Abstract Title Page

Title:
Scale Up at the Level of Multiple School Districts: Lessons Learned from Multiple IERI- and IES-funded Projects

Authors:

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Abstract Body

Background / Context:

Although the successes of some research-based educational practices have been documented, equally recognized is the “deep, systemic incapacity of U.S. schools, and the practitioners who work in them, to develop, incorporate, and extend new ideas about teaching and learning in anything but a small fraction of schools and classrooms” (see also Berends, Kirby, Naftel, & McKelvey, 2001; Cuban, 2001; Elmore, 1996, p. 1; Tyack & Tobin, 1992). There may be no more challenging educational and theoretical issue than scaling up educational programs across a large number of diverse populations and contexts in the early and primary educational system in the U.S., avoiding the dilution and pollution that usually plagues such efforts to achieve broad success. Our TRIAD model (Sarama, Clements, Starkey, Klein, & Wakeley, 2008), including the Building Blocks curriculum, have significantly and substantially increased young children's mathematical competence, both in previous studies (Clements & Sarama, 2008, g = 1.07) and in our present, largest implementation (Clements, Sarama, Spitler, Lange, & Wolfe, 2009, g = .72).

This presentation has three goals. (1) We will briefly review the findings of multiple studies on the TRIAD model, including effects (immediate and longitudinal), moderators, and mediators, and synthesize these results with qualitative analyses to identify “lessons learned” for scale-up model. (2) We will examine sustainability. (3) We will present nascent data regarding the diffusion of the TRIAD intervention to schools and districts not involved in the research.

Longitudinal evaluation is uniquely important for the preschool and primary years. Lasting effectiveness can be categorized as sustainability or persistence. We use sustainability to mean the length of time an innovation continues to be implemented with fidelity, the topic of a different TRIAD study (2010). We use persistence to mean the continuation of the effects of an intervention in individual children. To study persistence, we designed and evaluated the effectiveness of TRIAD’s Follow-Through treatment, testing our hypothesis that such follow through is the “missing piece” in many early interventions whose evaluations have found less positive effects. To examine sustainability, we returned to the preschool classrooms two years after the end of the TRIAD intervention.

TRIAD’s theoretical framework (Sarama, et al., 2008) is an elaboration of the Network of Influences model (Sarama, Clements, & Henry, 1998), illustrated in Figure 1. It is consistent with, but extends in levels of detail, such theories as diffusion theory and the overlapping spheres of influence (Rogers, 2003; Showers, Joyce, & Bennett, 1987). It applies to the preschool intervention and, recursively, to the longitudinal intervention—the follow through treatment—and its evaluation (see the lower right corner of Fig. 1). The TRIAD model involves 10 research-based guidelines for scaling up (space constraints prohibit full description, but see Sarama, et al., 2008, or UBTRIAD.org).

Purpose / Research Questions

As stated, this presentation will have three new foci. First, we will use both quantitative and qualitative analyses to identify basic lessons learned from all the studies. Second, we will report on the sustainability of the innovation by describing the implementation, including the fidelity of implementation, of the original cohort of teachers, years after the cessation of the study and its support (e.g., professional development, coaching, funding). Third, we will provide initial, qualitative data on the diffusion of these implementation of the TRIAD model to other schools and districts.

Setting:

The study took place in pre-K to first grade classrooms in two urban school districts, the Buffalo Public School system in Buffalo, NY and the Boston Public School system in Boston, MA (a third site, in Nashville, TN/Vanderbilt University, did not have a Follow Through intervention).
Participants:

In the Buffalo Public Schools, all schools whose pre-K teachers had not previously been involved in Building Blocks (e.g., Clements & Sarama, 2007; Clements & Sarama, 2008; Sarama, 2004; Sarama & Clements, 2002) or TRIAD (Sarama, et al., 2008) research or development projects were included.

Intervention:

We created a research-based model to meet the aforementioned scale-up challenge in the area of early mathematics, with the intent that the model generalize to other subject matter areas and other age groups. The specific goal of our implementation of the TRIAD (Technology-enhanced, Research-based, Instruction, Assessment, and professional Development) model is to increase math achievement in young children, especially those at risk, by means of centering aspects of the curriculum—mathematical content, pedagogy, technology, and assessments—on a common core of learning trajectories. For pre-K, this was facilitated by our introduction of the Building Blocks pre-K curriculum, designed on our learning trajectories. The Follow Through treatment was more difficult, involving training teachers the learning trajectories separately, and then how such knowledge could be used to teach their regular mathematics curriculum (Investigations in Number, Data, and Space) more effectively. We used the software application, Building Blocks Learning Trajectories (BBLT), which provides scalable access to the learning trajectories via descriptions, videos, and commentaries. We also offered teachers supplementation of their curriculum with the Building Blocks Software, also based on learning trajectories (but, unlike the print materials, the software progresses to 3rd grade). The Follow Through professional development was also limited to only 5 days of training starting during the year of data collection (the 15 days of pre-K training started a full year before data collection).

Research Design:

In a CRT design, schools within each district were publicly assigned to one of three treatment groups using a randomized block design (using a table of random numbers, with blind pointing to establish the starting number).

Data Collection and Analysis:

All assessments were completed each year, including the Classroom Observation of Early Mathematics Environment and Teaching (COEMET) and child outcomes in math (Research-based Elementary Math Assessment, REMA; literacy and language assessments were also administered, but are not the focus of this report). Data were analyzed with hierarchical linear modeling (HLM, Raudenbush, Bryk, Cheong, & Congdon, 2000; Raudenbush & Liu, 2003). All level-2 (school) predictors were centered on their group means. All interactions were computed on mean-centered transformations of the variables involved. Effect sizes were computed for significant main effects by dividing the regression coefficient by the pooled posttest standard deviation.

Findings:

**First grade impact.** The TRIAD-NFT group was no longer significantly higher in math achievement at the end of first grade (ES = .17, ns). The TRIAD-FT group continued to outperform the control group (TRIAD-FT ES = .47, p < .01). At this grade, consistent with our hypothesis, the TRIAD-FT significantly outperformed the TRIAD-NFT group—the Follow Through treatment had statistically significantly "value added" (ES = .25, p < .05). African American and Hispanic children displayed the lowest scores at first grade, but at this grade, the interaction was no longer significant. There was not a significant main effect of gender, but there was a significant interaction between gender and the TRIAD-FT group. Girls performed lower than boys in the control group, about the same as boys in the TRIAD-NFT group, and slightly better than boys in the TRIAD-FT group.
Mediators of the Follow Through treatment. We tested COEMET variables as mediators. In Kindergarten, the Number of SMAs (Specific Math Activities) mediated the effect of the TRIAD-FT compared to Control treatment (IE: .081, CI: .006 - .195). Also, the Classroom Culture subscale mediated the effects of the TRIAD-FT compared to the TRIAD-NFT treatment (IE: .139, CI: .027 - .297), even when controlling for pre-K posttest as well as pretest-the "value added" condition (IE: .047; CI: .015 - .134).

Sustainability. TRIAD teachers continued to demonstrate high levels of fidelity to the underlying curriculum two years past exposure (see Tables 1 and 2). The percentage of professional development sessions did not predict earlier fidelity measures, but was related to change over time, negatively correlated with the whole group subscale but positive to the small group subscale. Teachers with more experience had higher initial levels of fidelity to the whole group component but lower initial fidelity to the small group and general classroom subscales, followed by significantly faster rates of growth.

Diffusion. We are tracking diffusion within, but especially to surrounding districts (Dearing, et al., 2006). From the beginning of the implementation of the project, there was evidence of diffusion of the TRIAD/Building Blocks curriculum and model. Examples of this diffusion/spread are presented in Table 3 on a district level (experimental district and outside districts), on a school level (within the district and outside the district), on a classroom level (within and outside the district), and in a more general way via media and spread through conference presentations and journal articles.

Conclusions:

Lessons learned. 1. TRIAD is effective. The TRIAD implementation included a complete intervention in pre-K, and the impact was strong at pre-K. There was no evidence that the Building Blocks intervention was differentially effective for schools with different percentages of students with free or reduced lunch or English Language Learners, nor for individual children with or without IEPs. There was evidence that the intervention was differentially effective for one ethnic/racial comparison: African-American children learned less than other children in the same control classrooms and African-American children learned more than other children in the same Building Blocks classrooms up to first grade. It may be that the Building Blocks intervention is particularly effective in ameliorating the negative effects of low expectations for African-American children’s learning of mathematics (see National Mathematics Advisory Panel, 2008). Similarly, similar changes in expectations may have accounted for girls’ (vs. boys’) better performance in the TRIAD groups vs. the control group.

2. The TRIAD follow-through component was important for persistence of effects. By the end of first grade, the TRIAD-NFT group was no longer significantly higher than the control group (ES = .17). The TRIAD Follow through group outperformed the control group (ES = .47) and the TRIAD-NFT group (ES = .26). Thus, the Follow Through treatment had "value added." Multiple studies have reported that preschool gains “fade.” This is often reported without adequate attention to the follow-up—more frequently, the lack of follow-up—planned and implemented for these children. We designed and evaluated the effectiveness of TRIAD’s Follow-Through treatment, testing our hypothesis that such follow through is the “missing piece” in many early interventions whose longitudinal evaluations have found less positive effects. We agree that, “It is unrealistic, given our knowledge of development, to expect short-term early interventions to last indefinitely, especially if children end up attending poor quality schools. It is magical thinking to expect that if we intervene in the early years, no further help will be needed by children in the elementary school years and beyond” (Brooks-Gunn, 2003). Although this might appear to be an issue of effective “educational engineering,” the issue has momentous policy implications. Interpretations of this “fade” often call for decreased funding and attention to preschool (Fish, 2003, 2007). Although this may appear reasonable—“If effects fade out, why fund that intervention?”—We believe this mistakenly treats initial effects of interventions as independent of the future school contexts. That is, they theoretically reify the treatment effect as an entity that should persist
unless it is "weak" or evanescent, susceptible to fading. Instead, we believe children’s trajectories must be studied as they experience different educational courses. Treatment effects are relative, both in contrasting experimental and control groups and, longitudinally, to the nature of educational experiences these groups receive subsequently.

3. The full TRIAD intervention (such as at pre-K) is recommended, rather than the less complete follow-through used in these studies. Multiple factors impeded implementation for the follow-through component, including teacher’s views that district rules and “fidelity police” demanded following scripts and schedules exactly—and would not allow formative assessment or curriculum contraction. For example, a new edition of the mathematics curriculum (unfortunately) coincided with the TRIAD implementation, exacerbating those influences. These factors indicate that the Follow Through condition lacked elements of the full TRIAD model (see descriptions in Sarama, et al., 2008). That is, the lack of a shared vision of teaching, and especially the constraints on school leaders’ support of the innovation appeared to prevent learning trajectories from standing at the core of the follow-through teachers’ curriculum and teaching.

4. Core components of TRIAD include professional development, especially the coaching component, based on a core of learning trajectories and use of technology, as well as broad communication to build a consensus around the innovation. Mediational analyses and qualitative data identify as core components of the TRIAD implementation: professional development, especially in-class coaching, centered around a research-based curriculum (including educational technology) that places learning trajectories at the core. Mentors needed to have the knowledge and skill not just to “coach” but to demonstrate the implementation of all components of the curriculum, doing activities right in teachers’ classroom on many occasions. Also, communication among key groups around a shared vision of the innovation, ensuring school leaders is a central force, We found it necessary to repeatedly provide higher-level administrators with updates and reminders of the projects’ goals and activities.

5. TRIAD may be sustainable. TRIAD teachers continued to demonstrate high levels of fidelity to the underlying curriculum two years past exposure — without continued project support. Amount of professional development did not affect fidelity measures in a consistent way, perhaps due to TRIAD's dynamic model of providing more to teachers who appeared to need more. Teachers with more experience may have gravitated to and excelled at the whole group format as most closely mirrors their prior experience in PreK mathematics instruction. However, with time with the curriculum, they rapidly grow in their fidelity to the small group component, suggesting that they see its importance.

6. TRIAD may support diffusion of innovations. There were myriad instances of diffusion/dissemination/spread at both sites ads the districts/schools/teachers implemented Building Blocks in experimental classrooms during the TRIAD study. The availability of teacher trainers and independent mentors was especially crucial to this effort.
Appendixes

References


Appendix B. Tables and Figures

Figure 1: Revised Network of Influences Theoretical Framework including Follow Through*

* For this study, note that the Follow Through model in the lower right-hand corner is simply a copy of the same Network of Influences framework for upper grades. Contextual variables in dotted ovals include the school (A-D), teacher (E), and child (F-H) factors. For example, child socioeconomic status, or SES (G), impacts children’s initial math knowledge (H), which influences children’s achievement (R)—an outcome variable indicated by the solid rectangle. Implementation variables in solid ovals are features that the project can encourage and support, but cannot control absolutely. For example, heavy arrows from professional development (J), to teacher knowledge (N), to implementation fidelity (O), to child achievement (R), indicate the strong effects in that path. Support from coaches (L) also has a strong effect on implementation fidelity, while other factors (J, K, M) are influential, but to a moderate degree (not all small effects are depicted). Relationships are further described in the following section.
Table 1. Means (SDs) for each timepoint of measurement for each fidelity subscale.

<table>
<thead>
<tr>
<th>General Classroom Environment Total (Q1-5)</th>
<th>Example Items</th>
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<tbody>
<tr>
<td><strong>Fall 2006</strong></td>
<td><strong>Spring 2007</strong></td>
</tr>
<tr>
<td>N</td>
<td>61</td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>10.3 (2.33)</td>
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**Whole Group Total (Q12-18)**

<table>
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<tr>
<th></th>
<th>Example Items</th>
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<tr>
<td><strong>N</strong></td>
<td>61</td>
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<tr>
<td>Mean (SD)</td>
<td>18.1 (2.16)</td>
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**Small Group Total (Q19-39)**

<table>
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<th>Example Items</th>
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<tr>
<td><strong>N</strong></td>
<td>49</td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>45.8 (12.7)</td>
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</table>

**Computer Activities Total (Q40-52)**

<table>
<thead>
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<th>Example Items</th>
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<tbody>
<tr>
<td><strong>N</strong></td>
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</tr>
<tr>
<td>Mean (SD)</td>
<td>23.7 (6.39)</td>
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Table 2. Standardized estimates for Fixed and Random parameters for each best fitting modeled Fidelity subscale.

<table>
<thead>
<tr>
<th></th>
<th>GC</th>
<th>WG</th>
<th>SG</th>
<th>CP</th>
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<tr>
<td><strong>Means</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>9.99 (.445)**</td>
<td>7.73 (1.44)**</td>
<td>4.69 (1.38)**</td>
<td>5.15 (1.34)**</td>
</tr>
<tr>
<td>Slope</td>
<td>1.27 (.255)**</td>
<td>.863 (.816)</td>
<td>3.32 (2.32)</td>
<td>2.64 (.657)**</td>
</tr>
<tr>
<td><strong>Random Effects</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Site</td>
<td>-.223 (.578)</td>
<td>.171 (.116)</td>
<td>-.436 (.194)*</td>
<td>-.234 (.204)</td>
</tr>
<tr>
<td>Yr. Exp</td>
<td>-.051 (.013)*</td>
<td>.234 (.092)*</td>
<td>-.342 (.111)**</td>
<td>.019 (.212)</td>
</tr>
<tr>
<td>PD %</td>
<td>2.56 (1.95)</td>
<td>-.171 (.030)*</td>
<td>.344 (.203)</td>
<td>.260 (.174)</td>
</tr>
<tr>
<td>Slope</td>
<td>-.360 (.345)</td>
<td>-.438 (.097)**</td>
<td>.148 (.394)</td>
<td>-.017 (.143)</td>
</tr>
<tr>
<td>Yr. Exp</td>
<td>.015 (.013)</td>
<td>-.023 (.887)</td>
<td>.830 (.159)**</td>
<td>-.154 (212)</td>
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<tr>
<td>PD %</td>
<td>.463 (1.12)</td>
<td>-.046 (.666)</td>
<td>-.418 (.351)</td>
<td>-.241 (.122)*</td>
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<tr>
<td><strong>Variances</strong></td>
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<tr>
<td>Intercept</td>
<td>.836 (.124)**</td>
<td>.907 (.064)**</td>
<td>.401 (.159)*</td>
<td>.857 (.117)**</td>
</tr>
<tr>
<td>Slope</td>
<td>-- a</td>
<td>.798 (.087)**</td>
<td>-- a</td>
<td>.922 (.076)</td>
</tr>
<tr>
<td><strong>Model Fit</strong></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>$\chi^2$ (df)</td>
<td>15.80 (6)</td>
<td>15.91 (11)</td>
<td>2.31 (6)</td>
<td>7.23 (5) b</td>
</tr>
<tr>
<td>RMSEA</td>
<td><strong>.152 (.062)</strong></td>
<td><strong>.079 (.000)</strong></td>
<td><strong>.000 (.000)</strong></td>
<td><strong>.085 (.000)</strong></td>
</tr>
<tr>
<td>SRMR</td>
<td>.062</td>
<td>.173</td>
<td>.046</td>
<td>.074</td>
</tr>
</tbody>
</table>

Note: *p<.05; **p<.001. GC=General Classroom, WG=Whole Group; SG = Small Group; CP=Computer. *GC and SG models indicated a small, nonsignificant, negative variance on the slope and was constrained to zero. CP variance for third timepoint was constrained to zero. Site = (Buffalo, 1; Boston, 0)
Table 3. Events that Indicate Diffusion of the TRIAD Intervention

SITE 1

District Level

Local, Experimental District

- The district mathematics director and the elementary math director reviewed the Building Blocks curriculum to ascertain whether or not the curriculum addressed and satisfied all state mathematics standards for prekindergarten, and promoted it to the superintendent’s office.
- The superintendent of the Buffalo district named Building Blocks as the mathematics curriculum for prekindergarten in his “Three-Year Academic Achievement Plan,” first presented in 2005, and later revised to become the “Academic Achievement Plan.”
- The local school district hired project staff to provide, over the course of one year, in-service professional development sessions on the Building Blocks curriculum to all prekindergarten teachers who were not part of the study.
- The district administrators established plans to provide in-services for all of the prekindergarten teachers teaching in the Community Based Organizations (CBOs - prekindergarten classes funded by the district, but taking place in venues off-site from district schools).
- Local district invited project staff to provide an implementation fidelity instrument for use by district early childhood education and mathematics supervisors.
- Local district early childhood and mathematics directors invited university project staff to help rewrite the mathematics component of the district report card. TRIAD staff cooperated in this endeavor.
- The local district and project staff shared boundary objects: Fidelity instrument, fidelity instrument, the curriculum “Pacing Plan,” the Building Blocks abbreviated Fidelity Form (Walk-through), aligned, by request, to the district format.
- Local district early childhood department administrators engaged in continued, sustained discussions with project staff regarding the long-range plans for sustainability of the innovation.
- Local mathematics department director contacted TRIAD staff, informing us of the district decision to continue using the Building Blocks software, and asking what we recommended in terms of training for teachers, with a focus on a gifted program which listed Building Blocks as its curriculum.
- The local district approached TRIAD staff with a proposal to hire a mathematics mentor/consultant for the teachers, who would be partially embedded in the classroom. The local district mathematics director planned to set up communications with school level personnel as to the implementation of this plan.
- The superintendent of the local, experimental school district asked the public school/university liaison to contact TRIAD leaders regarding a specialized program he was interested in starting at a certain school with particularly low math scores. He wanted to know if the TRIAD leaders would be interested in collaborating with the district on this specialized plan. He referenced the New York Times article about TRIAD, which featured one of the Buffalo public schools where Building Blocks was being implemented.
- The Buffalo district math dept. director invited the TRIAD/Building Blocks leaders if they were interested in conducting five in-service sessions for the K-2 teachers over the course of the school year, focusing on connecting content knowledge with pedagogy.
- Several teachers from the Buffalo district who were implementing Building Blocks agreed to work with the TRIAD project over the course of the summer.
- The local experimental district hired TRIAD staff as consultants for Building Blocks, to provide beginning of the year instruction on the math curriculum, as a refresher for teachers who knew the curriculum, and as an initial in-service for new teachers and others who had not yet been in-serviced.
- The local experimental district hired TRIAD staff as consultants for Building Blocks, to provide professional development on Building Blocks for new teachers and teachers who had not been in-serviced on Building Blocks.
- The local district technology department, including the director as well as the administrative leaders in the department, supported and cooperated with TRIAD staff in substantial ways during the years of the innovation. They facilitated teacher use of district passwords, supplied ports and other parts, sent district tech specialists to trouble shoot problems, including "freeze" problems, and generally facilitated, within their powers, the enactment of technology component of the model.
• The local district technology director agreed to allow one of the district technology specialists to work for TRIAD/Building Blocks before and after his district employment hours, troubleshooting the integration of the BUILDING BLOCKS software with district software for classroom teachers. TRIAD hired this tech specialist, who then worked for the project until the end of the academic year, facilitating the implementation of the software by teachers who were restricted by district technology constraints.

• The director of the district technology department, in response to a TRIAD request that we employ one of his technology specialists in a support role for TRIAD teachers, before and after his district working hours, in replying, the tech director stated with enthusiasm: “I must say, for the Buffalo Public Schools, Building Blocks is one of the best things the district of Buffalo is doing.”

• The local school district agreed to allow kindergarten and first grade teachers to attend in-services to enhance the teaching of their mathematics curriculum.

Outside The Experimental District
• A neighboring school district hired TRIAD/Building Blocks staff to train teachers to implement the TRIAD model, including the professional development sessions, mentoring, print and software implementation, and use of the online professional development and web applications for teachers. Cleveland-Hill

• A rural school district, 40 miles from the university, hired TRIAD/Building Blocks staff to provide in-services to their teachers over the course of the 2009-2010 academic year, to satisfy district requirements for implementation of a research-based curriculum. Springville

• An out-of-state school hired TRIAD/Building Blocks staff to conduct professional development sessions around mathematical learning trajectories over the early grades, over the course of four days. In addition, they hired TRIAD/Building Blocks staff to provide professional development over the course of one year (via conference calls and visits) to accompany the implementation of the Building Blocks curriculum at the prekindergarten level. Maine

• An out-of-state school district hired TRIAD/Building Blocks staff to provide district-wide professional development sessions for their teachers (PreK to 5th Grade) on learning trajectories in mathematics over a four month period.

Diboll Independent School District
• MRDC – New York Cty

School Level
Local, Experimental Schools
• Principal showed interest in the professional development sessions run by project staff. She wanted to be sure her prekindergarten teachers were attending; she asked TRIAD staff to send her a copy of the sign-in sheets.

School Level
Outside the Local, Experimental Schools
• The university-sponsored laboratory preschool adopted the Building Blocks curriculum.

Teacher Level
Classrooms in Local Experimental District
• Teachers from a school in the Buffalo district who were not part of the study, but who were impressed by the Building Blocks curriculum (to which they were exposed in a pilot study), held self-organized study groups for themselves, and for teachers in other schools in their district, providing their own in-services. Teachers from a school in the Buffalo district (a school not in the study) asked for and obtained their principal's permission to attend TRIAD/Building Blocks daytime in-services, with the school picking up the cost of the substitute teachers.

• Teacher leaders held grade level meetings around the topic of Building Blocks. One of the local principals indicated to TRIAD staff that she was impressed with this.

• Control teachers (delayed implementers) repeatedly asked TRIAD staff and their own administrators when they would be eligible for TRIAD/Building Blocks in-services.

Classrooms outside the Experimental District
• Teachers from two schools (one district outside the study district Windemere, one diocesan St Benedict’s), having heard of Building Blocks, asked permission to attend TRIAD/Building Blocks in-services at their own expense, including the expense of day-time substitute teachers. Their principal supported them in this endeavor, providing substitutes and releasing teachers to attend in-services during the day, over the course of two academic years.
Media and other diffusion vehicles
- A New York Times cover story article by science writer explicated the TRIAD/Building Blocks project, Dec. 21, 2009, and was followed by telephone calls, e-mails, and blogs with inquiries about Building Blocks from throughout the country.
- Buffalo News article.
- NPR
- Science

SITE I

District Level
Distal Site, Experimental District
- Early childhood district level personnel attended Building Blocks professional development sessions for the prekindergarten teachers.
- The district hired three Early Childhood Education math/literacy coaches, and then required that they participate in the Building Blocks professional development.
- The Boston district math department hired a person whose specific job was to integrate the Building Blocks math curriculum with the OWL literacy curriculum.
- During the 2008-2009 academic year, the district of Boston hired TRIAD/Building Blocks staff to provide professional development for teachers who were not part of the original study (new teachers, replacement teachers, and special education teachers). The district organized the professional development for these teachers.
- One of the TRIAD/Building Blocks prekindergarten teachers was hired by the Boston district as an early childhood education coach to conduct in-services on Building Blocks.
- Another early childhood education coach was hired by the district to sit in on and learn Building Blocks through developer-provided professional development sessions, and then to coach the teachers through their lessons.
- A district leader from the Curriculum and Assessment department was hired by the district in Fall 2007 to work on differentiation of the kindergarten Investigations curriculum for the students who participated in Building Blocks.

Outside The Experimental District
- A neighboring public school system adopted Building Blocks. One of the TRIAD project staff was hired by this neighboring district of Boston to conduct professional development sessions for their early childhood teachers during 2008-2009. This district made the TRIAD/Building Blocks professional development part of the teachers’ contractual requirements. All professional development was job-embedded; the district provided for paraprofessional in-servicing as well. The district implemented all components, including professional development, print and software curriculum implementation, mentoring, coaching, parent involvement, paraprofessional in-servicing, and on-line web applications.
- IES-funded researchers from Harvard University tested the effectiveness of the early childhood curriculum (math and science) in the Boston district.

School Level
School in the Experimental Distal District, outside the study
- Building Blocks spread to a non-study school in the Boston district, due partially to the influence of one of the TRIAD mentors who worked for this schools as a math coach.

School outside Experimental Distal District
- A large Catholic School network hired TRIAD/Building Blocks mentors to train their prekindergarten teachers during the summer of 2008. The Building Blocks innovation spread from the Boston district to this parochial school network through the Catholic school’s association with one of the original Boston public school prekindergarten teachers.
• Also, a Catholic school partnered with an area college, using two of the TRIAD project staff to conduct in-services in *Building Blocks*.
• A third Catholic school began to implement *Building Blocks*, separately. The principal contacted two TRIAD mentors and asked them to do conduct math/*Building Blocks* in-services for their prekindergarten teachers. Mentor believes the school purchased *Building Blocks*.

**Media and other diffusion vehicles**
• Boston TV featured a television news report on a *Building Blocks* classroom (did not mention *Building Blocks* by name).