

## **The History of Early Literacy Research and Its Effect on the Project “Enriching a Child’s Literacy Environment (ECLE)”**

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### **Introduction**

By presenting a brief general history of educators’ efforts and struggles to influence the intellectual and social growth of young children, it will help the reader understand why the Exemplary Center for Reading Instruction (ECRI), a research and consulting group concerned with instructional practices, sought for and obtained funds from the U.S. Department of Education to conduct three major studies pertaining to early childhood education over a period of 25 years.

**The first study** was to determine the best age to introduce literacy instruction (three, four, five, or six) and to see if early gains in achievement, resulting from those experiences, would be maintained once the children reached the ages of seven or eight. Relationships between teaching reading and other subjects were studied, and an assessment of personality development was made to determine if academic instruction at an early age is beneficial. In 1968-69 two classes of three-year-olds and three classes of four-year-olds began receiving instruction in reading, spelling, science, music, concept development, arithmetic and art. The following year, 1969-1970, instruction was continued for the five classes, and classes of experimental five year olds were added. Classes of control four-year-olds were also identified. In 1970-71 all previously started classes were continued and experimental six-year-olds were added to the program and controls of five and six-year olds. The Utah State Governor funded a fourth year of the program at the request of parents, following which all students returned to classrooms at a level appropriate to their progress.

**A second study** from 1983 through 1991 known as “Early Start” was conducted with preschool and kindergarten age students as an integral part of a total school curriculum program. The “Early Start” program continues today in schools throughout the country and one program is cooperatively sponsored by Reid Foundation and the University of Utah Youth Division in Continuing Education, Salt Lake City, Utah.

**A third study**, “Enriching a Child’s Literacy Environment” (ECLE), was developed and evaluated from 1988 through 1993 and then funded by the Program Effectiveness Panel, U.S. Department of Education in 1994 so ECLE could be disseminated nationally. Its purpose is to teach parents and care providers of infants six months of age to three years of age to enrich their home/ center environment and, thereby, improve their children’s mental and psychomotor skills. ECLE is being used in various early childhood education programs such as Head Start, community and private programs, and daycare centers in 21 states, Korea, Canada, and Jamaica.

Descriptions of the studies, their findings and effects are described later in this paper.

### **Philosophies and Practices in the History of Early Childhood Education**

Published histories of early and present childhood education philosophies and programs and the persons who played major roles in them are studied and reviewed by undergraduates and graduates in the schools of education, early childhood education, and family studies. Educators

usually become familiar with major trends and names of key early childhood education developers, researchers, and authors. Personal experiences, research studies, and knowledge of and friendship with leaders in the field of early childhood education help shape advocates' beliefs, efforts, and the will to serve.

In both professional and popular publications concerned with education of young children, the amount of attention given to the years from 3-8 in the past 200 years is a reflection of the continued growing awareness of the importance of these years. Words from Hymes (1965-66) like "crucial" and from Widmer (1970) like "critical" were employed as adjectives to describe the impact these early years have upon the development and future education of the child. And, yet in 2010 (May 25), Robert C. Pianta, Ph.D., Curry School of Education, University of Virginia, urged the U.S. Senate Health, Education, Labor and Pensions Committee Hearing to consider the importance of developing "serious policy and program work connecting early childhood education with the K-12 schooling."

The past efforts of educators, psychologists, and others to identify appropriate early childhood schooling experiences motivated ECRI to become involved in identifying the best practices in educating young children.

One of the most troubling aspects of early childhood education, besides the differences found in the philosophies of methods of instruction and entering age of children, is reconciling the role of parents in child rearing and the role of the government in offering, and, perhaps, mandating educational programs for the very young. Joffe (1979) asked, "At what point do children enter the realm of 'public' life?"

Should the government provide early childhood educational quality programs for preschool age children if parents desire them? Are private preschool programs limited only for the middle and upper class children because their parents can afford to pay for them? If the government provides free preschool programs for all young children, will parents feel coerced to enroll their children?

In medieval times during infancy through the first seven years of life, most children were left almost exclusively in the care of women, and the Renaissance's "great intellectual foment did not engender any new considerations of children" (Shahar, 1992).

Comenius (1592-1628) and Pestalozzi (1746-1827) in the seventeenth and eighteenth centuries advocated that education should begin at birth with the mother as the first teacher—if she were properly taught. Infant schools in the United States flourished in the 1800's to serve children of working-class parents in the factories. Day nurseries or daycare centers which were largely custodial were located near to factories to aid working women. It was felt that the nursery was actually preserving the family since it was an alternative to the institutionalization of unsupervised children. During the post-Industrial Revolution there emerged teachers of teachers who developed educational practices widely used in University laboratory schools—which spread to experimental schools. Education for the young became desirable and popular—for some. However, other parents, educators, and psychologists believed early instruction was unimportant or harmful, and that parents are children's first teachers.

The Mothers' Pension, through which the U.S. government established grants to enable widows and wives of disabled men to stay at home and care for their children, was one of the country's earliest social policy measures. A 1914 report of a Commission on Relief reported that "the mother is the best guardian of her children; no woman in normal circumstances can be both breadwinner and homemaker for her family; and normal family life is the foundation of the State, and its conservation is an inherent duty of government" (Joffe, 1979).

During the Great Depression, the Works Progress Administration (WPA) established a network of more than 1700 nursery schools, and during World War II, the Lanham Act made funding available for childcare centers. The WPA nurseries were to provide jobs for unemployed adults, and the World War II centers were to enable women to work in war industries. Neither confirmed the idea of childcare for its own sake (Joffe, 1979). The programs were discontinued as the need ended and the funding was discontinued.

Some agencies still believe that professional daycare is seen as a threat to parental authority in spite of steadily increasing numbers of working mothers, the breakdown in the traditional family composite and family life, the nationwide impact of Head Start and other nationally-funded early childhood educational programs, the recognized merits of private preschools, the number of public schools with empty classrooms, and the trend in public schools to fill the empty classrooms with preschools paid for by parents.

The struggle of family versus early schooling programs need not be "either-or." Edward Zigler, first director of the Office of Child Development which administered the fledgling Head Start program, reported in a conversation with Deborah Perkins-Gough (2007) what ECRI demonstrated in the early 90's—that is, the importance of involving parents in their children's education.

Probably the most important single determinant of a child's growth is the behavior of the parents. Lots of research demonstrates that the more involved parents are in the education of their children, the better the children's education and performance....Victoria Seitz and others have collected considerable evidence that shows that if you can get the mother involved and make her a better socializer and teacher to her own children, that benefit will accrue to the younger children.

A brief survey of the history of early childhood education raises questions such as: Whose philosophy and methodology should be adhered to? What ages are critical to begin instruction and are most cost effective? Where and how will the future teachers of the young be taught and by whom? Will national standards or standards developed by early childhood associations for quality of instruction be accepted by state agencies and by universities?

### **The "Little Child as a Great Discovery"**

The idea of childhood as a special time of life gradually came about after the Industrial Revolution and in the years following complicated technological change and attendant lessening of the education being carried out in the home. Generations of children were regarded as simply persons inferior to adults. Braun and Edwards reported in the 1970's that it was only in the last 100 years that the educational implications of the stages of growth: infancy, early childhood,

childhood, adolescence, young adulthood and finally maturity were recognized.

In an address to the National Education Association in 1900, Georgia State School Superintendent, G.E. Glenn, pointed out the value of children as our country's greatest resource: If I were asked what is to be accounted the greatest discovery of this century, I would pass by all the splendid achievements that men have wrought...I would not go among the stars...I would pass over all the labor-saving machines and devices by which the work of the world has been marvelously multiplied. Above and beyond all these, the index finger of the world's progress...would point unerringly to the little child as the one great discovery of the century now speeding to its close. (Published in "The Journal of Education," August 16, 1900.)

Among those who early struggled for early childhood education reform and who profoundly affected the early infant school and later kindergartens were *Comenius* (1592-1628), Moravia, "Mothers must assume the teacher's role"; *Locke* (1632-1704), England, "Plan children's education on the basis of observation"; *Rousseau* (1712-1778), France, "Education of a child must be through experience only"; *Pestalozzi* (1746-1827), Switzerland, "It is through self-activity that knowledge is acquired"; and *Froebel* (1782-1852), Germany, "Early education is of supreme importance." Kindergartens in the United States, beginning in the 1850's and based on the ideas of the German Froebelian kindergartens, were also influenced by the work of Maria *Montessori* (1870-1952), Italy, "The child creates for himself an environment suited for his growth"; and Margaret *McMillan* (1860-1931), England, "The development of young children cannot be left to chance." (Lascarides and Hinitz, 2008).

*Montessori*, as early as 1907, with her schools for children of two, three and four years of age, implemented a teaching trend in philosophy by advocating that this age child should be instructed (Prakasam, 1961). She maintained that these very young children have all the implements necessary for being taught and that they have energy and enthusiasm for learning things by doing. The findings of Jean *Piaget* (1896-1980), Switzerland, "The thinking of younger children was qualitatively different from that of older children" also affected the education of children.

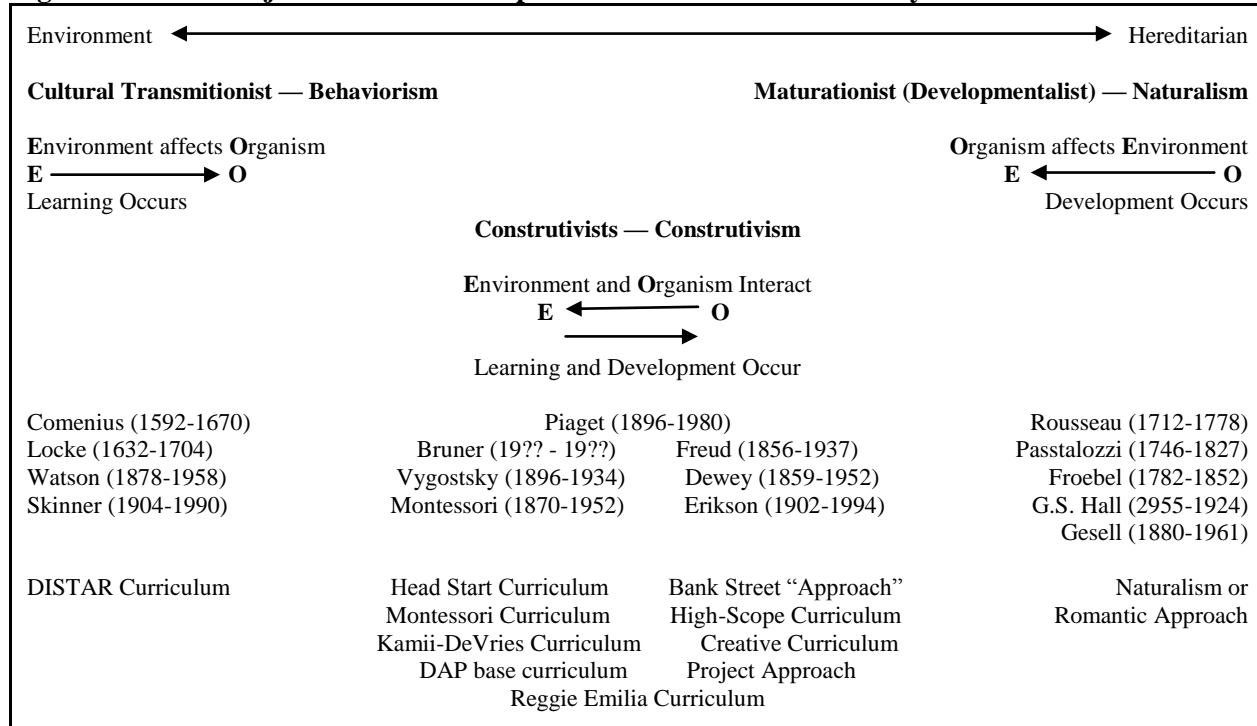
In America, efforts on behalf of children were led by such educators as Elizabeth Palmer *Peabody* (1804-1894), Massachusetts, "Moral culture is a twin object with physical culture"; Horace *Mann* (1796-1859), Massachusetts, "Learning is an active process in which the effective labor must be performed by the learner himself"; Patty Smith *Hill* (1868-1946), Kentucky, "Deep meaning lies in childish play"; John *Dewey* (1859-1952), Vermont, "No activity should be originated by imitation"; William H. *Kilpatrick* (1871-1965), Georgia, Students "purpose what to do; learning comes from the enterprise and is a result of guided experience"; G. Stanley *Hall* (1844-1924), Massachusetts, "Health is the criterion of everything in education"; Alice B. *Temple* (1866-1946), Illinois, "Unifying the kindergarten method of direct experience, self-activity, self-expression, and group cooperation with first grade will modify or eliminate the standard first-grade subjects."

Early childhood education as it evolved over those many years—even today—reflects the influence of philosophers, educators, psychologists, anthropologists, pediatricians, and

psychiatrists. It reflects the social, economic and even political climate within the country's culture, standards, and ethics. Many differing viewpoints are heard throughout the world.

A figure used by Eunsook Hyun in his paper presented at the American Education Research Association Annual Conference, April 2000, is his rendering of the "three major theoretical perspectives influenced in the U.S.'s Early Childhood Curriculum."

**Figure 1: Three Major Theoretical Perspectives Influenced in U.S. Early Childhood Curriculum**



Source: *Critical Examination of U.S. Curriculum History in Early Childhood Education*, Eunsook Hyun, Ph.D Florida Gulf Coast University, Paper presented to the AERA Annual Conference, April 24-28, 2000

**Play Oriented Movement**

As the movement for early childhood education grew—and this includes the organization of kindergartens, laboratory schools, private and cooperative day care centers, federally supported child care centers, Head Start and the like—the pervasive question became, “What should be taught in the way of cognitive instruction, in what way and by whom?”

Forest (1935) indicates that: “Froebel was perhaps the first educator to appreciate the value of play for its own sake and to state clearly that the self-activity of the child was the ideal method of learning.” Piaget and Froebel frequently would muse about why learning through play must be repeatedly justified.

But, the interpretation of play was open to controversy, and by 1910 the concept of the American kindergarten as a freely organized group of four and five-year-olds attending a laboratory school and available for observation and study emerged. Eventually, newer and freer kindergartens evolved with respect to demands of modern educational psychology. “Creativity,” “personal growth” and “social adjustment” were key phrases as early childhood educators sought

to substitute academic training for sympathetic interest and insights into children.

The period during which education first felt the influence of John Dewey was one generally typified by a hesitancy to hasten the educational process and fear of over-taxing the child's intellectual capacities (Berlyne, 1965).

Eveline B. Omwake, Professor of Early Childhood Education (1963) at Connecticut College and former president of the Early Childhood Education Association of America is quoted in Braun & Edwards (1972):

In the early days of the nursery school movement, such phrases as good play environment, appropriate play experiences, free play, dramatic play, group play, parallel and solitary play, social play, quiet play, play materials, etc., comprised much of the teacher's professional vocabulary.

For middle-class children who came to school verbal, curious, well-organized by the "hidden" curriculum inherent in their home life, play worked out very well. An environment rich in materials, children with whom to play and a caring teacher provided the basis for the nursery school experience. Concept development, speech and motor coordination naturally unfolded through the children's play, which was fostered in such a setting.

The controversy arose when it was believed, that although there is nothing the matter with play (indeed it may be called the "work" of childhood), play alone cannot carry the total burden of a young child's education. And, it was believed, for the disadvantaged child, play as the curriculum core for his formal preschool experience was grossly inadequate.

The outstanding Dissertation Award given to Karen E. Wohlwend (2008), Indiana University, Bloomington, Indiana, by the International Reading Association, was an "ethnographic study of kindergarten literacy play—combined children's play, reading, writing, and design." When literacy and play were combined in a two-hour period in an all-day kindergarten class, they supported and strengthened one another. Students playfully taught one another to read; other children authored books, puppet shows, and plays during writing workshop sessions; and a third group "made stuff" and enacted college sports events indicating that "literacy" activities are fun and that "play" can be a means of learning.

Literacy experiences need not exclude play, and play need not exclude literacy experiences.

### **Extending Schooling Downward**

Prior to 1840 when the infant schools provided by factory owners and reformers flourished in the United States, a program of periodic daily instruction in the three R's and morals was published. In the 1840's educators who believed that young children should not be taught and who agreed with Pestalossi's beliefs that young children should receive a balanced, graduated education and that the mother is most important in educating young children had the effect of helping remove infant schools from public schools.

During the 1930's and 1940's, children's learning inadequacies appeared to be blamed on

low I.Q. (low general ability), a mental age of below six years and six months, or not being ready.

In 1949, however, Ralph Tyler commented, "...learning takes place through the experiences which the learner has; that is, through the reactions he makes to the environment in which he is placed." Educators began to look to the schools to prevent learning inadequacies and extend instruction downward.

Hunt's (1961) observations and investigations added to the growing trend of providing preschool education when he wrote concerning the former established ideas of a fixed I.Q. and the development of maturity:

...the assumptions of fixed intelligence and predetermined development led to a general attitude that investigations of the effects of various kinds of early experience on later intellectual capacities would be useless.

These implications influenced education. These differences between children and ages removed the onus of moral blame from school failure...the belief that the wherewithal to solve problems comes automatically with neural tissues of the cerebrum, **is being shown to be palpably false.**

Bruner (1963) pointed out that, "...our schools may be wasting precious years by postponing the teaching of many important subjects on the ground that they are too difficult." He continued, "...any subject can be taught effectively in some intellectually honest form to any child at any stage of development." Hymes (1966) stated, "Children under six are greatly underserved...and passive programs are almost as hurtful as pushy ones. Passive programs are monuments to missing opportunities."

De Hirsch, Jansky, Jefferson and Langford (1966) and Hunt, along with Fraser (1969) went on to substantiate the need for research and studies that have to do with early training.

Changes in curriculum and methods of instruction in kindergarten and nursery school objectives were suggested in the *Handbook on Research on Teaching* (1963) as well as, "Greater importance should be established to meet the needs of the millions of children who are enrolled in preschools...the number of children enrolled in 1960 in all the preschool establishments throughout the world can be estimated at 17 million" (UNESCO, 1963). By 2008 there were 12,583,000 children in the United States who were of three to five years of age, and 7,928,000 were enrolled in public and private nursery schools and kindergartens—52.8% of three and four year old children were enrolled in school.

The trend to extend the school downward and the importance of those early years was reported on by Pines (1966):

Even the usually conservative National Education Association has gone on record asking for free public schooling for all four-year olds. The generally accepted school-starting age of six, it declared, is now obsolete....There is no evidence that guided stimulation has ever harmed young children, ...but there is plenty of evidence that no human being of high ability has ever grown up without it.

Many educators began to experiment with the idea of teaching the very young child.

### **Training in Skills**

Thorndike and Gates (1929) made observations which seemed revolutionary to their peers at that time. Whereas, most educators around the 1930's through to 1966 discussed the importance of "readiness," physical and social development and perceptual development before reading instruction should begin, Thorndike and Gates stated:

The initial impossibility and later difficulty which infants experience in taking care of themselves and the wastefulness of their unguided methods of learning are both evidence that children need more than mere opportunity to learn; they need to be taught.

It is never safe to say that a child is intrinsically unready to read because he has not tried and shows no inclination to try to read...Readiness does not always precede the acquisition of ability...Abilities cannot get into a state of readiness before they exist.

In 1942, Gates, Jersild, McConnell and Challman made the comment "...readiness is a complex of inner growth factors and the results of training....Studies reveal that, under certain conditions, it is definitely advantageous to give young children training in skills for which maturing capacity alone is inadequate." They continued:

The fact that the abilities most closely related to progress in beginning reading depend upon experience and training is of fundamental import. Preparing a child to read is certainly more than merely letting him grow. Guidance and basic training are essential both in the preparatory stages and in the actual process of acquiring reading skills.

### **Academically Oriented Movement**

Recognizing Dewey's influence on the programs for young children, Berlyne (1965) helped to set the stage for a newer concept of early education when he stated the following:

The period during which North American education was dominated by Dewey's influence was one marked generally by a fear of hastening the educational process and of over-straining the child's intellectual capacities. Recent psychological research concurs with the experience of educators around the world in suggesting that the rate at which the average child, let alone the gifted child, can advance has been grossly underestimated, with unfortunate consequences. . . Above all, there was a grave underestimation of the extent to which the ordinary child can find intellectual substance appetizing and intellectual effort satisfying, provided they are introduced at the right time and in the right way.

Fowler (1962) also pointed out that the preschool child's potential for profiting from instruction was being neglected because teachers were adhering to the notions of progressives that pressure is bad.

As a greater emphasis was placed on the education of the preschool child, a change in preschool educational philosophy became manifest in the 1950's and 1960's. Instead of stressing only social, emotional and physical development of children, there became a growing interest in the inclusion of intellectual, even academic material in the curriculum.



Two major social factors were believed to have played an important part in the enlargement of early childhood education in the 1960's and 1970's. The first was the knowledge explosion. Russia's space achievements did a great deal to change the country's educational philosophies. The second factor was the realization that school systems must improve conditions for deprived children. Bereiter and Engelman (1966) were concerned with the cognitive deficiencies of the disadvantaged, and Moore (1967) and Fowler (1968) were interested in accelerating the learning of middle-class children. The federal government appropriated large sums of money to help these children. Education of young children through Head Start was a recipient of much of the early funding.

Contrary to the concept of the naturally unfolding personality, psychologists, such as McDonald (1968) went so far as to suggest that parents and/or society might deliberately intervene as soon as possible to provide the most favorable contrived setting for the child, since the child is born into the man-made society anyway.

The appeal of cognitive learning for young children is not new. In the earliest kindergartens didactic materials and direct instruction were integral parts of the curriculum. Froebel had his "gifts" and other activities to foster learning (Braun & Edwards, 1972); Montessori created manipulative devices and exercises (Frost, 1968); Piaget had his structured learning experiences (Frost, 1968). But the Dewey-Hall progressive education movement eliminated much of this cognitive emphasis, and it was only during the last six decades that the impetus has been to extend formal education downward.

### **Teaching Young Children to Read**

One of the most controversial issues in early childhood education was that of teaching young children to read. Washburne and Morphett (1931) believed that the mental age of six and one-half years to be the best age to start formal reading instruction.

Keliher (1960) stated that:

We know that a few are ready to read at five but that the great majority are not. Research has consistently shown that a mental age of six and one-half or over is necessary for reading with understanding....Oculists warn us that most children's eyes are not mature enough even at six for close application to print and figures.

Betts (1936), Kirk (1940) and Dolch (1951) all made mention of the necessity for the need of a mental age of six and one-half as a factor contributing to reading readiness.

The premise that an age of six and one-half for a child to learn to read with understanding seemed to be refuted by the incidence of children who learned to read before they came to school, presumably as a result of family influences, the media bombardment which included among other influences, television, easy-to-read-books for children and for parents, accelerate-your-child's-learn-books and articles (Engelmann & Engelmann, 1966), and attempts to remediate the deficits of the disadvantaged child as he entered school.

Brzeinski's (1967) study involving approximately 4,000 children in the Denver Public Schools in reading readiness instruction in kindergarten revealed that the time of introduction of beginning reading readiness activities had a significant effect on achievement. Initial and long-range gains from the experimental program were evident in both reading comprehension and reading vocabulary. Those children who were taught the experimental materials in kindergarten

were significantly better readers at the end of first grade than those children who were taught those same materials for the first time in first grade. No evidence was found that the experimental early instruction in the beginning reading affected visual acuity, created emotional difficulties or caused dislike for reading; no statistically significant difference existed between controls and experimental groups in these areas.

Durkin (1964) found that children who learned to read at home maintained the mean relative advantage significantly over controls as far as the sixth grade.

A study by Hillerich (1963) revealed that children who had a pre-reading program in kindergarten demonstrated significantly greater reading achievement at the end of first grade as compared to children who had no pre-reading program in kindergarten. This study also supported the idea of an earlier age than the first grade for formal instruction in skills related to reading. Eames (1962) found that children five-years-old have more accommodative power than at a subsequent age. He also found that the poorest near visual acuity found among five-year-old children was sufficient for reading the usual texts. These studies and others eliminated the claim that a mental age of six and one-half was necessary for beginning reading from the standpoint of visual maturity and efficiency in reading.

In a letter dated May 15, 1972, Dr. Joseph L. Hatch, President of the Utah Ophthalmological Society explained:

Some things are quite complex. Other things can be very simple and should be treated as such, rather than trying to make them appear complicated far beyond their importance.

Except in certain situations following surgery, one does not do physical harm to one's eyes by looking or using them no matter what the age or conditions. This is contrary to many people's superstitions, but it is a simple fact. Teaching even a six month old child to read would not be harmful to the eyes in any way. (It may be somewhat a challenge to the educator, however.)

The research findings of Durkin, Brzeinski, Hillerich, Eames, Moore, Fowler, Bereiter and Engelmann and others substantiate the value of an earlier start in reading, placing it between the age of four and five and possibly, even earlier.

### **Personality Adjustment**

A child's mental health was a concern of educators following the advancement of the Freudian theory that the difficulties and problems adults experienced had their genesis in childhood.

Jenkins (1960) said:

At the very time we bemoan pressures which bedevil us, we do not seem to be fully aware of the pressures which we are pushing on boys and girls: pressures to behave in a socialized way; to be popular—to belong to the group; to achieve in school and get to college; to hold their own in a competitive world; to take advantage of all the advantages; to live in a world which even grown-ups cannot

say is safe and secure. As if these pressures were not enough for our children to face, many adults are adding to pressures in the name of education.

One of the many vocal and research-oriented spokesmen of early reading was Fowler (1962) who contended that early intellectual stimulation results in superior achievement that is maintained through the elementary years without negative personality or social effects. Leiter (1971), Knudsen (1970), Draper (1975), and Andersen (1971) indicated in the ECRI studies that early education does not interfere with the normal and desired psychological development.

Of the disadvantaged children in the Bereiter-Engelmann school in Urbana, Illinois, Pines (1966) said:

There is evidence of more change in Bereiter's school than any other I've seen. When he set up his class last year, the children, tested under age three on the Illinois Test of Psycholinguistic Abilities (ITPA), didn't talk to each other at all except in single words and grunts. In each of two three-month periods of this school they gained about one year of psycholinguistic ability on the test.

In response to the criticism of the "pressure pot" school, as schools with structured learning programs for young children were sometimes called, Ward (1957) said:

The results indicate that stimulation and guidance toward the more effective thinking of the young child do not bring about strain or emotional disturbances of any kind. Rather, there is indication of increased happiness and well being in the group because of the achievements of greater self-realization and satisfaction.

### **What Now in the Twenty-first Century? Programs for Three's and Four's and Younger**

- Dr. Edward Zigler in the interview with Perkins-Gough (2007) also reported: It troubles me that most of the states are starting preschool at age 4. Most middle-class families send their children to preschool at age 3. That's when a child is ready for preschool experience. It's particularly important for poor children. We have evidence from the National Institute of Early Education Research demonstrating that two years of intervention give you more benefits than one year. So we want a program for 3- and 4-year-olds.

But we have to reach down even earlier. Conception, not birth, is when development starts. The Early Head Start findings demonstrated that when mothers are pregnant, they're extremely interested in information and instruction.

- In an interview conducted by D'Archangelo (2003) with Sally Shaywitz, Co-director of the Yale Center for Study of Learning and Attention at the Yale University School of Medicine, Shaywitz was asked:

**We often hear that the first three years are the most important, but is that necessarily the case?**

The brain is a living, dynamic organ that is plastic throughout life. It is always taking in information and refining and reinforcing connections once they're made. But when a child is young, this refining goes on more easily and as a matter of course. You're starting with so many possibilities. It's like a house. Think of it this way. It is much harder to renovate an already standing house than it is to build it right from the start.

To correct a reading problem in 3<sup>rd</sup> or 4<sup>th</sup> grade, you almost have to undo certain pathways that the child has developed. But children between 4 and 6 are at the cusp of learning to read. Their spoken language system is in place. They are ready to build the connection to print. It is an incredibly exciting time. They want the sign "Go." You have wide-open opportunities. You don't have to undo faulty connections.

### **How can teachers help children become automatic readers?**

The goal of preschool, kindergarten, and 1<sup>st</sup> grade is to provide the experiences and the substance that will lead to automatic reading on a behavioral level, and on a neurobiological level, to begin to build the neural systems that are responsible for fluent reading (D'Archangelo, 2003).

- A team of researchers under the guidance of psychologist Burton L. White (1976), director of the Harvard University Preschool Project, after a decade of study, found that the origins of human competence are to be found in a critical period of time between eight and 18 months of age. The children's experiences during this little-studied time span do more to determine future competence than at any time before or after. White and his associates identified several specific types of experiences that they found are central to the development of fundamental linguistic, intellectual and social skills.

The amount of live language directed to the child. The more the child is talked to directly, the better.

Toddlers who spent a lot of time in steady staring develop better than those who scan the environment.

Children who are given free access to the living area of their home do better than those whose movements are restricted.

Children who develop best have twice as much social experience. They seek the attention of an adult, cooperate with simple requests, and seek the services of an adult. The most effective parents were (1) superb designers and organizers of their child's environment; (2) were firm disciplinarians while showing great affection; and (3) served as personal consultants to their children in brief periods of time.

- In a 21-year study (Thompson, 1993) conducted at the Frank Porter Graham Child Development Center, University of North Carolina at Chapel Hill, one specific factor was singled out that differentiates the learning disabled child from the "normal" one. So powerful

was this one factor, that intellectual ability, the nature of the child's learning abilities, the kind of program or school history didn't make the difference this one factor made. They called it persistence—the ability to focus on the task at hand, to shut-out any distractions and to keep at the task. This behavior has been called “task oriented” and it means that the child develops a work pattern that rivets him to the job to be done. He does not quit.

The effect on the improvement in academic functioning as a result of Frank Porter Graham's preschool program was never lost through age 15, even after 10 years. Although academic achievement differences have disappeared at the end of some special programs for young children, a 21-year study released in April of 1993 from the Frank Porter Graham Child Development Center at the University of North Carolina at Chapel Hill concludes that there is a significant advantage in providing a good early learning environment for poor children, and that it makes a significant and enduring difference to the child's future.

- Robert C. Pianta (2003) (referred to earlier as he testified on Capitol Hill in 2010), Professor of Education and Director of the National Institute of Child Health and Human Development Study of Early Child Care, University of Virginia, and Karen La Paro, found:

“Of 3,500 kindergarten teachers surveyed in the United States, a total of 46 percent of the kindergarten teachers reported that at least half of the students in their classes had difficulty following directions. Other problems that teachers most frequently reported for half of the class or more included lack of academic skills (reported by 36 percent of the teachers), difficulty working independently (34 percent), lack of formal preschool experience (31 percent), difficulty working as part of a group (30 percent), and poor social skills (20 percent).

In other observations of 2,000 classrooms from prekindergarten to 1st grade, at a time of the day each teacher asked to be observed, 20 percent of the classrooms observed were rated poor on the level of quality of the literacy experiences offered to children. Children seldom in any of the classrooms—in a morning-long observation—received exposure to phonetic activities, storytelling, or listening to a story being read to them.

It was concluded that the 2,000 classrooms that were observed were low on productivity and low in intentionality. There were no directed, designed interactions between children and teachers in which teachers purposefully challenged, taught, and extended students' skills. Improving the quality of the classroom settings and teaching practices—key aspects of daily schooling—directly affect student performance.”

- At the heart of ECRI's remarkable success in the three early childhood education projects, whose descriptions follow, is the effective and replicable professional development program that is offered to teachers, parents, and care providers who are trained in techniques that utilize a highly interactive and teacher-intensive approach to instruction.

The following three major studies in early childhood education funded through U.S. Department of Education grants were conducted by the Exemplary Center for Reading

Instruction (ECRI) staff members and University of Utah professors: Drs. Gabriel Della-Piana, Howard Slone, Asahel Woodruff, and Elliot Landau associates of ECRI who lent direction to its research into teaching and learning. Drs. J. Thomas Hastings, University of Illinois, Douglas Porter, Harvard University, and George D. Spache, University of Florida served as ECRI's Advisory Board.

Although the author believed that young children could be more effectively taught in a formal preschool program than the typical nursery school and kindergarten program available to her own children, the program that ECRI designed was based on consultation with leaders in the field and on ECRI's findings in effective instruction. The assessment strategies in each study were planned and conducted by independent external evaluators. This is true, also, of the statistical analyses.

The theoretical framework for the three experimental programs was provided by Bloom (1964). Correlating data from numerous cross-sectional and longitudinal studies, he demonstrated and theorized a common growth curve for several qualities which he termed "characteristics," e.g., intelligence, interest, attitudes and personality, and academic achievement. This growth curve shows rapid development usually before the age of five and always by eight or nine. This rapid growth in these very early years equals half the expected adult development. He also believed environment accounts for most of the variance. He concluded if learning does not take place or is insufficient at the appropriate time, deficiencies in learning occur which require remediation and may even prove irreversible. Bloom believed this growth curve to be universal and consistent enough to permit behavioral scientists to begin to think in terms of laws, rather than trends.

### **Study One: 1968-1972**

The three and four-year old children who were registered in ECRI's experimental program came from five different school districts' geographical areas since an announcement of the availability of the early childhood educational classes appeared in the two major Utah papers with a "first-come, first-served" entrance policy. The five- and six-year-old students, however, were from schools in the Granite School District boundary, since that is where ECRI was located.

Much evaluation resulted from the U.S. Department of Education grants. In addition, three theses and two doctoral dissertations contributed to the data pool—each with a slightly different focus.

Knudsen's (1970) master's thesis was limited to the Granite School District's first year kindergarten Experimental and Control groups. Eighty-eight children in the experimental groups in School A attended school the first year for a half day. They were divided into three different heterogeneous ability classes with an average class size of 29.3 children with IQ's ranging from 81 to 145. Their curriculum included reading, language, science, math, music, and art.

The control group in School B included all of its three classes of 65 kindergarten children (average size of 21.7), with IQ's ranging from 81-141. Their work included reading, math, rest, science, music, art, educational TV, and recess.

Pre- and posttests included Gates-MacGinitie Reading, Vocabulary, and Comprehension Tests, Wide Range Achievement Test, California Test of Personality (Personal, Social, and Total Adjustment), and The Peabody Picture Vocabulary Test.

Comparison of the two groups after spring testing showed that the achievement scores were significantly higher for the experimental group than the control group. The reading scores were exceptionally high. The differences on spellings scores were highly significant for boys and girls. The arithmetic test score showed less difference in comparison but were still significant at the .05 level for boys and at the .001 level for girls. There were no significant differences in the personality scores in comparing the two groups, although the experimental group scored slightly higher.

Carr's (1970) dissertation tested four groups of students on four Piaget-type math tests: Conservation, Discrimination, Numeration, and Total Scores as part of the experimental and control early childhood study: Group A—five year olds who began the program as 4's; Group B—first year in the Experimental program as 5-year olds; Group C—control five year old groups; and Group D—the two younger age groups of three's and four's. Group A's scores, five's who had had two years in the program, exceeded all other groups on all four tests; Group B's scores, experimental 5 year olds, exceeded Groups C and D except for seriation (C was higher); Group C (5 year-old controls) was lower than Group D (younger children) even on Numeration, the same as D on discrimination and higher on seriation than D but lower than A and B.

Andersen's (1971) master's thesis assessed change in all age groups for I.Q., reading readiness, reading, spelling, and arithmetic. Results were: Mean I.Q. of the 3- and 4-year old groups increased statistically significantly at the .001 and .0001 levels of confidence. Statistically significant increases in reading readiness, reading, and spelling skills occurred among the experimental groups when compared with the control groups after one-year in the program.

Leiter's (1971) dissertation divided the groups as follows:

#### **Experimental Groups**

- E1 — children who completed first grade as 5-year olds who began the study as 3-year-olds.
- E2 — children who completed first grade as 6-year olds who began the study as 4 year-olds.
- E3 — children who completed first grade as 6-year olds who began the study as 5-year olds.
- E4 — children who completed first grade as 6-year olds who began the study as 6-year olds.

#### **Control Groups**

- C1 — children who completed first grade as 6-year-olds and who were the matched control students for E3 above.
- C2 — children who completed first grade as 6-year olds who were matched with E-4 children.

Leiter's conclusions were that children's personalities are not damaged by their participation in an academically-oriented early childhood educational program, and that there may be a positive advantage for children to participate in such an educational experience. He found that the experimental groups of 3's, 4's, 5's, and 6's demonstrated significantly greater achievement at the end of the 1<sup>st</sup> grade than the control groups; and that the children who began in the experimental program one year earlier than the others had greater advantages—especially at age 4.

Draper's (1975) master's thesis added a science portion of the Sequential Tests of Educational Progress to the other tests previously cited, and the same children in the experimental and control groups were examined as second graders to determine if advances in reading were maintained with comparable achievement in other academic areas and suffering no apparent personality damage. In Draper's study it was found that between the four experimental groups and the two control groups, the mean experimental scores differed from the mean control scores on vocabulary, comprehension, speed and accuracy, oral reading, spelling, and science. The students who had begun at age 4 in the program had the highest mean scores in all four reading variables and also had the lowest standard deviation on three of them. (For the first two years of the experimental program, math materials could not be obtained for the three- and four-year-old classes.) An early introduction of academic instruction did not affect the personality of the pupils. The significant differences between the experimental and control groups emphasize the importance of an academic preschool program for students.

(As an additional note: for these almost 400 preschool students, they had the lowest percent of absences in a district of 62,000 students. Many parents had to drive by the school during the holiday break to prove to the children that school was not in session.)

The significance of the data dramatically changed educator and parent expectations of kindergarten and first grade programs. The "Implications Section" that was written in conclusion to the Federal Grant stated:

A unique feature of the program out of which came the data for this study is that it is preventative, rather than remedial. The materials and methodology used were specifically formulated to enhance the development of children's academic progress in a structured preschool experience based on Bloom's and Carroll's educational theories and employing known and accepted principles of learning in a task-oriented approach. Many other programs have arisen reactively as dictated by immediately compelling circumstances. It would seem that the tragedy of children who fail in school, and many begin to fail in kindergarten and grade one, may be averted through attempts such as this to change the preschool experience. Other avenues that must be explored are, of course, changes within the public schools and better parent-child relationships.

The findings submitted to USDE resoundingly emphasized the importance of the literacy program in which the three, four, five, and six-year-old students were enrolled. Matched control groups were involved in these studies. Considerable changes in Utah State's kindergarten programs occurred as the data, over a four-year period of time, revealed that the three year olds maintained a lead over the fours; the fours learned much better than the fives; and the fives exceeded the growth of the sixes. Gains were considered large enough to warrant the extra cost of the three-year-old program. (Leiter, 1971).

It wasn't long before districts/schools were including early childhood teachers in ECRI's seminars.



## **Second Study: 1983-1991 Early Start**

### **Goal**

The goal of Early Start was to utilize the findings of Study One in a school setting where the teaching strategies and curriculum could be continued on from preschool into succeeding grades. Early Start today continues to develop a firm literacy foundation for preschoolers and kindergartners on which reading and mathematics skills are built. The curriculum includes concept development, literature, oral language activities, science and social studies units, rhythm and movement activities, and a comprehensive fine arts program. Children are actively involved as they learn. Early Start builds on children's current knowledge and abilities. Because of Early Start's uniqueness in individualized instruction, it develops positive feelings toward learning. Its flexibility for teachers creates confidence for students and promotes success without pressure. The program fosters exploration and inquiry and develops reasoning, problem solving and decision making.

Adams (1990) concluded that effective teaching requires a balance between phonics activities and exposure to meaningful, written text. Early Start teaches students in a descriptive rather than a prescriptive way to recognize that symbols (letters) represent sounds, and that sounds can be blended into words which have meaning. Students are taught strategies for obtaining meaning through listening, and they learn that meaning changes as words appear in different clusters of words called sentences, paragraphs, poetry and stories. Early Start especially focuses on the desire and importance of learning to share ideas that can be written and read.

Teachers use *Start Reading* (Cove Publishers) storybooks and *Teaching Mathematics* (Cove Publishers) as their basic reading and mathematics programs. Students are taught in small groups. Their attention is sustained with the momentum of the activities and the reinforcement offered.

Simple criterion-referenced tests are provided for the reading/spelling/writing and mathematics materials and occur naturally as students complete their activities. Many hands-on experiences are provided. Teachers learn how to introduce children's literature to students, what books to select, and how to stimulate children's interest in them.

Mathematics in the Early Start program includes the introduction of geometric shapes (characteristics and names); spatial awareness (in, out, above, below, etc.); number sense (including rote counting of manipulatives); numeral recognition (numerals 0-9 as the basis of all numbers); whole number manipulation (addition, subtraction, more, less, equality); fractions (half, whole, thirds, fourths, etc.); ordinal numbers (first, second, third, fourth, last, etc.); measurement and measuring devices (length, weight, time (clock), volume, calendar). With the exception of some rote activities, concrete experiences and learning exercises are introduced before the mathematics concepts they emphasize.

### **Evidence of Effectiveness**

As a result of the Early Start program, preschool children (3 and 4 years of age) demonstrate: significantly greater gains ( $p < .01$ ) in auditory comprehension of language, as measured by the Test for Auditory Comprehension of Language (TACL-R) than expectancies derived from national normative data and significantly greater gains ( $p < .01$ ) in basic relational concepts, as measured by the Preschool Boehm Test of Basic Concepts than

expectancies derived from national normative data. Kindergarten children (ages 5 and 6 years of age) demonstrate:

significantly greater gains ( $p < .01$ ) in basic relational concepts, as measured by the Boehm Test of Basic Concepts (K - 2<sup>nd</sup> Grade) than expectancies derived from national normative data, significantly greater gains ( $p < .01$ ) in auditory comprehension of language, as measured by the Test for Auditory Comprehension of Language (TACL-R) than expectancies derived from national normative data, and significantly greater gains ( $p < .01$ ) in basic skills (reading, math and language), as measured by the Metropolitan Achievement Test (MAT) than expectancies derived from national normative data.

A norm-referenced design was selected to estimate the impact of the Early Start program on preschool and kindergarten students.

### Sample

The sample used for the study included eight groups of preschool (1986-91) students and four groups of kindergarten students (1987-91) enrolled in the Early Start program. Participants could best be described as “middle class” except for those enrolled in the program through a FIRST–USDE grant in 1989-90. FIRST grant students by definition were “low income/ disadvantaged.” Students were included in the analysis on the basis of complete pre- and posttest data for each subtest. Missing data were minimal.

### Results

Pre- and posttest data for six groups of **preschool students** are presented in Tables 1 and 2. As can be seen in Table 1, each of the six groups of Early Start students recorded large and significant ( $p < .0000$ ) NCE gains between pre- and posttests on the TACL-R. Gains ranged from 10.97 NCEs for Group 6 to 25.00 NCEs for Group 5. In terms of standard deviations, gains ranged from .75 sd to 1.5 sd and averaged over one full standard deviation.

**Table 1: Pre- and Posttest NCE Means, Standard Deviations and Correlated t-Tests for Six Groups of Preschool-Age Early Start Students on the Test for Auditory Comprehension of Language**

Group	N	Pre		Post		Gain	t	p
		x	sd	x	sd			
86-87	45	44.86	17.06	66.55	15.22	21.69	11.51	.0000
87-88a	17	48.61	12.77	67.51	14.02	18.90	6.29	.0000
87-88b	30	48.91	17.52	71.61	12.86	22.70	7.61	.0000
88-89	39	51.20	22.08	75.87	16.89	24.67	8.81	.0000
89-90	38	35.65	21.81	60.65	19.45	25.00	11.51	.0000
90-91	22	49.88	12.87	60.85	14.54	10.97	8.04	.0000

Early Start **preschool student** data on the Preschool Boehm Test of Basic Concepts are presented in Table 2. Boehm data\* were not collected for the 1989-90 FIRST grant group. As can be seen, significant NCE gains ranging from 13.60 (Group 6) to 25.53 (Group 2) were recorded by each of the five groups. Expressed in terms of standard deviations, gains ranged from .75 sd to 1.25 sd.

**Table 2: Pre- and Posttest NCE Means, Standard Deviations and Correlated t-Tests for Five Groups of Preschool-Age Early Start Students on the Preschool Boehm Test of Basic Concepts**

Group	N	Pre		Post		Gain	t	p
		x	sd	x	sd			
86-87	44	51.93	18.58	71.38	18.53	19.45	8.43	.0000
87-88a	17	53.64	20.28	79.17	19.42	19.42	6.67	.0000
87-88b	28	54.84	17.13	72.75	17.96	17.91	5.49	.0000
88-89	38	68.32	17.36	84.06	17.35	15.74	8.51	.0000
* 89-90	—	—	—	—	—	—	—	—
90-91	20	53.85	21.35	67.45	19.08	13.60	6.69	.0000

The comparability of the treatment group and the normative groups—and therefore, the validity of the norm-referenced design—is best established by examining pretest scores.

The mean pretest scores in Tables 1 and 2 for each of the treatment groups are comparable to the mean for the norm group. NCEs have a mean of 50 and a standard deviation of 21.06. All pretest scores with the exception of the 1989-1990 group are well within a standard deviation of the mean. The lower mean pretest score (35.65) for this group of economically disadvantaged students (FIRST grant) was anticipated and in no way invalidates the norm-referenced model.

Data for Early Start **kindergarten students** are presented in Tables 3, 4 and 5. These data parallel those presented for preschool students in the consistency and size of the observed NCE gains. For auditory comprehension of language (Table 3), all pre- to post- gains were significant ( $p < .0004$ ) and exceeded a full standard deviation. All gains exceeded 15 NCEs.

**Table 3: Pre- and Posttest NCE Means, Standard Deviations and Correlated t-Tests for Four Groups of Kindergarten Age Early Start Students on the Test for Auditory Comprehension of Language (TACL-R)**

Group	N	Pre		Post		Gain	t	p
		x	sd	x	sd			
87-88	19	51.93	15.22	67.65	12.74	15.72	10.15	.0000
88-89	17	45.34	15.39	66.25	14.60	20.91	7.86	.0000
89-90	11	60.39	16.33	79.06	12.15	18.69	5.46	.0003
90-91	12	47.11	17.28	62.28	10.64	15.17	5.22	.0003

For concept development (Boehm) data were available for two of the four kindergarten groups (Table 4). Both groups recorded significant ( $p < .01$ ) gains of approximately two-thirds of a standard deviation. While gains for the 87-88 group were in the order of 10 NCEs, 89-90 students' gains exceeded 15 NCEs.

**Table 4: Pre- and Posttest NCE Means, Standard Deviations and Correlated t-Tests for Two Groups of Kindergarten Age Early Start Students on the Boehm Test of Basic Concepts**

Group	N	Pre		Post		Gain	t	p
		x	sd	x	sd			
87-88	19	61.06	18.69	71.59	18.57	10.53	2.91	.009
89-90	9	50.89	16.01	66.33	18.21	15.44	4.89	.0012

The two kindergarten groups that did not receive Boehm testing were instead assessed using the Metropolitan Achievement Test. These data are presented in Table 5. As can be seen, both groups recorded NCE gains for each of the three subscales (reading, math, and language). All gains were large (13+ NCEs) and significant ( $p < .01$ ) with the exception of the 1990-91 group on the Reading subscale. Given the size and consistency of the previously stated effects and the small n size, this is likely a data quirk.

**Table 5: Pre- and Posttest NCE Means, Standard Deviations and Correlated t-Tests for Two Groups of Kindergarten Age Early Start Students Three Subscales of the Metropolitan Achievement Test**

**READING Subscale**

Group	N	Pre		Post		Gain	t	p
		x	sd	x	sd			
88-89	16	57.85	23.86	71.05	8.88	13.20	2.29	.003
90-91	12	66.81	15.45	70.27	10.12	3.46	0.74	NS

**MATH Subscale**

Group	N	Pre		Post		Gain	t	p
		x	sd	x	sd			
88-89	16	55.13	19.23	68.61	18.45	13.48	4.34	.000
90-91	12	67.55	15.92	85.45	13.93	17.90	4.68	.000

**LANGUAGE Subscale**

Group	N	Pre		Post		Gain	t	p
		x	sd	x	sd			
88-89	16	50.36	21.64	69.63	15.19	19.27	5.68	.000
90-91	12	64.37	17.10	81.91	12.92	17.54	3.28	.008

**Interpretation and Discussion of Results**

The norm-referenced approach effectively controls for maturation and testing, the two major threats to internal validity. The size of the means and the size and consistency of the effects across groups, provide an indication that neither statistical regression, nor the unique effect of the teachers were operative. Given this, and the fact that there was little group attrition, it can be concluded with a fair degree of certainty that it was the Early Start treatment that caused the observed effects.

The consistency and size of the gains across 10 separate groups strongly support the claim of program effectiveness. NCE gains ranged from 10 to 25 but the trend has been for gains in the area of 15 to 20 NCEs. Stated another way, gains over pretest have typically exceeded a full standard deviation after adjustments for maturation. These effects are considerable.

**Summary**

The summary included in the USDE final report stated:

Evidence has been presented which testify to the effectiveness of the Early Start intervention across ten different groups of preschool and kindergarten students. The effects have been consistent and reliable. The need for sound developmental programs has never been greater than it is today. Skills learned at these early ages

provide the cornerstones on which traditional K-12 skills are built. Typically, the most common solutions to the problems of early school failure have been to exclude some students based upon test results from entrance into kindergarten, raise the entrance age into kindergarten, provide an additional year between kindergarten and first grade (sometimes referred to as “rising first graders”), or retain children in preschool, kindergarten or first grade. These are all attempts to get “older” children—who educators will be more capable to teach as they move through the grades—into the primary grades. All of these solutions are evidence that the curriculum is not flexible enough to take care of the differences in children and that staff development in effective instruction is required for teachers of all ages.

The third ECRI study then focused its attention on younger children and their parents.

### **Third Study: 1988 - 1994 — Enriching a Child’s Literacy Environment (ECLE)**

ECLE is a program to teach parents and caregivers to engage in activities with young children six months of age through three which will enhance their cognitive and psychomotor behaviors. Since that time, it has become a popular and viable method of teaching parents/care providers to enhance the environment of their very young children.

#### **Goals**

ECLE’s goals are to develop oral language, thinking abilities and motor skills in infants and toddlers through activities conducted in the classroom and activities conducted by parents/caregivers in the home/centers.

There is a compelling need for parents to make learning a high priority in their children’s lives (Tomlinson, 1992). There is a need to reduce the number of at-risk children at age three, the number of children entering school requiring remedial or special education, and an ever increasing need to help families develop practices and activities that promote literacy in their homes and build confidence and foster individual responsibility in their children.

#### **Overview**

ECLE professionals teach parents, teachers and other care providers how to develop young children’s oral language, thinking abilities and motor skills. They instruct by first modeling with children each activity in the program, by prompting usage, and, then, through discussion and lectures. The parents or care providers replicate in class with their own children what is demonstrated. They practice in class what they will continue to do at home or in centers.

ECLE’s activities assist young children in developing more mature oral language and improved perceptual and intellectual functions. Experiences are provided to children that give them opportunities to practice what they ultimately will learn. Parents and teachers are shown how to help the children carry out the new behavior and, also, how to *talk* about their experiences. The earlier the investment in children’s use and understanding of their language, the greater the return.

ECLE has proven successful with young children (ages 6 months to 3 years) from varying socioeconomic levels and from different cultural groups. The program is successful

when delivered by fathers, mothers, grandparents, or babysitters in the ECLE class, in their homes, or in care centers.

ECLE emphasizes the development of a comprehensive set of psychomotor and cognitive skills during class and home instruction. In the classroom setting, working collaboratively with ECLE professionals, parents (or other care providers) learn how to develop their children's oral language, thinking and motor skills. Here, instructional techniques are modeled for parents who then practice with their children under the guidance of ECLE teachers. Once the skills are mastered, parents/care providers replicate the activities in the home or day care setting. Parents and their children attend class twice a week for 75 minutes which is divided into large and small muscle coordination activities, sensory stimulation/oral language development, print and number awareness, introduction to children's literature, music, movement and rhythm, and concept development experiences.

### **Evidence of Effectiveness**

Infants and toddlers (ages 6 months to 3 years) demonstrate significantly greater gains ( $p < .01$ ) on the Mental Development (MDI) and the Psychomotor Development (PDI) subscales of the Bayley Scales of Infant Development than expectancies derived from a group of comparison students and from national normative data. The evaluation employed a design in which pre and post treatment group measures were contrasted with those from an equivalent comparison group (1992-93) and with normative data provided by the test developers (1988-93). The tools selected to measure projected growth were the Mental and Motor subscales of the Bayley Scales of Infant Development (Psychological Corporation). The major criterion for selection of this tool was its high degree of validity for the ECLE intervention. (See Reid [2008] for constructs measured by Bayley which provide evidence for the practice activities that parents/care-givers engage with their children.)

### **Data Collection**

The Bayley battery of tests was administered according to the publisher's guidelines immediately prior to and again on exit from the program. All the data reported were hand scored and coded by independent evaluators. Also, as a check on accuracy, the transformation of a sample of individual student scores was verified against publisher's manuals by an independent external auditor.

### **Sample**

The sample used for the current study included five separate groups of students enrolled in the ECLE program from 1988 to 1993. Not considering program validation in the early years, no students were measured for comparison with ECLE groups 1-4. A comparison group for ECLE group 5 was sought and found.

**ECLE Groups 1, 2 and 4** included infants and their mothers/fathers, babysitters, or grandparents. They varied widely in primary occupation but were mostly middle class professionals.

**The ECLE Group 3** was comprised of infants and their parents from low socioeconomic backgrounds who were funded through a U.S. Department of Education "FIRST" grant.

Families from the Granite and Salt Lake City School Districts' catchment areas were invited to attend at no cost. The group included many welfare recipients, single parents, and unmarried mothers.

Neither **ECLE Group 5 parents nor its comparison group parents** were charged tuition. The two groups were drawn from the same area and shared the same income range (\$16,000 to \$30,000 per year). The parents of both groups had applied for acceptance in the program. Treatment and comparison groups were assigned by random drawing. Comparison group parents were told that the program was full and that they would be accepted at no charge during the next year if they would agree to the testing of their infants. The data for all students enrolled were included in the analysis. There were no missing data. ECLE and comparison student demographics are presented in Table 1.



Group	Year	Average Age (in months)	Age Range (in months)
1	1988-89	20.66	15-26
2	1989-90	22.75	13-27
3	1990-91	22.33	12-33
4	1991-92	20.37	6-30
5	1992-93	20.52	11-33

### Results

The results of pre- and post-intervention testing with the 1992-1993 treatment (group 5) and comparison groups are presented in Tables 2 and 3.

Group	n	Pre		Post		Gain	t	p
		x	sd	x	sd			
Treatment	21	108.00	20.27	123.05	15.11	15.05	5.73	.0000
Comparison	20	100.45	23.38	94.45	19.95	-6.00	-2.77	.02

Group	n	Pre		Post		Gain	t	p
		x	sd	x	sd			
Treatment	21	114.38	19.06	126.09	14.95	11.71	6.65	.0000
Comparison	20	103.60	22.57	94.95	15.08	-8.65	-3.17	.005

As can be seen, for both the MDI (Table 2) and the PDI (Table 3), while significant gains ( $p < .0000$ ) were made by infants in the ECLE group, significant losses ( $p < .02$ ) were made by their comparison counterparts over the course of the treatment period. As one would expect, when these differential effects were examined by a two-way analysis of variance, the interaction terms were also significant. For the MDI, the F ratio was 34.51 ( $p < .0000$ ). For the PDI, the F ratio was 40.22 ( $p < .0000$ ).

Pre and post test data for five years of ECLE students are presented in Tables 4 and 5.

**Table 4: Pre- and Post-test Means, Standard Deviations and Correlated t-Tests for Five Groups of ECLE Students on the Mental Development Index**

		Pre		Post				
Group	n	x	sd	x	sd	Gain	t	p
1 (88-89)	20	97.45	13.51	121.40	12.78	23.95	9.04	.0000
2 (89-90)	10	89.00	11.43	109.00	10.93	20.00	8.43	.0000
3 (90-91)	18	99.16	27.73	112.72	21.14	13.56	3.37	.0036
4 (91-92)	21	104.24	13.69	117.10	14.99	12.85	4.91	.0000
5 (92-93)	21	108.00	20.27	123.05	15.11	15.05	5.73	.0000
TOTAL	90	100.90	19.16	117.66	16.05	16.76	12.02	.0000

**Table 5: Pre- and Post-test Means, Standard Deviations and Correlated t-Tests for Five Groups of ECLE Students on the Psychomotor Development Index**

		Pre		Post				
Group	n	x	sd	x	sd	Gain	t	p
1 (88-89)	20	88.30	18.52	113.80	14.15	25.50	6.85	.0000
2 (89-90)	10	79.50	13.03	110.90	21.49	31.40	6.27	.0001
3 (90-91)	18	93.55	24.45	120.44	22.07	26.89	4.49	.0002
4 (91-92)	21	95.38	12.43	113.14	15.66	17.76	5.42	.0000
5 (92-93)	21	114.38	19.06	126.90	14.95	11.71	6.65	.0000
TOTAL	90	96.11	21.12	117.52	17.79	21.44	11.36	.0000

At pre-test, the total sample mean was statistically equivalent to that for the population ( $x=100$ ;  $sd=16$ ) for the MDI ( $t=0.53$ ;  $p=.59$ ) and significantly less than that for the population and for the PDI ( $t=2.31$ ;  $p=.02$ ). Following treatment, however, the picture was considerably different. Here, the total sample mean was significantly greater than the population mean for both the MDI ( $t=10.47$ ;  $p<.0000$ ) and the PDI ( $t=10.39$ ;  $p<.0000$ ). Statistically significant growth ( $p<.01$ ) had occurred in both the mental ( $t=12.02$ ;  $p<.0000$ ) and psychomotor ( $t=11.36$ ;  $p<.0000$ ) domains on standard scores which include adjustments for maturation and on which no growth is expected.

**Interpretation and Discussion of Results**

The pre/post comparison group design in conjunction with a norm-referenced approach effectively controls for maturation and testing effect, the two major threats to internal validity. The size of the means and the size and consistency of the effects across groups, provide an indication that neither statistical regression, nor the unique effect of the teacher were operative. Given this, and the fact that there was no group attrition, it can be concluded with a fair degree of

certainty that it was the ECLE treatment that caused the observed effects.

The consistency and size of the gains across five separate groups strongly support the claim of program effectiveness. These data only include students who were 30 months or below at the time of post-testing, as the norms for the Bayley do not go beyond this age.

The average gain for the five groups combined was 16.76 for the MDI and 21.44 for the PDI. This represents an average effects size of in excess of one full standard deviation even after scores are adjusted for age. Keeping in mind that the expected standard score gain is zero, this growth is outstanding.

When individual group effects are examined, the program effect is consistent across all five subsets with gains ranging from one-half to two full standard deviations for the MDI and exceeding a full standard deviation for the PDI.

To provide a more interpretable picture of this dramatic effect, individual student data are described in terms of expected versus actual growth in months (Tables 6 and 7).

<b>Table 6: Estimated versus Actual Growth on the Mental Development Index for Individual Students in Five ECLE Groups</b>				
Group	n	Ƒ months MDI gain	Ƒ months in programs	Ƒ months gains over expected
1	19	5.95	3.00	2.94
2	8	5.75	3.55	2.63
3	14	4.86	2.57	2.14
4	19	4.73	2.68	2.05
5	18	4.96	2.90	2.06
TOTAL	78	5.21	2.87	2.34
<b>Table 7: Estimated versus Actual Growth on the Psychomotor Development Index for Individual Students in Five ECLE Groups</b>				
Group	n	Ƒ months PDI gain	Ƒ months in programs	Ƒ months gains over expected
1	19	6.47	3.00	3.47
2	8	6.50	3.55	3.00
3	14	6.64	2.57	4.07
4	19	5.51	2.68	2.83
5	18	4.82	2.90	1.92
TOTAL	78	5.88	2.87	3.01

As can be seen, gains on both the MDI and PDI were approximately twice that expected. On average, for every one month in the program, ECLE children showed two months of growth relative to the normative group.

**Conclusions**

As parents and teachers are mentored and coached, based on observations, constructive feedback, and support, children’s skill gains are considerable, on the order of a standard deviation. Findings from all three studies indicate, conclusively, the value of well-planned, structured, meaningful learning experiences for preschoolers whose teachers utilize ECRI’s teaching strategies and the necessity to teach parents to enrich the environment in which they are rearing their children (Reid, 2008).

Dr. Pianta (2010) testified:

The positive long-term effects of preschool education include: increased achievement test scores, decreased grade repetition and special education rates, increased educational attainment, higher adult earnings and improvements in social and emotional development and behavior. Evidence is so clear [that] the opportunities to learn, and learning that takes place, in this age range are simply more important than at other ages, for the long-term well-being of individuals, families, and communities. . .

ECRI's staff and the author found in our ongoing programs for the infant, preschooler, and kindergartner, that parents and teachers are excited and eager to learn and children are happy and relish time spent in learning. The challenge is for society to provide parents and teachers of young children with quality (research-based) professional staff development programs to meet the challenge of educating this significant and highly valued proportion of the population.

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