. The Early Childhood Assistance Programs (ECAP) are modeled after the federal Head Start program and use the Head Start Performance Standards as their program standards. In combination with federal Head Start funding, the ECAPs made Delaware one of the first states to provide comprehensive four-year-old early childhood programming for every child living in poverty.

To oversee this flourishing activity in the area of early intervention, an innovative governmental structure was created. The Delaware Interagency Resource Management Committee[1] (IRMC), an inter-departmental committee designed to oversee some of the resources allocated to Delaware's early intervention programs, was formed in 1992. The IRMC was and is currently charged with overseeing three major early intervention programs: 1) the Birth to Three Early Intervention System for very young children with disabilities and their families, 2) the state-funded Early Childhood Assistance Programs (ECAP) for four-year-olds living in poverty and their families, and 3) the Preschool Children with

[1] The Interagency Resource Management Committee is composed of the state Budget Director, the state Comptroller, the Secretary of the Department of Health and Social Services, the Secretary of the Department of Services to Children, Youth, and their Families, and the Secretary of the Department of Education, who also has the role of Committee Chair.

Disabilities programs operated through local school districts for three- and four-year-olds with mild disabilities that included developmental delays and speech and language delays.

Once formed, one of the first questions asked by the IRMC members was about the impact that such programs have on children's long-term outcomes. Committee members wanted to know what academic, behavioral, and social impact these early intervention programs were having on children who were living in poverty and children who had disabilities.

The Genesis of a Longitudinal Study

Prompted by the IRMC members' questions about the impact of early intervention programming, the Delaware Early Childhood Longitudinal Study was born. In the Spring of 1997, a team of researchers, policy analysis, and program managers at the University of Delaware Center for Disabilities Studies and the Delaware Departments of Education, Health and Social Services and Services for Children, Youth, and their Families designed and proposed a study to follow a group of children as they entered kindergarten in the Fall of 1997. The study was designed to follow the children from their kindergarten experience through their third grade year, coinciding with their participation in the 3rd grade Delaware State Testing Program (DSTP).

One of the primary questions of the study asked how did children with disabilities or living in poverty who received early intervention programming compare to children in similar situations who did not receive early intervention services? The IRMC approved the study and the work was begun in the fall of 1997.

Study Design

The Delaware Early Childhood Longitudinal Study (DeCLS) was designed as a retrospective, two-group, post-test only design (see Campbell & Stanley, 1963). That is, it was designed to ensure that there was no bias in the sampling process and that there was a group of children to whom the intervention group could be compared.

A stratified random sampling process was used to select 717 kindergarten students entering school in the fall of 1997 in eight of Delaware's school districts. The random selection increased the likelihood that the two groups of students compared would be equal in characteristics except for their early intervention experiences.

Sample

A stratified random sample of kindergarten students from eight school districts throughout the state was selected for inclusion in the DeCLS. The sample was stratified according to socioeconomic level and presence of disability. The randomized sample included 217 kindergarten students with active Individualized Education Plans (IEPs), 250 students who qualified for free lunch at the start of kindergarten, and 250 students from the general student population who did not have a disability and did not qualify for free lunch (see Table 1).

Found within the randomized sample of kindergarten students were children who had received early intervention services during their preschool years. Forty-nine (49) of the 717 children had received either ECAP or federal Head Start services when they were four years of age. Eighty-nine (89) of the children had received services from the local school district preschool special education (PSE) programs when they were three and/or four years of age. Five children had received services from the Birth to Three Early Intervention System and specifically from Child Development Watch[2] (see Table 2).

Table 1. DeCLS Sample Categories

Category	Number	Percentage
Children Living in Poverty	250	34.9%
Children with an active IEP	250	34.9%
Children without a disability/not living in poverty	217	30.2%
Total	**717**	**100%**

Table 2. DeCLS Sample Receiving Early Intervention Services

Early Intervention Programming	Number	Percentage
Birth to Three/Child Development Watch	5	0.7%
Early Childhood Assistance Program/Head Start	49	6.8%
Preschool Special Education programs	89	12.4%

[2] Because of the small number of students who were found to have received early intervention services from the Birth to Three Early Intervention System, analysis of this program's services on child outcomes was not conducted.

Outcomes Measured

Success of students can be measured in many ways. For the purposes of this study, the outcome variables measured included academic as well as behavioral variables. The outcome measures collected for this study included:

- annual year-end grades
- annual grade promotion/retention
- formal behavioral reports
- referrals to and enrollment in special education services
- referrals to and enrollment in other school services
- third grade Delaware State Testing Program results in reading and math

Analysis

Comparisons of the outcomes for students who received early intervention services and those who did not receive early intervention services were conducted at the conclusion of the 2001-2002 school year. These comparisons were conducted using statistical analyses such as analysis of variance or means testing such as t-tests. These statistical tests measure for the differences between groups.

At the end of the 2001-02 school year (the fourth year of the study), an analysis of the number of students remaining in the study who had received early intervention services was conducted. At the same time, comparable comparison groups of students to those who received the ECAP/Head Start or PSE services were determined. These analyses revealed there were 506 of the original 717 students who remained available to the study. This is an attrition rate of 29.4% or 211 students. This is a comparable rate of attrition to other similar longitudinal studies.

The 211 students who were not available at the end of the study were either no longer living in Delaware or were no longer attending Delaware public schools. Fifty-two (52) of the 506 students who remained in the study were not in third grade during the 2001-02 school year and had been retained at least one grade. These 52 students did not participate in the 3rd grade DSTP in March 2001. A total of 454 (63.3%) of the original 717 students did participate in the March 2001 DSTP.

For purposes of comparative analysis, the 42 students who received ECAP or Head Start services when they were four years of age in 1996-97 and remained in the study at the end of the 2001-2002 school year were

compared with 109 students who were living in poverty at the time they began kindergarten who did not receive ECAP or Head Start services.

Also for purposes of comparative analysis, the 72 students who received PSE services when they were three and four years of age in 1995-96 and 1996-97 and began the 1997-98 school year in kindergarten with an IEP were compared with 51 students who began kindergarten in 1997-98 and were identified as needing special education services while in kindergarten, first, or second grade.

In addition to the comparison group analyses, grade retention rates for the groups of students receiving ECAP and PSE services during their preschool years were also compared to all 506 students for whom information was available. See Table 3 for a summary of the comparative groups for the study.

Table 3. DeCLS Sample Early Intervention and Comparative Groups

Original Intervention Groups	N	Comparison Groups	N
Number of Students in 2001-02 who received Special Education Preschool Services in 1995-97	72	Number of Students in 2001-02 who were identified as needing special education services in K, 1st or 2nd grade	51
Number of Students in 2001-02 who received ECAP services in 1996-97	42	Number of Students in 2001-02 who were living in poverty when they entered kindergarten but did not receive ECAP or Head Start Services as four year olds	109

Findings

Students with Disabilities

Students who received preschool special education services...had significantly higher DSTP scores and grades than their peers.

For students who had identified disabilities at the start of their kindergarten public school experience and who received early intervention services, the outcomes are significantly better than for those students who were not identified with a disability until they began kindergarten or later. Students who received preschool special education (PSE) services operated by the public school districts had significantly higher DSTP scores and grades than their peers who were not identified with disabilities until they were in kindergarten, first, or second grade.

Seventy-two students who received PSE services were tracked through their third grade year and compared to 51 students who were identified as having a disability while in kindergarten, first, or second grade. The findings of these comparisons indicated that:

Students who participated in PSE services were significantly more likely to meet or exceed the standard on their third grade reading and math DSTPs than those students identified with a disability in kindergarten or later.

- Students who participated in preschool special education services when they were three or four years old were significantly more likely to meet or exceed the standard[3] on their third grade reading and math DSTPs than were those students who were identified with a disability in kindergarten, first, or second grade ($p < .001$).

- Over 65% of the students who received PSE services when they were preschoolers met or exceeded the standard for reading on the March 2001 DSTP.

- Over 55% of the same students met or exceeded the standard for mathematics on the March 2001 DSTP.

- Only 33.3% of the students in the DeCLS study who were identified for special education services in kindergarten, first, or second grade met or exceeded the standard for reading and only 33.4% met or exceeded the standard for mathematics on the March 2001 DSTP.

- Only 28.8% of all third grade students with an IEP statewide met or exceeded the standard for reading and only 28.3% met or exceeded the standard for mathematics on the March 2001 DSTP (See Table 4 and Figures 1 and 2 for further details.)

Table 4. Percentage of Students with IEPs Meeting or Exceeding Third Grade Standards for Reading and Mathematics--2001

Group of Students	% Meeting or Exceeding Reading Standard	% Meeting or Exceeding Math Standard
DeCLS Students Receiving PSE Services (n=72)	65.2%	55.6%
DeCLS Students Identified for Special Education in K, 1, or 2 (n=51)	33.3%	33.4%
All 3rd grade Students with an IEP Statewide (n=446 reading, 568 math)	28.8%	28.3%
All 3rd Grade Students Statewide (n=8177 reading, 8303 math)	75.1%	73.4%

[3] A score of "3" meets the standard on any of the DSTP exams. A score of "4" or "5" exceeds the standard.

Figure 1. Preschool Special Education Students (PSE) DSTP Reading Performance Score Percentages--2001

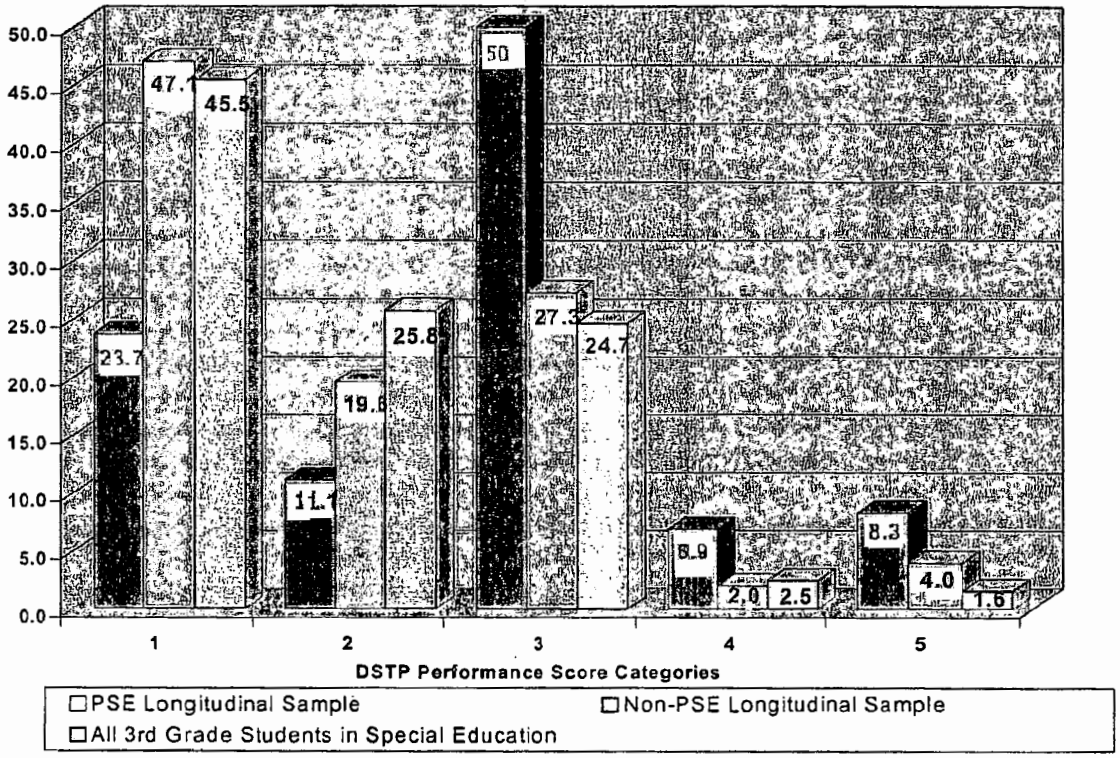
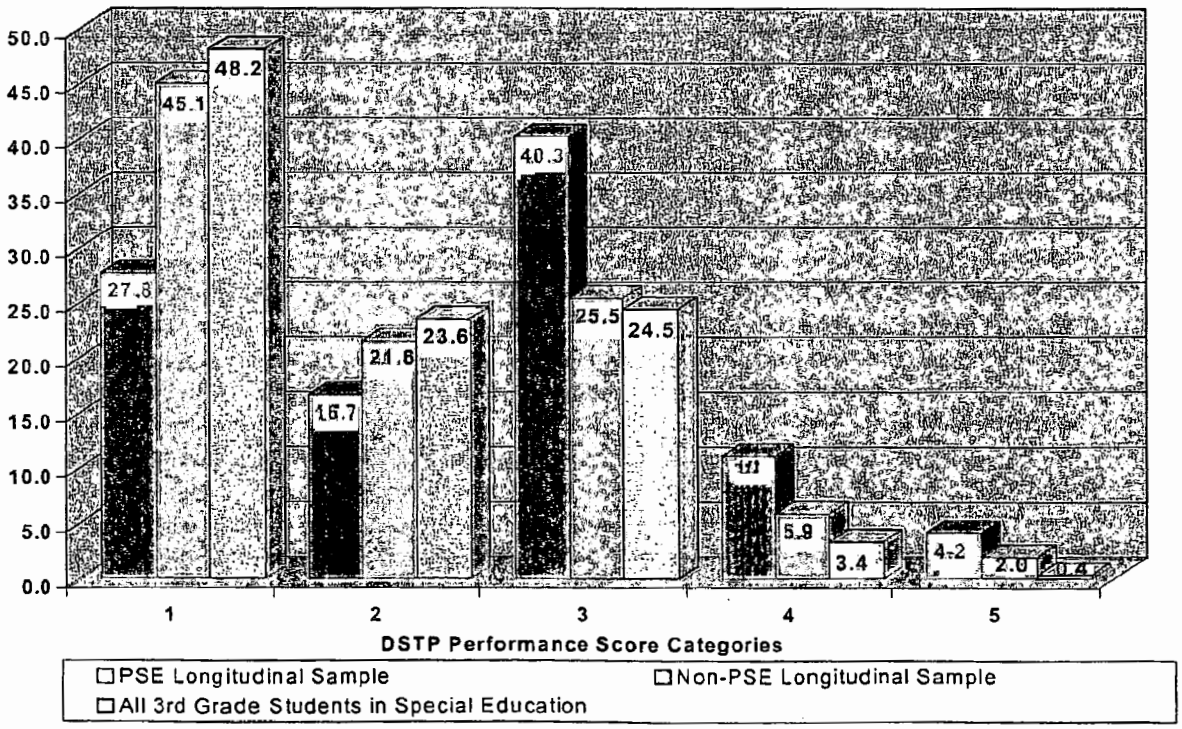


Figure 2. Preschool Speical Education Students (PSE) DSTP Mathematics Performance Score Percentages--2001



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Students who received PSE services had significantly higher grades than their peers.

- Students who received services from the PSE programs when they were three and/or four years old had significantly higher grades in first, second, and third grade than did their peers who were identified with a disability in kindergarten, first, or second grade ($p < .01$).

- 73% of the students with PSE experience had grades of satisfactory or outstanding in language arts, mathematics, and listening in third grade.

- Students who did not receive PSE services and were not identified as needing special education services until they were in kindergarten, first, or second grade, only 59% received grades of satisfactory or outstanding in the areas of language arts, mathematics, and listening in third grade.

Students who received PSE services had a grade retention rate of 5.56 per 100 students, four times less than a comparable group of students.

- Students with disabilities who received PSE services at ages three and/or four had a grade retention rate of 5.56 per 100 students. Students with disabilities that were identified in kindergarten, first, or second grade, had a grade retention rate of 26.09 per 100, over four times the retention rate of students who had received PSE services.

Students Living in Poverty

Students who received ECAP or Head Start services...had significantly higher DSTP scores and grades than their peers.

For students who were living in poverty at the start of their kindergarten public school experience, the outcomes for those with ECAP or Head Start experience were significantly better than those who did not receive ECAP or Head Start early intervention services. Students who received ECAP or Head Start services had significantly better academic outcomes compared to those children who were living in poverty and did not receive these early intervention services.

Forty-two students who received ECAP or Head Start services were tracked through their third grade year and compared to 109 students who were also living in poverty at the start of their kindergarten experience. The findings of these comparisons indicate that:

Students who participated in ECAP or Head Start services were significantly more likely to meet or exceed the standard on their third grade reading and math DSTPs than those students living in poverty who did not receive the ECAP or Head Start services.

- Students who received ECAP or Head Start services at age four were significantly more likely to perform at or above the standard on their third grade reading and math DSTP than their peers living in poverty who did not receive ECAP or Head Start services ($p < .001$).

- Over 69% of the students who received ECAP or Head Start services at age four met or exceeded the standard for reading on the March 2001 DSTP.

- Almost 62% of the same students met or exceeded the standard for mathematics on the March 2001 DSTP.

- Only 48.7% of the students in the DeCLS study who lived in poverty but did not receive ECAP or Head Start services met or exceeded the standard for reading and only 45.8% met or exceeded the standard for mathematics. (See Table 5 and Figures 3 and 4 for further details.)

- The percentage of students meeting or exceeding the reading standard at the third grade level and who received ECAP or Head Start services when they were age four was only six percentage points fewer (69.1%) than the general population of students in Delaware (75.1%). (See Table 5 and Figures 3 and 4 for details.)

Table 5. Percentage of Students Living in Poverty Meeting or Exceeding Third Grade Standards for Reading and Mathematics--2001

Group of Students	**% Meeting or Exceeding Reading Standard**	**% Meeting or Exceeding Math Standard**
DeCLS Students Receiving ECAP or Head Start Services (n=42)	69.1%	61.9%
DeCLS Students Not Receiving ECAP or Head Start Services (n=109)	48.7%	45.8%
All 3rd grade Students Living in Poverty Statewide (n=2970 reading, 3051 math)	60.4%	58.3%
All 3rd Grade Students Statewide (n=8177 reading, 8303 math)	75.1%	73.4%

Figure 3. Students Living In Poverty Reading Performance Score Percentages--2001

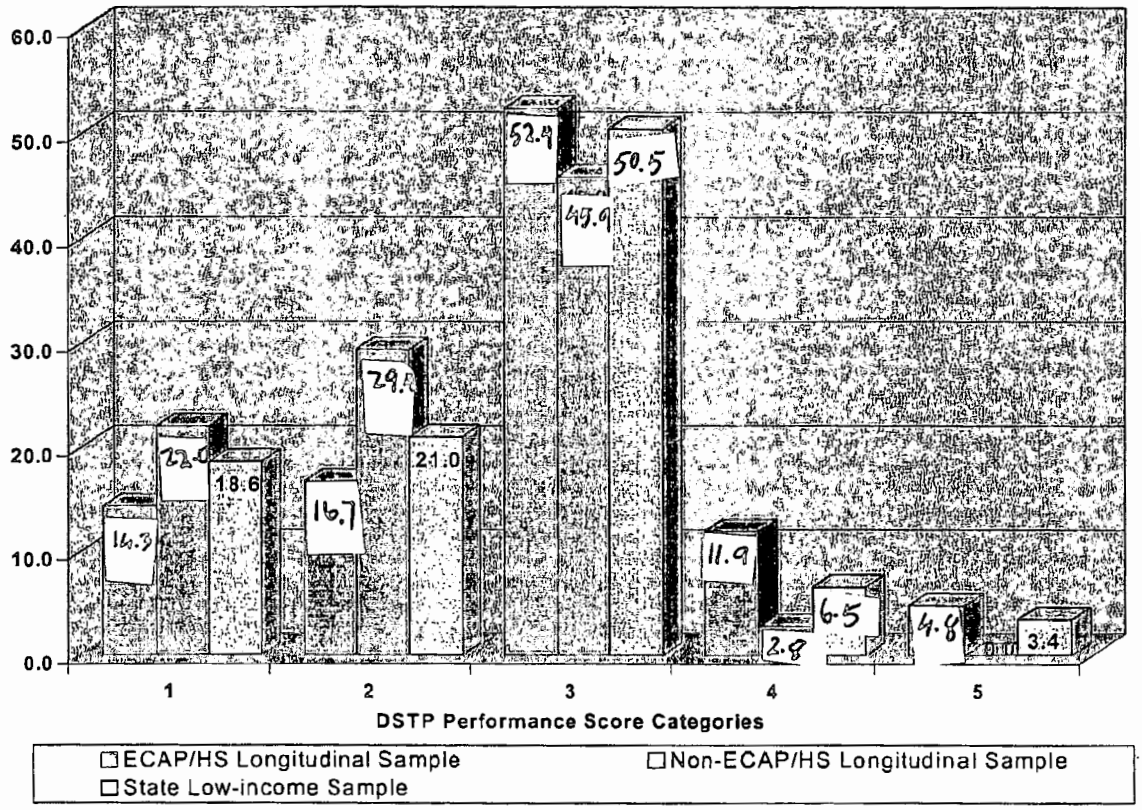
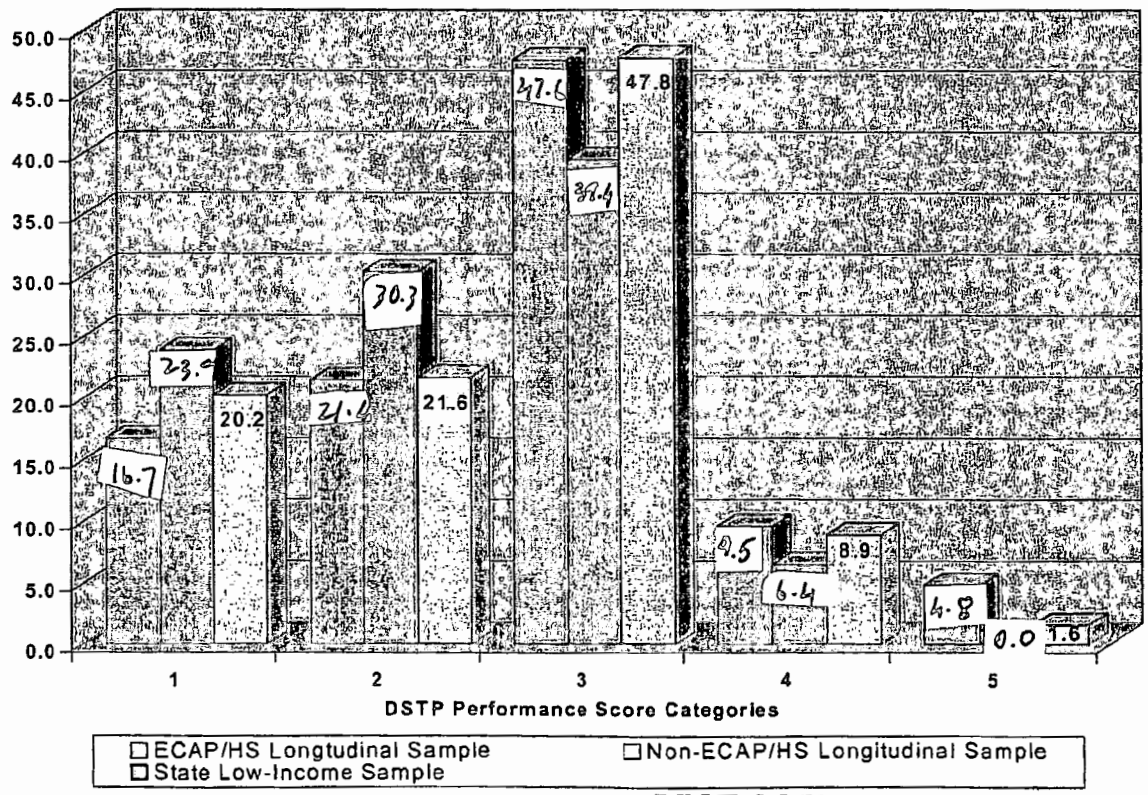


Figure 4. Students Living in Poverty Mathematics Performance Score Percentages--2001



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Students who received ECAP or Head Start services had significantly higher grades than their peers.

- Students who received ECAP or Head Start services at age four had significantly higher grades in first, second, and third grade than their comparable group peers living in poverty ($p < .01$).
- Over 83% of the 42 students who had received ECAP or Head Start early intervention services had grades of satisfactory or outstanding in the areas of language arts, mathematics, and listening in third grade.
- Students who did not receive four-year-old ECAP or Head Start services 71% had satisfactory or outstanding grades in the areas of language arts, mathematics, and listening in third grade.

Students who received ECAP or Head Start services had a grade retention rate of 6.67, less than half that of a comparable group of students.

- Students who had received ECAP or Head Start services at age four had a grade retention rate of 6.67 per 100 students.
- Students living in poverty who had not received ECAP or Head Start services at age four had a grade retention rate of 16.5 per 100, two and a half times the rate of retention of those students receiving the early intervention services.

Other Factors Influencing Student Outcomes

In addition to the early intervention services children received from the ECAP, Head Start, and Preschool Children with Disabilities programs, two additional school-based service variables were found to be associated with students' positive academic outcomes.

K-3 Early Intervention Services

A number of students in the DeCLS sample received referrals during their kindergarten and/or first grade years to the K-3 Early Intervention program. Thirty-nine students in the sample were referred to and received K-3 Early Intervention services from Family Crisis Therapists. These 39

students were from all three sub-sample groups of students with disabilities, students living in poverty, and students from the general population.

When examined as a group, 74.4% of the students receiving K-3 Early Intervention services met or exceeded the reading standards according to the March 2001 DSTP. Over 71% of this group of students (71.8%) also met or exceeded the standard in mathematics according to the March 2001 DSTP. Both the reading and math percentages are virtually equal to the overall state percentage. Despite the challenging social emotional factors in these children's lives, including such challenges as foster care, living in poverty, and violence in the family, this group of children still met or exceeded the state standards in reading and math at the same rate as students throughout the state.

Although it is impossible to determine through this study what factors associated with the K-3 Early Intervention services are supporting students' academic performance, the correlation between the K-3 Early Intervention services and the academic outcomes for students in third grade are clear.

Immunizations and Health Reports

A small number of students in the DeCLS sample did not have completed immunizations or health reports at the beginning of kindergarten. While records indicated that no child began public school services until their immunization records were complete, records did show that school personnel worked with these families to complete the children's immunizations and to secure updated health reports.

The lack of up-to-date immunizations and health reports at the time of kindergarten entry was highly correlated with living in poverty and not being enrolled in an ECAP or Head Start program. Twenty of the 21 students fit this profile.

Of these 21 students, only 47.6% met or exceeded the standard in reading according to the March 2001 DSTP. Only 42.9% met or exceeded the standard for mathematics according to the March 2001 DSTP. Both of these rates are significantly lower than the statewide rates for students living in poverty ($p. < .01$).

While it is unclear that lack of immunization and on-going health care has a direct link to academic outcomes, those children who did not have immunizations or complete health reports at the start of kindergarten had significantly poorer performance on their third grade reading and math DSTP exams in March 2001.

Summary

At the conclusion of third grade, after four years of public education, students who received early intervention services through the state funded Early Childhood Assistance Programs, the federally funded Head Start programs, or the state and federally funded Preschool Children with Disabilities programs were showing significantly better academic outcomes in comparison to comparable students who did not receive these early intervention services.

It is clear that those children living in poverty who receive ECAP and Head Start services perform better academically four years after receiving those services than those children living in poverty who did not participate in ECAP or Head Start services. Likewise, those students with disabilities who were identified in their preschool years and who received special education preschool services when they were three and four years old performed better academically four years after receiving those services than those children who were not identified as needing special education services until they entered kindergarten or later.

ECAP, Head Start, and preschool special education services provide instruction and support that has a significant impact on children's academic performance and can address the achievement gap for students living in poverty and students with disabilities.

With a significant achievement gap documented for students from lower socioeconomic backgrounds (Delaware Education Research and Development Center, 2002), early intervention services such as the state-funded Early Childhood Assistance Programs, the federally funded Head Start programs, and the jointly funded preschool special education programs are one of the strategies to address this gap.

The state-funded Early Childhood Assistance Programs, the federally funded Head Start programs, and the jointly funded preschool special education programs are an investment in children for better academic outcomes. They are an investment in Delaware's future.

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Title: Investing in Better Outcomes	
Author(s): Gamel-McCormick, Michael & Amsden, Deborah	
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