Section D. Research Narrative

The Need for Early Mathematics Education

Beginning in elementary school, American children fall short in the area of mathematics, with performance well below expectations. Children from China, Japan, and Korea outperform their American counterparts in mathematics achievement as early as kindergarten (Stevenson, Lee, & Stigler, 1986) as well as during the primary school years (Mullis, Martin, Beaton, Gonzalez, Kelly, & Smith, 1997) and beyond (Mullis, Martin, Gonzalez, Gregory, Garden, & O'Connor, 2000). Within the U.S., low-income children—a group comprised of a disproportionate number of African-Americans and Latinos (National Center for Children in Poverty, 1996) show lower average levels of academic achievement than do their middle- and upper-income peers (Denton & West, 2002).

One approach to address this problem is to provide preschoolers with sound mathematical instruction that will promote school readiness and later academic success (Bowman, Donovan, & Burns, 2001). Historically, however, preschool education in the U.S. has devoted little attention to mathematics teaching and learning. Indeed, over the past two centuries, brief periods of richness in early childhood mathematics have been frequently overshadowed by longer fallow periods in which the mathematical abilities and interests of young children were seriously underestimated (Balfanz, 1999). The typical practice in preschools has been to ignore mathematics education, except for basic counting and identification of simple shapes (Graham, Nash, & Paul, 1997).

The growing consensus among educational organizations is that the role of preschools in mathematics education must expand. The Good Start, Grow Smart initiative suggests that establishing preschool mathematics education is essential to the future of the nation. In addition, the National Association for the Education of Young Children (NAEYC) and the National Council of Teachers of Mathematics (NCTM) have collaborated to produce a joint position statement advocating increased attention to early childhood mathematics education. Their joint position statement asserts that, "…high-quality, challenging, and accessible mathematics education for 3- to 6-year-old children is a vital foundation for future mathematics learning" (2002, p. 1).

In response to growing pressures to help all children succeed, many states and education agencies have decided to introduce programs of early childhood education. Texas and Illinois have begun to expand preschool programs, particularly for "at risk" children. Georgia, New York and Oklahoma have adopted a policy of "universal" preschool education (although states like New York have yet to secure sufficient levels of funding). Further, educators have come to recognize that mathematics, and not only literacy, needs to occupy a central place in early childhood education. In New Jersey, for example, school mandates now require many preschools and daycare centers serving low-income children to teach mathematics, as well as literacy and everything else deemed necessary for young children.

The recent explicit emphasis on early education places a heavy burden on early childhood programs and the professionals who work in them. In addition to fulfilling all their other responsibilities, they must now become proficient in teaching new programs, both in literacy as

well as mathematics. While curricula for early literacy instruction have been available for some time, few if any comprehensive programs of mathematics instruction have been available at the preschool level. Several research-based early childhood mathematics programs have recently been developed with NSF support (Casey, Anderson, & Schiro, 2002; Clements & Sarama, 2003), yet none have yet been evaluated in a rigorous fashion.

Pilot research and field-tests of one of these programs, *Big Math for Little Kids* (*BMLK*), indicate that the curriculum is effective for lower-SES children, and indeed for children from all social backgrounds, helping them to achieve high levels of mathematics learning and to improve their language skills. (*BMLK* was developed by the co-PI on this proposal, as well as two of the consultants.) In this **Goal Two IES proposal (Efficacy and Replication Trial)** we propose to rigorously test the efficacy of the *Big Math for Little Kids (BMLK)* curriculum in a random assignment study involving approximately 640 children in pre-Kindergarten (preK) classrooms and 320 children in kindergarten classrooms.

Project Overview

Our central hypothesis is that in preK and kindergarten, *BMLK* will promote more extensive mathematics learning than does a control group experience. Our primary outcome measure will be drawn from the mathematics portion of the Early Childhood Longitudinal Study (ECLS). The ECLS has been administered to a nationally representative stratified random sample of children. Using the ECLS as our primary measure will enable us to make comparisons to key sub-groups such as high poverty students and examine to what extent *BMLK* closes the achievement gap between poor and non-poor and minority and non-minority children in the U.S.

We also propose a hypothesis concerning conditions that affect program impact. Since *BMLK* was developed to be a comprehensive, structured, and sequenced preK and kindergarten mathematics program, we hypothesize that children's performance will be positively related to the fidelity and intensity with which teachers implement the program.

New York City's Administration for Children's Services (ACS) has agreed to serve as the research context for this study. ACS provides childhood education services to more than 45,000 preschoolers and approximately 25,000 school age (kindergarten) children throughout New York City; 94 percent of the children ACS serves in its childcare programs come from families 200 percent below the federal poverty level.

The following tasks will be accomplished over the three years of the project. During year one we will develop fidelity measures for both treatment and control settings; we will randomly select treatment and control samples, and we will provide *BMLK* teacher training to treatment teachers at the preK level.

During the second year, pre- and post-assessments will be administered to all treatment and control preK students; demographic and contextual data will be collected on all participating preK students, teachers, and centers; fidelity observations in all preK treatment and control classrooms will be conducted; preK treatment teachers will participate in ongoing *BMLK* training; and treatment kindergarten teachers will participate in initial *BMLK* training.

During Year 3 pre- and post-testing of all treatment and control kindergarten students will be conducted; demographic and contextual data will be collected on all participating kindergarten students, teachers, and centers; fidelity observations will be conducted in all kindergarten treatment and control classrooms; and ongoing *BMLK* training will be provided to treatment kindergarten teachers. Additionally, once all data are collected, *BMLK* training will be available for all control teachers as well as interested colleagues from other ACS centers.

Basic Features of Big Math for Little Kids

BMLK offers a separate curriculum for preK (roughly age 4) and kindergarten (age 5) children. At each age level, the curriculum is a systematic approach to teaching mathematics. *BMLK* offers a structured sequence of activities designed to promote challenging mathematical learning and related verbal expression. *BMLK* is designed for use at least 20 to 30 minutes each day of the week, for a total of approximately 32 weeks, the length of the typical academic year at these age levels (not counting holidays and the like). A teacher guide describes the *BMLK* "lessons" in detail and helps teachers to implement them in large groups, small groups, and with individual children. The "lessons" take the form of games, activities with manipulatives, explorations, stories, a very small amount of work with writing and reading mathematics, and various other activities. The teachers' guide also contains background information on the program, a planning chart, take home activities for parents (in English and Spanish), and suggestions on how to assess children's mathematical learning and thinking in the context of instruction.

Both the preK and kindergarten levels are organized into six major content strands: number; shape; measurement; operations on numbers; patterns and logic; and space. The strands differ in length and number of activities. The strands cover similar topics at each age level, but offer more advanced material at the kindergarten level.

Number. This strand develops students' abilities to count by ones, fives, tens and hundreds; to identify the numbers of objects in sets, either visually or by counting; and to recognize that attributes of the objects (e.g., color, size, function) do not affect their number. Emphasis is placed on representing numbers in different ways (e.g., numeral, word name, sets of tallies or dots), and on showing children several representations at the same time.

Shape. Activities focus on recognition of two- and three-dimensional shapes of varying size and orientation. Students identify characteristics of the shapes (e.g., numbers of sides, edges, vertices, faces, and shapes of faces) and their properties (e.g., symmetry).

Measurement. This strand focuses on developing children's understanding of fundamental principles of measurement, including comparison, standard measure, and seriation. Children gain experience with these principles as they study length, height, weight, capacity, time, temperature, and monetary relationships.

Operating on Numbers. These activities focus on developing children's understanding of ways in which groups of objects can be put together and taken apart in preparation for the more formal exploration of addition and subtraction. Relationships between sets and their subsets are also investigated. Emphasis is placed on different ways to represent or model the actions, and on use of appropriate language.

Patterns and Logic. This strand introduces children to shape, number, color, pitch, and rhythmic patterns involving repetition or growth. Children copy, extend, and describe patterns, and use their descriptions of patterns to predict what might come next. Children's deductive reasoning abilities are developed as they use clues to eliminate candidates for the solution to a problem.

Space. This strand emphasizes understanding of spatial concepts and vocabulary such as *up, down, above, in front of, next to, between,* and *to the right*. Children dramatize stories involving spatial terminology; engage in treasure hunts to locate objects from clues about their positions in space relative to other objects, and follow directions to navigate a maze. Children also construct maps of their classrooms.

Stories

For each of the strands at both the preK and kindergarten levels, *BMLK* offers storybooks for children to "read." These books contain pictures that illustrate key math concepts coupled with story lines that furnish the associated mathematical language. After listening to each story several times, children are provided with their own copies of the books. They draw missing information in the illustrations, retell the stories to each other, and take the books home to read with their families. Please refer to Appendix B for additional information on the *BMLK* program.

Rationale for *Big Math for Little Kids* Intervention

In the following sections of the proposal we will discuss three specific rationales for why we have selected *BMLK* as the intervention we wish to rigorously study. First, the curriculum was developed over a four-year period by a group of mathematics educators who have extensive expertise in the developmental and cognitive underpinnings of young children's mathematical knowledge and learning. The design and development of *BMLK* drew heavily on their own and other research as well as two studies examining socio-economically diverse children's mathematical behaviors in clinical interview and "natural" settings (Ginsburg, Pappas, & Seo 2001; Seo & Ginsburg, 2004). Second, Ginsburg and his students have been working on an in-depth professional development model to support the implementation of *BMLK* in settings where educators have little or no experience in using formal curriculum materials and limited understanding of young children's mathematical competencies (Ginsburg, Galanter, Morgenlander, 2004). This model makes use of a train-the-trainer approach and is thus a scalable and sustainable model that can work in large school districts or children's services organizations. Third, two evaluation studies (Balfanz, in preparation; Greenes, 2003) conducted after the publication of the materials show evidence of *BMLK's* effectiveness as outcomes for participating children were higher than those for children in similar settings who were not exposed to the *BMLK* intervention.

1. The development of *Big Math for Little Kids* curriculum. *BMLK* is based on a solid foundation of psychological and educational research. For many years, the research of Jean Piaget dominated the fields of developmental psychology and education (Ginsburg & Opper, 1988). Piaget's pioneering work showed that children do not simply receive knowledge from adults but instead construct their own ways of understanding the world, including the world of mathematics. In recent years, psychological researchers expanding on Piaget's work have

shown that young children's mathematical understanding is more complex than even he surmised. Young children around the world construct a surprisingly competent "informal mathematics" that includes basic ideas about more and less, counting, and addition and subtraction (Ginsburg & Baron, 1993).

Two research studies in this tradition provided the foundation for *BMLK*. One "naturalistic" investigation followed 4 and 5 year-old children as they engaged in free play in various day care centers and nurseries. Observation showed that regardless of social background, the children spontaneously engaged in a large amount—about 40% of their activities—of "mathematical play" (Ginsburg, Inoue, & Seo, 1999; Seo & Ginsburg, 2004). The most frequent mathematical activity was *pattern and shape*. For example, one child built a block castle with two cylinders representing towers and a triangular prism on top of each, thereby creating a structure symmetrical in three dimensions. The next most frequent types of activities involved *magnitude*, as when a child insisted loudly that his tower is the tallest, and *enumeration*, as when a child pointed out proudly that she has three dolls or counted to 100. Many children love to count to high numbers and even speculate about what is the biggest number. Mathematical thinking even permeates children's "reading" of storybooks (Ginsburg & Seo, 2000). Young children do not need to be made ready to learn mathematics; they are already learning it in everyday life.

A second investigation involved detailed interviews with 4 and 5 year-olds as they solved various addition and subtraction problems (Ginsburg et al., 2001). One important finding was that regardless of social background, all children used very similar *strategies* in solving the problems. To add, they counted on from the larger number or represented addends with pictures. In other words, all the children possessed rudiments of an apparently untaught informal arithmetic. However, lower-income children achieved lower levels of success than did their more affluent peers. These children also suffered from a major difficulty in "metacognition." They were less able than their more affluent peers to describe thinking—that is, to state in words the clever strategies they used to solve a problem (Pappas, Ginsburg, & Jiang, 2003). This lack of expressiveness may make it difficult for teachers to recognize lower-income children's underlying competence.

This research is consistent with other studies. In general, the research literature suggests that lower-SES 4 and 5 year-old children tend to under perform their middle-SES peers on a variety of mathematical tasks, including enumeration (Kirk, Hunt, & Volkmar, 1975); counting words, cardinality, number conservation, and numerical equivalence (Ginsburg & Russell, 1981); production of number, addition and subtraction, and complex counting (Saxe, Guberman, & Gearhart, 1987); concrete addition (Hughes, 1986); counting-error detection, number reproduction, verbal one- and two-set addition and subtraction, modified number conservation, and numerical comparison (Starkey & Klein, 1992); mental number line and other tasks comprising "central conceptual systems" of number (Case, Okamoto, Griffin, McKeough, Bleiker, Henderson, Stehpenson, Siegler, & Keating, 1996); and reading numerals, sequencing patterns, and using nonstandard units of length to compare objects (West, Denton, & Germino-Hausken, 2000). A major contributor to the lower performance may be a lack of verbal facility. Jordan, Huttenlocher, and Levine (1992, 1994) have found that lower-SES children perform more poorly on mathematics tasks that depend heavily on language, but not on mathematics tasks presented in a non-verbal fashion. It is possible, they argue, that lower-SES children's performance, when measured by verbal means, does not adequately reflect their true competence (Jordan et al., 1992, 1994).

Researchers have also stressed the need to examine children's learning potential when they participate in rich educational environments. Careful observation shows that when given stimulating materials and challenges, young children can engage in remarkable investigations of topics like symmetry, measurement, and pattern (Greenes, 1999). Given sensitive adult stimulation, young children are capable of learning important and complex mathematical ideas.

This research showing that children construct a powerful informal mathematics, spontaneously engage in mathematical activities during free play, possess basic strategies for addition and subtraction, are ready to learn complex mathematics, and sometimes have difficulty in expressing mathematical thinking, led to a rethinking of the mathematics that is typically taught to young children (Balfanz, 1999) and to the development of *BMLK* (Balfanz, Ginsburg, & Greenes, 2003). This work also guided the development of the NAEYC/NCTM standards for early childhood mathematics education (National Association for the Education of Young Children & National Council of Teachers of Mathematics, 2002).

BMLK is based on several basic principles deriving from research, including:

- Young children are already engaged in learning (informal) mathematics. They do not need to be made ready to learn.
- Young children already possess many basic informal mathematical ideas upon which instruction can be built.
- Sensitive adult guidance—*not* a pushdown curriculum—can help children engage in complex forms of mathematics learning and to realize their learning potential.
- Play is not enough. It is crucial to provide stimulating early childhood mathematics education for low-income children. Their everyday mathematical activities cry out for attention and nurturance. They have the potential to do well in school.
- The mathematics curriculum should stress not only basic ideas and procedures, but also the verbal expression of mathematical thinking. Low-income children in particular need help in describing their mathematical thinking and making explicit their mathematical competence.

Four years of research and development went into the creation of *BMLK*. For the first three years, the program was created and formatively tested in classrooms in three cities: Baltimore, MD (seven church based classrooms, all serving low-income children), Chelsea, MA (four public school classrooms, all serving low-income children), and New York City (two classrooms, one in a public school serving low-income children, and the other in a parochial school serving middle- and low-income children). The formative evaluation involved testing out the activities in the classrooms, obtaining teacher feedback, and carefully observing children's reactions. Using this information, activities were revised and then re-evaluated. Expert mathematics educators were asked to review the materials, and mathematicians were asked to examine their mathematical accuracy. This feedback was incorporated into the *BMLK* materials.

In the fourth and final year of the National Science Foundation supported effort, *Investigating the Big Ideas: A Mathematics Program for Preschool and K Children (NSF #9730683, 1998-2002),* colleagues were asked to field-test the materials in other sites, including a University Lab school (one classroom serving middle-income children), public schools in Boston (two classrooms, both serving low-income children), and a small city in New England (two classrooms, serving both middle- and lower-income children). The field-testing indicated

that other educators could implement *BMLK* with great success and were enthusiastic about the program. During this fourth year, field-test of the program were also continued in the Baltimore, Chelsea, and New York sites.

2. Development of *Big Math for Little Kids* professional development workshops. In order to support the implementation of *BMLK*, particularly among early childhood educators who are likely to be unfamiliar with mathematics teaching and learning, a *BMLK* professional development program was developed during the 2002-2003 school year (Ginsburg et al., 2004). The workshops were based on four major principles. First, like their students, teachers need to learn in active ways in a real life context (Bransford, Brown, & Cocking, 1998). The workshops encourage teacher participation and frequently involve teachers learning the same activities that they would later teach their students. Second, because teachers have a great deal to learn, particularly when they are just beginning to master a curriculum, learning opportunities need to be extensive, taking place over the course of an academic year. One-shot workshops, which are all too frequently the norm, are of little lasting value (Sarama, 2004). Third, a case-based approach is often most effective. Case-based learning, which is very popular today in business, legal and medical education, has also been encouraged for teacher professional development (Gragg, 1994; Rand, 2000). Cases involve learning in a context where theory and practice genuinely and meaningfully intertwine (Kinzer & Risko, 1998). They enable teachers to discuss issues, problems and concerns that arise in the classroom, and brainstorm ways to resolve them. They bring to life the main features of the activities in the curriculum, and present a forum in which teachers can discuss divergent perspectives. Fourth, video is particularly effective in providing the basis for the intensive study of activities and lessons (Beck, King, & Marshall, 2002; Flake, 2002; Ginsburg, Kaplan, & Baroody, 1992; Lampert & Ball, 1998). Videotaped examples can bring to life the reality of teaching young children mathematics in a classroom setting. Videos can show how a teacher introduces an activity and how the children react. Videos stimulate discussion and analysis of children's thinking, of pedagogy, of curriculum activities, and of the mathematics involved in a lesson. And because they can be played and replayed, videos provide opportunities for careful review and examination of the "evidence," that is, the important but not always obvious events taking place in the course of the activity.

Using these principles, a series of seven workshops were developed to introduce the *BMLK* curriculum (Ginsburg et al., 2004). The workshops were piloted during the 2002-2003 academic year with early childhood educators working in low-income communities in New York and New Jersey. Formative evaluation of the workshops resulted in the version that is now available and that we propose to implement during the grant.

The *BMLK* professional development introductory workshop includes the following features: (1) background information concerning research on children's everyday mathematical abilities; (2) the educational goals of *BMLK*; (3) the pedagogical approach of *BMLK*; (4) a videotaped example of a *BMLK* activity in action; (5) the overall structure of the program, including the six mathematical content strands, planning chart, and design of the teacher guide; (6) discussion of the benefits of *BMLK* for teachers and children; and (7) frequently asked questions.

At the end of the introductory workshop, teachers have obtained an overview of the program, know how to use the teacher guide, and are ready to learn how to implement the six content strands. Each of the next six workshops introduces a specific content strand (number, shape,

etc.). Although each workshop is unique, all involve a similar format that includes discussion of the relevant mathematical content, children's everyday mathematics and learning, the goals of the strand, the planning chart, the specific activities comprising the strand, issues of pedagogy, methods of assessment, and take home activities.

3. Preliminary empirical evidence of *Big Math for Little Kids'* effectiveness. In the year after publication of the program (2002-2003), *BMLK* was the subject of two small summative evaluation studies. This research was designed to measure growth from the beginning to the end of the academic year in the mathematical understanding of children in the *BMLK* program, and to compare the mathematical performances of children in *BMLK* classrooms with other children not receiving the program. To measure growth and make those comparisons, researchers developed the *Assessment of Children's Understanding of Mathematics* (ACUM), an individually administered clinical interview that examines understanding of concepts of number, geometry, patterns, measurement, operations with numbers and spatial relations (Greenes, 2003).

The first study was conducted with students enrolled in preK and kindergarten classes in the Early Learning Center (ELC), one of the public schools in Chelsea, MA implementing the curriculum. At the start of the academic year during which this study was conducted, 94% of students in the ELC were Hispanic; 90% of students were from families in which English was not the first language spoken at home; and 78% of students were on the free or reduced lunch program.

At the preK level, 38 students were assessed using ACUM; 19 (nine boys and ten girls) were in *BMLK* classes, and 19 (ten boys and nine girls) were in classes in which *BMLK* was not used. The *BMLK* subjects came from four different classes (two morning and two afternoon) involving two different teachers. The comparison subjects, the control group, came from three classes (two morning and one afternoon) involving two teachers. At the kindergarten level, 32 children were interviewed; 16 (eight boys and eight girls) from *BMLK* classes involving two different teachers, and 16 (nine boys and seven girls) from control classes involving two different teachers.

At the preK level, students were assessed and compared only at the end of the school year, post-instruction. Pre-instruction interviews were not conducted because the vast majority of children were not able to communicate in English at the start of the school year. At the kindergarten level, subjects were assessed both pre- and post-instruction.

The post-instruction administration of ACUM to preK children revealed a significant difference in average total scores for the *BMLK* and control groups; the difference favored the *BMLK* group. Statistical analyses showed that, compared with the control group, the *BMLK* group performed especially well on concepts of geometry and measurement. Because it was hypothesized that children in the Big Math program would perform better than those in the control group, one-tailed t-tests were conducted to test the significance of the observed differences. At the preK level post instruction, the Big Math group had significantly better (lower) mean scores than did the control group for the entire assessment ($P<.045$) and for the domains of shape ($p<.043$) and measurement ($p<.025$) when considered separately.

At the kindergarten level, comparison of performance from pre- to post- instruction showed that both the *BMLK* group and the control group improved significantly. The results also showed that after instruction, the *BMLK* group performed significantly better than did the control group on the set of domains dealing with geometry, measurement, patterns and spatial reasoning concepts,

and especially on measurement and geometry. For the kindergarten classes post instruction, the Big Math group had significantly better mean scores than did the control group for the domains of shape ($p<.003$) and measurement ($p<.046$).

A second small study was undertaken to examine the impact of the *BMLK* Pre-School instructional program on Head Start children's readiness for a standards-based K-5 elementary curriculum (Balfanz, in preparation). The sites for the study were three Head Start classrooms serving approximately 45 high-poverty, minority 4-year-olds in the city of Philadelphia. The classrooms were located inside an elementary school where the majority of the Head Start children would continue their education. The three Head Start teachers in the building used the *BMLK* curriculum throughout the 2002-2003 school year. The teachers received a day of introductory training and four follow-up half day professional development sessions spread across the school year. Each teacher completed the Number and Shape units and portions of the four remaining units. All teachers reported that the *BMLK* program provided them with a richer and more structured instructional program than they had had in the past.

To examine the impact of the *BMLK* pre-school program on the mathematical knowledge and skills that high poverty students bring to kindergarten, all children who were enrolled in the Head Start program at the school during the 2002-2003 school year, attended throughout the year, enrolled in the school's kindergarten the following year, and attended kindergarten during the last week of September 2003, were individually administered the Number and Shape sections of ACUM. Twenty children met these conditions and were tested. Their performance was then compared to 20 children who had attended kindergarten at the school during the prior year. These control students had also attended Head Start at the school with the same set of Head Start teachers but did not experience the *BMLK* preK program. They were individually administered the Number and Shape sections of the ACUM during the last week of September 2002, when they were also beginning kindergarten. Only the Number and Shape sub-tests were used because in discussions with the Head Start teachers it was clear that in prior years these were the main domains they had covered.

Overall the results indicate that the experimental group entered kindergarten more prepared for a standards-based elementary curriculum than the control students. The mean score for the experimental group on the number and shape section of the ACUM was 20 percent higher then the control group ($p = 270$, effect size = .35) with the largest differences occurring on the Number sub-scale. Although this difference was not statistically significant ($p = 270$), the effect size was moderate (.35) and the standard deviations of the experimental students were considerably smaller than the control students. Given the small sample size involved (and thus the weak power of the analysis) and the fact that the ACUM was given nearly 9 months after students received the bulk of their instruction in number, these results provide a positive indication of the impact of *BMLK* and point to the need for larger and more precise studies.

Although the results from both studies are promising, they must be viewed with caution in light of the small samples involved and the experimental nature of the ACUM.

4. Research context.

New York City's Administration for Children's Services (ACS) will serve as the research context for the proposed study. ACS's Division of Child Care provides full day (8 a.m. – 6 p.m.) and part-day childcare services for children between the ages of 2 to 12. The program provides

early childhood education services to more than 45,000 preschoolers and approximately 25,000 school age (kindergarten-level) children throughout the city. ACS serves families that are eligible for subsidized care for various reasons. Families served by Head Start are on public assistance or in welfare to work programs, while most of those receiving childcare through ACS are low-income working families. Ninety four percent of the ACS childcare children come from families 200% below the federal poverty level.

At present, there are 115 ACS centers that have full-time preschool and kindergarten classrooms. Teachers working at the preschool and kindergarten level are encouraged to follow the Creative Curriculum for 3 to 5 year olds, but they receive no formal training on how to use this curriculum or any other. Childcare center teachers are required to attend 3 workshops a year. These workshops generally cover procedural and administrative topics such as the regulations and reporting for the ACS Childcare system rather than substantive curricular issues.

It is important to note that we have developed an effective working relationship with ACS. During the 2003-2004 academic year, 18 center directors, master teachers, and others volunteered to serve as trainers for a pilot of *BMLK* in ACS's Head Start programs. The program uses a train-the-trainer approach to deliver the curriculum. First, the trainers of teachers are introduced in depth to the *BMLK* workshops. Second, these trainers then use the workshops to train the teachers. Third, the teachers implement each strand of *BMLK*. The *BMLK* curriculum is currently being implemented in 51 of ACS's Head Start classrooms.

For the purposes of this study we will **not** be working in ACS Head Start classrooms; we will work only in ACS child care centers and only in those centers that offer both preK and kindergarten classrooms. This will ensure that there is no contamination from the prior *BMLK* pilot. Further, this will enable us to track the effects of *BMLK* through two years of implementation starting with preK and following through into kindergarten.

Methods Section

Hypotheses

Our primary hypothesis is that in preK and kindergarten, *BMLK* promotes more extensive mathematics learning than does a control group experience. Our prediction is that students in the treatment group will perform better on the measure of mathematics (to be described below) than will the control group.

We also propose a hypothesis concerning conditions that affect program impact. Since *BMLK* was developed to be a comprehensive, structured, and sequenced preK and kindergarten mathematics program, we hypothesize that children's performance will be related positively to the fidelity and intensity with which teachers implement the program.

Sampling Plan and Power Analysis

Sampling plan. The purpose of this study is to follow children through their preK and kindergarten years within the ACS system. Because approximately half of the ACS children enrolled in preK programs elect to leave the ACS system for the New York City public schools for kindergarten, we are required to have a larger preK than kindergarten sample in both

treatment and control conditions. As a result, our objective is to have a preK treatment sample consisting of 320 students and a control sample of another 320 students. These numbers will result in a kindergarten sample that includes 160 children in the treatment condition and 160 in the control. To arrive at these numbers, we will need to identify 16 centers that have two preK classrooms and one kindergarten classroom. There is currently a pool of 115 ACS childcare centers that match this profile.

In the spring of 2005, we will seek volunteers from the 115 fulltime ACS childcare centers that have both preK and kindergarten classrooms, seeking to work ultimately with 16 centers. We then will randomly select 16 centers from the volunteer pool to participate in the proposed project. All of these centers will have preK and kindergarten classrooms, thus making it possible to trace the development of students from preK into their kindergarten classes. Random assignment will be done at the center level. Of the 16 centers, half (eight centers) will serve in the treatment group, receiving *BMLK*, and half (eight centers) will serve as a comparison or control group. Assignment to treatment or control group will be strictly random. In the eight treatment centers, approximately 16 preK teachers (two per center) will attend a two-day *BMLK* summer training program, with six follow-up sessions during the academic year. An equal number of teachers from the eight control group centers will serve as the comparison group. The comparison group will continue to use the standard ACS program, Creative Curriculum.

The sample for Year 3 will be half the size of the Year 2 sample because of the smaller number of kindergarten classes. We will continue to work with the eight control and eight treatment centers, but with only one teacher per center. Assuming 20 students per class, the control and treatment groups will each have approximately 160 students for a total sample of 320.

Power analysis. To determine the appropriate balance among sample size, the size of the effect being measured, and the level of error we are willing to accept, a power analysis was conducted. Taking into account the substantive goals of the study for examining the differences in achievement scores between the experimental group and the control group, a power analysis anticipates the likelihood that the study will be able to yield significant effects. The type I error rate or alpha level is the rate at which a type I error is likely to occur assuming that the null hypothesis is true; for this study, alpha will be set to 0.05. Also for this study, the smallest effect size between groups deemed to be of substantive significance is 0.35. According to Cohen, this is considered a medium effect (Cohen, 1988, 1992).

Approximately 640 students clustered within 16 teachers will be randomly assigned to one experimental group and one control group. Assuming $N \approx 8$ teachers per treatment and control group and alpha=.05, for a two-tailed test, the study will have power of 98 percent to detect a treatment effect of 0.25 standard deviation units.

Instrumentation

Early Childhood Longitudinal Study (ECLS). We have selected the mathematics portion of the Early Childhood Longitudinal Study (ECLS; U. S. Department of Education, 2003) to serve as a measure of mathematics learning outcomes. The ECLS is particularly attractive because it has been normed on a nationally representative sample and has undergone rigorous psychometric testing (Rock & Pollock, 2002). The ECLS was given to a large stratified random sample that is

not only nationally representative, but allows for comparisons to key subgroups (e.g., high poverty students, various ethnic groups). It has been validated on a kindergarten population, and now is being extended to a preK audience (J. West, personal communication, December 16, 2003). The ECLS-preK will contain 100 to 120 items geared to 4-year-old children. The preK battery will undergo a large field test in Fall 2004 to establish its psychometric properties. It is anticipated that a psychometrically sound and field-tested preK version of the ECLS will be available by Fall 2005 when we would administer the first pre-test.

The ECLS, because of its norming, will provide us with another type of control group in terms of possible comparisons of pre-test and post-test performance to other groups of students nationwide and across the different types of mathematics tasks targeted and the proficiency levels identified. We will examine the performance of the ACS students in comparison to other similar groups of students nationwide in order to ascertain the extent to which *BMLK* closes the achievement gap between poor and non-poor and minority and non-minority children in the U.S.

The ECLS has two forms of items. First it has adapted items from the Test of Early Mathematics Ability (TEMA-2) (Ginsburg & Baroody, 1990), a Tier 1 measure recognized by *Early Childhood Education and School Readiness* sponsored by the U.S. Department of Health and Human Services (2002). Other items have been developed by test development experts at the Educational Testing Service and, most recently, the American Institutes for Research. The test specifications were based on the framework for the 1996 National Assessment of Education Progress (NAGB, 1996) and the National Council of Teachers of Mathematics (1989) K-4 curriculum standards. The ECLS-K test specifications call for the following time percentage allocations to the five content strands: 50 percent to number sense, properties, and operations; 15 percent to measurement; 5 percent to geometry and spatial sense; 10 percent to data analysis, statistics, and probability; and 20 percent to patterns, algebra, and functions (Rock & Pollock, 2002). Because the mathematical domains covered on the ECLS are quite comprehensive, we are confident that they will map effectively onto the mathematical content strands that are central to the *BMLK* curriculum.

The ECLS is a two-stage test, with testing of kindergarten students in the fall and first grade students in the spring as generally administered (we intend to use the kindergarten or first stage of the test for both pre- and post-tests at the kindergarten level). The measures of internal consistency are high (Rock & Pollock, 2002). Gain score analyses indicated that the test is sensitive to growth in mathematics achievement. DIF analyses indicated that there was little DIF among the items. This means that there are no substantial differences in performance among the major groups on which the test was normed and pilot tested. There also is a Spanish version, whose psychometric properties are equivalent to the English version.

In addition to its psychometric characteristics, another distinct advantage to the use of the ECLS is that it is administered and scored on a computer. Items are presented via the computer. The student responds and a response is recorded and scored on the computer. This procedure will minimize the potential for administration and scoring errors and decrease the amount of human handling of raw data.

As stated above, a preK version of the ECLS currently is under development. In the highly unlikely event that the ECLS preK version is not sufficiently tested by the time we are ready to administer it, our secondary choice of instrument will be the TEMA-3 (Ginsburg & Baroody, 2003), a recent revision of the TEMA-2. The TEMA-3 contains parallel forms that could be used in counter-balanced order as pre- and post-tests.

Fidelity testing. It is imperative to determine the degree to which the program is being implemented as designed. As noted above, we hypothesize that fidelity of implementation is related to student learning of mathematics. We therefore propose to develop fidelity measures for both preK and kindergarten level implementation of the *BMLK* and the Creative Curriculum programs. The preK measures will be developed during Year 1 of the proposal in pilot classrooms and applied to experimental and control preschool classrooms in Year 2; the kindergarten measures will be developed in pilot classrooms during Year 1 and applied to experimental and control classrooms in Year 3. The goal is primarily to relate fidelity of implementation to student learning within each program; it is not possible to compare implementation effectiveness between *BMLK* and Creative Curriculum because they are so different from each other.

In both cases (*BMLK* and Creative Curriculum) and at both age levels (preK and kindergarten), the fidelity measures will include simple indications of program coverage (supervisors' records of how often the teachers implement the program and which parts of the program they implement or fail to implement) and questionnaires to be completed by teachers concerning their coverage of the program, their perceptions of difficulty of implementation, their evaluations of their performance and of the program, and the like. The fidelity measures will also include observations of teachers' implementation of carefully selected activities. The observations of the teachers will be conducted in all control and treatment classrooms (see below).

Four activities from *BMLK* and four from Creative Curriculum will be selected to provide information on the teaching of different mathematical content areas as well as different aspects of teaching. For example, in the case of *BMLK*, the four activities might cover number, pattern, working with number, and spatial concepts. In the case of Creative Curriculum, the four activities might include number work in the discovery area; pattern work in the block area; operations on number in the cooking area (sharing, one-one correspondence); and measurement in the sand and water area.

Because the *BMLK* activities are organized and carefully described in the teachers' manual, it is possible to specify in some detail key aspects of the lessons that teachers should be expected to cover. Hence, observers will focus on such matters as the teachers' coverage of key parts of the lessons; their effective use of large group, small group, and individual work; the proper use of mathematical language; the accuracy of the mathematical content; and the engagement of the children. For example, in the number activity, "Numbers with Pizzazz," teachers are expected to help the children learn to count by both ones and tens; to emphasize that a new kind of number comes after a number ending in 9 (like 39); that rules underlie counting (add 1…9 to a decade number like 30); and that the spoken numbers correspond to written numerals on a number chart. The teacher is expected to do this work in the whole group setting (for example, as part of circle time) and to involve as many children as possible in the counting (for example, by having one

child count from 20 to 29; another child suggest what number follows 29; another count from 30 to 39; and another child count by tens from 10 to 50).

Observations will have to be somewhat different in the case of Creative Curriculum because its activities are less structured than those offered by *BMLK*. For example, Creative Curriculum recommends that teachers facilitate mathematics learning in the block area by encouraging children "to explore patterns and relationships by pointing out patterns children have made in their constructions ('Look how balanced your fence is. It goes tall, short, tall, short, and just keeps going.') and suggest that children draw a picture of their block design" (Teaching Strategies, 2003a). The Creative Curriculum activity is very open-ended, with more room for teacher variation than *BMLK* activities. Observers will therefore note whether teachers use the block area in their own ways to stimulate work with patterns; use appropriate language to describe patterns; introduce mathematical content accurately; and work effectively with individual children or small groups of children. Observers will also rate the extent to which children are engaged.

During Year 1, we will construct the supervisor records and teacher interviews for both *BMLK* and Creative Curriculum at the preK and kindergarten levels. We will also collect videotapes of a small number of teachers implementing key activities for both programs; use the videotapes to construct observation protocols for those activities; and determine the reliability of observations.

During Year 2, we will implement the fidelity measures on the preK *BMLK* and Creative Curriculum classrooms. Four research assistants will obtain the different fidelity measures (supervisors' records, teacher questionnaires, and classroom observations). Each of the four research assistants will observe eight classrooms (four treatment and four control group classrooms), for a total of all 32 participating classrooms. In each of those classrooms, each assistant will observe each of the four key activities. Thus, there will be four observers x eight classrooms x four activities, for a total of 128 sets of data (supervisor records, teacher questionnaire, and classroom observations), half experimental and half control. These observations will provide critical data concerning program implementation.

During Year 3, we will use the same methods to obtain fidelity results for *BMLK* and Creative Curriculum kindergarten activities. In Year 3 fewer classrooms will be involved at the kindergarten level. Each of the four assistants will observe four classrooms (two treatment and two control group classrooms), for a total of all 16 participating kindergarten classrooms. We will collect a total of 64 sets of data (four observers x four classrooms x four activities) so as to obtain adequate numbers for statistical analysis. See Figure 1 below for a project timeline.

Teacher Training

We will use a train the trainer model of teacher training. We will employ graduate assistants from Teachers College in addition to curriculum trained ACS lead teachers who are prior users of *BMLK*. The preK *BMLK* teachers will attend a two-day summer institute in the summer of 2005 (that is, the summer preceding the second year of the project when the preK classes will be evaluated) where they will receive an introduction to the *BMLK* program. The summer institute will be an expanded version of the introductory workshop already developed. During the academic year 2005-2006, the graduate students and ACS lead teachers will conduct the six

content area workshops with the teachers. The content area workshops will be conducted on six afternoons, each prior to the introduction of the relevant content area concepts and materials in the classrooms. The participating teachers will be pulled out of their classrooms for 1.5 to 2 hours of training for each of the content areas. Aides will be responsible for the classrooms in the teachers' absence. The content areas correspond to the six domains targeted in *BMLK*: (1) number – including counting, cardinal, and ordinal number; (2) shape – recognition of shapes and identification of characteristics of shapes and their properties; (3) patterns – repeating and growing patterns involving number, color, shape, etc. and logic; (4) measurement – including comparison, non-conventional and standard measure, and seriation; (5) working with numbers or operations – understanding how groups of objects can be taken apart or put together; and (6) space – ideas of position, location, and mapping. Teachers will be paid a stipend for their participation in the professional development and research activities.

In the summer of 2006 (the summer preceding the third year of the project when the kindergarten *BMLK* curriculum will be implemented) a second summer institute will be conducted to train lead educators who will supervise the kindergarten implementation of *BMLK* during Year 3. The structure will be the same as for the preK training. Eight teachers, one from each of the centers that are in the treatment group, will participate in a two-day summer institute, with the six follow-up sessions during the academic year that correspond to the curriculum components. Again, the content area workshops will be conducted on six afternoons, when the participating teachers will be pulled out of their classrooms for 1.5 to 2 hours of training. Aides will be responsible for the classrooms in the teachers' absence. Again, the teachers will be paid stipends for their professional development and research activities.

Control group teachers will continue to use Creative Curriculum, the standard ACS center curriculum. The Creative Curriculum (Teaching Strategies, 2003b) is a preschool program for children ages 3 through 5. The program emphasizes "active thinking and experimenting to find out how things work," focusing on children's natural tendencies to want to play. Creative Curriculum is not a structured curriculum, but rather a guide for teachers that uses spontaneous play to promote learning. Grounded in research and developmental psychology, the curriculum's underlying philosophy is that play is the most effective strategy to help young children grow intellectually, socially, and emotionally.

The control teachers will not receive formal teacher training in the use of Creative Curriculum. They are, however, required by ACS to attend three professional development days. The days generally focus on administrative topics such as regulations and reporting for the ACS Childcare system rather than substantive instructional issues.

After conclusion of the study, the 24 teachers who participated in the preK and kindergarten control groups will be offered the same training on *BMLK* as did the treatment group teachers. This training will occur at the conclusion of data collection as an incentive for having played an important role in the study as a member of the treatment group. This training serves as an incentive for the control group to minimize their attrition throughout the course of the study. The preK and kindergarten control teachers will be paid a small stipend during Years 2 and 3 respectively for their participation in research activities, and a larger stipend in Year 3 for their participation in professional development activities.

Student Data Collection
Students in ACS childcare centers generally attend five full day sessions (8 a.m. to 6 p.m.) per week all year long. The ECLS will be administered in a pre and post manner to the 320-student control group and the 320-student *BMLK* treatment group preK students. The first administration of the pre-test will occur in September and October of 2005. The first post-test will occur in June of 2006. The second pre-test, given to the 160-student *BMLK* treatment group and the 160-student control group (kindergarten students), will be administered in September and October of 2006, followed by the second post-test in June of 2007. The focus in Year 3, during the second set of administrations, will be to follow the preK students into kindergarten and track their progress. Outcome data for Years 2 and 3 will be analyzed.

We will hire a cadre of testers to conduct the administrations of the ECLS. The testers will be trained in the summer of Year 1 on the administration of the ECLS before the pre-tests the following fall. We estimate that each tester can cover one center in a two-week period of time, administering the ECLS to the participating students in the two classrooms. We will use 16 testers. Each will administer the ECLS in two different schools during two-week blocks of time. The first block will occur the last two weeks of September, and the second block the first two weeks in October for the two pre-test administrations. A similar two-week block arrangement will be used for post-testing in June of Year 2. For the kindergarten sample, only one two-week block in the fall and spring will be needed because we will be testing half as many children in Year 3.

Demographic Data Collection
We will need to collect certain demographic data on students, teachers, and center context to determine comparability across classrooms as well as to identify variables that may influence the impact of the implementation of *BMLK*. In particular, we are interested in whether or not the length of time students have attended an ACS center affects their ability to learn more effectively from *BMLK*. It is possible that the longer students' have been exposed to participating in ACS center activities, the more receptive they will be to the *BMLK* curriculum. In terms of the teachers, it is also possible that teachers who have worked at ACS centers for longer durations might be better able to carry out the *BMLK* curriculum than those who have been there for shorter times. Further, and because not all ACS teachers possess teaching credentials, we are also interested in the extent to which teachers with teaching credentials are better able to carry out the curriculum. We will also collect information on the number of aides per classroom, class size, and mobility throughout the year.

We will collect specific demographic variables of interest at the student, teacher, and center levels. We will collect the following student demographic variables: (1). ethnicity; (2) sex; (3) poverty level; (4) primarily language spoken at home; (5) length of time at ACS centers; and (6) attendance record. Teacher demographic variables include: (1) years taught, both overall and at ACS; (2) academic credentials; (3) ethnicity; (4) age; (5) sex; and (6) professional development experience, particularly in mathematics. Center contextual variables include: (1) class size; (2) mobility; (3) number of aides per classroom; and (4) number of years the center has been operating preK and kindergarten programs.

Data Analysis Plan and Reporting

Data analyses will include student-level analyses as well as examination of classroom implementation. Because students are nested within teachers who are nested within ACS centers, we will use Hierarchical Linear Modeling (HLM) as a primary means of statistical analysis. Because of the complexity of the design and analyses, we have enlisted the expertise of Dr. Douglas Mac Iver of Johns Hopkins University, who will provide statistical consultation to EDC. EDC will carry out the analyses. Classroom-level analyses of the implementation and fidelity data will be conducted. We also will use analyses of covariance to take into account pre-existing differences at the classroom level. We will examine the potential impact of teacher, student, and center demographic and contextual differences.

Analyses in Year 2 will focus on differences in performance between the treatment and control students on the pre- and post-ECLS. The pre-test will serve as a baseline measure. We will focus on the gain scores from pre- to post-test. Analyses in Year 3 will examine the impact of students who have been exposed to *BMLK* in preK and kindergarten, in comparison to those in the control group. Again, analyses will focus on outcomes from the pre- and post-ECLS. Classroom fidelity data also will be examined. The analyses will be conducted by EDC with external consultation by Dr. Mac Iver.

Hierarchical Linear Modeling. HLM (Bryk & Raudenbush, 1992; Bryk, Raudenbush, & Congdon, 1996; Goldstein, 1995; Kreft & de Leeuw, 1998) will be used to analyze student achievement gains and the mediating impact of program implementation levels. The dependent variable will be a T-score from the ECLS instrument (described in the data collection section) that is designed to measure mathematical skills and understanding. Since data will be collected in fall and spring of preK and kindergarten, we will be able to examine the impact of *BMLK* on mathematical achievement in the following ways: (1) during preK and kindergarten; (2) the cumulative effect of two years of *BMLK* (preK plus kindergarten); and (3) the impact of summer loss between preK and kindergarten.

The basic hypothesis to be tested is that students in *BMLK* classrooms will outperform control students on ECLS measure and that the *BMLK* advantage will increase with each year of participation in the program. Student growth curves will be entered at level 1 of the HLM and student characteristics at level 2. Relevant control variables, including student background characteristics (e.g., gender, language status, age, etc.), will be taken from demographic data collected from each ACS center.

Ideally, a number a number of classroom/teacher/center level variables would be entered at the third level of a 3 Level HLM model. Because of the small number of teachers/classrooms in the study (32 teachers in preK, 16 teachers in kindergarten), however, any use of a 3 Level HLM model must be seen as exploratory and the number of classroom/teacher level variables that can be entered into the analyses will be limited. Thus because of our substantive interest in the impact of implementation on student outcomes, and the likelihood that many of the classroom/teacher variables of interest will ultimately exert impact on student achievement through implementation factors (i.e., the amount and intensity of mathematics instruction), we will focus our analysis of classroom/teacher level on implementation effects.

Implementation effects will be examined by adding the content coverage and program fidelity variables described in the data collection section into the equations at the student level in a two-level model (by assigning each student the value for their classroom) and at the classroom level in exploratory three level models. The basic hypothesis to be tested is that all things being equal we expect students in *BMLK* classrooms, with greater content coverage, instructional intensity, and program fidelity to learn more than control subjects. Finally, exploratory item analysis, (driven by theoretical constructs and confirmed through factor analysis) will be conducted to examine the impact of *BMLK* on number versus non-number related items and procedural versus conceptual items.

Reporting
Results from Year 2's implementation will be reported to IES in the form of a second year report. This report also will be submitted to the American Educational Research Association (AERA) for presentation and dissemination of results at the annual meeting.

A final report on the impact of *BMLK* on student learning will be prepared and delivered to IES at the conclusion of the project. Results from the study also will be submitted for presentation at the annual meeting of AERA. EDC and Teachers College also will seek broader dissemination of the results through publication of the study's findings upon completion of the proposed work.

Letter of Agreement and Informed Consent for all Phases of the Project.
In order for the study to be carried out as intended, it is imperative that the ACS centers and teachers fully understand the ramifications of their participation. We will therefore give each center a letter of agreement. A sample letter is included in Appendix A. Because we will be collecting data on student performance that would not be a normal part of activity in the ACS centers, we have obtained institutional approval from EDC's IRB.

Key Project Personnel
Ellen Mandinach is the Associate Director for Research at EDC/CCT. Dr. Mandinach has a strong background in research methodologies and has done extensive work in the field of educational technology and educational measurement for over two decades. Her work has focused on the implementation and impact of computer environments on teaching, learning, classroom dynamics, and schools as organizations. Her prior work at Educational Testing Service focused on the impact of extended time impacts students' ability to solve quantitative and verbal problems. Dr. Mandinach has worked on a variety of projects since coming to EDC/CCT in 2002. Her most recent project is to direct the development of an evaluation framework for technology-based instructional decision making, sponsored by the National Science Foundation. She holds a Ph.D. in educational psychology from Stanford University. She will serve as the principal investigator, devoting 50 percent of her time to the project.

Herbert Ginsburg holds the Jacob H. Schiff Chair at Teachers College, Columbia University, where he is professor of education and psychology. His research focus is on cognitive development, particularly the development of children's mathematical thinking. He has translated his research knowledge into educational applications to enhance teachers' understanding of their students' learning of mathematics. He has developed mathematics textbooks, tests of mathematical thinking, and mathematics curricula. Dr. Ginsburg is a leading

interpreter of children's understanding of mathematics. He has authored several books and numerous scholarly articles on children's learning of mathematics. Dr. Ginsburg holds a Ph.D. in developmental psychology from the University of North Carolina. He will serve as the expert in mathematical learning on the project.

Robert Balfanz is a Research Scientist at the Center for Social Organization of Schools, Johns Hopkins University. He is one of the co-authors of *BMLK*. As a mathematics educator and educational researcher he has focused his efforts on translating research findings into effective educational programs for students placed at risk. Dr. Balfanz holds a Ph.D. from the University of Chicago in education. He will serve as a mathematics expert on the fidelity of implementation measure and consult on the statistical analyses.

Carole Greenes is a professor of curriculum and teaching in the School of Education at Boston University. Principally interested in mathematical problem solving, mathematics learning, and special needs students, Dr. Greenes has written and collaborated on more than 200 books, monographs and articles in these areas for grades preK through 12 and college mathematics. Dr. Greenes holds an Ed.D. from Boston University. She will serve as a mathematics curriculum expert, focusing on the fidelity measures and the professional development framework.

Douglas Mac Iver is a Principal Research Scientist at the Center for Social Organization of Schools, Johns Hopkins University. Dr. Mac Iver has worked on a variety of educational research projects, focusing his efforts as an expert in multivariate data analysis. He holds a Ph.D from the University of Michigan in developmental psychology. He will serve as a consultant to the project on the statistical analysis of complex data using HLM.

Education Development Center, INC. (EDC)

The proposed project will be housed at the Education Development Center, Inc. (EDC). EDC is a nonprofit international research and development organization dedicated to improving the quality, effectiveness, and equity of education: in schools, colleges, healthcare facilities, and community settings throughout the United States and in more than 40 countries. Founded in 1958, the company is acknowledged as a leader in efforts to solve a wide range of educational, health, and social problems and is recognized for the high quality of our training, technical assistance, program and product development, evaluation research, and organizational development. EDC brings together a staff of over 650 educators, researchers, and materials developers who work on over 325 projects. As a publicly supported, non-profit organization, EDC conducts its activities primarily under grants or contracts from government agencies and private foundations. Annual revenues are currently over $80 million. Internally we maintain a sophisticated IT support organization with an intranet portal to expedite workflow and internal business processes worldwide.

EDC's financial management is under the direction of the EDC treasurer and vice president. An accounting staff and a management information system provide accurate and regular reports on receipts and disbursements. The financial reporting system and management controls are reviewed annually by the auditing firm of Grant Thornton.

Figure 1. Project Timeline.

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Rock, D. A., & Pollock, J. M. (2002). *Early childhood longitudinal study – Kindergarten class of 1998-99 (ECLS-K), psychometric report for kindergarten through first grade* (NCES Working Paper No. 2002-05). Washington, DC: U.S. Department of Education. Retrieved December 17, 2003, from http://nces.ed.gov/pubsearch/pubsinfor.aps?=200205.

Sarama, J. (2004). Technology in early childhood mathematics: Building Blocks as an innovative technology-based curriculum. In D. H. Clements, J. Sarama & A.-M. DiBiase (Eds.), *Engaging young children in mathematics: Standards for early childhood mathematics education* (pp. 361-375). Mahwah, NJ: Lawrence Erlbaum Associates, Publishers.

Saxe, G. B., Guberman, S. R., & Gearhart, M. (1987). Social processes in early number development. *Monographs of the Society for Research in Child Development, 52*(2, Serial No. 216).

Seo, K. -H., & Ginsburg, H. P. (2004). What is developmentally appropriate in early childhood mathematics education? Lessons from new research. In D. H. Clements, J. Sarama & A.-M. DiBiase (Eds.), *Engaging young children in mathematics: Standards for early childhood mathematics education* (pp. 91-104). Hillsdale, NJ: Erlbaum.

Starkey, P., & Klein, A. (1992). Economic and cultural influences on early mathematical development. In F. L. Parker, R. Robinson, S. Sombrano, C. Piotrowski, J. Hagen, S.

Randolph & A. Baker (Eds.), *New directions in child and family research: Shaping Head Start in the 90s* (pp. 440-443). New York: National Council of Jewish Women.

Stevenson, H., Lee, S. S., & Stigler, J. (1986). The mathematics achievement of Chinese, Japanese, and American children. *Science, 56*, 693-699.

Teaching Strategies. (2003a). *The creative curriculum*. Retrieved December 30, 2003, from http://www.teachingstrategies.com/pages/page.cfm?pageid=53.

Teaching Strategies. (2003b). *The creative curriculum*. Retrieved December 30, 2003, from http://www.teachingstrategies.com/pages/page,cfm?pg_section=preschool.

U. S. Department of Education. (2003). *Early childhood longitudinal study*. Retrieved December 17, 2003, from http://nces.ed.gov/ecls/.

U. S. Department of Health and Human Services. (2002, July). *Early childhood education and school readiness: Conceptual models, constructs, and measures.* Washington, DC.

West, J., Denton, K., & Germino-Hausken, E. (2000). *America's kindergartners: Findings from the early childhood longitudinal study, kindergarten class of 1999-99, Fall 1998*. Washington, DC: U.S. Department of Education, National Center for Educational Statistics.

Resumes of Principals

Robert Balfanz
Center for Social Organization of Schools
Johns Hopkins University
3003 N. Charles St.
Baltimore MD 21218

Education

Ph.D. in Education, University of Chicago, 1995.

B.A. in History, Johns Hopkins University, 1984.

Professional Experience

Research Scientist, Center for Social Organization of Schools, Johns Hopkins University 2002-

Associate Research Scientist, Center for the Social Organization of Schools, Johns Hopkins University 1996-2002

Senior Author/Developer, University of Chicago School Mathematics Project-Elementary Component, 1991-1996

Professional Activities

Maryland Mathematics Commision 1999-2000

Editorial Board Member, NCTM, Math in the Early Years, 1996-1998

Summer Fellow, Center for Advanced Study in the Behavioral Sciences. Summer Institute on Research in Urban Education: Transitions To and from School. Summer 1996.

Student Editor, American Journal of Education, 1989-1990.

Selected Scholarly Publications

~~Books~~

Legters, N., Balfanz R., Jordan W., and McPartland J., (2002) *Comprehensive Reform for Urban High Schools: A Talent Development Approach* New York: Teachers College Press

Articles and Book Chapters (First and Co-Author)

Balfanz, R., Ginsburg H., & Greenes C. (2003) "Big Math for Little Kids Early Childhood Mathematics Program" *Teching Children Mathematics* 9(5) 264-268

Balfanz, R., MacIver D., and Ryan D. (2002) "Enabling "algebra for all" with a facilitated Instructional program: A case study of Talent Development Middle School" in V. Anfara (Ed) *Handbook of Research in Middle Level Education, Volume 2.* Greenwich CT: Information Age Publisher

Balfanz, R, Ruby A, and MacIver, D. (2002) "Essential Components and Next Steps for Comprehensive Whole School Reform in High Poverty Middle Schools" in *Educating At Risk Students* eds. S. Stringfield and D. Lamb Chicago: National Society for the Study of Education

Balfanz, R., and MacIver, D., (2000) *Transforming High-Poverty Urban Middle SchoolsInto Strong Learning Institutions: Lessons From the First Five Years of the Talent Development Middle School.* Journal of Education for Students Placed at Risk 5(1,2),137-158

Balfanz, R. (2000) "Why do so Many Urban Public School Students Demonstrate So Little Academic Achievement?: The Underappreciated Importance of Time and Place in *Schooling Students Placed at Risk Research, Policy, and Practice in the Education of Poor and Minority Adolescents* ed. by M. Sanders Erlbaum

Balfanz, R. (1999) "Why Do We Teach Young Children So Little Mathematics: Some Historical Considerations" in *Mathematics in the Early Years* ed. N. Copley. Reston VA: NCTM

Balfanz, R. (1990). "Elementary School Quality, The Mathematics Curriculum and the Role of Local Knowledge" *International Review of Education* 36(1):43-56

Balfanz, R. (1988). "The Role of Environmental Knowledge in Early Mathematical Performance" *Cultural Dynamics 1*(2):158-179

Articles and Books Chapters (Joint Author)

Ginsburg, H., Balfanz, R. and Greenes, C., (1999) Challenging Mathematics for Young Children in *Teaching for Intelligence II* ed. A Costa Arlington Heights, IL: Skylight

MacIver, D, Balfanz, R. & Plank S, (1998) "An Elective Replacement Approach to Providing Extra Help in Math: The Talent Development Middle School's Computer- and Team-Assisted Mathematics Acceleration (CATAMA) Program" *Research in Middle Level Education Quarterly 22*(2).

Commissioned Papers

Balfanz, R., Shaw A., and McPartland J. (2002) "Reconceptualizing Extra-Help for High School Students in a High Standards Era" U.S. Department of Education. Presented at Preparing for America's Future: High School Symposium Washington DC.

Balfanz, R, and Legters N. (2001) "How Many Central City High Schools Have a Severe Dropout Problem, Where are They Located, and Who Attends Them?" Harvard Civil Right Project and Achieve Conference on Dropouts in America: Cambridge

Conference Papers

Balfanz, R. (2002) "Enabling Mathematics for All" American Educational Research Association, New Orleans

Balfanz, R. (2000) "Watching Children do Mathematics: Developing Design Principals for Early Childhood Mathematics" AERA: New Orleans

Balfanz, R. (2000) "Real and Imagined Implementation Roadblocks to Creating Strong Learning Opportunities for All in Early Childhood Mathematics" NSF Conference on Standards for Early Childhood Mathematics Arlington, Va.

Balfanz, R, & Ginsburg, H. (1998)"Exploring Advanced Mathematics with Preschoolers" Washington D.C.: NCTM

Curricular Publications

Ginsburg , H., Greenes, C, and Balfanz R. (2002) *Big Math for Little Kids* –Pre-K and Kindergarten Mathematics Program New York: Pearson Learning

Bell, M, Balfanz, R, Carroll, W, Hartfield, J, and Saecker P. (1994-96) *Everyday Mathematics Grades 4,5,6 (UCSMP)* Chicago: Everyday Learning Corporation.

Balfanz, R. (1991) *Do Elephants Eat Too Much?* and *If I Walk in the Woods, Will I Run Into a Bear?*: 1st-4th Grade Mathematics and Science Teacher Resource Books Chicago: Everyday Learning Corporation.

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VITA
December 2003

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Department of Human Development
Teachers College, Columbia University
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New York, NY 10027
(212) 678-3443

Education

Harvard University, 1957-61, B.A. with honors (Social Relations)

University of North Carolina, Chapel Hill, 1961-63, M.S. (Developmental Psychology)

Institute of Child Development, University of Minnesota, 1963-64,
Visiting Pre-doctoral Fellow

University of North Carolina, Chapel Hill, 1964-65, Ph.D. (Developmental Psychology)

Recent Professional Experience

Chair, Department of Developmental and Educational Psychology, Teachers College, Columbia University, 1985-1988

Professor, Department of Developmental and Educational Psychology, Teachers College, Columbia University, 1985- 1996

Professor, Department of Mathematics Education, Teachers College, Columbia University, 1989- present

Fellow, Center for Advanced Study in the Behavioral Sciences, 1993-94

Jacob H. Schiff Foundation Professor of Psychology and Education, Teachers College, Columbia University, 1997- present

Visiting Scholar, Russell Sage Foundation, 2000-2001

Research and Teaching Interests

Intellectual development and education, particularly in poor and minority children; development of mathematical thinking; mathematics education; culture and cognitive development; assessment and methodology; the educational uses of psychological research; professional development of teachers.

Current Research Grants

National Science Foundation, Information Technology Research, "Using Portable Computing to Build Observational Assessments for Mathematics Learning" (With Margaret Honey, Education Development Center and Larry Berger, Wireless Generation) 2002-present.

Relevant Publications

Books

Ginsburg, H. P. (1972). *The myth of the deprived child: Poor children's intellect and education.* Englewood Cliffs, NJ: Prentice-Hall.

Ginsburg, H. P. (Ed.) (1983). *The development of mathematical thinking.* New York: Academic Press.

Ginsburg, H. P. & Opper, S. (1988). *Piaget's theory of intellectual development.* (3rd Ed.). Englewood Cliffs, NJ: Prentice-Hall.

Ginsburg, H. P. (1989). *Children's arithmetic.* (2nd Ed.). Austin, TX: Pro-Ed.

Ginsburg, H. P. (1997). *Entering the child's mind: The clinical interview in psychological research and practice.* NY: Cambridge University Press.

Ginsburg, H. P., Jacobs, S. F., & Lopez, L. S. (1998). *The teacher's guide to flexible interviewing in the classroom: Learning what children know about math.* Boston: Allyn and Bacon.

Chapters in Books

Ginsburg, H. P., Klein, A., & Starkey, P. (1998). The Development of Children's Mathematical Thinking: Connecting Research with Practice. In I. Sigel & A. Renninger (Eds.) *Handbook of Child Psychology: 5th Ed., Vol. 4. Child Psychology and Practice.* NY: John Wiley & Sons, pp. 401- 476.

Ginsburg, H. P., Inoue, N., & Seo, K.-H. (1999). Preschoolers doing mathematics: Observations of everyday activities. In J. Copley (Ed.), *Mathematics in the early years* Reston, VA.: National Council of Teachers of Mathematics, pp. 88-99.

Ginsburg, H. P., Pappas, S., & Seo, K.-H. (2001). Everyday mathematical knowledge: Asking young children what is developmentally appropriate. In S. Golbeck (Ed.), *Psychological perspectives on early childhood education : Reframing dilemmas in research and practice.* Mahwah, NJ: Lawrence Erlbaum Associates, pp. 181-219.

Seo, K.-H., & Ginsburg, H. P. (2003). "You've got to carefully read the math sentence...": Classroom context and children's interpretations of the equals sign. In A. J. Baroody & A. Dowker (Eds.), The development of arithmetic concepts and skills: Recent research and theory (pp. 161-187). Mahwah, NJ: Lawrence Erlbaum Associates, Publishers.

Seo, K.-H., & Ginsburg, H. P. (2004). What is developmentally appropriate in early childhood mathematics education? Lessons from new research. In D. H. Clements & J. Sarama & A.-M. DiBiase (Eds.), Engaging young children in mathematics: Standards for early childhood mathematics education (pp. 91-104). Hillsdale, NJ: Lawrence Erlbaum Associates, Publishers.

Journal Articles

Ginsburg, H. P., & Seo, K.-H. (2000). Preschoolers' math reading. *Teaching Children Mathematics*, **7**, 226-229.

Balfanz, R., Ginsburg, H. P., & Greenes, C. (2003). The Big Math for Little Kids early childhood mathematics program. *Teaching Children Mathematics*, **9**, 264-268.

Pappas, S., Ginsburg, H. P., & Jiang, M. (2003). SES differences in young children's metacognition in the context of mathematical problem solving. *Cognitive Development*, **18** (3), 431-450.

Ginsburg, H. P., Lin, C.-L., Ness, D., & Seo, K.-H. (2003). Young American and Chinese children's everyday mathematical activity. *Mathematical Thinking and Learning* **5** (4), 235-258.

Tests

Ginsburg, H. P. & Baroody, A. J. (2003). *The test of early mathematics ability (3rd Ed.)* Austin, TX: Pro-Ed.

Ginsburg, H. P. (2003). *The test of early mathematics ability (3rd Ed.) Assessment probes and instructional activities.* Austin, TX: Pro-Ed.

Videotape Workshops

Ginsburg, H. P., Kaplan, R. G., & Baroody, A. J. (1992). *Children's mathematical thinking: videotape workshops for educators*. Evanston, IL: Everyday Learning Corporation.

Mathematics Textbooks

Ginsburg, H. P., Greenes, C., & Balfanz, R. (2003). *Big math for little kids*. Parsippany, NJ: Dale Seymour Publications.

Carole E. Greenes

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EDUCATION:

University of Michigan; Ann Arbor, Michigan	1959-62	B. A. (English Studies)
Boston University, Boston, Massachusetts	1963-65	Ed. M. (Mathematics Education)
	1965-70	Ed.D. (Mathematics Education)

ACADEMIC POSITIONS HELD:

1989-Present	Professor, Mathematics Education, Boston University.
1989-2003	Associate Dean, Research, Development and Advanced Academic Programs, Boston University.
1988-89	Assistant Dean, Academic Programs and The Chelsea Project; Professor, Math Education, BU.
1986-88	Professor and Prog. Coordinator, Math Education; Director, Project PROBE; Lecturer, Dept. of Mathematics, BU.
1973-86	Associate Professor, Mathematics Education (with tenure); Lecturer, Department of Mathematics, BU.
1974-75	Director, Elementary Education, Mills College, Oakland, California. (on B.U. leave)
1970-73	Assistant Professor, Mathematics Education, Boston University.
1967-70	Instructor, Mathematics Education, Boston University.
1966-67	Research Associate, U.S.O.E. Geometry Project, Boston University.
1964-66	Teacher, and Mathematics Specialist, Newton Public Schools, Newton, Massachusetts
1962-64	Teacher, Quincy Public Schools, Quincy, Massachusetts.

SELECTED OTHER PROFESSIONAL ACTIVITIES:

- President, National Council of Supervisors of Mathematics (NCSM), 2001-2003; Past President 2003-2004
- Member, Executive Committee, Conference Board of the Mathematical Sciences, 2003-2005
- Member, Steering Committee, Navigations Series, NCTM, 1999-Present
- Editor, NCSM-Houghton Mifflin Monograph Series: Leadership in Mathematics Education, 2002-Present
- Member, Advisory Board, Mathematical Olympiads, 2003 - Present
- Member, Advisory Board, Project Achieve, 1992-Present
- Member, Advisory Board, Lenses on Learning, 2001-Present

SELECTED PUBLICATIONS
Books and Programs (beginning with the most recent)

1. Greenes, C., Larson, M., Leiva, M., Shaw, J., Stiff, L., Vogeli, B. and K. Yeatts. Houghton Mifflin Mathematics, K-5. (6 textbooks, 6 teachers editions, and 6 assessment instruments) Boston, MA: Houghton Mifflin Co., 2005.
2. Greenes, C. and C. Findell. Niktu (Separate games for Levels 1, 2, 3, 4, 5 and 6) Chicago, IL: Creative Publications, Wright Group, McGraw-Hill, 2003.
3. Greenes, C., C. Findell and T. Caufield. The abc's of Algebra, (Grades 3-8), Chicago, IL: Creative Publications, Wright Group, McGraw Hill, 2003.
4. Greenes, C., L. Dacey, C. Findell and R. Spungin. Groundworks: Reasoning About Measurement, (Grades 1-7), Chicago, IL: Creative Publications, Wright Group, McGraw Hill, 2003.
5. Ginsburg, H., Greenes, C. and R. Balfanz, Big Math for Little Kids – Prekindergarten. Parsippany, NJ: Dale Seymour Publications, Pearson Learning Group, 2003.
6. Ginsburg, H., Greenes, C. and R. Balfanz, Big Math for Little Kids – Kindergarten. Parsippany, NJ: Dale Seymour Publications, Pearson Learning Group, 2003.
7. Greenes, C., Ginsburg, H. and R. Balfanz, Jenny Saves the Day. Parsippany, NJ: Dale Seymour Publications, Pearson Learning Group, 2003.

8. Greenes, C., Ginsburg, H. and R. Balfanz, The Trees of Mrs. McGee. Parsippany, NJ: Dale Seymour Publications, Pearson Learning Group, 2003.
9. Greenes, C., Balfanz, R. and H. Ginsburg, Dobee Doubler. Parsippany, NJ: Dale Seymour ` Publications, Pearson Learning Group, 2003.
10. Greenes, C., Balfanz, R. and H. Ginsburg, Favorite Shapes. Parsippany, NJ: Dale Seymour Publications, Pearson Learning Group, 2003.
11. Greenes, C., Ginsburg, H. and R. Balfanz, The Tales of Phinneas Fable. Parsippany, NJ: Dale Seymour Publications, Pearson Learning Group, 2003.
12. Greenes, C., Balfanz, R. and H. Ginsburg, Tick-Tock. Parsippany, NJ: Dale Seymour Publications, Pearson Learning Group, 2003.
13. Balfanz, R., Ginsburg, H. and C. Greenes, Leftover Muffins. Parsippany, NJ: Dale Seymour Publications, Pearson Learning Group, 2003.
14. Balfanz, R., Ginsburg, H. and C. Greenes, Acorn Hat. Parsippany, NJ: Dale Seymour Publications, Pearson Learning Group, 2003.
15. Ginsburg, H., Balfanz, R. and C. Greenes, Two-Two the Tooth Fairy. Parsippany, NJ: Dale Seymour Publications, Pearson Learning Group, 2003.
16. Ginsburg, H., Balfanz, R. and C. Greenes, Henrietta Sees Numbers. Parsippany, NJ: Dale Seymour Publications, Pearson Learning Group, 2003.
17. Ginsburg, H., Balfanz, R. and C. Greenes, Rafael's Messy Room. Parsippany, NJ: Dale Seymour Publications, Pearson Learning Group, 2003.
18. Ginsburg, H., Balfanz, R. and C. Greenes, So Many Fives. Parsippany, NJ: Dale Seymour Publications, Pearson Learning Group, 2003.
19. Sheffield, L., Cavanagh, M., Dacey, L., Findell, C., Greenes, C. and M. Small. Navigating Through Data and Probabilty, Prekindergarten through Grade 2. Book in the Pre-K – Grade 2 Navigation Series. Series Editor: Carole Greenes, Reston, VA: NCTM, 2002.
20. Greenes, C., Leiva, M., and B. Vogeli. Houghton Mifflin Mathematics (7 books: Grades K-6) Boston, MA: Houghton Mifflin Publishing Company, 2002.
21. Greenes, C., Cavanagh, M, Dacey, L., Findell, C., and M. Small. Navigating Through Algebra, PreK-Grade 2. Series editor: Carole Greenes. Reston, VA: National Council of Teachers of Mathematics, 2001.
22. Findell, C. Small, M., Cavanagh, M., Greenes, C. and L. Sheffield. Navigating Through Geometry, Prekindergarten through Grade 2. Book in the Pre-K – Grade 2 Navigations Series. Series Editor: Carole Greenes, Reston, VA: NCTM, 2001.
23. Findell, C. and Greenes, C. That's Logical. (2 Books: Primary and Advanced) Chicago, IL; Creative Publications, 2000.
24. Greenes, C., Findell, C., Gavin, K., and L. Sheffield Awesome Problems (5 Books) Chicago, IL: Creative Publications, 2000.
25. Greenes, C., Dacey, L. and R. Spungin. Hot Math Topics (20 books). White Plains, NY: Dale Seymour Publications, 2001.
26. Greenes, C. and C. Findell. Groundworks: Algebraic Thinking (7 books). Chicago, IL: Creative Publications, 1999, 2000.

SELECTED ARTICLES

1. Balfanz, R., Ginsburg, H. and C. Greenes. "The Big Math for Little Kids Early Childhood Mathematics Program, in *Teaching Children Mathematics*, Vol. 9, No. 5, January, 2003, 264-268.
2. Greenes, C., "Algebra for All Ages," Houghton Mifflin Mathematics Reports from Leaders. Boston, MA: Houghton Mifflin, Co., 2002, 2005.
3. Ginsburg, H.P., Balfanz, R. and C. Greenes. "Challenging Mathematics for Young People" in Teaching for Intelligence. Arlington Heights, IL: Sky Light, 2000.
4. Greenes, C . "Ready to Learn: Developing Young Children's Mathematical Powers" In Mathematics in the Early Years. J. Copley, (Ed.) Reston, VA: National Council of Teachers of Mathematics, 1999.
5. Greenes, C. "Mathematics Learning and Knowing: A Cognitive Process" In .Mosher, R., D. Youngman and J. Day, (Eds.) Human Development Across the Lifespan Westport, CT: Praeger, 1999.
6. Greenes, C. and M. Mode "Empowering Teachers to Discover, Challenge, and Support Students with Mathematical Promise." In L. Sheffield (Ed.), Developing Mathematically Promising Students. Reston, VA: National Council of Teachers of Mathematics, 1999.

7. Greenes, Carole. "Investigations: Vehicles for Learning and Doing Mathematics." The Journal of Education. Boston, MA: Boston University, Volume 178, No. 2, 1996.

GRANTS
(Principal Investigator)

1985 – 1987	Project PROBE: Probing Difficulties in the Learning of Mathematics. Funded by the Fund for the Improvement of Post Secondary Education (FIPSE), Department of Education. $170,230.
1989	Technology Laboratory (equipment grant) Hayden Foundation. $102,000.
1989 – 1992	Project FOCUS: A Mathematics Curriculum for Non-Math Majors at the College Level. FIPSE, Department of Education. $234,636.
1989	The IBM Technology Orientation Program Lab (equipment, software, travel and training grant). $183,000.
1990-1991	High Technology Home Learning Centers Project. IBM. $140,700.
1992 – 1994	Alternative Assessment Materials for Mathematics. Polaroid Corporation. $7,500.
1992 - 1994	High Technology Home Learning Centers Project. IBM. $125,000.
1993	Boston University-Brookline Public Schools; Mathematics Learning Outcomes and Assessment, Massachusetts DOE, Noyce Foundation. $10,000.
1993	College Course Planning Grant, Massachusetts DOE, Project Palms. $3,000.
1993 – 1995	Standards-Driven Reform Initiative, U.S. DOE-OERI. $182,726.
1998-2002	Investigating the Big Ideas: A Mathematics Program for Pre-School and Kindergarten Children, NSF, $301,875; Supplement for $37,000.
1999-2001	Making the Connections: Undergraduate Algebra to School Mathematics, NSF, $75,000.
2003-2003	Evaluation: Big Math for Little Kids. Pearson Learning Group, $50,000.

COLLABORATORS

Robert Balfanz, Johns Hopkins University; Mary Cavanagh, Solano Beach School District (CA); Al Cuoco, Educational Development Center, Inc.; Linda Dacey, Lesley College; Wally Feurzig, BBN Technologies; Carol Findell, Boston University; J. Franklin Fitzgerald, Boston University; Peter Garik, Boston University; Cathy Gavin, University of Connecticut; Herbert Ginsburg, Teachers College, Columbia University; Wayne Harvey, Educational Development Center, Inc.; Peggy House, University of Northern Michigan; Emma Previato, Boston University; Steve Rosenberg, Boston University; Oliver Selfridge, BBN Technologies; Linda Sheffield, University of Northern Kentucky; Marian Small, University of New Brunswick, Canada; Rika Spungin, Wheelock College; Glenn Stevens, Boston University

DOCTORAL ADVISEES SINCE 1997

Galena Dobrynina (completed); Susan Gray (completed); Arthur Johnson (completed); Susan Looney; Barbara Loud (completed); Joan McConaghy; Emily McFadden (completed); Marsha Kindall-Smith (completed); Polina Sabinen; Carole Sokolowski (completed); Victor Steinbok; Evgenia Tsankova (completed); Deborah Upton; Gisele Zangari

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Education

Teachers College, Columbia University	Ph.D. Developmental Psychology	1988
Teachers College, Columbia University	M.A. Developmental Psychology	1983
Hampshire College	B.A. Social Theory	1978

Areas of Expertise

- Technology and media in education (K-12)
- Public education in the context of federal, state, and local policy
- Developmental needs of children in formal and informal learning environments
- Strategic planning, program development, management and administration
- Comprehensive understanding of not-for-profit fundraising
- Research, development and evaluation
- Establishing partnerships with government, not-for-profit and commercial entities

Current Position

Vice President and Director
Education Development Center, Inc.
Center for Children and Technology

Selected Recent Projects

National Science Foundation. *Using Portable Computing to Build Observational Assessments for Mathematics Learning*. (Principal Investigator, 2002-2004)

U.S. Department of Education (through a subcontract with American Institutes for Research). *Preparation of policy paper for the National Technology Plan (*Project Director, 2003)

Carnegie Foundation. *Linking Data and Learning: The Grow Network Study.* (Principal Investigator, 2002-2004)

National Science Foundation. *Innovation Exchange: Exploring Portability of Systemic Reform.* (Principal Investigator, 2001-2002)

National Science Foundation. *Union City Public Schools: Project Hiller.* (Principal Investigator, 1999-2002)

Chase Manhattan Foundation. *Supporting Technology Integration in a Brooklyn Middle School.* (Principal Investigator, 1999-2000)

Milken Family Foundation. *New Mexico Online Leadership Academy.* (Project Director, 1997-2000)

Benton Foundation. *Impact of the E-Rate on Four Urban School Districts.* (Principal Investigator, 1999)

National Science Foundation. *Collaborative Research and Learning Technologies: The Portals Project.* (Principal Investigator, 1996-1999)

National Science Foundation. *Union City Online: An Architecture for Networking and Reform.* (Principal Investigator, 1995-1999)

Selected Recent Publications

Carrigg, F. & Honey, M. (In press). Literacy as the key to academic success and educational reform. In D. Strickland & D. Alvermann (Eds.) *Improving literacy learning for pre-adolescent and adolescent learners grades 4-8: Bridging the achievement gap.* New York: Teachers College Press.

Carrigg, F., Honey, M., & Thorpe, R. (In press). Putting Local Schools Behind the Wheel of Change: The Challenge of Moving from Successful Practice to Effective Policy. In C. Dede and L. Peters (Eds.). *Scaling up success.* San Francisco: Jossey-Bass Press.

Culp, K.M., Honey, M., & Spielvogel, B. (In press). Local relevance and generalizability: Linking evaluation to school improvement. In B. Mean and G. Haertel (Eds.). *New approaches to evaluating the impact of educational technology.* New York: Teachers College Press.

Culp, K.M., & Honey, M. (2003). Balancing priorities in the evaluation of educational technology. *The Evaluation Exchange, IX*(2), 19-20.

Honey, M. (2002). New approaches to assessing students' technology-based work. In N. Dickard (Ed.), *Great expectations: Leveraging America's investment in educational technology*, (pp. 24-29). Washington, DC: Benton Foundation.

McMillan-Culp, K. & Honey, M. (2002). Imagining less gendered games. In N. Yelland & A. Rubin (Eds.), *Ghost in the machine*, (pp. 33-53). New York: Peter Lang.

Bennett, D., Culp, K.M., Honey, M., Tally, B. & Spielvogel, B. (2001). It all depends: Strategies for designing technologies for education change. In W. Heinecke & L. Blasi (Eds.), *Methods of evaluating educational technology*, (pp. 101-124). Greenwich, CT: Information Age Publishing, Inc.

Bennett, D., Honey, M., Parris, J., Spielvogel, R., & Tally, W. (March, 2000*). It all depends: Technology as one element of change.* Paper for the International Conference on Learning with Technology, Temple University, Philadelphia Pennsylvania. Accessed online June 26, 2003, at: http://www.temple.edu/iclt/index.html .

Brunner, C., Bennett, D.T., & Honey, M. (2000). Girl games and technological desire. In R. Pea (Ed.), *The Jossey Bass Reader on Technology and Learning.* San Francisco: Jossey-Bass.

Honey, M., & Culp, K.M. (2000). An educator's toolkit: Planning an evaluation of the E-Rate program. In A. Carvin (Ed.), *The E-Rate in America: A tale of four cities*, (pp. 18-27). Washington, DC: Benton Foundation.

Honey, M., & Culp, K.M. (2000). The E-Rate in practice: Research findings from four midwestern cities. In A. Carvin (Ed.), *The E-Rate in America: A tale of four cities*, (pp. 28-50). Washington, DC: Benton Foundation.

Honey, M., Culp, K.M., & Carrigg, F. (2000). Perspectives on technology and education research: Lessons from the past and present. *Educational Computing Research, 23*(1), 5-14.

Selected Professional Activities

- National Study on the Effectiveness of Educational Technology. Design team member in collaboration with Mathematica Policy Research, the American Institutes for Research, and the Institute for Education Sciences.

- Partnership for 21st Century Skills. National Advisory Board Member. (2002-2003)

- Research Advisor. State Technology Directors Meeting (December, 2002)

- Participant, Teens and Technology Roundtable, sponsored by the Jacobs Foundation, Siftung Digitale Chancen, the Benton Foundation, Russell Sage Foundation, W. T. Grant Foundation, and AOL-Time Warner Foundation. (Washington, DC, 2001; Zurich, 2002)

- Testimony before United States Senate, Labor, HHS, and Education Appropriations Subcommittee on educational technology (July 25, 2001)

- U.S. Department of Education. Expert Technology Panel. (1999-2000)

- Dr. Honey presents research findings and leads workshops regularly at major technology and education conferences, and serves on numerous advisory boards of education technology projects nationwide.

Selected Research Experience

2000 - present	Vice President and Director Education Development Center, Inc. Center for Children and Technology New York, NY
1998 - 2000	Director Education Development Center, Inc. Center for Children and Technology New York, NY
1992 - 1998	Associate Director Center for Children and Technology Center for Technology in Education Education Development Center, Inc. New York, NY
1988 - 1992	Research Scientist. Bank Street College of Education. Center for Children and Technology Center for Technology in Education New York, NY

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EDUCATION

A.B., 1979, Occidental College, magna cum laude, with departmental honors in Psychology, Phi Beta Kappa.
M.A., 1981, University of Michigan, Major: Developmental Psychology.
Ph.D., 1986, University of Michigan, Major: Developmental Psychology, Minors: Educational Psychology, Multivariate Data Analysis.

PROFESSIONAL EXPERIENCE

Principal Research Scientist, Center for the Social Organization of Schools (CSOS), Johns Hopkins University, 1998-present
Program Director at Johns Hopkins, The Talent Development Middle School Model, Center for Research on the Education of Students Placed At Risk (CRESPAR), 1994-present
Previous positions include serving as NIMH Postdoctoral Scholar in Applied Human Development at UCLA Graduate School of Education; Associate Research Scientist, Research Scientist, and Associate Director at CSOS, and Research Associate and Teaching Fellow at the University of Michigan

SELECTED HONORS AND PROFESSIONAL ACTIVITIES

Martin Luther King, Jr. Award for Community Service, Presented by the Johns Hopkins University and Medical Institutions, 1997
Co-Chair, Task Force on Middle Learning Years Education, Maryland State Department of Education, 1998-2001
Human Development Research Award (with Allan Wigfield, Jacquelynne Eccles, David Reuman, and Carol Midgley), Presented by American Educational Research Association's Division E, 1992
Research Committee, National Middle School Association, 1990 - 1995
Faculty member, Institute on Statistical Analysis for Education Policy, American Educational Research Association, 1992 - 1995
Charter Member and Steering Committee Member, National Forum to Accelerate Middle Grades Reform

SELECTED PUBLICATIONS

Mac Iver, D. (1987). Classroom factors and student characteristics predicting students' use of achievement standards during ability self-assessment. Child Development, 58, 1258-1271.
Mac Iver, D. (1988). Classroom environments and the stratification of pupils' ability perceptions. Journal of Educational Psychology, 80(4), 495-505.
Shatz, M., Hoff-Ginsberg, E., & Mac Iver, D. (1989). Induction and the acquisition of English auxiliaries: The effects of differentially enriched input. Journal of Child Language, 16, 121-140.
Stipek, D. & Mac Iver, D. (1989). Developmental change in children's assessment of intellectual competence, Child Development, 60, 521-538.
Mac Iver, D. (1989). Effective practices and structures for middle grades education. Charleston, WV: Policy and Planning Center, Appalachia Educational Laboratory.
Epstein, J. L., & Mac Iver, D. J. (1990). Education in the middle grades: National practices and trends. Columbus, OH: National Middle School Association.
Epstein, J. L., & Mac Iver, D. J. (1990). The middle grades: Is grade span the most important issue? Educational Horizons, 68(2), 88-94.
Mac Iver, D. J. (1990). Meeting the needs of young adolescents: Advisory groups, interdisciplinary teams

of teachers, and school transition programs. Phi Delta Kappan, 71(6), 458-464. This article has been reprinted in Annual Editions: Educational Psychology 91/92. Guilford, CT: Dushkin Publishing.

Mac Iver, D. J., & Epstein, J. L. (1990). How equal are opportunities for learning in the middle grades in disadvantaged and advantaged schools? (Report 7). Baltimore: Center for Research on Effective Schooling for Disadvantaged Students.

Mac Iver, D. J. (1991). Helping students who fall behind: Remedial activities in the middle grades (Report No. 22). Baltimore, MD: Center for Research on Effective Schooling for Disadvantaged Students.

Mac Iver, D. J. (1991). Motivating students to reach new heights -- The Incentives for Improvement Program: A manual for teachers (2nd Edition). Baltimore, MD: Center for Research on Effective Schooling for Disadvantaged Students.

Mac Iver, D. J., & Epstein, J. L. (1991). Responsive practices in the middle grades: Teacher teams, advisory groups, remedial instruction, and school transition programs. American Journal of Education, 99, 587-622.

Mac Iver, D. J., Stipek, D. J., & Daniels, D. H. (1991). Explaining within-semester changes in student effort in junior high school and senior high school courses. Journal of Educational Psychology, 83, 201-211.

Epstein, J. L., McPartland, J. M., & Mac Iver, D. J. (1991). The Hopkins Enhancement Survey of NELS:88 Middle Grades Practices (Codebook and Data Collection Instruments). Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement.

Wigfield, A., Eccles, J. S., Mac Iver, D., Reuman, D. A., & Midgley, C. (1991). Transitions during early adolescence: Changes in children's domain-specific self-perceptions and general self-esteem across the transition to junior high school. Developmental Psychology, 27, 552-565.

Mac Iver, D. J., & Epstein, J. L. (1992). Middle grades education. In M. Alkin (Ed.), Encyclopedia of Educational Research, 6th Edition. New York: Macmillan.

Mac Iver, D. (1992). Scheduling and school organization. In M. Alkin (Ed.), Encyclopedia of Educational Research, 6th Edition. New York: Macmillan.

Mac Iver, D. J. (1992). Motivating disadvantaged early adolescents to reach new heights: Effective evaluation, reward, and recognition structures (Report 32). Baltimore, MD: Center for Research on Effective Schooling for Disadvantaged Students.

Epstein, J. L., & Mac Iver, D. J. (1992). Opportunities to learn: Effects on eighth graders of curriculum offerings and instructional approaches (Report 33). Baltimore, MD: Center for Research on Effective Schooling for Disadvantaged Students.

Mac Iver, D. J., & Epstein, J. L. (1993). Middle grades research: Not yet mature, but no longer a child. Elementary School Journal, 93, 519-533.

Mac Iver, D. J. (1993). Effects of improvement-focused student recognition on young adolescents' performance and motivation in the classroom. In P. R. Pintrich & M. L. Maehr(Eds.), Advances in Motivation and Achievement: Vol. 8, Motivation and Adolescence (pp. 193-218). Greenwich, CT: JAI Press.

Mac Iver, D. J. & Reuman, D. A. (Winter 1993/1994). Giving their best: Grading and recognition practices that motivate students to work hard. American Educator, 24-31. This article has been reprinted in Annual Editions: Education 95/96. Guilford, CT: Dushkin Publishing.

Mac Iver, D. J., Reuman, D.A., & Main., S. (1995). Social structuring of the school. In M. R. Rosenzweig and L. W. Porter (Eds.), Annual Review of Psychology: Vol. 46, (pp. 375-40). Annual Reviews Inc.: Palo Alto, CA.

Mac Iver, D. J. & Plank, S. B. (1996). Creating a motivational climate conducive to talent development in middle schools: Implementation and effects of student team reading. (Report 4). Baltimore, MD and Washington, DC: Center for Research on the Education of Students Placed at Risk.

Madhere, S., & Mac Iver, D. J. (1996). Essential components of the talent development middle school (Report 3). Baltimore, MD and Washington, DC: Center for Research on the Education of Students Placed at Risk.

Mac Iver, D. J. & Jones, L. (1996). Career exploration and educational decision-making for sixth-, seventh-,

and eighth-grade. Baltimore, MD and Washington, DC: Center for Research on the Education of Students Placed at Risk.

Mac Iver, D. J., Plank, S. B, & Balfanz, R.. (1997). Working together to become proficient readers: Early impact of the Talent Development Middle School's *Student Team Literature Program.* (Report 15). Baltimore, MD & Washington, DC: Center for Research on the Education of Students Placed at Risk.

Mac Iver, D. J., & Plank, S. B. (1997). Improving urban schools: Developing the talents of students placed at risk. In J. L. Irvin (Ed.), What current research says to the middle level practitioner. (pp. 243-256). Columbus, OH: National Middle School Association.

Plank, S.B. & Mac Iver, D.J. (1998, January). The Talent Development Middle School: A blueprint for reform. Principal, 77(3), 54-55.

Mac Iver, D.J. Balfanz, R., & Plank, S. B. (1998). An 'elective replacement' approach to providing extra help in math: The Talent Development Middle Schools' *Computer- and Team-Assisted Mathematics Acceleration* (CATAMA) Program. Research in Middle Level Education Quarterly, 22(2), 1-23.

Mac Iver, D. Mac Iver, M., Balfanz, R. Plank, S.B., & Ruby, A. (2000). Talent Development Middle Schools: Blueprint and results for a comprehensive whole- school reform model. In M. G. Sanders (Ed.), Schooling students placed at risk: Research, policy, and practice in the education of poor and minority adolescents (Chapter 12, pp. 292-319). Mahwah, NJ: Erlbaum.

Mac Iver, D.J., & Balfanz, R. (2000). Helping at-risk students meet standards: The school district's role in creating high performing schools. In B. Gaddy (Ed.), Including at-risk students in standards-based reform: A report on McREL's Diversity Roundtable II. (pp. 35-69). Aurora, CO: Mid-continent Research for Education and Learning (McREL).

Balfanz, R. & Mac Iver, D. J. (2000). Transforming high poverty urban middle schools into strong learning institutions: Lessons from the first five years of the Talent Development Middle School. Journal of Education for Students Placed At Risk, 51(1&2), 137-158.

Mac Iver, D.J., Young, E., Balfanz, R., Shaw, A., Garriott, M., & Cohen, A. (2001). High quality learning opportunities in high poverty middle schools: Moving from rhetoric to reality. In T. Dickinson (Ed.), Reinventing the middle school. New York: Routledge Falmer.

Mac Iver, D.J. & Balfanz, R. (2001, February). No excuses: Committing to high performance. Principal Leadership, 1(8): 36-40.

Mac Iver, D. J., Young, E. A., & Washburn, B. (2002). Instructional practices and motivation during middle school (with special attention to science). In A. Wigfield & J. Eccles (Eds.), Development of achievement motivation (pp. 333-351). San Diego, Ca: Academic Press.

Balfanz, R., Mac Iver, D.J., & Ryan, D. (2002). Enabling "algebra for all" with a facilitated instructional program: A case study of a Talent Development Middle School. In V. Anfara, (Ed.), Middle school curriculum, instruction, and assessment: Volume 2 in the handbook of research in middle level education. Greenwich, CT: Information Age Publishing. [A peer-reviewed research annual sponsored by AERA's Research in Middle Level SIG.]

Balfanz, R., Ruby, A., & Mac Iver, D. (2002). Essential components and next steps for comprehensive whole-school reform in high poverty middle schools. In S. Stringfield & D. Land (Eds.), Educating At-Risk Students: One Hundred-first Yearbook of the National Society for the Study of Education, Part II. (pp. 128-147). Chicago, Il: NSSE.

Plank, S. & Mac Iver, D. J. (2003). Chapter 26: Educational achievement. In M. H. Bornstein, L. Davidson, C. M. Keyes, K.A. Moore, & the Center for Child Well-Being (Eds.), Well-being: Positive development across the life course. (pp. 341-354). Mahwah, NJ: Erlbaum.

Mac Iver, D.J., & Ruby, A. (2003). Middle schools. In J.W. Guthrie (Ed.), Encyclopedia of Education, Second Edition. New York: Macmillan.

Mac Iver, D.J., Ruby, A., Balfanz, R. & Byrnes, V. (2003). Removed from the list: A comparative longitudinal case study of a reconstitution-eligible school. Journal of Curriculum and Supervision, 18 (3): 259-289.

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PROFESSIONAL PREPARATION

Smith College	Psychology, cum laude	1978	A.B.
Stanford University	Educational Psychology	1984	Ph.D.

PROFESSIONAL APPOINTMENTS

2002-Present	Associate Director for Research, Center for Children and Technology and Managing Project Director, Education Development Center.
2000-2002	Senior Research Scientist, Center for Higher Education, Research Division, Educational Testing Service.
1995-2000	Senior Research Scientist and Group Head, Division of Educational Policy Research, Educational Testing Service.
1991-1995	Senior Research Scientist and Group Head, Division of Cognitive and Instructional Science, Educational Testing Service.
1987-1991	Research Scientist, Division of Cognitive and Instructional Science, Educational Testing Service.
1985-1987	Associate Research Scientist, Division of Measurement Research and Services, Educational Testing Service.
1984	Postdoctoral Fellow, Far West Laboratory for Educational Research and Development and the University of California, Berkeley.

SELECTED PUBLICATIONS RELATED TO THE PROPOSED RESEARCH

Cline, H. F., & Mandinach, E. B. (2000). The corruption of a research design: A case study of a curriculum innovation project. In A. E. Kelly & R. A. Lesh (Eds.), *Handbook of research design in mathematics and science education* (pp. 169-189). Mahwah, NJ: Lawrence Erlbaum Associates.

Mandinach, E. B., & Cline, H. F. (2000). It won't happen soon: Practical, curricular, and methodological problems in implementing technology-based constructivist approaches in classrooms. In S. P. Lajoie (Ed.), *Computers as cognitive tools: No more walls* (Vol. II, pp. 377-395). Mahwah, NJ: Lawrence Erlbaum Associates.

Mandinach, E. B., & Cline. (1996). Classroom dynamics: The impact of a technology-based curriculum innovation on teaching and learning. *Journal of Educational Computing Research*, *14*(1), 83-102.

Mandinach, E. B., Cline, H. F. (1994) *Classroom dynamics: Implementing a technology-based learning environment*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Mandinach, E. B., & Cline, H. F. (1994). Modeling and simulation in the secondary school curriculum: The impact on teachers. *Interactive Learning Environments*, *4*(3), 271-289.

OTHER REPRESENTATIVE PUBLICATIONS

Corno, L. & Mandinach, E. B. (in press) What we have learned about student engagement in the past twenty years. To appear in D. McInerney & S. Vanetten (Eds.), *Research on sociocultural influences on motivation and learning Vol. 4: Big theories revisited.* Greenwich, CT: Information Age Press.

Corno, L., Cronbach, L. J., Kupermintz, H., Lohman, D., Mandinach, E. B., Porteus, A., & Talbert, J. E. (2002). *Remaking the concept of aptitude: Extending the legacy of Richard E. Snow*. Mahwah, NJ: Lawrence Erlbaum Associates.

ICT Literacy Panel. (2002). *Digital transformation: A framework for ICT Literacy*. Princeton, NJ: Educational Testing Service. http://www.ets.org/research/ictliteracy/index.html.

Mandinach, E. B. (in press). The development of effective evaluation methods for e-learning: A concept paper and action plan. *Teachers College Record.*

Mandinach, E. B., Bridgeman, B., Cahalan, C., Trapani, C. (in press). *The impact of extended time on SAT test performance*. Princeton, NJ and New York: Educational Testing Service and the College Board.

McMillan Culp, K., Honey, M., & Mandinach, E. (2003). *A retrospective on twenty years of education technology policy*. Washington, DC: U.S. Department of Education, Office of Educational Technology.

Snow, R. E., & Mandinach, E. B. (1999). *Integrating instruction and assessment for classrooms and courses: Programs and prospects for research*. Princeton, NJ: Educational Testing Service.

SYNERGISTIC ACTIVITIES

- Program Chair, AERA, Division C, Section 4a, 2001-2002.
- Manuscript Review Board, *Journal of Educational Computing Research.*
- Expert on Technology Literacy Assessment, State Educational Directors Association, National Leadership Institute, December, 2002.
- Chair, Advisory Board, Mid-Atlantic Regional Technology in Education Consortium, 2001-present.
- Panel Member, International Panel on ICT Literacy, 2002.

COLLABORATIONS AND OTHER AFFILIATIONS

Collaborators in the last 48 months: Henry Braun, Educational Testing Service; Brent Bridgeman, Educational Testing Service; Cara Cahalan, Educational Testing Service; Wayne Camara, College Board; Courtenay Carmody, Mouse; Hugh F. Cline, Teachers

College, Columbia University; Lyn Corno, Teachers College, Columbia University; Lee Cronbach, Stanford University; Ben Fishman, GrowNetwork; Haggai Kupermintz, University of Colorado; Susanne Lajoie, McGill University; David Lohman, University of Iowa; Barbara O'Connor, California State University, Sacramento; Ann Porteus, Stanford University; Joan Talbert, Stanford University; Catherine Trapani, Educational Testing Service; Michael Rosenfeld, Educational Testing Service

Graduate Advisors: Lee J. Cronbach, Stanford University (deceased); Richard E. Snow, Stanford University (deceased); Lee S. Shulman, Carnegie Foundation for the Advancement of Teaching; Lyn Corno, Teachers College, Columbia University

Budget Justifications

EDC'S CENTER FOR CHILDREN AND TECHNOLOGY
ED/IES
EVALUATION OF BIG MATH FOR LITTLE KIDS
DETAILED BUDGET FOR THE PERIOD SEPTEMBER 1, 2004 - AUGUST 31, 2007

PERSONNEL	% of Effort			Salary	Salary	Salary	12 Mos	12 Mos	12 Mos	TOTAL
PI - Mandinach	0.50	0.50	0.50	121,275	127,339	133,706	60,638	63,669	66,853	
Research Associate - Kanaya	0.20	0.20	0.20	51,450	54,023	56,724	10,290	10,805	11,345	
Research Assistant, II - TBA	1.00	1.00	1.00	40,000	42,000	44,100	40,000	42,000	44,100	
Administrative Assistant, TBA	0.40	0.40	0.40	50,000	52,500	55,125	20,000	21,000	22,050	
Full-time Equivalent Staff	*2.10*	*2.10*	*2.10*							
TOTAL SALARIES AND WAGES							130,928	137,474	144,348	412,750
EMPLOYEE BENEFITS @ 27.7%							36,267	38,080	39,984	114,331
TOTAL SALARIES & BENEFITS							167,194	175,554	184,332	
	Number of									
TRAVEL	Person/Trips					Rate				
PI Grantee Meeting	1	1	1			900	900	900	900	
Baltimore - NYC (MacIver)	0	1	1			600	0	600	600	
Baltimore - NYC (Balfanz)	2	2	2			600	1,200	1,200	1,200	
Boston - NYC (Greenes)	3	3	3			900	2,700	2,700	2,700	
CCT Staff Site Visits	144	288	144			20	2,880	5,760	2,880	
Travel - 16 PreK Treatment Teachers - Workshop, 2 days	32	0	0			20	640	0	0	
Travel - 16 PreK Treatment Teachers - Training, 6 half days	0	96	0			20	0	1,920	0	
Travel - 8 K Treatment Teachers - Workshop, 2 days	0	16	0			20	0	320	0	
Travel - 8 K Treatment Teachers - Training, 6 half days	0	0	48			20	0	0	960	
Travel - 24 PreK and K Control Teachers - Training, 6 half days	0	0	144			20	0	0	2,880	
Travel for 16 Testers (Yr 1 Summer) 2 days each	32	0	0			20	640	0	0	
Travel for 16 Testers (Yr 2 Sept/Oct) 20 half days each	0	320	0			20	0	6,400	0	
Travel for 16 Testers (Yr 2 June) 20 half days each	0	0	320			20	0	0	6,400	
Travel for 16 Testers (Yr 3 Sept/Oct) 10 half days each	0	0	160			20	0	0	3,200	
Travel for 16 Testers (Yr 3 June) 10 half days each	0	0	160			20	0	0	3,200	
Conference/Dissemination - Staff	0	2	2			2,000	0	4,000	4,000	
Conference/Dissemination - Greenes	0	1	1			2,000	0	2,000	2,000	
TOTAL TRAVEL							8,960	25,800	30,920	65,680
	Number of Months					Rate				
TOTAL SUPPLIES	12	12	12			125	3,150	3,150	3,150	9,450
CONTRACTUAL	Number of					Rate				
Consultants	Consultant/Units									
Statistical Consultant, MacIver-John's Hopkins	6	6	6			1,000	6,000	6,000	6,000	
Prof Dev, Curriculum and Math Consultant, Balfanz-John's Hopkins	4	4	4			1,000	4,000	4,000	4,000	
Prof Dev, Curriculum and Math Consultant, Greenes-Boston University	20	10	10			1,000	20,000	10,000	10,000	
Teacher Consultants (5)	5	0	0			500	2,500	0	0	
	Number of						12 Mos	12 Mos	12 Mos	TOTAL

Consultants (continued)	Consultant/Units			Rate				
Stipends - Treatment PreK Professional Development	16	16	0	500	8,000	8,000	0	
Stipends - Treatment PreK Research	0	16	0	500	0	8,000	0	
Stipends - Treatment K Professional Development	0	8	8	500	0	4,000	4,000	
Stipends - Treatment K Research	0	0	8	500	0	0	4,000	
Stipends - Control PreK Research	0	16	0	500	0	8,000	0	
Stipends - Control PreK Professional Development	0	0	16	1,000	0	0	16,000	
Stipends - Control K Research	0	0	8	500	0	0	4,000	
Stipends - Control K Professional Development	0	0	8	1,000	0	0	8,000	
Stipends for 16 Testers (Yr 1 Summer) 2 days each	32	0	0	100	3,200	0	0	
Stipends for 16 Testers (Yr 2 Sept/Oct) 20 half days each	0	320	0	50	0	16,000	0	
Stipends for 16 Testers (Yr 2 June) 20 half days each	0	320	0	50	0	16,000	0	
Stipends for 16 Testers (Yr 3 Sept/Oct) 10 half days each	0	0	160	50	0	0	8,000	
Stipends for 16 Testers (Yr 3 June) 10 half days each	0	0	160	50	0	0	8,000	
Admin. for Children's Services-Center Support	0	16	16	300	0	4,800	4,800	
Admin. for Children's Services-Coordination Support					10,000	10,000	10,000	
Total Consultants					**53,700**	**94,800**	**86,800**	
Subcontract								
Teachers College @ Columbia University					197,936	205,413	213,190	
Total Subcontract					**197,936**	**205,413**	**213,190**	
TOTAL CONTRACTUAL					**251,636**	**300,213**	**299,990**	**851,839**
OTHER	Number of Months			Rate				
Telephone/Telecommunications	12	12	12	136	3,427	3,427	3,427	
Duplication/Printing	12	12	12	50	1,260	1,260	1,260	
Postage/Mailing	12	12	12	50	1,260	1,260	1,260	
Program-Specific Supplies, Books, Subscriptions, Fees, etc.	12	12	12	50	1,260	1,260	1,260	
Computer Support @ $1500/fte-yr					3,150	3,150	3,150	
Rent @13381, 14050, 14753, /fte-yr					2,342	2,459	2,582	
Rent @ 14050, 14753, 15490/fte-yr					27,046	28,400	29,818	
Teacher Professional Development Meetings								
16 teachers plus 8 research staff for 2 full days					1,920			
16 teachers plus 8 research staff for 6 half days						2,880		
8 teachers plus 8 research staff for 2 full days						1,280		
24 teachers plus 8 research staff for 6 full days							7,680	
Testers Training Sessions								
16 Testers plus 4 research staff for 2 full days							1,600	
Research Staff/Consultant Meetings					320			
Yr 1, 3 meetings for 8 people, Yrs 2 & 3, 3 meetings for 9 people					960	1,080	1,080	
Computers for 16 Testers	16	0	0	1,000	16,000	0	0	
Research Instruments					10,000	0	0	
TOTAL OTHER					**68,945**	**46,455**	**53,117**	**168,517**
TOTAL DIRECT					**499,886**	**551,172**	**571,509**	**1,622,567**
TOTAL INDIRECT (33.5% of $337,019 & 5% of $616,539)					**111,052**	**126,101**	**130,694**	**367,847**
TOTAL PROJECT COST					**610,938**	**677,273**	**702,203**	**1,990,414**

BUDGET JUSTIFICATION –
EVALUATION OF BIG MATH FOR LITTLE KIDS

1. PERSONNEL

Ellen Mandinach, PI, will devote 50% of her time to the project in all three years. She will oversee each stage of the project, including the development of design, providing methodological expertise, taking responsibility for the analysis and reporting of the project results. She will insure the rigorous conduct of the study and broad dissemination of the results.

Tomoe Kanaya, Research Associate, will devote 20% of her time to the project in all three years. She will design the structure of the project database and provide consultation with staff members to insure the appropriate collection of usable data. She will conduct all data analyses for the project.

Research Assistant II (TBA), will devote 100% of time to the project in all three years. The Research Assistant, II will collect data in the ACS childcare centers and also contribute to the coding and input of the data for analysis.

Administrative Assistant (TBA), will devote 40% time to the project in all three years. The Sr. Administrative Assistant will coordinate all project travel, meetings with consultants, help prepare materials and reports, and oversee all other administrative tasks that will insure the project's smooth functioning.

We have budgeted a 5% salary increase each year.

2. FRINGE BENEFITS

Fringe benefits are calculated at 27.7% of salaries. EDC's fringe benefits rate is composed of the following items: FICA, Medicare, Health Insurance, Unemployment, Insurance, Life Insurance, Long-Term Insurance, and Pension (TIAA-CREF). EDC's cognizant audit agency is the Department of Health and Human Services, Cost Allocation Division, Region II, D/HHS, 26 Federal Plaza, New York, NY 10278.

3. TRAVEL

We have budgeted for the following regional travel plans:
Mandinach will travel to the annual PI meetings in Washington, D.C., for two days each of the three years of the project. MacIver will travel from Baltimore to New York once in Years 2 and 3 of the project to consult with staff on the data analysis. Balfanz will travel from Baltimore to New York twice in each of the three years. Greenes will travel from Boston to New York three times in each of the years. Both Balfanz and Greenes will meet with project staff to consult on mathematics, curriculum, and professional development as they pertain to training the teachers in *BMLK*, curriculum development, and the teachers' understanding of the program.
We have budgeted for the following local travel plans:
Research staff will make site visits to the ACS centers to help collect data throughout Years 1, 2, and 3. These site visits will involve local travel throughout New York City.

They will occur every other week throughout the school year. The four research assistants will each have responsibility for two, four, and two classes respectively in Years 1, 2, and 3. Participating teachers will travel locally throughout New York City to attend the professional development activities. In the summer of Year 1, the 16 preK treatment group teachers will attend a two-day workshop. In Year 2, they will receive six afternoons of content training. Also in the summer of Year 2, the 8 kindergarten treatment teachers will attend their two-day summer workshop, followed in Year 3 with their six afternoons of content training. The 24 preK and kindergarten control teachers will all receive their training in the summer of Year 3, at the conclusion of data collection.

Testers will have to travel to the ACS centers for testing during the fall and spring of Years 2 and 3. We have budgeted for testers to travel to the CCT office for two days of training in the summer of Year 1. We have budgeted for local travel for the 16 testers who will spend 20 half-days in the two falls of the project administering the pre-tests and 10 half-days in the two springs administering the post-tests.

We have budgeted for the following dissemination travel plans:

Members of the project staff will make two trips to attend the annual meeting of the American Educational Research Association to present papers on the results of the project. Greenes also is budgeted for one trip in each of Years 2 and 3 to a professional meeting such as the American Educational Research Association annual conference.

5. SUPPLIES

The supplies budget includes general office supplies and materials. The estimates are based on EDC's experience with projects of similar scope. Only actual costs are charged to the projects.

6. CONTRACTUAL

Consultants

We have budgeted for the contractual work of professional experts, lead teachers, testers, and participating teachers as well as for the ACS centers.

We will pay Dr. MacIver of Johns Hopkins University $6,000 per year for his contributions on statistical procedures, particularly HLM and power analysis. Year 1 will be for planning the future analyses and Years 2 and 3 will be for his continued expertise.

Dr. Robert Balfanz of Johns Hopkins University will receive $4,000 per year for his expertise on mathematics, curriculum development, and the teacher professional development using *BMLK*. He will review the fidelity of the implementation measure, the professional development framework, and the cognitive measure of domain specific mathematics learning.

Dr. Carole Greenes of Boston College will be paid for 20 days of consulting in Year 1 and for 10 days of consulting in Years 2 and 3 at $1,000 per day. She will help with the fidelity measures and on modifying the professional development activities as needed.

We will work with five teacher consultants who are experienced lead teachers with BMLK. For their contributions, these individuals each will receive $500 in Year 1.

Teachers participating in the project will receive stipends. The control group teachers (16 preK in Year 2 and 8 kindergarten in Year 3) will each receive $500 for their contributions to the project during the year in which they are serving as a control. In

Year 3, we will offer each of the 24 individuals who have served as a control the opportunity to receive the *BMLK* training. We have budgeted $1,000 per person for their attendance at the control group professional development workshop for BMLK upon conclusion of the data collection in the summer of Year 3. The treatment group teachers will receive a $500 research stipend and an additional stipend to cover the cost of the professional development activities. We have budgeted a total of $8,000 in Year 2 for the 16 preK treatment teachers and $4,000 in Year 3 for the 8 kindergarten treatment teachers. We have also budgeted for their professional development activities. In Year 1, the 16 preK treatment teachers each will be paid $500 to cover the cost of attendance at the summer workshop, totaling $8,000. In Year 2, we will pay professional development stipends to both the preK and kindergarten teachers. The 16 preK teachers will receive another $500 for their participation in the content domain training sessions, totaling $8,000; the 8 kindergarten teachers each will receive $500 for their summer workshop activities, totaling $4,000. The total amount of professional development stipends for Year 2 is $12,000. In Year 3, the 8 kindergarten treatment teachers will receive $500 for their participation in the six content domain training sessions, totaling $4,000. Given the confusing nature of the way the stipends for both professional development and research activities align themselves over the three years and across grade levels and treatment and control groups, the following schematic may help to represent more clearly how the money will be paid.

	Year 1	Year 2	Year 3
Treatment PreK (16)	$500 PD	$500 PD $500 Research	
Treatment Kindergarten (8)		$500 PD	$500 PD $500 Research
Control PreK (16)		$500 Research	$1,000 PD
Control Kindergarten (8)			$500 Research $1,000 PD

We will pay 16 testers for their four months of testing. These stipends are distributed across the three years and consist of five line items in the budget. The testers will receive two days of training during the summer of Year 1 for which they will each be paid $200 ($100 per day). During Year 2, they each will conduct 20 half-days of testing (the preK pre-tests) in September and October and another 20 half-days of testing (preK post-tests) in June. Each tester will receive $1,000 for the pre-testing and $1,000 for the post-testing. The same model will be used in Year 3 for the kindergarten pre- and post-tests. The testers will be testing only half as many students in Year 3 and therefore be paid $500 for the pre-testing and $500 for the post-testing.

We have budgeted $10,000 each year for central support to ACS administration for the extra work incurred on behalf of their participation in the project. This is to support Maria Cordero and her staff for the logistics of conducting the project.

Each of the participating ACS centers will receive support for their coordination of project activities in their centers during Years 2 and 3. There will be 16 centers in Year 2 and 3, each receiving $300.

Subcontract
We have budgeted a subcontract to Teachers College and Columbia University as follows: Year 1, $197,936; Year 2, $205,413; and Year 3, $213,190.

8. OTHER
Telephone/telecommunications, duplication/printing, postage/mailings, program-specific/non-general supplies, books, subscriptions, fees, etc. The estimates are based on EDC's experience with projects of similar scope. Only actual costs are charged to projects. EDC anticipates the computer upgrades, repairs, supplies and related software charges will average $1,500 a year per full-time employee. Rent and maintenance charges are based on total projected facilities costs organization-wide for the fiscal year, distributed evenly across the number of employees. EDC is currently projecting the cost per full-time equivalent employee to be as follows FY04 $13,381; FY05 $14,050; FY06 $14,753; and FY07 $15,490. The amount is allocated to each project on which an individual works during each payroll period, based on the number of hours devoted to that project's activities. The charge per employee is reviewed annually, and adapted to reflect actual costs, if necessary.
We have budgeted for food that will be provided for the teacher professional development meetings, the tester's training sessions, and the research and consultant meetings.
We will purchase 16 laptop computers to be used for the training of the testers and the testing to be conducted in the ACS centers. We have budgeted $1,000 per machine. Given that the testing alone will occur in four one-month periods, in addition to the necessary training and transfer of data, it is more cost effective to purchase the computers rather than rent them.
We also have budgeted $10,000 in Year 1 for the purchase of the ECLS, which is being used as the primary measure of mathematics learning.

10. INDIRECT COSTS
Indirect costs are calculated at 33.5% of total direct costs excluding equipment and subcontracts. Indirect costs for subcontracts are calculated at 5% and equipment at 0%. These are provisional rates.

Budget for Evaluation project 12-12-03

Salaries

2003-04 salary	122,353.00
2004-05 salary (1.04 of preceeding)	127,247.12
2005-06 salary (1.04 of preceeding)	132,337.00
2006-07 salary (1.04 of preceeding)	137,630.48

	2004-05	2005-06	2006-07	3 year totals
Salary PI academic year @ .20	25,449.42	26,467.40	27,526.10	79,442.92
Salary PI summer @ .11	13,997.18	14,557.07	15,139.35	43,693.61
Total faculty salary	39,446.61	41,024.47	42,665.45	123,136.53
Faculty benefits @ .328	12,938.49	13,456.03	13,994.27	40,388.78
3 graduate students @ 21,000 each	63,000.00	65,520.00	68,140.80	196,660.80
grad benefits @ .095	5,985.00	6,224.40	6,473.38	18,682.78
Salaries total	102,446.61	106,544.47	110,806.25	319,797.33
Benefits total	18,923.49	19,680.43	20,467.64	59,071.56
supplies	3,000.00	3,000.00	3,000.00	9,000.00
other (duplicating, postage, telephone)	1,000.00	1,000.00	1,000.00	3,000.00
Travel	7,000.00	7,000.00	7,000.00	21,000.00
Total direct costs	132,370.09	137,224.90	142,273.89	411,868.89
Indirect costs @ .64	65,565.83	68,188.46	70,916.00	204,670.29
Total	197,935.92	205,413.36	213,189.89	616,539.18

Budget explanation for Teachers College component --
Evaluation of Big Math for Little Kids

Salary for 2004-2007 is computed based on the assumption of a 4% increase on current salary.

Personnel

Funds are requested for the PI to spend 20% time on the project during the academic year and one month (one ninth of academic year salary or 11%) during the summer. Benefits are calculated at the rate of 32.8%.

Funds are requested for three graduate student assistants to work half time on the project for 12 months, each for $21,000. Benefits are calculated at the rate of 9.5%.

Fringe Benefits

Fringe benefits are calculated at 32.8 % for full-time salaries. Teachers College fringe benefits cover the cost of providing retirement benefits, social security taxes, disability insurance, health and dental insurance, employee tuition benefits, severance pay, unemployment insurance, and workers compensation insurance for all full-time and part-time employees.

The rate of 9.5% for graduate students covers statutory benefits such as social security tax, workers compensation, and unemployment insurance.

Travel

Travel is included for the PI and graduate students to professional meetings and to local schools.

Other Direct Costs

Supplies and Other include phone, postage, and office supplies. The estimates are based on our experience with projects of similar scope. Only actual costs are charged to the project.

Indirect Costs

Indirect costs are calculated at the Teachers College rate of 64% on salaries and wages only.

APPENDIX A

LETTERS OF SUPPORT

Boston University
School of Education
Office of Research Support
Two Sherborn Street
Boston, Massachusetts 02215

617-353-3218
Fax: 617-353-8971

Dr. Ellen Mandinach
Associate Director for Research
EDC Center for children and Technology
96 Morton Street
New York, New York 10014

December 18, 2003

Dear Dr. Mandinach,

I am writing to indicate my commitment to serve as a consultant to your proposal to the Institute for Education Sciences entitled, "Evaluating an Early Mathematics Curriculum." Since 1998 I have been collaborating with Professors Ginsburg and Balfanz to develop a comprehensive mathematics program for pre-kindergarten and kindergarten children. That program, *Big Math for Little Kids*, is now published, and the job of evaluating its effectiveness is timely.

During the first year of the project I agree to commit 20 days of consulting time to assisting with the fidelity measures and professional development plan. I will plan on traveling to New York for three meetings to consult with you and Dr. Ginsburg during this first year of work.

In years two and three I agree to spend 10 consulting days each year on the *BMLK* evaluation. I will attend three two-day project meetings during each of these to review the fidelity findings and the professional development materials, and the results of the evaluation.

I look forward to working with you on this important project.

Sincerely yours,

Carole Greenes, Ed. D.
Professor, Mathematics Education
Boston University
Two Sherborn Street
Boston, MA 02215 Phone: 617-353-3289 Email: cgreenes@bu.edu

ADMINISTRATION FOR CHILDREN'S SERVICES
DIVISION OF CHILD CARE AND HEAD START
66 JOHN STREET
NEW YORK, NEW YORK 10038

WILLIAM C. BELL
Commissioner

HARVEY L. NEWMAN
Deputy Commissioner

LARRY LEE
Associate Commissioner

December 23, 2003

Dr. Ellen Mandinach
Associate Director for Research
EDC Center for Children and Technology
96 Morton Street, 7th fl.
New York, NY 10014

Dear Dr. Mandinach:

The Administration for Children's Services (ACS) is looking forward to working with the Education Development Center and Dr. Herb Ginsburg of Teachers College (TC), Columbia University to conduct a rigorous field-test of the *Big Math for Little Kids (BMLK)* curriculum. We have been delighted with the *BMLK* professional development workshops that Dr. Ginsburg has been creating for our teachers and we look forward to expanding the scope of this work. ACS provides childhood education services to over 45,000 preschoolers and approximately 25,000 school age (kindergarten) children throughout New York City; 94% of the children we serve come from families that fall 200% below the federal poverty level. The students in our centers could benefit tremendously from a curriculum that gives them a leg-up in mathematics, and we think your proposal to determine the efficacy of the *Big Math* program is an excellent idea.

Dr. Maria Codero, Special Projects Manager at ACS, will serve as your point of contact for this work. It is our understanding that the grant will provide a stipend to ACS to assist your research team in the logistics of running the research. We are aware that the research study requires random assignment of the *BMLK* program to different classrooms and we agree to work with you to accomplish the following over the 3 years of the grant:

- Year 1. EDC and Dr. Ginsburg will work with ACS early childhood educators (the same group that has been involved in the professional development pilot), to develop fidelity measures in *BMLK* and classrooms that use the Creative Curriculum. In addition, ACS agrees to work with EDC and Dr. Ginsburg to develop a pool of approximately 16 centers that are interested in implementing *BMLK* in their classrooms. All centers will have both preK and K classrooms

making it possible to follow students from a preK into a kindergarten BMLK implementation year. We understand that 8 of the centers will be randomly selected to participate in the *BMLK* implementation project with their preK teachers. Approximately 16 PreK teachers will attend a two day *BMLK* summer institute. The remaining 8 centers and their preK and kindergarten teachers will serve as a comparison group.

- Year 2. We understand that EDC, Dr. Ginsburg and his graduate students will be observing participating classrooms (both *BMLK* and non-*BMLK*) on a regular basis. We also understand that a mathematics assessment will be administered in the Fall of 2005 and the Spring of 2006 to all preK children in participating *BMLK* and non-*BMLK* classrooms. *BMLK* preK teachers will also attend 6 additional training workshops and in the summer of 2006 training for the *BMLK* kindergarten teachers will begin.

- Year 3. We understand that year three will focus on the *BMLK* and non-*BMLK* students in participating ACS kindergarten classrooms. We further understand that the assessment measures used in year two will be administered to students participating in the year three pilots and that EDC and TC researchers will be making regular visits to *BMLK* and non-*BMLK* classrooms. The *BMLK* kindergarten teachers will attend 6 additional training workshops. During the summer of year 3 all teachers who participated in the research but did not receive BMLK training will be eligible to receive the professional development at no cost.

As we have discussed, the confidentiality of students and teachers participating in the research will be fully protected. We understand that all teachers participating in the research will be compensated for their time. In addition, and all participating ACS centers *(BMLK and non-BMLK)* will receive a stipend for their involvement in the research process. We are delighted to learn that Pearson, the publishers of the *BMLK* curriculum, has agreed to donate copies to ACS for the purposes of the research.

We look forward to this collaboration and we hope that your proposal is successful.

Sincerely,

Maria Cordero
Special Projects Manager

cc: Larry Lee
Harvey I. Newman

JOHNS HOPKINS
UNIVERSITY

Center for Social Organization of Schools
3003 N. Charles Street, Suite 200
Baltimore MD 21218-3889
410-516-8800 / FAX 410-516-8890

Dr. Ellen Mandinach
Associate Director for Research
EDC Center for Children and Technology
96 Morton Street, 7th fl.
New York, NY 10014

Dear Dr. Mandinach:

This letter is to confirm my participation in your proposal to the Institute for Education Sciences entitled, "Evaluating an Early Mathematics Curriculum." As you know I was one of the co-developers of the *Big Math for Little Kids* Curriculum and I think the proposed effort to undertake a rigorous study of the program's impact on underserved students' mathematics learning is extremely important.

As a consultant to the study I agree to attend two, two-day project meetings during each year of the project. I also agree to review the fidelity of implementation measure and the professional development framework you are proposing to develop in the first year of the project. And I will consult on the statistical analyses.

This is an important effort and I hope that you are successful in securing funding.

Sincerely,

Robert Slavin

JOHNS HOPKINS
UNIVERSITY

Center for Social Organization of Schools
3003 N. Charles Street, Suite 200
Baltimore MD 21218-3859
410-516-8800 / FAX 410-516-8890

Dr. Ellen Mandinach
Associate Director for Research
EDC Center for Children and Technology
96 Morton Street, 7th fl.
New York, NY 10014

Dear Dr. Mandinach:

This letter is to confirm my participation in your proposal to the Institute for Education Sciences entitled, "Evaluating an Early Mathematics Curriculum." I am pleased to serve as statistical consultant to your project, providing specific guidance on the use of HLM techniques. I understand that I am written into your budget for six days of consulting during each year of this three-year effort.

Best of luck in securing your proposal.

Sincerely,

Douglas J. MacIver

MARCY BAUGHMAN
DIRECTOR OF ACADEMIC RESEARCH
PEARSON EDUCATION
160 GOULD STREET
NEEDHAM HEIGHTS, MA 02494
Marcy.Baughman@pearsoned.com

January 6, 2004

Dr. Ellen Mandinach
Associate Director for Research
Education Development Center
Center for Children and Technology
96 Morton Street
New York, NY 10014

Dear Dr. Mandinach:

I am writing on behalf of the Pearson Learning Group in support of your proposal to the Institute for Education Sciences entitled, "Evaluating an Early Mathematics Curriculum." As publishers of the *Big Math for Little Kids* curriculum that you are proposing to study, we are fully supportive of conducting rigorous research to determine the effectiveness of *BMLK* for pre-kindergarten and kindergarten students. This letter confirms that the Pearson Learning Group will be pleased to supply 24 complete sets of the *Big Math for Little Kids* curriculum at no charge if your proposal to the Institute for Education Sciences is funded. Each curriculum set will include teacher guides with activities and assessment, a program overview for planning and implementation, full-color storybooks for classroom use, and take-home consumable storybooks.

We hope you are successful in securing funding.

Sincerely,

Marcy Baughman
Director of Academic Research

TEACHERS COLLEGE
COLUMBIA UNIVERSITY
DEPARTMENT OF HUMAN DEVELOPMENT

December 30, 2003

Dr. Ellen Mandinach
Associate Director for Research
EDC Center for Children and Technology
96 Morton Street, 7th fl.
New York, NY 10014

Dear Ellen:

This letter is to affirm my intention to work with you on the proposed DOE-supported effort to evaluate the Big Math for Little Kids program. I understand that my work will involve:

- serving as co-principal investigator on the project;
- providing guidance to Teachers College graduate students who will test children and collect fidelity data in classrooms, and who will assist with teacher workshops;
- supervising the development of fidelity measures;
- reviewing and making minor modifications in the teacher workshops;
- and assisting with the writing of reports concerning the research.

I look forward to contributing to this project and to another opportunity to collaborate with colleagues at EDC.

Best regards,

Herbert P. Ginsburg
Jacob H. Schiff Foundation Professor of Psychology and Education

Phone 212-678-3443
Fax 212-678-3837
e-mail hpg4@columbia.edu

Education
Development
Center, Inc.

Human Protections Program
Edward De Vos, Ed.D., IRB Chair
Jennifer Wiley-Cordone,
Human Protections Administrator

Dr. Ellen Mandinach
Education Development Center, Inc.
55 Chapel Street
Newton, MA 02458

December 23, 2003

Title: Evaluation of *Big Math for Little Kids (BMLK)*
Funding Source: Department of Education

Dear Dr. Mandinach:

I have reviewed your application for administrative review of "Evaluation of *Big Math for Little Kids*", and determined that the first year activities as described in your proposal meet the criteria for exemption from IRB oversight provided for in 45 CFR §46.101(b)(1) in that it is conducted in an established education setting and involves normal education practices, such as research on regular and special education instructional strategies, or research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.

Investigators conducting work exempt from expedited or full-IRB review are nevertheless responsible for ensuring proper protections for human subjects. These protections include safeguarding privacy and confidentiality; documenting the human subjects training of all key personnel; ascertaining that each potential subject understands the nature of the research and of their participation; taking whatever steps are necessary to gain informed consent; reporting any serious or unexpected adverse events to the Human Protections Administrator; and requesting IRB approval of any proposed change in the protocol that would alter the exempt status prior to its implementation.

Work conducted in Years 2 and 3 of the project, however, do not qualify for the 45 CFR §46.101(b)(2) exemption because of plans to interview children. This portion of the project will require expedited review from EDC's IRB once assessment tools and interview scripts have been developed.

If you have any questions, please contact me at 617-618-2336 or at hpa@edc.org.

Sincerely,

Jennifer Wiley-Cordone

Jennifer Wiley-Cordone
Human Protections Administrator,
Office of Sponsored Programs

cc: Ed De Vos, IRB Chair

HUMAN PROTECTIONS PROGRAM
55 CHAPEL STREET
NEWTON, MASSACHUSETTS 02458-1060
TELEPHONE 617-969-7100 x2336
FAX 617-969-3401
E-MAIL hpa@edc.org

ACS Center Invitation Letter

Dear ACS Center Director:

With the cooperation of Dr. Maria Cordero at ACS, Dr. Ellen Mandinach of the Education Development Center (EDC) and Dr. Herb Ginsburg of Columbia University, Teachers College (TC) will soon be conducting a field test of the *Big Math for Little Kids (BMLK)* curriculum in ACS centers. We are interested in locating ACS centers with both pre-kindergarten (for 4-year-olds) and kindergarten classrooms that are willing to work on the implementation of the curriculum beginning in the Fall of 2005. Once we have identified a pool of volunteer centers, we will randomly select 8 centers that will implement *BMLK* and 8 centers that will continue to use their existing curriculum. The project will run over a two-year period with *BMLK* being implemented in pre-kindergarten during the first year (2005-2006) and kindergarten classrooms during the second (2006-2007). The centers selected to continue using their existing curriculum will receive training in BMLK if they so desire after the study is completed. The centers selected to implement the *BMLK* program will receive the necessary materials at no cost. Regardless of whether you are selected to implement the *BMLK* curriculum, centers will receive a participation stipend of $300 during each year of participation.

Teachers in centers selected to implement *BMLK* will be required to participate in the following training activities:

- Pre-kindergarten teachers will attend a two-day summer workshop in 2005.
- Pre-kindergarten teachers will attend 6 additional afternoon workshops (2 hours each) during the 2005-2006 school year)
- Kindergarten teachers will attend a two-day summer workshop in 2006.
- Kindergarten teachers will attend 6 additional afternoon workshops (2 hours each) during the 2006-2007 school year)

All teachers receiving the *BMLK* training will receive a stipend of $1,500 ($1,000 for their professional development activities and $500 for participation in the research). Teachers who are not receiving *BMLK* training, but whose classrooms are serving as research sites, will receive a stipend of $500. In addition, these teachers will be eligible to receive the *BMLK* training during the summer of 2007 and will be compensated for their participation with a stipend of $1,000 for the professional development workshop.

In addition to the teacher training requirements, all *BMLK* and non-*BMLK* centers participating in this research project should be aware of the following:

- Pre-kindergarten students will be tested on the mathematics portion of the Early Childhood Longitudinal Study in the fall of 2005 and again in the spring of 2006.

- Kindergarten students will be tested on the mathematics portion of the Early Childhood Longitudinal Study in the fall of 2006 and again in the spring of 2006.
- Classrooms will be visited on a regular basis by project research staff. Pre-kindergarten classrooms will be visited during the 2005-2006 school year, and K classrooms during 2006-2007.

If you are interested in participating in this project please return the enclosed form to:

Dr. Ellen Mandinach
Associate Director for Research
Education Development Center
96 Morton Street, 7th floor
New York, NY 10014

If you have questions, Dr. Mandinach can be reached at 212-807-4209.

Sincerely,

Ellen Mandinach
Education Development Center

CURRICULUM MATERIALS

1. **Cube Train Rulers**
2. **Muffy's Missing Mitten**
3. **Numbers with Pizzazz**
4. **The Table of Phinneas Fable**

Activity 3

Cube Train Rulers

Measure length and height with nonstandard units

Suggested Pacing

Over a two-week period, allow several days to complete this activity and repeat as time permits.

Group Size

Task 1: Whole class

Tasks 2–4: Whole class in pairs

Language of Mathematics

about the same length (height)

cube

long (longer, longest)

measurement

short (shorter, shortest)

tall (taller, tallest)

Things You'll Need

- ❑ Connecting cubes (or linking objects like large paper clips)
- ❑ Objects of various lengths and heights to measure (such as straws, pencils, books, shoelaces, and toys)
- ❑ Removable stickers, 5 for each pair of children

Field-Test Note

Since an object will rarely be a whole number of cubes long, show children how to line up the train with the object and decide which cube is closer to the end of the object.

ABOUT THE ACTIVITY

In Brief

Children use connecting cubes or other linking objects to measure the lengths (heights) of objects, compare their lengths (heights), and order the objects by length (height). Each cube or linking object is counted as one measurement unit.

Activity Goals

- Compare objects by length and height.
- Use nonstandard units to measure length and height.
- Order objects by length and height by comparing the numbers of measurement units.

Skills Children Need at the Start

- Use the terms *long, longer, longest, tall, taller, tallest, short, shorter, shortest, about the same length,* and *about the same height* to describe length and height comparisons.
- Compare objects to tell which is longer, longest, taller, tallest, shorter, shortest, and about the same length or height.

GETTING READY

Setting Up For Task 1, seat children in a circle for a demonstration of how to measure using nonstandard units. For Tasks 2–4, the measurement of objects should be done with the whole class working in pairs or on their own. The objects to be measured should be placed on a flat surface, such as a tabletop or the floor.

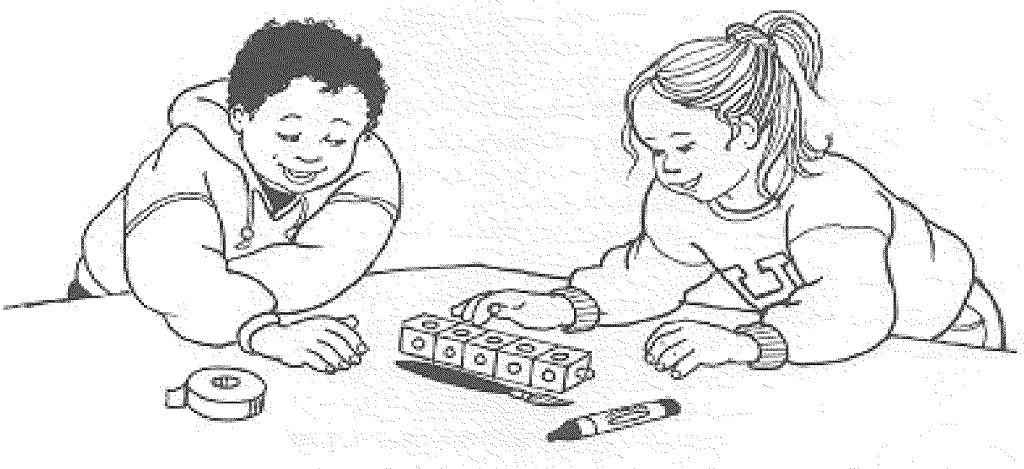
Focused Assessment You may wish to use this activity to conduct an in-depth assessment with individual children. See the Focused Assessment on pages 7–8 for further information.

LET'S GO!

Task 1 Select an object, for example a straw, and connect cubes to make a train about the same length as the straw. Say, **The cube train is about the same length as the straw.** Call on a child to count the cubes and tell the length of the straw by saying the number of cubes. For example, the child might say, "The straw is about 10 cubes long."

Call on a child to come to the table and pick something that is longer than the straw. Then ask that child to measure the new object by constructing a cube train about the same length as that object and counting the cubes. Follow the same procedure for objects that are shorter than the straw.

Task 2 Have children make cube trains that are five cubes long. Have them work in pairs to find two classroom objects that are about five cubes long, two objects that are longer than five cubes, and two objects that are shorter than five cubes.



Task 3 Give each pair of children four or five objects of different lengths. Have the children order the objects by length from shortest to longest using visual comparison.

Next, have children make cube trains to measure the objects and verify the order. Have them record the number of cubes on removable stickers and attach these to the objects. Have them mix up the objects and reorder them from shortest to longest by using the numbers on the stickers. Ask, **How do the numbers show that the objects are in order from shortest to longest?** *(The numbers become greater from the shortest to the longest object.)*

Task 4 Repeat Tasks 1, 2, and 3, but measure the height of objects rather than the length.

MORE TO DO

Have children use other nonstandard units (such as paper clips or straws) laid end to end to measure objects. Talk about why the measurements of the same object may be different depending on the length of the unit of measure (for example, a tabletop that is eight straws long may also be 40 small paper clips long).

For Activity 3

Focused Assessment

Observation and Interview

This Focused Assessment provides an opportunity to examine individual children's understanding of measurement concepts and skills. You may wish to use this assessment activity with children experiencing difficulty. The observation part of the assessment is done while a child is engaged in the tasks in Activity 3, Cube Train Rulers. The interview questions help to clarify the nature of the child's understanding. After completing the Focused Assessment, you may wish to use some of the reteaching suggestions to help children who are having difficulty with the measurement concepts and skills.

Concepts and Skills to Be Assessed

- Recognize the need for a common endpoint to compare heights or lengths. (Unit Goal 1a)
- Compare objects by height or length. (Unit Goal 1b)
- Order objects by height and length. (Unit Goal 1c)
- Measure and compare heights and lengths using nonstandard units. (Unit Goal 1f)

Things You'll Need: Assessment Record B (p. 45); materials for Activity 3

Observation

Observe the child's behavior during each task in Activity 3. Record results in the observation part of the child's copy of Assessment Record B by circling *Yes* or *No* to indicate the child's level of understanding.

Tasks 1 and 4: Observe whether the child correctly identifies an object that is longer than (taller than), shorter than, or about the same length (height) as another object by visual inspection.

Tasks 1 and 4: Observe whether the child correctly constructs a connecting cube train to measure the length (height) of an object. Note particularly if the child matches the ends of the cube train with the ends of the object to be measured.

Tasks 2 and 4: Observe whether the child finds objects that are longer (taller) than, shorter than, and about the same length (height) as a cube train with 5 cubes.

Tasks 3 and 4: Observe how the child orders objects by length (height) from shortest to longest (tallest). Also note whether the child correctly uses the numbers of cubes to verify the order.

Interview

After observing the child, you still may need more information to determine if the child understands concepts related to length and height. To further assess the child's understanding, conduct the following interview with the child. Record your assessment of the child's understanding on the interview part of Assessment Record B.

A. Does the child compare and order objects by length and height using a common endpoint?

Children are more likely to have difficulty ordering objects by length than by height because they do not recognize the need to line up objects with a common endpoint.

Provide the child with two objects that are not the same height. Ask, **Which object is taller? How can you tell?** If the child responds correctly, introduce a third object. Say, **Now put these objects in order from shortest to tallest.** Then ask, **Which is tallest? How do you know?** If the child points to the tallest and says, for example, "This is higher than these" or "It's way up and these aren't," then the child is showing understanding. Continue by asking the child to identify the shortest of the three objects.

Next, show the child two objects of different lengths placed flat on the table. Ask, **Which object is longer? How did you figure it out?** If the child does not arrange the objects so that one end of both matches and says, for example, "I put them together and this one is longer," then move the objects so that the other object extends beyond the first and ask again for the child's judgement. If the child changes the answer, point out the contradiction in responses by asking, "Why is this longer now?" If the child does not decide to use a common end point, ask, **Do you have to put them together in a special way?** If the child doesn't say or indicate that one end of the two objects must match, then the child does not understand the need for a common endpoint.

Give the child three and then four objects to order by length from shortest to longest. Point to the second object and ask, **How did you know where to put this object?** A child who understands the order concept should be able to give an explanation for the location of each object in the order. Repeat for height.

B. Can the child measure and compare lengths and heights using nonstandard units?

Provide the child with connecting cubes and an object to measure. Ask, for example, **How many cubes long is this book?** After the child answers, ask, **How did you figure it out?** The child may say, "I made a cube train and counted three cubes."

Give the child two objects of different lengths—separated so that they cannot be compared visually—and have the child measure them with cubes. Ask, **How do you know which object is longer?** The child may say, "This one is eight cubes long and that one is six cubes long. Eight is more than six." Repeat for height.

C. Can the child order objects by length and height by comparing numbers of units?

Give the child four objects of different lengths and four stickers. Have the child measure each object using connecting cubes and record the number of cubes on each sticker. Attach the stickers to the corresponding objects. Arrange the objects randomly on a tabletop. Ask, **Which object is the longest? How do you know?** If the child tries to move the objects to compare, ask, **Can you tell just by looking at the numbers?** If the child is unable to respond correctly, then the child most likely does not understand the relationship between the number of cubes, at least as presented in written form, and the length of the object. Continue by asking, **Which object is shortest? How do you know which objects are longer?** Repeat for height.

Reteaching and Practice

You may wish to use some of the following suggestions for reteaching the concepts and skills in Activity 3 or provide children with opportunities to practice them. Remember, however, that young children may not learn all of the material you present. Some children simply need additional time to develop the cognitive abilities needed to master certain concepts.

- If a child has difficulty comparing and ordering objects by length because he or she doesn't establish a common baseline, have the child select an item, such as a book or block, and mark the location of the common endpoint before making length comparisons.
- If a child doesn't understand the relationship between the number of cubes and the length or height of an object, construct a train with six cubes. Have the child identify the number of cubes in the train and then find one or more objects with the same length.
- If a child doesn't recognize that the longest object in a group corresponds to the matching cube train with the greatest number of cubes, provide three cube trains of differing lengths. Have the child line them up along a common endpoint, arrange the cube trains in order from shortest to longest, and then count the number of cubes in each train. Move the cube trains around and ask the child to identify the longest or shortest by using the numbers of cubes in the trains.

Activity 6

Muffy's Missing Mitten

Identify positions using clues

Suggested Pacing

Over a one-week period, allow one or two days to complete this activity.

Group Size

Whole class or small group

Language of Mathematics

behind	*next to*
in front of	*on top of*
inside	*under*

Things You'll Need

- ☐ Muffy, the small stuffed animal or doll from Activity 2
- ☐ Mittens, toys, and other objects
- ☐ Classroom storybook *Rafael's Messy Room*
- ☐ Construction paper (optional)
- ☐ Take-Home Game (pp. 23–24), one for each child

ABOUT THE ACTIVITY

In Brief

Children use clues involving positional terms to locate objects hidden in various places in the classroom.

Activity Goals

- Review positional concepts and the terms *on top of, under, inside, next to, behind,* and *in front of.*
- Use clues to locate objects.

Skills Children Need at the Start

- Recognize the positional terms being reviewed.
- Recognize the names of areas, furniture, and other objects within the classroom.

GETTING READY

Preparing the Materials Duplicate the Take-Home Game so that it is ready to send home with children after they complete Task 4. You may wish to make construction paper cutouts to substitute for the objects that are hidden in this activity.

Setting Up Before introducing Tasks 2 and 3, hide the objects in various places in the classroom. For example, put mittens on top of, under, inside, next to, behind, or in front of the easel.

LET'S GO!

Task 1 Read *Rafael's Messy Room* to review positional concepts and terms.

Task 2 Tell the children that Muffy is missing some of her favorite things and that their job is to find Muffy's favorite things. Say, **You are going to take turns being a detective. I am going to give you a clue. A clue can help you figure out where to look for something that is missing.** Give children simple clues that involve the positional terms *on top of, under,* and *inside.* For example, say, **Here's the clue. Muffy's mitten is under the water table.** Call on a child to use the clue to find the hidden object.

Task 3 Follow the same procedure as in Task 2. Introduce new clues using the terms *next to*, *behind*, and *in front of*.

Task 4 Have children hide objects and give clues to their classmates using positional terms. Explain that objects can be hidden in different places from those in which they have been hidden before.

Field-Test Note

A child may be tempted to give a clue by saying, "It's over there!" or he or she may simply point to the correct location. Encourage the child to use positional terms by saying, for example, "Do you want to say that it's behind the block area or next to the doll house?"

MORE TO DO

Have children describe the sequence of the actions they completed in order to find a missing object. A child may say, for example, **"I started at the table, and then I walked over to the blocks, and then I looked behind the blocks."** This helps children to reflect on their actions and gives them experience in thinking about temporal order.

Activity 10

Numbers With Pizzazz!

Count by ones to 50 and by tens to 100

Suggested Pacing

Allow one to two weeks to complete this activity. Review and expand for the rest of the school year.

Group Size

Whole class

Language of Mathematics

count from 1 to 50

next

Things You'll Need

- ❑ Poster board
- ❑ Permanent ink markers in 6 different colors
- ❑ Copies of Assessment Records

ABOUT THE ACTIVITY

In Brief

Children dramatize the decade numbers in a variety of ways as they count by ones to 50.

Activity Goals

- Count by tens from 10 to 100.
- Identify the decades to the 40s.
- Count by ones to 50.
- Identify repeating unit patterns within the decades.

Skill Children Need at the Start

- Count by ones from 1 to 30.

GETTING READY

Preparing the Materials Make a fifty chart on poster board as shown. Use a different color marker for each row (decade).

	1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50									

Setting Up This activity requires sufficient floor space for the children to stand, hop in place, and twist at the waist.

Checking Up Use this activity to assess Unit Goal 1a. For best results, observe each child as he or she completes the activity and record results on the Assessment Record.

LET'S GO!

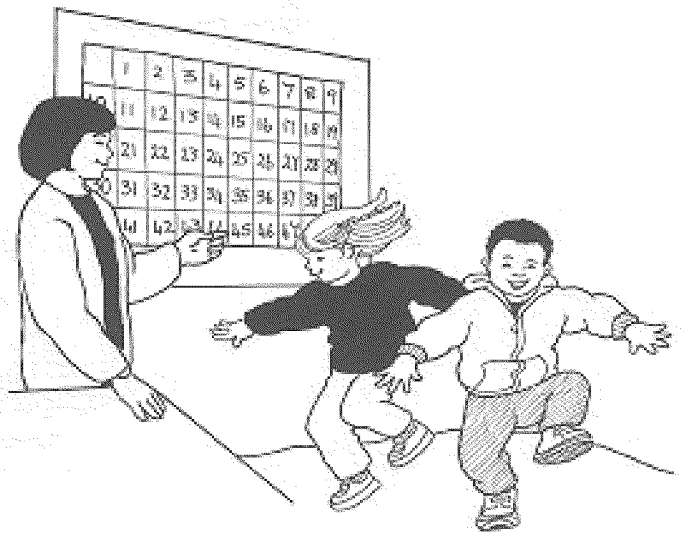
Task 1 With children, count aloud by tens from 10 to 100. Then call on children in pairs to repeat the counting sequence.

Field-Test Note

One field-test teacher said, "To help children remember the action associated with each decade, I took a photograph of children performing the actions. Then I taped the pictures on the number chart next to the appropriate decades."

Task 2 Children learn to count by ones from 1 to 50. To help them recall the sequence, have the children perform a different action as they say the numbers in each decade.

Decades	Actions While Saying Numbers
Quiet Ones	Children whisper the numbers.
Yucky Teens	Children make funny faces.
Roaring 20s	Children say the numbers loudly.
Twisty 30s	Children twist their torsos.
Hopping 40s	Children hop up and down in place.



Field-Test Note

To help children remember the counting sequence, point out how 1 to 9 is repeated in the 20s, 30s, and 40s (for example 21, 22, 23, . . . 31, 32, 33). To emphasize the change from one decade to the next, say *next* after each number that has a 9 in the ones place (for example, 19, next, 20, 21, 22, . . . 29, next, 30, 31, 32, and so on).

Task 3 Show children the fifty chart pointing out that the numbers in each row are recorded in a different color. As children count aloud, point to the numbers on the chart. Remind the children to perform the actions they learned in Task 2 as they say the numbers in each decade. Then have them count by tens as you point to the numbers on the chart. Children can also identify the pattern formed by the numbers when counting by tens.

MORE TO DO

Have children use rhythm instruments, clapping, and foot tapping to identify and distinguish the numbers in the different decades. For example, children could clap as they say the "Handy Ones" or hit a cymbal as they say the "Clanging Teens."

Activity 3

The Table of Phinneas Fable

Identify shape patterns

Suggested Pacing

Over a two-week period, allow several days to complete this activity and repeat selected tasks as time permits.

Group Size

Tasks 1, 2, and 3: Whole class

Task 4: Whole class in small groups

Language of Mathematics

circle	*pattern*	*square*
first	*row*	*third*
last	*second*	*triangle*
next	*shape*	

Things You'll Need

- ☐ Dry pasta, 3 different shapes that can be strung (such as ziti, rigatoni, and macaroni)
- ☐ 3 containers
- ☐ 3 cardboard strips, each 10 to 12 in. long
- ☐ Tape or glue
- ☐ Colored construction paper
- ☐ Yarn, one 36-in. piece for each child
- ☐ Classroom Storybook *The Table of Phinneas Fable*
- ☐ Take-Home Storybooks of the same title, one for each child
- ☐ Assessment Records

ABOUT THE ACTIVITY

In Brief

As they listen to a storybook, children explore shape patterns. They also identify patterns made with various pasta shapes. Then they string pasta and compare pasta-pattern necklaces.

Activity Goal

- Identify, create, and extend shape patterns.

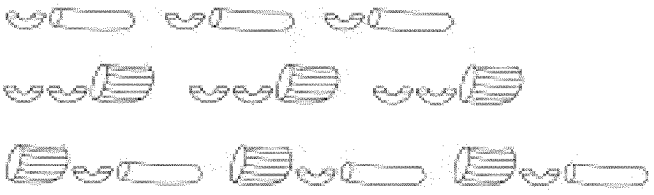
Skills Children Need at the Start

- Identify the first, second, third, and last objects in a row.
- Point to the next object in a line.

GETTING READY

Preparing the Materials Make three pasta pattern cards, each showing one of the three patterns below. Tape or glue pasta pieces to cardboard strips to make these patterns. Measure and cut 36-in. pieces of yarn. Put each type of pasta into a different container.

Pasta Patterns



Setting Up Because Task 3 is a demonstration, seat all children so they can clearly see you. Task 4 is best conducted with small groups of children who are seated at tables. Children could also sit on the floor, but their work area should be clearly defined. Place pieces of yarn, a construction paper workmat, and three containers of pasta in the center of the work area.

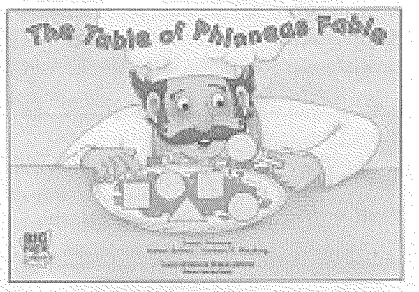
Checking Up Use this activity to assess Unit Goal 1c. For best results, observe each child as he or she completes the activity and record results on the Assessment Record.

Focused Assessment You may wish to use this activity to conduct an in-depth assessment with individual children. See the Focused Assessment on pages 7–8 for further information.

LET'S GO!

Task 1 Read the classroom storybook *The Table of Phinneas Fable* to the whole class. Have children talk about the shapes and patterns on each page. Then read the story a second time and have children identify the missing shapes and give reasons for their shape choices.

> **Field-Test Note**
>
> Use the storybook to review multiple math concepts. One teacher said, "The whole story about patterns has really reinforced shapes and numbers, too."



Task 2 After children have heard *The Table of Phinneas Fable* several times, distribute the Take-Home Storybooks. Read the story with children once again and have them draw the missing shape in the patterns on pages 3, 7, 11, 13, and 14. Then have children color their storybooks. Children can take their completed storybooks home to share with their families.

Task 3 Show one pasta pattern card to the class. Ask, **What do you see?** Point to the first pasta shape. Say, **This pasta shape is first.** Ask, **Which pasta is second? Third? Last?** Say, **Let's keep the pattern going. Which pasta do you think comes next? How do you know?** Place a sheet of construction paper so that it touches the right side of the pasta pattern card. Have a child place the next pasta piece in position on the construction paper workmat. Call on other children to continue the pattern. Be sure that every child participates. Repeat the activity using the other pasta pattern cards.

> **Field-Test Note**
>
> Some children may have fine motor coordination problems that make stringing difficult. Have them paste their pasta patterns on colored sheets of paper.

Task 4 Have the children sit at tables in groups of four. Allow children time to create their own pasta patterns on the table using at least 9 pieces of pasta. As you move around the table, have the children describe their patterns.

Give each child a piece of yarn. Help the children tie one end of the yarn around the first piece of pasta in their patterns so that the pasta will not slide off the yarn. Have children string the other pasta in their pasta patterns to form necklaces. Children can wear their pasta jewelry for the remainder of the day.

MORE TO DO

Use undiluted food coloring or paint to make different color pastas. (Just dip the pasta quickly into the coloring so it does not get soggy!) Be sure that the pasta is completely dry before it is used. In an art area, have children create necklaces that show color-shape patterns.

This activity may be moved to a center. Children can work in small groups or individually to make pattern necklaces.

View Application Submit Review
Application Detail

APPLICATION R305K04001

Item 1. on ED 424 Organization Name and Address

Name	Education Development Center
Unit	Center for Children and Technology
Address	55 Chapel Street
City	Newton
State	MA
Country	United States of America
Zip-Code	024581060

Item 2. on ED 424 Project Director Name and Information

First Name	Ellen
Middle Initial	
Last Name	Mandinach
Prefix	Dr.
Address	EDC/CCT 96 Morton Street
City	New York
State	NY
Country	United States of America
Zip-Code	100143378
Phone	212-807-4200
Fax	212-633-8804

Email	emandinach@edc.org

Item 3. on ED 424 Authorized Representative Name and Information

Primary	Yes
First Name	Andrea
Middle Initial	
Last Name	Watson
Prefix	Ms.
Address	EDC 55 Chapel Street
City	Newton
State	MA
Country	United States of America
Zip-Code	204581060
Phone	617-969-2219
Fax	617-969-5979
Email	awatson@edc.org

Country	United States of America
Zip-Code	
Phone	
Fax	
Email	

Primary	No
First Name	

Middle Initial	
Last Name	
Prefix	
Address	
City	
State	
Country	United States of America
Zip-Code	
Phone	
Fax	
Email	

Item 4. on ED 424 Application Details

4a. D-U-N-S Number	(b)(2)
4b. T-I-N Number	04-2241718
4c. CFDA Number	84.305K
4d. Novice	N/A
4e. Federal Debt Delinquency	No
If Yes, Federal Debt Explanation	N/A
4f. Type of Applicant	Non-Profit Organization
If Other, Description:	N/A
4g. Type of Submission	Non-construction Application
4h. Executive Order 12372	N/A
4i. Project Start Date	9/1/2004
Project End Date	8/31/2007

4j. Human Subjects Research If yes, Exempt From Regulations?	Yes
4k. Exemption Number(s)	45 CFR §46.101(b)(1)
4l. Exempt Research Narrative	Dear Dr. Mandinach: I have reviewed your application for administrative review of "Evaluation of Big Math for Little Kids", and determined that the first year activities as described in your proposal meet the criteria for exemption from IRB oversight provided for in 45 CFR §46.101(b)(1) in that it is conducted in an established education setting and involves normal education practices, such as research on regular and special education instructional strategies, or research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods. Investigators conducting work exempt from expedited or full-IRB review are nevertheless responsible for ensuring proper protections for human subjects. These protections include safeguarding privacy and confidentiality; documenting the human subjects training of all key personnel; ascertaining that each potential subject understands the nature of the research and of their participation; taking whatever steps are necessary to gain informed consent; reporting any serious or unexpected adverse events to the Human Protections Administrator; and requesting IRB approval of any proposed change in the protocol that would alter the exempt status prior to its implementation. Work conducted in Years 2 and 3 of the project, however,

	do not qualify for the 45 CFR §46.101(b)(2) exemption because of plans to interview children. This portion of the project will require expedited review from EDC's IRB once assessment tools and interview scripts have been developed. If you have any questions, please contact me at 617-618-2336 or at hpa@edc.org. Sincerely, Jennifer Wiley-Cordone Human Protections Administrator, Office of Sponsored Programs (see Appendix A for complete letter on letterhead with signature) NEWTON, MASSACHUSETTS 02458-1060 TELEPHONE 617-969-7100 x2336 FAX 617-969-3401 E-MAIL hpa@edc.org
4m. Non-Exempt Research Narrative	N/A
4n. Human Subjects Assurance Number	N/A
4o. Application Title	Evaluation of Big Math for Little Kids

Item 5. on ED 424 Estimated Budget

a. Federal Funding	$610,938.00
b. Applicant Funding	$0.00
c. State Funding	$0.00
d. Local Funding	$0.00
e. Other Funding	$0.00
f. Program Income Funding	$0.00

Section A on ED 524 Federal Budget

Budget Categories	Project Year 1 (a)	Project Year 2 (b)	Project Year 3 (c)	Project Year 4 (d)	Project Year 5 (e)	Total (f)

1. Personnel	$130,928.00	$137,474.00	$144,348.00	$0.00	$0.00	$412,750.00
2. Fringe Benefits	$36,267.00	$38,080.00	$39,984.00	$0.00	$0.00	$114,331.00
3. Travel	$8,960.00	$25,800.00	$30,920.00	$0.00	$0.00	$65,680.00
4. Equipment	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
5. Supplies	$3,150.00	$3,150.00	$3,150.00	$0.00	$0.00	$9,450.00
6. Contractual	$251,636.00	$300,213.00	$299,990.00	$0.00	$0.00	$851,839.00
7. Construction	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
8. Other	$68,945.00	$46,455.00	$53,117.00	$0.00	$0.00	$168,517.00
9. Total Direct Costs	$499,886.00	$551,172.00	$571,509.00	$0.00	$0.00	$1,622,567.00
10. Indirect Costs	$111,052.00	$126,101.00	$130,694.00	$0.00	$0.00	$367,847.00
11. Training Stipends	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
12. Total Costs	$610,938.00	$677,273.00	$702,203.00	$0.00	$0.00	$1,990,414.00

Section B on ED 524 Non-Federal Budget

Budget Categories	Project Year 1 (a)	Project Year 2 (b)	Project Year 3 (c)	Project Year 4 (d)	Project Year 5 (e)	Total (f)
1. Personnel	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
2. Fringe Benefits	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
3. Travel	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
4. Equipment	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
5. Supplies	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
6. Contractual	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
7. Construction	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
8. Other	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
9. Total Direct Costs	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
10. Indirect Costs	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
11. Training Stipends	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
12. Total Costs	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00

Abstract

An Examination of the Impact of Big Math for Little Kids on PreK and Kindergarten Student's Learning of Math

RFA # NCER-04-03

For American children, difficulties in mathematics performance begin to surface as early as kindergarten and elementary school, while children from other countries consistently outperform their American counterparts. Alarmingly, a disproportionate number of these under-achieving students are Lationos and African-Americans. One approach to addressing this problem is to focus on preschool children, providing them with sound mathematical education that will promote school readiness and later academic success. Historically little time in preschool is devoted to mathematics teaching and learning. Big Math for Little Kids (BMLK) is a curriculum that targets lower-SES children and children from all social backgrounds, helping them to achieve high levels of mathematics learning and improve their language skills. The proposed project intends to examine the impact of BMLK on preK and kindergarten student's ability to learning mathematics. The project will attempt to demonstrate that BMLK can help to close the achievement gap between poor and non-poor and minority and non-minority preK and kindergarten children.

The project will study children who are served by the Administration for Children's Services (ACS) Childcare centers. ACS provides childhood education services to over 45,000 preschoolers and 25,000 kindergarten children in New York City; 94 percent of the children come from families 200 percent below the federal poverty level. Of the 115 ACS centers, we will randomly select to work with 16 centers (half as controls and half as treatment centers). With two teachers per center, we will have 16 treatment and 16 control teachers at the preK level in Year 2 of the project. At the kindergarten level in Year 3, we will have one teacher per center (eight controls and eight treatment teachers). The preK sample to be studied in Year 2 will consist of 320 control and 320 treatment children. The kindergarten sample to be studied in Year 3 will consist of 160 control and 160 treatment children. These children will be ages 4 to 5, primarily Latino and African-American, and come from families well below the federal poverty level.

Year 1 will be used to establish the fidelity of the implementation

of BMLK and train the preK teachers. The treatment group will receive the BMLK 32-week program for preK and kindergarten students. The control groups will receive Creative Curriculum, the standard mathematics used in the ACS centers for preK and kindergarten children. Teachers will be trained to use BMLK and then implement the curriculum in the preK classes in Year 2 of the project. We then will follow the students in their kindergarten classes where BMLK will be implemented at the kindergarten level in Year 3. We will collect pre-test and post-test data on student mathematics learning as the primary variables of interest in Years 2 and 3, using the Early Childhood Longitudinal Study mathematics measure, a nationally normed, age-appropriate instrument. We also will collect demographic data at the student, teacher, and center level. Hierarchical linear modeling will be used to analyze student achievement gains and the mediating impact of program implementation levels.

Collaborating Organizations

NAME	CONTACT
Boston University	Carole Greenes, consultant
Johns Hopkins University	Robert Balfanz, consultant
Johns Hopkins University	Douglas J MacIver, statistical consultant
New York City, Administration for Children's Services	Larry Lee
Pearson Education	Marcy Baughman, consultant
Teachers College	Herbert Ginsburg

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Application Abstract

APPLICATION R305K04001

Project Director	Dr. Ellen Mandinach
Applicant Organization	Education Development Center
Application Title	Evaluation of Big Math for Little Kids

Collaborating Organizations

NAME	CONTACT
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Johns Hopkins University	Robert Balfanz, consultant
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