

***ENGAGING SCHOOLS IN
STANDARDS-BASED MATHEMATICS:***

***EVALUATION OF THE
BUILDING CAPACITY FOR CHANGE PROGRAM***

***A REPORT PREPARED FOR THE
CONSORTIUM FOR MATHEMATICS AND
ITS APPLICATIONS***

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*Engaging Schools in Standards-Based Mathematics: Evaluation of the
Building Capacity for Change Program*

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I. Introduction

The Alternatives for Rebuilding Curricula (ARC) Center is a collaborative effort of COMAP, Inc. (Consortium for Mathematics and Its Applications) and three National Science Foundation supported elementary district mathematics curriculum projects: *Everyday Mathematics* (The University of Chicago), *Investigations in Number, Data and Space* (TERC), and *Math Trailblazers* (the University of Illinois at Chicago). As stated by ARC, the goal of the ARC Center is to promote the wide-scale and effective implementation of reform elementary mathematics curricula. The ARC Center consults with schools and districts and provides resources and information that support teacher enhancement and leadership development, and public awareness of mathematics reform and new curricula.

In Spring 2003, the ARC Center began a new program called Building Capacity for Change (BCC), designed to introduce a range of improvement options to school districts in underserved areas, and to increase the understanding of standards-based elementary mathematics curricula. Funded by the National Science Foundation, this initial BCC work was conducted in the state of New Mexico.

Char Associates, an independent educational evaluation and design firm, was hired by COMAP in March 2003 to conduct a year-long evaluation of the BCC program. This report presents the findings of the BCC program evaluation.

Program Description: The BCC had two basic program components. Phase I (March 2003 – June 2003) involved a three-day BCC Mathematics Summer Institute offered in June 2003 to districts interested in learning about standards-based elementary mathematics education. Teams from ten New Mexico districts participated in the Institute. Prior to the Summer Institute, a three-day design retreat for key curriculum partners, project staff and New Mexico educational advisors was held in April 2003 to help plan and design the Summer Institute.

Phase II (July 2003-May 2004) involved follow-up on-site consulting by an ARC math consultant with BCC district teams wishing to initiate more in-depth and sustained efforts on curriculum reform work in their districts. Six of the ten districts involved in Phase I chose to continue with Phase II work.

The Institute was organized by the ARC Center in collaboration with the New Mexico Partnership for Math and Science Education. The BCC Institute had presenters from four curriculum development and implementation support groups: the ARC Center (COMAP), the Math Trailblazers Center (University of Illinois in Chicago), the Everyday

Mathematics Center (University of Chicago), and the Investigations in Number, Data and Space Center (TERC), as well as the mathematics supervisor from the Albuquerque District District, and a mathematics education professor from New Mexico State University. As described in a letter to conference participants, the conference was designed specifically for New Mexico school leadership teams to provide “a forum of the sharing of information and experiences about standards-based mathematics teaching and learning in the elementary grades,” within the broader context of the New Mexico mathematics framework and its implications for current practice.

Phase II (July 2003-May 2004) involved follow-up on-site consulting by an ARC math consultant with BCC district teams desiring more in-depth efforts in curriculum reform in their districts. Six of the ten districts involved in Phase I chose to continue with Phase II work. The ARC consultant visited the New Mexico districts six times over the course of a year, roughly on a bi-monthly basis. The ARC consultant also spearheaded efforts to organize and hold a spring conference on Everyday Mathematics (EM) for a group of New Mexico districts in April 2004, in response to interest expressed by a subset of Phase II districts. In addition, the consultant helped design a second curriculum showcase, similar to the Phase I BCC Summer Institute, hosted by the Northern New Mexico Rural Systemic Initiative, and also offered mathematics content courses at three different sites in the state, in Summer 2004.

State Context: New Mexico has a high minority population that is about 48% Hispanic, 39% White, 10% Native American, 2% African American and 1% Asian, with one in every four children in New Mexico living in poverty. (Gonzales, Picket, Hupert, & Martin, 2002.) The drop-out report in many districts is 50% (Davis, 1997). New Mexico is comprised of 89 district districts, ranging in size from the Albuquerque Public districts with over 87,000 students, to three districts with fewer than 100 students. Some districts are vast in geographic area, such as Gallup that covers over 5000 square miles.

The state curriculum framework, called *Content Standards with Benchmarks*, is based on the new NCTM Standards and was adopted by the State Board of Education in 2002. Student testing for grades 3-9 have used the Terra Nova test, a practice which has recently been phased out; specifically developed criterion referenced tests were piloted in grades 4 and 8 in 2003.

New Mexico is an adoption state, with the adoption cycle being about every six years. With the last round of adoption in Spring 2000, the next math adoption cycle will occur in New Mexico in 2006-07 (three years from the 2003-04 year evaluated.) *Everyday Mathematics (EM)* appears to be the most widely used reform series across the state. Saxon is used in a lot of districts, sometimes as the only text, and sometimes alongside reform texts.

In Albuquerque, *Investigations* was the most widely used reform curricula. In Spring 2000, of the 80 elementary schools in Albuquerque, 20% (16 districts) adopted *Investigations*, 15% (12 districts) adopted *EM*, and 11% (9 districts) adopted *Math Trailblazers*. Teacher training opportunities in Albuquerque has been the most extensive with *Investigations*, with 115 teachers attending an Investigations Institute held in Albuquerque by TERC in Summer 2002, and 120 teachers planning to attend the institute

in Summer 2003. Very little professional development on *EM* has been provided for Albuquerque teachers other than sending two teachers from each of the original 12 districts to a training in Chicago during the first year. There has been no district technical assistance for *Math Trailblazers*.

Evaluation Foci and Methods: Given that the BCC is in its initial year, the evaluation's primary objective was a formative one – to ascertain how the BCC program took shape and evolved to respond to the teacher development, leadership and curricular needs of New Mexico districts new to standards-based mathematics. Analysis was done for each of BCC's two basic program components - – the Phase I Summer Institute and the Phase II ARC on-site consulting work. A major focus of the evaluation was investigating what aspects of the BCC program were most helpful and instrumental in promoting a district's willingness and ability to initiate efforts to utilize standards-based mathematics curricula in their classrooms.

We also examined the contextual factors of school districts and district teams that made the BCC project of interest to districts, and appear to heighten, or hinder, a district's progress towards considering and implementing standards-based mathematics curricula. We also assessed the BCC's programmatic benefits and outcomes in terms of participants' professional growth, changes in classroom practice, and intentional, coordinated district actions regarding elementary mathematics instruction.

A variety of methods were utilized for the evaluation. These included:

- pre- and post- BCC Institute surveys
- post-first year surveys to participants engaged only in the BCC Summer Institute
- post-first year interviews with district administrators and teachers receiving BCC on-site consulting
- individual interviews with New Mexico educators involved in mathematics reform efforts at the district and state level
- in-depth interviews with the ARC consultant providing extensive on-site consulting to all participating Phase II districts.
- surveys to educators attending the spring Everyday Mathematics conference
- a review of various BCC project documents (e.g., district teams' applications for the Summer Institute, teams' work plans/planning templates for Phase II consulting; field notes and written reports produced by ARC consultant.)
- observations of the BCC design retreat and the BCC Summer Institute
- communication with BCC staff through regular meetings throughout the project.

The data collection period was from April 2003 through May 2004.

Given the project's first year, the evaluation's formative nature, and the relatively small sample size of districts and individual program participants, survey instruments were largely qualitative in nature, consisting primarily of open-ended prose items. Qualitative data obtained from surveys, interviews, and project documents were coded for major themes, and then quantified and analyzed to reveal major trends in educator response.

II. FINDINGS FROM BCC SUMMER INSTITUTE (PHASE I)

Background Profile of Participating Districts: To be selected as Summer Institute participants, district teams needed to complete an application form developed by the ARC Center. The application provided background information on the districts and their self-assessment of their programs and teacher professional development in elementary mathematics.

Our analysis of these applications revealed that the BCC Institute attracted a diverse set of school districts, with respect to district size, current mathematics textbooks used and their level of satisfaction with these texts. At the same time, all but one of the ten BCC districts were considering a new mathematics program for the next cycle of math textbook adoption, with most expressing dissatisfaction with their students' test scores in mathematics and/or the curriculum's lack of problem-solving and independent learning by students. This openness to adopting a new curriculum is in spite of recognized challenges posed by limited time, funding, resources, and staff resistance to change. Districts also varied widely in their provision of teachers' professional development in mathematics, with respect to the kinds of services offered, having someone in the district providing such services, and belonging to a collaborative group for mathematics education.

Specific results are summarized below. Differences between Phase I and Phase II districts (i.e., those limiting their BCC involvement to the Summer Institute vs. those requesting subsequent BCC on-site consulting during the year) are noted when present.

- The BCC Institute attracted a quite diverse set of school districts, with respect to student population size. At one end of the continuum were two clusters from the Albuquerque district with roughly 84,000 students in K-12, and 80 elementary schools in the district; each of the two participating Albuquerque clusters had six or seven elementary schools. In contrast, five BCC districts were ones with a single school at the elementary school level, with the smallest school having only 158 elementary school students.

Additional information gathered through other sources indicated that all of the BCC districts had a high percentage of students (80% or higher) receiving free and reduced lunch, and high percentage of students who are Hispanic or Native American.

- District varied in the types of textbooks they currently used, and their expressed level of satisfaction with these texts. Four districts (the two large Albuquerque clusters, and two small districts) indicated that at least a small number of the schools or classrooms used one of the NSF-sponsored standards-based curricula (either *Everyday Math*, or *Investigations*.) Three districts were using either Silver Burdett or Harcourt Brace textbooks, while three districts indicated that they had been using the traditional Saxon text for many years.

District teams ranged in their level of satisfaction with their current texts. Three districts reported either being unhappy with their traditional texts, or pleased by what they saw

occurring with the standards-based curricula used in a few of their schools/classrooms. Three districts were mixed in opinion, saying they viewed both strengths and weaknesses in their current texts. Two of the three Saxon districts reported being generally pleased with the traditional text. (Two districts did not indicate a level of satisfaction for their texts.)

Regarding features they liked best about their current texts, participants said that their text: provides opportunity for practice, repetition and review; aligns with standards and benchmarks; offers a good sequence of concepts and continuity; or is “teacher friendly” and teachers feel comfortable using it.

- While having varying levels of satisfaction with their current texts, all but one of the ten districts reported were considering a new math program for the next round of New Mexico math adoption occurring in 2006-07 (three years away.) Various reasons were given as to why they were considering adopting a new program, including having low test scores, wanting more problem-solving activities and less rote learning, and desiring more consistency across the district and within a district in what mathematics curriculum is used.

Depending on the district, a wide range of individuals were identified as being involved in the adoption process, including classroom teachers, math curriculum committees, and building principals. Both federal and state funds were identified as being used to support textbook purchases.

- Seven out of the ten districts reported being dissatisfied with their math scores. A difference in reactions from Phase I vs. Phase II districts suggests that dissatisfaction with low test scores may be a primary factor in motivating districts to continue with Phase II BCC on-site consulting; dissatisfaction was uniformly emphasized by all six Phase II districts, while only one of the four Phase I districts voiced dissatisfaction with their test scores.

- About half of the districts had someone in the district providing teacher professional development in mathematics (six districts had such a person, while four did not.) Districts that continued with Phase II were in greater need of in-district support: five of the six Phase II districts had no in-district support in mathematics within their districts, whereas only one of the four Phase I districts had no such in-district support.

Roughly half of the districts were part of a collaborative group for mathematics education (four districts were part of such a group, while five were not.) Of the six Phase II districts, three were part of the Northern New Mexico Network, while three were not part of a collaborative group.

- Districts varied widely in the kinds of mathematics staff development provided in their district. The two large Albuquerque clusters reported district level training on the NSF math curricula, but that it only reached a small percentage of the 3600 elementary school teachers in the district. One of the Albuquerque clusters reported that there was an instructional coach in each of the 80 elementary schools, but that the coaches have varying levels of understanding of standards-based mathematics. Other districts reported

single workshops on distinct products or projects (e.g., digiblocks, Accelerated math, Star Math, Excel math) or topics (e.g., curriculum writing, test taking strategies). A range of different individuals were identified as being responsible for planning and conducting the training, including district level coordinators, Central office administrators (e.g., superintendent, director of instructional support), school administrators and principals, and instructional coaches. Districts identified a range of funding sources for training, including Title I and Title II funds, operational budgets, and other federal funds.

- Regarding challenges they faced in trying to improve mathematics teaching and learning, district teams voiced a variety of issues, concerning inadequate time, funding and resources, weaknesses in their current curricula, and the difficulty of having staff willing to improve their teaching methodologies and strategies.

BCC Summer Institute: Participant Reactions and Outcomes: As reported in an earlier study (Char, 2003), a post-conference survey was administered to Summer Institute participants who attended at least one day of the Institute (n = 27; 93% of active participants.) Survey results revealed that the BCC Institute was well-received by conference participants, and was successful in sharing information and experiences about standards-based mathematics teaching and learning in the elementary grades in New Mexico.

- Participants reported three main important areas of learning resulting from the Institute: 1) information about standards-based mathematics and the different ways for students to learn about mathematics; 2) knowledge of what is involved in the district change process; and 3) awareness of the broader New Mexico state context for districts around mathematics. Thus, areas of learning mapped well onto the Institute's primary goals. Participants were especially appreciative of the opportunity to hear from other districts and educators in New Mexico, and requested additional time for such discussion, exchanges, and teamwork to improve the Institute.

- Participants viewed the BCC Institute as having a variety of educational impacts on themselves as individuals. These included a desire to use new mathematics teaching techniques and more standards-based curricula with their students in the future, and to engage colleagues by sharing information and increasing the professional development activities in mathematics in their districts.

- Regarding desired district changes resulting from the BCC Institute, most participants reported that they hoped their districts would move more towards standards-based instruction, start the process of school change (e.g., create a plan, get buy-in from others), or begin piloting standards-based curricula. They viewed next steps for their district teams as involving sharing information with others in their schools and districts, increasing professional development activities for themselves and others, connecting and networking with other New Mexico districts, and planning to implement some aspects of standards-based curriculum in their classrooms and districts. The main "important question left unanswered" involved how to share information and work with others, how to pilot materials and receive support for doing so, and issues around student achievement, testing and assessment.

Student achievement and assessment in mathematics was a common theme in participants' responses, with a consistent presence of evaluation issues in respondents' discussion of the most important things they had learned, description of anticipated team activities, questions they still had, and as a motivating factor for moving towards standards-based curricula.

- The majority of participating individuals and districts left the BCC Institute interested in pursuing continued efforts in standards-based mathematics efforts at their districts, and seeking project support in those efforts.

- Participants offered few suggestions for changing or improving the Summer Institute, with the exception of desiring more time for discussion and exchanges with other districts and educators in New Mexico engaged in mathematics reform efforts, and for work in their teams.

Interviews held ten months after the Summer Institute (April 2004), with core participants from each of the six Phase II districts, shed additional light on participants' motivations for attending the Institute. When asked why they chose to participate, district administrators often described their motivation in terms of the desire for their district to move towards a scientifically-based, standards-based curriculum, or stemming from their districts' low test scores.

*A number of years ago the district started a focus to move closer to research-based models of instruction. The district started with literacy and had just started to work on the writing piece. When we started to look at what our districts needed, we knew we also needed the math piece; we were looking at ways to focus on the math.
(District director of curriculum and instruction)*

*Our district is a district that is considered "in need of improvement." The reading scores are pretty low...and we found our math scores are pretty low too. We are going to standards-based instruction because the textbooks that we had weren't making the grade. We were looking for a series that would provide more critical thinking, more hands-on type of instruction rather than the rote type of instruction.
(Principal)*

Somewhat in contrast, several teachers described their motivation as stemming from previous, personal experience with one of the NSF standards-based curricula:

I had been using Investigation on my own over six years. I would do Investigation and a little bit of Everyday Math because in the early 90's I was involved on an NSF review panel for material development. On my own, I ordered the materials and tried them out. I became aware of new materials that I thought would be better for my students, especially with my second language learning students...I spoke to my principal, after our low CRT scores, and said what we're doing in math is not working. We need to make a change to a standards-based program.

In my previous district, I taught Everyday Math...When I came to [my current district]the 6th grade was using Math Land, and it was the adoption year for math.

Last summer the teachers and I went to the University of New Mexico library and looked at the different math programs and textbooks and I talked about Everyday Math and gave the teachers background. So the teachers adopted Everyday Math last year.

In general, district teams had classroom teachers with more experience and familiarity with NSF math curricula than their administrator colleagues. A notable exception was one principal with prior experience with *Investigations* and other NSF-sponsored science and mathematics curricula from working as a mathematics curriculum director in a New Mexico SSI. This principal brought a teacher team from his district to learn about *Investigations* with the clear intention that they would begin using it in their district.

Our math scores were beginning to appear pretty low in our school and in our district. I knew from my previous experiences of having been involved with Investigations that that's something we really needed to look at to help us to improve scores and get people on board... You got to get started somewhere and this was the kind of introductory type experience to get teachers interested to see what is going on, to see what kind of nationally recognized programs are out there. This is one of the things with NCLB, that we use research-based curriculum and this is one of the things that fit. (Principal)

Post-program interviews corroborated the positive reactions to the Summer Institute expressed immediately following the Institute. What participants valued most was gaining exposure to and initial insights about each of the three curricula, and having the opportunity to learn from other educators undergoing the process of district change.

I had never had any experience with standards-based math. It was a total eye-opener for me. Getting the real hands-on, showing lessons, was very informative, plus being able to ask questions. You could see what was going to be taught in the classroom and the reasoning behind it. I had heard of standards-based math -- that had been kind of the talk at the last meeting of elementary districts, but it really didn't mean anything to me.... I liked the way that they gave us the three different companies that we could choose from and to see the differences, because there were definitely differences. It worked for me. (Principal)

I was really grateful that I had this opportunity to experience the three-day training in Albuquerque. It certainly opened my eyes. I have a phobia of math. I learned just how it was approached by standards-based curricula. It was challenging, not dummed down, but it was engaging. (Principal)

The most helpful part was the idea that this was really a quest, a journey; that there were lots of districts starting out on this process, that we weren't alone in this process.. It gave folks a way to feel good about looking at math, that they weren't making this journey on their own. Gave them time to converse about math. (District administrator)

The requirement that participants attend as district teams appears to have also been a critical component, since the Institute enabled participants to actively engage with colleagues from their own district towards the endeavor of mathematics reform.

The major reason that I went was to have a setting where administrators could listen and learn about the three programs...I was just happy to have an administrator come with me who was being supportive. The real reform has to come from an administrator supporting it, so that was probably the most valuable. (Teacher)

Looking back ten months later and having subsequently experienced on-site ARC consulting, core Phase II participants had few recommendations of ways to improve the Summer Institute. The main recommendation voiced by three administrators was the option to bring more teachers from their districts, as the Summer Institute had necessarily limited them to 3-person teams due to the BCC's goal to accommodate ten or more districts. This desire to have more faculty attend such professional development trainings was partially addressed in a BCC curriculum conference held in April 2004, as will be discussed in a later section of the report.

The ARC consultant also suggested some possible modifications to the Summer Institute, given additional insights drawn from her later Phase II work with districts. These recommendations pertained to:

- *outreach and recruitment* (sending flyers to principals and not just superintendents, extending the recruitment period to more than four weeks, allowing a project staff member to meet with potential districts beforehand to establish contacts);
- *participant guidelines* (requiring that decision makers/administrators attend Institute, setting up follow-up district site visit to observe classrooms as one of first steps for Phase II work);
- *design of conference sessions* (leading off with research on effectiveness and why change is needed, providing comparisons between NSF programs and regular publishers' programs, having fewer "mathematical topics" sessions since teachers first need some prior experience with materials, greater emphasis on need and methods for professional development if districts wish to pilot materials);
- *time allocation of conference structure* (redistribute time so that "three full days" conference becomes "half day – 2 full days – half day" conference, to increase participant attention and retention of information).

III. TRANSITION FROM BCC PHASE I TO PHASE II: PLANNING FOR FOLLOW-UP WORK IN DISTRICTS

Six of the ten districts participating in the Summer Institute chose to continue working with the BCC and its ARC consultant in the upcoming school year (2003-04) as they initiated exploring the use of standards-based curriculum in their districts.

In their post-program interviews in the spring, core members of the Phase II district teams described why they wished to continue with the BCC during the school year. Some team members reiterated their determination to try out one of the NSF curricula in their districts, given their dissatisfaction with their current texts and their students' mathematics learning and test scores. Others pointed to their great need for teacher professional development in mathematics that they knew was essential when attempting to implement new standards-based curricula.

In every case, Phase II district teams expressed their enthusiasm and appreciation for having the opportunity to receive follow-on consulting support from ARC.

Very early on, Mary Kay got in touch with [my principal] and then [my principal] came to me very excited, and said that the ARC Center and Mary Kay really were ready to support us. It's always a surprise when these things happen. A lot of people do drive-by workshops and they say they will help, but when it comes down to it they don't follow through. (Teacher)

Post-program surveys sent to the four districts that decided only to engage in the Summer Institute asked why they chose not to continue with the Phase II on-site consulting option. Of the nine educators contacted, only six returned completed surveys (66% return rate.) Of the six respondents, two educators reported that they were committed to other programs, while two said this was not their decision to make, but someone higher up in their school/district. Two, somewhat surprisingly, indicated that they were not fully aware that they had this option. The evaluator, having attended all three days of the BCC Summer Institute, can confirm that the BCC presenters made clear that continued involvement through on-site consulting was an option for all districts. We suspect that the lack of clarity of this option reported in the post-program survey was due to the fact that ten months had elapsed since the Institute was held. One respondent simply indicated, "it has been a very crazy and challenging year."

Planning and the Importance of a Year-Long Plan: During the Institute's final day, district teams filled out a planning template to map out where districts saw themselves in their elementary mathematics programs and where they would like to be, and what type of resources and actions they thought were needed to help them make this change.

Responses to the planning worksheets provide an additional snapshot that both confirms and extends some of the information gleaned from districts' original BCC applications completed one month earlier, and provide a rough composite profile of the Phase II districts and their varying needs.

Planning Worksheets: When describing how they currently regarded their districts in terms of their elementary mathematics programs, Phase II districts viewed themselves as being traditional textbook-based and/or driven, with low test scores, and in the beginning or transitional stages of moving from traditional instruction to more student-centered learning/standards-based instruction. As to where they would like their district to be, Phase II districts described wanting all students to be able to perform well on assessments (e.g., “99% of our students to score proficient or above on the Terra Nova), and having students who were more critical and independent thinkers and problem-solvers, and more motivated learners of mathematics. District teams identified low test scores as a primary factor for considering changing its mathematics curriculum, along with teacher interest, and a realization that the current programs were not serving students well (e.g., “Our students are not prepared to go to the next level.” “They can not relate to real life problems.).

When presented with options of possible activities they could chose to support school change, district teams described various combinations of activities, incorporating professional development, information gathering, help with action plans, evaluation and assessment. Also mentioned, but to a lesser degree, were materials review and selection, communication with parents, and articulation between grades. Individuals also expressed an interest in receiving support with purchase of materials and supplies, receiving videos that showed students in standards-based classrooms and visits to classrooms where these standards-based programs are being used, and more generally speaking, help with being “a catalyst for change.”

Each district envisioned a slightly different constellation of educators and other constituents as being involving in planning and facilitating these changes. Individuals mentioned included classroom teachers, teacher and math leadership teams, principals, superintendents and other administrators, circuit riders from the Northern Network, and parents and community members. Equally varied was the set of district resources teams indicated were available to support such change, with respect to funding (Chapter I and Chapter II, Title II), release days, and professional staff (e.g., cluster staff developer, instructional coaches from other districts.)

Given the diverse set of needs, desires, and resources across the various districts, district teams identified a wide range of requested outside assistance. District teams described ARC support in working with instructional coaches and the math leadership team, professional development regarding content, program selections, and modeling of effective instruction, support in piloting materials, and access to grant money and other districts using these materials.

While Phase II districts had a number of options before them to support desired changes in their mathematics program (e.g., engaging in study groups, forming teacher groups to review materials, teacher meetings or workshops), almost all of them ambitiously embarked on trying to pilot one or more of the three new NSF curricula in at least some of their classrooms in the coming year.

Formulation of the Year-Long Plan: District teams found it challenging to frame their plans for the year with much specificity, and indicated that the ARC consultant was instrumental in guiding their planning and formulation of their year-long plan that fall.

Actually a lot of planning was with Mary Kay's help. She came in and worked with some teachers and then we planned one of our in-service days to have her come in and work with us. We sat down as a staff and looked at what our needs were and what our time constraints were. We started writing some of the plan at the Institute. Then, it was completed in October, before the in-service day. (Principal)

Mary Kay explained what we had to do. It had to be tied into national curriculum and there had to be some way to be accountable. She was very good because she understands people's reluctance. She was not concerned with methods to go about to start something. (Teacher)

Even one of the experienced circuit riders (master teachers) from the Northern Network acknowledged that she was not inclined to think through year-long plans with the districts she worked with on a weekly basis, saying, "It was valuable to write a plan at the end [of the Institute]. I find it difficult, but I find it helpful too. I am not a plan type person but it was helpful for the teachers to have the plan."

Several Phase II educators stated that the written plan was an extremely useful tool to refer back to throughout the district year, as the ARC consultant continued to work with them.

We developed an action plan about where we were going to go and what we were going to do to get there. The follow-up meetings with Mary Kay where she would come in and sit down with us and see where we were, were helpful. This kind of kept us on line. If we had some questions she could guide us. She could tell us what we needed to do. She could keep us on track and coordinating everything. (Principal)

One district-level math specialist underscored the important addition of the BCC planning piece to how districts normally worked.

Mary Kay brought in content – these are the curricula out there, and what they stand for, and how they're different – the knowledge package. But she also brought these processes of systems – let's plan it, let's make it intentional, type it [the plan] up, get it back to you. Some people don't take that planning process for granted, or it doesn't exist.

IV. ON-SITE WORK IN DISTRICTS (PHASE II): ACTIVITIES AND OUTCOMES

During BCC Phase II (July 2003 – May 2004), the ARC consultant made five visits to New Mexico over the year, roughly on a bi-monthly basis, meeting on-site with Phase II district teams to support their progress on their year-long action plan. In response to interest expressed by a group of Phase II districts, the ARC consultant also spearheaded efforts to organize and hold a spring conference on *Everyday Mathematics (EM)*. The consultant extended support during the summer and fall of 2004 and made three additional trips to New Mexico, offering math content courses and planning a coaches training program.

During the 2003-04 school year, most of the six Phase II districts either piloted one of the NSF curricula in some of their classrooms, or made significant progress in setting up a pilot for the 2004-05 school year. In a number of cases, the Phase II districts, while well-intentioned and determined to make change happen in their math instruction, initially set out on an overly ambitious and not well-defined plan to use or pilot materials. For example, one principal purchased the *EM* series for his teachers immediately following the Summer Institute, yet had no provision, plans or budget set aside for how to provide his teachers with professional development to learn how to use these materials.

Nonetheless, over the past year with the able assistance from the ARC consultant, three of the six BCC districts actively explored and/or piloted *EM*, two districts piloted *Investigations*, and one district began exploring both *Investigations* and *Math Trailblazers*.

As illustrated in Figure 1, each of the Phase II districts set out on a somewhat different course of how they wished to actively explore and/or pilot the standards-based curricula during the year. The figure illustrates the diversity of the districts' plans, the modifications of these plans during actual implementation, the various levels of exploration and piloting that occurred, and the flexible and comprehensive approach the ARC consultant took to addressing each district team's needs.

Figure 1: BCC District Teams' Phase II Plans versus Actual Implementation

	Original Plan	Actual Implementation
		<i>EXPLORATION WITH CURRICULUM MATERIALS</i>
District A	1 class at each grade, K-3 would begin an EM pilot this year. Difficulties w/ obtaining materials, so changed goal to some exploration with materials.	<i>Exploration of EM*</i> . AC modeled EM lesson in each of 4 classrooms. Met with piloters twice, once to intro program components, and once to revise pilot plan for the next district year. Helped district math leader obtain EM game kit which she used in lesson study group with other teachers in the district. Several non-piloting teachers from school came to both days of EM user's conference and became inspired to pilot also. While starting a year later, will actually involve 2 teachers at each grade level rather than one, and should be much better prepared. After EM spring conference, 3 other schools from this cluster will pilot EM in 2005.
District B	Explore both Investigations and Math Trailblazers this year.	<i>Initial exploration of Investigations</i> . Met with CR* and principal in Aug., twice in fall scheduled meeting to solicit piloters but both times cancelled. Shadowed CR in winter. New superintendent agreed to pilot if teachers interested, organized meeting. AC presented need for change and some aspects of Inv. and all but kindergarten teachers agreed to try 2 units in the fall. Sent CR and Director of Instruction cost analysis of work. Also contacting Sales rep if could provide day of staff development.
		<i>PILOTING OF CURRICULUM MATERIALS</i>
District C	Observed all classrooms w/ CR* then met with grade 4 teacher & principal to develop plan to explore a new pgm. CR was to model lessons from the 2 pgms of interest; unfortunately CR resigned so modeling left to AC.	<i>Spring Piloting of Investigations</i> . Fall - AC modeling and 2 teachers from each grade agreed to try 2 units from Inv., planned for spring. Principal also wanted some exploration of EM, planned for fall 2004. Lead teacher had ordered 4 different units for each grade; then both teachers at each grade decided to pilot Inv. Consultant and AC felt each pair of teachers should start together, so obtained another copy; mainly selected Data units so all district could have similar experience. Planned 2-day kick-off (Bridges work on data; & unit exploration; modeling of lessons). Currently teachers are finishing 1st unit, and soon begin next. AC arranged for these teachers to receive EM training for fall pilot with APS teachers.
District D	Decide to use EM pgm and materials ordered.	<i>Piloting of EM</i> . Aug. - AC visited with some teachers to explain program components. Oct- some teachers started to use, other had not. Met to discuss issues about pacing and lesson format. Dec. – modeled lesson in Gr. 4 and presented workshop on EM's unique approach to Number Operations. Implementation issues in K-2, principal advised about need to support those teachers. AC offered additional help during winter, none requested. All teachers attended EM user's conference in April & responded favorably. AC gave ideas from EM list-serve for a parent night they had mentioned needing. Most teachers participated in summer math content course.
District E	At BCC Summer Institute, invited to Inv. Training in Gadsen (through another NSF	<i>Fall/Spring Piloting of Investigations</i> . Fall – AC modeled Inv. Lessons and met w/ piloters several times. In spring, worked with other 2 districts modeling Inv. Lessons and meeting teachers after district to explain why change in program advantages for them as

	grant.) Principal bought the teachers materials and grade 4-5 pilot ensured.	their new state standards and criterion referenced local tests already shown improvement in student performance. Met twice with their Regional Ed Ctr director to discuss possible staff development for the summer. Had several meetings with principals and one with superintendent to discuss fall pilot possibilities.
District F	Work with EM sales rep and principal to obtain pilot materials for EM.	<i>Fall/Spring Piloting of EM.</i> One teacher from each grade level began using materials soon after start of district, through end of year. During 1st visit, introduced materials to pilots and demoed lessons in most of the 6 classrooms. 2 nd trip - - met with MS principal and ass't to superintendent explaining program and discussion some options for staff development as well as extending programs. Also met with pilots to resolve use issues and to plan for sharing findings with other teachers. All pilots and K-1 teachers attended April EM conference. Local tests have already shown an improvement in student performance. All teachers attended a four-day math content course in Summer 2004.

AC = Arc Consultant

EM = Everyday Mathematics

CR = Circuit Rider from Northern Network Inv. = Investigations

Thus, with considerable and skilled assistance from the ARC consultant over multiple on-site visits, all six Phase II districts were able to make significant progress in their actual piloting of new curricula, or active exploration of these materials.

Nature of ARC Consultant Support and Facilitation: According to the ARC consultant’s field report, the consultant’s work could be characterized as falling into four major categories of support – engendering buy-in; leadership development, identifying resources, and curriculum review, piloting and selection. The consultant clearly articulated a comprehensive, and well-articulated framework of support and services, and specific tasks and efforts that constituted each of the categories of support.

<p>Engendering Buy-In</p> <ul style="list-style-type: none"> • Finding like districts who have successfully implemented a standards-based program and send teachers to observe and debrief with their staff. • Sharing and discussing articles and research that support standards-based change. • Offering after-district presentations on the need for change. • Offering professional development giving teachers opportunities to experience the learning of math with a standards-based approach and to expand math content knowledge. • Modeling lesson samples from the programs in classrooms.
<p>Leadership Development</p> <ul style="list-style-type: none"> • Communicating with each district’s leadership team on a regular basis; sharing and developing ideas through email, phone or meetings • Encouraging leaders and/or potential pilots to attend professional organization functions such as: meetings sponsored by national and state math associations, the state department, consortiums, and leadership training provided by the publisher • Discussing ways to reduce identified impediments to change • Helping leaders facilitate staff development in their buildings with such things as discussion groups, lesson study, and consultant presentations • Encouraging publishers to develop more local teachers as presenters
<p>Identifying Resources</p> <ul style="list-style-type: none"> • Encouraging administrators to use Title monies in new ways • Soliciting support from sales representatives • Finding materials that could be borrowed • Locating local consultants who could support piloting • Encouraging other grant organizations and two of the Regional Education Centers to provide staff development opportunities in mathematics • Meeting with superintendents and principals to explain what was needed and prepare a cost analysis for them • Finding other districts that were willing to mentor and/or collaborate in users groups • Finding businesses to fund a program users meeting
<p>Curriculum Review, Piloting and Selection</p> <ul style="list-style-type: none"> • Helping the leadership team to develop a plan to review, pilot, select and implement a new program. • Asking publisher representatives to organize presentations, sampling and/or piloting of program materials or send teachers to regional showcases of standards-based programs • Planning the materials purchase and the staff development for the pilots • Offering a model evaluation instrument to use with piloting • Suggesting ways to inform parents about how things will change and why • Meeting with pilots to introduce the use of a program • Meeting with pilots to help resolve challenges as they used the program • Presenting the need for change and aspects of the programs to staff not already knowledgeable

(ARC Consultant project report, May 2004)

Post-program interviews with both administrators and teachers from the six Phase II BCC districts provided strong documentation of the extent and range of these consultant activities, the way this support was deeply valued by district team members, and the positive impact the consulting support had on districts.

<i>Consultant Support</i>	<i>BCC District Team Comments</i>
<i>Engendering Buy-In</i>	
<ul style="list-style-type: none"> • Finding like districts who have successfully implemented a standards-based program & having teachers observe & debrief with their staff. 	<p>“It’s nice to have people at the same grade level but at a different district who are farther along, like the Rio Rancho teachers. The networking they’ve [ARC] been doing has been very helpful. Having some teachers who could say, “When we started we were having some problems, but now it’s not a problem and here’s how we worked it out.”</p>
<ul style="list-style-type: none"> • Offering professional development that allows teachers to experience the learning of math with a standards-based approach. 	<p>“MK did a math class using examples from standards-based curriculum. The teachers who came found it very helpful especially because it came from several programs. This really helped them with the math. Some even realized that you could do algebra in kindergarten.”</p>
<ul style="list-style-type: none"> • Modeling lesson samples from the programs in classrooms. 	<p>“MK has been very helpful, she’s met with teachers, she’s demonstrated lessons. She goes in the classroom and works with teachers. To me, that’s the most valuable.”</p> <p>“When MK first came in, she taught a lesson. I could watch her. The kids were so involved. I thought if they responded to her and she doesn’t know them, they will respond to me.</p>
<ul style="list-style-type: none"> • Offering presentations on the need for change. 	<p>“She was very good because she understands people’s reluctance. She was not concerned with methods to go about to start something.”</p>
<i>Leadership Development</i>	
<ul style="list-style-type: none"> • Communicating with a district’s leadership team on a regular basis 	<p>“My principal decided to come along with me [to the Summer Institute] and then she really started the emphasis on making moves to standards-based....The follow-up that MK has given us has been spectacular.”</p>
<ul style="list-style-type: none"> • Helping leaders facilitate staff development in their building 	<p>“As the math leader, I was able to come back and bring ideas of how to look at math differently. I learned that there are different ways to present math from a standards-based perspective. All of this has helped me get ideas for presenting to other teachers.”</p>
<i>Identifying Resources</i>	
<ul style="list-style-type: none"> • Soliciting support from sales representatives • Locating local consultants who could support piloting 	<p>“[The Albuquerque math specialist] has worked really hard with the EM sales rep to get EM trainers ready for the district. We don’t have enough trainers for such a huge district. That’s been a huge barrier. MK has been instrumental in addressing this and keeps reminding the sales rep (based in Texas) that New Mexico is important...We are now getting at least some number of people that we can use to do the training.”</p>
<ul style="list-style-type: none"> • Meeting with superintendents and principals to explain what was needed and preparing a cost analysis for them 	<p>“What proved to be really great was that she spearheaded getting materials for the district, like getting manipulatives....MK said that the piloters had to have the manipulatives and the administration found the money.”</p>

<ul style="list-style-type: none"> • Encouraging administrators to use district monies in new ways • Soliciting support from sales representatives 	<p>“We decided to get one teacher in each grade level to pilot the program. We talked to the sales rep. He donated the first journal for the classrooms for all the kids if we ordered the teacher resources. I came home and scrounged around and found the money and it [the pilot] happened.”</p>
<ul style="list-style-type: none"> • Encouraging other grant organizations and centers to provide staff development opportunities in math. • Finding other districts willing to mentor and/or collaborate in users groups 	<p>“What’s been most helpful is having her sit with teachers, do problem solving, help them see where they were, figure out how to get other districts interested. She worked quite a bit in doing that. She did go to the other districts [in our district]. She did some work with them, presented some classes, talked to them. We met with some outside agencies, our regional co-op here. She’s worked a lot with the Northern Network. The Co-op is going to be doing their summer showcase.”</p>
Curriculum Review, Piloting and Selection	
<ul style="list-style-type: none"> • Helping the leadership team to develop a plan to review, pilot, select and implement a new program. 	<p>“It’s not a math adoption year, so we wanted to get a jump start and have teachers see what was available. Our plan was to educate the teachers and see what would best work for our population of students, and to look ahead to adoption and see what would worked best for our teachers.”</p>
<ul style="list-style-type: none"> • Meeting with pilots to introduce the use of a program • Meeting with pilots to help resolve challenges as they used the program 	<p>“One of the things I hear my teachers talk about a lot is how they appreciate having real quality in-service. It’s great to have people in your building who you can walk next door to and talk about your program with, but when you get stuck or have a question, it’s not real helpful to...talk to a person who doesn’t understand it any better than you do. So having access to people that really understand how the math works, how the spiraling works, in particular for EM, that is the piece they have talked a lot about. They really appreciated having someone who could give them a direct answer to their questions; they didn’t flounder as much.”</p>
<ul style="list-style-type: none"> • Planning the materials purchase and the staff development for the pilots 	<p>“She was instrumental to know what [the district] should purchase if they are piloting next year. She’s very knowledgeable about that. She’s also made some good contacts in the state [who provide professional development training], a couple of people that I did not know. I can network with them now. They are going to put a together a showcase this summer [to which my teachers are going.]”</p>

All team members interviewed voiced the critical need for their teachers to receive professional development in mathematics if they wished to effectively implement standards-based curricula in their districts.

In her post-program interview, the ARC consultant offered her own perspective on what she regarded as her particular contributions to the BCC districts, and the wide range of objectives and consulting strategies necessary for fostering district changes in mathematics reform.

(Engendering buy-in) “Raising awareness among all the teachers and administrators - that’s a biggie, getting everyone on the same page. Because in the summer, we only had three or four people from a district. So I had to go back and

make sure other people heard the message. I did multiple visits beyond the summer.... I demonstrated a lesson in teachers' own classrooms – that was an important step that was part of the buy-in.”

It's important to involve administrators in the process – making sure they were part of the planning, making sure they were going to bring resources, and set aside meeting time for teachers.”

(Leadership development) *“I arranged an introduction for how to use the program, demonstrating in classrooms, and arranged to do content courses – funded by either the superintendent or NSF grant directors – in half the BCC districts.”*

(Identifying Resources) *“Get materials purchased, write proposals. I literally figured out what they needed to buy, laid it out, what they would need to order, if they were going to pilot. There are a lot of pieces in any program – some you need, some you don't. So you need a trained eye to do that, which I learned the hard way when I saw what some of them were doing and had ordered.”*

(Curriculum Review, Piloting and Selection) *“ I helped get preview materials for people, and developed the pilot plan. I supported and helped the piloters – whatever their issues are, talking with them, demoing, answering questions”.*

The ARC consultant stressed the importance of the follow-up on-site support that teachers critically need that was afforded by the BCC Phase II work, and how teachers' specific, burning questions do not arise until they are back in their classrooms trying out the materials. She also emphasized that multiple visits were absolutely critical.

During my visits, I answered lots of questions – “What should I do about homework? How much time to spend on a lesson? Should I expect all my kids to master this at a time? I'm way behind, how can I speed up? Where do I find certain materials? How do I assess the kids?” Just the typical questions implementers have with a new program like this. Which is why when you're doing an implementation pilot you have to come back two or three times to them.

They can't take it all in initially during the initial training. Only as they use the program do other things surface. You have to get back to them, and make sure that they don't get frustrated because they don't have the information they need. That's why on-going visitation – two or three times through the year – is critical.

The ARC consultant also stressed that an essential element of the multiple visits was having the initial visit include her observing at least one elementary and one intermediate class in each participating district.

You meet the people at the Institute, you hear their problems, you hear what their goals are, but you don't really understand it until you get into the district, in the classroom. It's part of the due diligence that you have to do as someone who is really going to help them. You have to go down and see what's going on in the building.

That's Step 1. Without any expectation to do anything else, except to go in and fact-find.

Another thing the ARC consultant arranged was for several district teams to visit a district already successfully implementing one of the standards-based curricula. Participants spoke appreciatively about all they had learned from the visit. As the ARC consultant described, "It's always been my experience doing this in many different districts, that there is something about getting teachers to go and visit another district [using the curriculum.] It's a powerful thing they can do, to get buy-in – to watch a colleague or peer use the program and see what kids can do in the classroom. It challenges them to get it to happen."

Team members corroborated the importance of the ARC consultant spending time in their districts observing their teachers, modeling lessons, and providing follow-up support as teachers began trying out aspects of the new standards-based curriculum with their students. One particularly successful model of this approach occurred in one district in which the ARC consultant partnered with an *Investigation* consultant and a circuit rider from the Northern Network (part of the Rural Systemic Initiative). Together, they provided a two-day workshop that first introduced teachers to *Investigations*, and then had consultants model these lessons. Then, on the following day, teachers began teaching a lesson from the curriculum. As one of the pilot teachers described,

The workshop we had in January was outstanding. People were excited and enthusiastic...Aspects that were important were the 2-day length, having folks go through lessons in the program, focusing just on Investigations. Everyone got two units per classroom that they chose, everybody went through a couple of data collection/statistics lessons. The next day, [the presenters] modeled lessons. That [modeling] was the strength. Those teachers that were willing to try, that gave them the incentive to kick it off. They had good support on how to use the books. [One of the circuit riders] was in yesterday and she was following up – she's checked up on us 2-3 times.

This enthusiasm and momentum experienced by the teachers proved to be a critical factor in the future prospects for success at the district. This district, fraught with a history of high administrative turn-over, ended up not rehiring the elementary principal who had become a champion of standards-based curriculum through the Summer Institute, and had exercised leadership in promoting the pilot work established at the district that year. Although the main teacher team member who was an advocate of the program and pilot remained at the district, it was unclear whether math reform would keep progressing or cease. However, in June, the ARC consultant heard from this teacher and received the promising news that work would be continuing in the coming year, citing the positive BCC efforts to include the district in training offered by another large district, and the receptiveness of the new principal, fortuitously already familiar with standards-based mathematics.

I can't thank you enough for contacting APS (Albuquerque Public Districts) and getting us included in the Everyday Math training!! I was at the Showcase yesterday and Anna shared your e-mail with me. I am so thrilled that we have been included.

One of the best things is that our new principal was there and I could share the information with her! I was sure we would get a new principal that would not get the information, or who was not interested, however the timing was perfect and she was very glad to take the ball and run with it!!! So YIPEEE!! We are still on track.

Our new principal was the director of instruction in [another district] and said she was in the process of getting that district to pilot EM, so she is a believer!! Our principal had a meeting with our superintendent yesterday and was going to ask about funding. Also since the training is our first day of district she is hoping we can be released to go to the training. Also Anna spoke to Franny (the Albuquerque math specialist) and asked if we could send two people per grade and Franny said that would be fine, so we can all get trained! This has fallen together perfectly. I hope the Superintendent supports the effort. Once again, thank you so much for your part in making this happen.

Thus, it appears that reform efforts can survive administrative upheaval, if it can build upon educators' previous experience with standards-based mathematics curriculum, can harness established "professional development infrastructure" and connections within and between districts, and administrators are sufficiently involved and convinced that standards-based mathematics is the necessary future direction for their districts. Other studies (e.g., Char, 2002) have also documented the importance of instructional leadership teams comprised of both administrators and teachers to provide districts with stability, continuity, and momentum in district reform efforts, despite high administrative turn-over.

Interviews with members of the Phase II teams were uniformly glowing and highly positive about the type of support they received from the ARC consultant. They described her as extremely knowledgeable, skilled, and experienced, and as one who understood not only standards-based mathematics and these particular NSF curricula extremely well, but understood how schools and districts worked, and what teachers wanted and needed. District teams were especially appreciative of her responsiveness, and flexibility in working with the special needs, personalities, and idiosyncrasies of their particular districts, and being sympathetic to, and knowledgeable about the challenges and pressures faced by classroom teachers and administrators.

Our school year started in July, but we didn't get the books until September and the manipulatives until December. She gave the teachers permission to do as much or as little as they could. I had used the first edition, but just the change from the first edition to the second edition was overwhelming. She gave us permission to try parts. We called it an exploration.

Phase II teams appreciated her kind and supportive nature and personality, and also admired her tenacious dedication to having districts grow and progress in their plans to have increasingly skilled, informed, and practicing teachers utilizing standards-based mathematics curriculum with their students. As one administrator described, "Mary Kay was able – because she's a gentle kind person – to say to teachers you have to look at math seriously, without being mean about it."

One of the circuit riders concurred on the ARC consultant's role as a change agent and catalyst for change in the districts, and her effect not only on the teachers but on the circuit rider herself as well. As she described:

The thing that was most helpful was her determination to make things happen. She was very willing to work side by side with me and kind of pick up the loose ends. She was determined to find the materials, to force the staff into a decision. She comes in and wants to see things moving. "You've explored this. It's time to think seriously about this. Do you want to pilot it?"

...Mary Kay is very positive and very knowledgeable. She comes out here with a purpose and she's got a lot of energy and she goes for it. And that kind of lights a fire under me too. I think, "Oh my gosh, Mary Kay is here. We need to really do this stuff. She takes us out of the day-to-day stuff and helps us to move a little more forward."

When asked how the BCC Phase II support extended what normally occurs in districts, the ARC consultant characterized the BCC's distinct contributions as providing districts with the opportunity for piloting, for formulating and implementing a year-long plan, and for receiving staff development, on-going support and training.

- **Opportunity for piloting.** *"When they adopt a new math program, they don't usually pilot in advance – they just look at the materials. And when they do implement, they do K-6 – all in one year. For the BCC, we're having just implementing in a couple of grades, or with a couple of teachers; we don't just bring it all in, in one year."*
- **Formulation and implementation of a year-long plan.** *"They don't lay out a year-long plan for review and exploration, a program, before they adopt. It isn't that thoughtful – step-by-step, first we do this, then we do that, and here's the resources we need. There's not usually a thoughtful plan around it. It's the year we adopt, so we look at the books and pick one – that's basically how it happens."*
- **Staff development.** *"They don't usually meet very often to discuss math issues. Most have had very, very little staff development in mathematics curriculum, certainly not a math content course. The districts usually don't have any support. What they basically do is buy a program, and someone from the company helps walk them through the program before September sets in."*
- **On-going support and training.** *"There's usually no on-going support and visiting through the year, to get at some of the issues that arise. They don't usually have someone come in and model what it looks like in the classroom. That's why you don't get good implementation, and scores don't improve. Because teachers use the new program like the old program, because they don't know how to do anything differently, regardless of whether it's a standards-based program or not. No one's helping teachers learn the new way."*

District Outcomes from Phase II Work: As team members described the work they had engaged in this past year, there emerged a rich set of accomplishments and outcomes across the different Phase II districts. These outcomes included:

- the establishment of working teams of teachers and administrators around mathematics reform
- the provision of time, structure and focus for thinking through mathematics curricula before the adoption process starts
- the development of mathematics leadership
- increased buy-in by teaching colleagues
- increased outreach to parents
- increased student engagement in mathematics

Each of these accomplishments is discussed separately below.

• ***The establishment of working teams of teachers and administrators around mathematics reform.*** The BCC Summer Institute, with its request that educators attend in teams that include an administrator, resulted in several district teams establishing a working coalition between teachers and administrators in promoting district change in mathematics. The joining of forces between teachers and administrators worked in a variety of ways. In one district, a teacher was already experienced in standards-based curricula from work in a previous district. She recruited her administrator to attend the conference, which provided a valuable learning experience for the principal and made her an active champion of standards-based mathematics this past year. She described, “With Mary Kay’s support, the principal really jumped on the bandwagon and started to make it happen.”

In another district, one principal was already highly familiar with *Investigations*, through a prior job in another district. While eager to have his school use *Investigations*, he lacked the resources to do so until he learned of the BCC. As he expressed, “I’m glad we had the opportunity to get this going. I’ve been wanting to do this a long time and until this came along, I didn’t know how I could do it single handedly. It kind of opened the door for us.”

Thus, the BCC -- through its sound offerings in the Summer Institute and its flexible and customized on-site consulting -- served well both districts with principals new to the idea of standards-based mathematics, and those already experienced with these curricula through previous work experiences. Furthermore, as noted earlier, the formation of instructional teams involving both administrators and teachers and the practice of distributed educational leadership helps weather the “fits and starts” of educational reform that are further exacerbated by, or sometimes even derailed by, high administrative turn-over.

• ***The provision of time, structure and focus for thinking through mathematics curricula before the adoption process starts.*** District teams described the value of having the opportunity to think through, discuss, and experiment with standards-based curricula in a thoughtful, district-wide fashion in advance of the math adoption process,

three years away. Not only the timing was key, but so were the establishment of year-long plans that districts formulated and referred back to throughout the year, and the opportunity to pilot lessons.

As one principal expressed, “It was great we had this opportunity to prepare for the thinking about the math adoption in the future. It doesn’t need to be in January, before an adoption looking at materials. The idea of planning is new.... [What worked well] was making the time to dialogue with teachers, to express their thoughts on the program... Some conversations happen at every other Monday staff meetings and also at the in-service day.” A teacher at another district echoed a similar sentiment, “We have plenty of time now to look and try things out...We’ve made some tremendous steps forward. “

• ***The development of mathematics leadership.*** A number of district teams spoke appreciatively of how the ARC consultant provided outside credibility and expertise to bolster teacher leaders’ efforts within their districts. As one teacher explained, “[One of the reasons the ARC consultant was so helpful is that] it’s hard for a teacher in a classroom to ignite change in other classrooms. A teacher can be ignored. Where do I get the authority to tell others that it’s better for kids and for second language learners?”

In their descriptions of what was most helpful, educators described a wide variety of valuable services provided by the ARC consultant, and how this enabled them to better work with their colleagues to promote mathematics reform. For example, one teacher described how the ARC consultant arranged a visit to a district using EM, that provided her with ideas of help the teachers in her own district. The ARC consultant also helped obtain the EM game book that she used as a way to introduce her colleagues to EM, by playing the game and then discussing what students might learn from the games and how they might adapt it for their classes.

As this teacher described, “As the math leader, I was able to come back and bring ideas of how to look at math differently. I learned that there are different ways to present math from a standards-based perspective. All of this has helped me get ideas for presenting to other teachers...She has helped us think about the broader implications of implementation.”

• ***Increased buy-in by teacher colleagues:*** In addition to strengthening the knowledge, experience and resolve of district team members and pilot teachers trying out standards-based curriculum, the BCC Phase II districts made considerable progress in engendering buy-in from other teachers in the district. This was done in a variety of ways, including having other teachers observe the ARC consultant model lessons in classrooms, joining study groups, allowing time to discuss mathematics at staff meetings, and attending curriculum conferences that the BCC organized in the spring and one she helped the Northern Network RSI offer.

A number of teachers described colleagues experiencing significant shifts in their approaches to mathematics teaching, the kinds of teacher conversations about mathematics, and the level of district-wide coordinated efforts around mathematics. One teacher described how the first and second grade teachers in her district are now piloting materials and that they “have truly bought into the standards-based and the hands-on

material. One teacher says it makes so much more sense. She said, “I can’t believe I’ve been teaching 15 years at such a shallow level. “

Another teacher described her successful efforts to recruit the primary grades to pilot one of the standards-based curricula next year, and how the BCC has enabled them to have a more focused, pro-active approach to math reform.

I have been reaching two different populations – the other piloters and the other teachers. The end result is that people are talking about math standing in the hall. Recently a team of teachers came to visit a class that MK taught. The first and second grade teachers voted that K, 1, and 2 will pilot next year.... I really am excited about the pilot for K, 1, 2. All teachers will be teaching it. When a program is taught just piecemeal, it doesn’t give grade level support. Math was the stepchild of literacy. Now it is getting attention also.

• **Increased Outreach to Parents:** In addition to needing to engender buy-in from teaching colleagues, several teams described working hard to have standards-based curricula gain wider acceptance amongst parents. Districts experienced a range of parent reactions to the new piloted curricula being tried out with students this past year. One district team specifically talked about challenges posed by parents seriously questioning the use of these curricula. The teacher team member described, “We’ve had a few parent situations. They don’t understand the way this math works. We’ve had a hard time convincing some parents that it is worthwhile, that the tests have changed and the curriculum needs to change.” Her principal also acknowledged the need for increased community outreach, saying, “We’ve had some parents come in and say, “I don’t like this. We didn’t learn math this way.” But [we explain] the testing you took and what we’re doing now is different. We’re going to have to talk to the community a little bit more.”

One principal described the situation as parents having a “love-hate” relationship with the curriculum, saying, “[One thing we’ve accomplished] is that we got people questioning, excited. The parents of the kids that are in there, they don’t like it because it’s hard and they can’t help them with the homework. But they sure love the kids’ enthusiasm about it. You know what I mean? [It’s] like a love-hate thing. “

To enable parents to better support their children at home, one district team initiated specific outreach efforts to parents, such as math nights, and were considering more frequent parent nights in the upcoming district year.

We had a math night with math games for parents. With the staff next year we’re thinking of having parents nights, when starting a new level [topic]. It will be training for the parents from the teachers so that the parents can better help their kids at home.

A few districts spoke of positive parent reactions to the curricula, but how this was a bit of a double-edged sword, since the curricula were only being tried in certain classrooms during this initial pilot year. This raised issues of competition as some parents wished for their students to become part of pilot classrooms, a situation heightened given the small

sizes of some of the districts. As one district team described the situation in their small rural district,

The other parents are really jealous that the kids are not in my math class. One parent said she had requested another teacher, but if she had known that I was going to teach this kind of math, she would have requested me. (Teacher)

Parents are calling concerned and asking, “Why didn’t everyone [all teachers] get the program?” We can’t even really brag about how good we’re doing because everyone’s going to be like, “Well, why is my kid not in there then?” – it’s a small community. (Principal)

• ***Increased Student Engagement in Mathematics:*** While not asked specifically to describe student outcomes from the piloting, several district teams included as Phase II accomplishments their students’ increased enjoyment, skills and confidence in mathematics.

It’s just amazing how the children did, even for receiving the program late (mid-year.) The amount they know this year is more than what they knew last year. They have more math skills. They have a confidence the students didn’t have last year. (Teacher)

I found that the kids were very engaged. There was no groaning at math time. Everyone was challenged. The lower students were challenged. [And at the other end of the spectrum] one student whose mother thinks is a genius went home and told his mother what he was doing – she felt he was challenged. (Teacher)

As noted earlier, number of principals stated that a primary motivation for trying standards-based curricula had been their low test scores, and the move in the state towards criterion-referenced tests. Given that this past school year was the first year piloting materials, there are no standardized test scores to report on as of yet to reflect student learning outcomes. (Tests were administered in Spring 2004, with results released later the next year.)

At the same time, one principal familiar with *Investigations* described the need to increase his students’ test scores, and how they would be piloting a science criterion-referenced test in the 5th grade this year. He hoped that *Investigations*, while in mathematics, might help increase students’ science test scores because of its open-ended questions requiring students’ written responses. He reported that one of his pilot teachers using *Investigations* had commented that her students could write better, and how it had helped her students produce better responses on their science examinations.

A second teacher piloting *Investigations* felt that her students displayed a greater awareness of mathematics in the world. As she stated, “They are more aware of real live math problems which is amazing to see because they usually don’t transfer over.”

V. BCC SPRING CURRICULUM CONFERENCE (PHASE II)

In addition to the Phase II on-site consulting, the ARC consultant organized a more formal, multi-school professional development event in the spring, a curriculum conference on *Everyday Mathematics*. In response to the interests and needs expressed by a group of Phase II BCC districts in the northern region of New Mexico, the curriculum conference was organized by The ARC Center, working in partnership with the Rio Rancho School District, the Center for Hands-On Learning, and McGraw Hill Publishers (the publishers of *EM*). The two-day April conference was designed to meet the needs of two different teacher audiences. The first day was an Introduction to *EM* designed for teachers neither teaching nor piloting *EM*; these teachers might or might not be in schools where pilot testing was already occurring. School teams needed to include at least one administrator from the district.

The second day was designed for new users - teachers either piloting *EM* or teaching *EM* for their first or second year and administrators in those districts. Thus, in contrast to the BCC Summer Institute foci on standards-based mathematics and all three of the NSF elementary curricula (*Everyday Mathematics*, *Investigations*, and *Math Trailblazers*), this spring conference focused specifically on *EM*. A second conference on *Investigation* was planned for the summer.

Both days began with discussion on the research effectiveness of the program regarding test scores, which the Summer Institute had revealed was in the forefront of many educators' minds. Results were shared from the national ARC Tri-state study, as well as local successes experienced by the host district of Rio Rancho, and by several educators from El Paso and Dallas with sizeable Hispanic populations who have been using the program for four to five years and have had highly positive test data.

Friday's Introductory session involved several national and local speakers doing a pre-session on *EM*, covering how the curriculum builds concepts, and how it was being used in New Mexico. The afternoon was devoted to a presentation of what *EM* looks like in the classroom.

Saturday's New User session began with "teacher-to-teacher talk", with presentations on ways teachers can be more effective, led by an experienced user and grade level teachers who have used the program. The afternoon had break-out sessions on topics such as algorithms and assessment, and a session in which the ARC consultant met with administrators and special educators to cover special issues they might have.

The curriculum conference was well-attended and well-received. A total of 37 teachers and administrators, representing nine different New Mexico schools and five districts, registered for the Introductory workshop. A total of 72 teachers and administrators, representing 16 different New Mexico schools and 5 districts, registered for the New Users workshop. One source reported that 12 schools came to the Introductory conference day, and 26 different schools came to the New Users conference day.

Phase II districts were well-represented, with teams from three of the six Phase II districts attending the curriculum conference. Teams from these districts ranged from five to

fifteen individuals. Phase II school staff constituted 43% (16 individuals) of the Introductory workshop participants, and 32% (23 individuals) of the New Users workshop participants. Thus, the April conference provided a substantive professional development experience on *EM* that considerably extended the outreach possible through the Summer Institute in Albuquerque, to which only teams of up to four educators were able to attend from each school.

Reactions and Outcomes of Curriculum Conference: Phase II team members interviewed were highly positive about the sessions, based on what they observed directly, or heard from their teaching colleagues who attended.

All my teachers went...It was very helpful. They realized the value of training, and want more training. The more they learn, the more they want to learn.” (Principal)

Everyone came back enthused. The teachers who went on Friday (intro) found it very helpful. They thought they could teach this math. (Teacher)

When asked what was most helpful about the sessions, core members spoke about a variety of the session’s aspects, including the value of hearing expert perspectives, the presentation of national data, the hands-on activities, and the grade-level sessions. One teacher felt that the presenters were so on target that they “answered questions before I could raise them. They had a lot of good ideas.” Another expressed how the hands-on activities were important because “the teacher needs to do the activities. They need to say, “I got ideas I can use tomorrow.”

I went on Friday with the K and 1st teachers who have not taught it and are going to teach it next year. The presenters did a great job...The presenters showed some very good data, national data (4th grade, 8th grade, high school data) so we felt it wasn’t just a (name of my school) or just a New Mexico problem... The information from Rio Rancho and what they have done was good. The hands on activities were very exciting – the teachers really liked this. (Phase II principal)

As with participant reactions to the Summer Institute, one of the facets viewed as most valuable was the opportunity to hear from, and network with, other schools that have been successful and making progress in their mathematics reform efforts.

It was great hearing all the schools that have been very successful with the program. Even hearing about the frustrations the teachers had when they started the program. It motivated me, inspired me, it made me want to do more than I’m doing now. (Phase II Pilot teacher)

Even though this conference was short, I found the information very beneficial. I hope my school will implement the program – especially after hearing about how successful it has been in El Paso (we have a similar population.) (Participant in Introductory Workshop.)

As with the Summer Institute, conference participants completed a post-conference questionnaire. Completed surveys were received from 18 Introductory workshop

participants, and 37 New User workshop participants. Given the differentiated audiences and goals of the conference for each of the two days, those attending the Introductory workshop and New Users workshop offered different reactions to the curriculum conference. Survey results, presented separately below, thus provide a simultaneous snapshot as to the different teacher audiences and “points on the learning curve” with regards to understanding and implementing standards-based mathematics curriculum.

Introductory Workshop: As a result of the Introductory Workshop, participants reported gaining a basic understanding about standards-based mathematics and characteristics of *EM*. When asked to describe three important things they had learned during the conference, participants new to *EM* described five major areas of learning:

- characteristics of standards-based mathematics in general;
- specific features and characteristics of *Everyday Mathematics*,
- specific mathematical ideas;
- mathematical teaching techniques
- attitudes about how children can, and should learn mathematics.

Area of learning	Sample quotes from participants
Standards-based mathematics qualities and objectives	<p>“Math is an exploration experiment. We can no longer teach the rote learning of the past.”</p> <p>“Problem solving. Word problems don’t necessarily make problem solving activities.”</p> <p>“We need to be teaching more than just computation.”</p>
Everyday Mathematics characteristics	<p>“EM consists of manipulatives and hands-on learning, routines (very important), and is research based.”</p> <p>“EM spirals math concepts. There is no teaching to mastery.”</p> <p>“How concepts tie in across grade levels in EM.</p>
Mathematical Ideas	<p>“Algebra is everywhere.”</p> <p>“Zero is a number. From that negative numbers can be created.”</p> <p>“Algorithms – different ways for doing subtraction problems.</p>
Mathematical teaching techniques	<p>“The idea of hands-on needs to be used extensively.”</p> <p>“Always make time for games. Use of name collection box.”</p> <p>“The importance of the number grid in the classroom.”</p>
How children can and should learn mathematics	<p>“Children can do so much more than we expect them to do; children’s solutions can teach us a lot about math.”</p> <p>“Children need to be trained to take educational risks. They need to understand what math is all about and how it works.”</p>

As a result of the workshop, a third of the participants said they now hoped they would use additional teaching techniques with their students, such as greater use of games, manipulatives, the number grid, and exploration. Other participants described hoping to use *EM* in the future, or their increased understanding and openness to standards-based curriculum.

As to what they hoped their school would now do as a result of the workshop, the vast majority of participants expressed hopes of using and/or adopting *EM* in their school. Over half said they wished to adopt or pilot *EM*, with several describing specific plans of what they hoped to pursue (“Adopt *EM* at K-1 level to start and add a grade each year.”

“Adopt this program and have the workbooks and manipulatives to start with at the beginning of the school year, which begins at the beginning of July.”) About a third of the participants hoped to acquire the EM materials, with a number mentioning specific books or components they desired (e.g., “Order teacher masters! I need them!”; “Update our EM (we have ’98 edition); manipulatives for all teachers.”). The remaining individuals primarily described a serious, but less curriculum-specific view of how they wished to begin changing their mathematics instruction (“Start thinking about choosing a math program that the entire school uses.” “Develop this type of program.”)

It is interesting to note that participants’ responses to the Introductory Workshop appeared consistently more active and focused than post-workshop responses to the Summer Institute. With the Summer Institute, even with the three-day length, participants were more divided into two groups: those wishing to jump into piloting one of the standards-based curriculum, and those wanting to begin thinking more critically about their current math curriculum and/or begin to adopt isolated teaching techniques borrowed from standards-based curricula. These differences in participant reactions as to “hopes as educators and schools” may be due to a variety of factors, including differences in:

- *participant pool* (the Summer Institute’s more “interested and curious about standards-based mathematics” schools vs. the April workshop’s involving schools who may already piloting, or interested in piloting);
- *scope of the workshop foci* (the Summer Institute’s focus on introducing participants to standards-based curricula more generally, with an equitable attention to each of the three NSF curricula, vs. the April conference’s more singular focus on Everyday Mathematics);
- *outreach and recruitment process* (the Summer Institute’s more general distribution of flyers and contacts, given the early phase of the BCC project, vs. the April conference’s more extensive use of the ARC consultant’s contacts and partnerships with local groups, and previous work through on-site of consulting with a subset of schools who attended.), and
- *size and composition of participating school teams* (the Summer Institute generally needed to limit the size of school teams to about 4 participants in order to accommodate 10-12 schools, while the April conference allowed for some school teams with as many as fifteen teachers. Both the Institute and conference actively encouraged school teams to include an administrator.)

Most participants felt there was no important question left unanswered at the end of the conference. A handful of individuals identified a variety of different topics they wished to know more about regarding obtaining materials, actual time involved in teaching lessons, ways to address specific student populations and school calendars (“How difficult is teaching the program to a school with very high mobility?” “What about year-round schools?”), and change throughout one’s district (“How do we get our feeder middle school to use this series?”)

New Users Conference: In contrast to the Introductory workshop, those attending the New Users conference described their learning in terms of more advanced implementation issues, reflecting the New Users conference agenda. While some teachers described specific mathematical teaching techniques and mathematical ideas, similar to the Introductory workshop teachers, the New Users conference participants described in greater detail management techniques for handling materials and time, and use of specific curriculum components such as games. Some participants also mentioned learning more about student assessment, and the school change process.

Area of learning	Sample quotes from participants
Management of materials and time	<p>“Components of the EM that are essential to do and some scheduling suggestions to address that.”</p> <p>“Classroom organization of manipulatives for EM, giving the students responsibility for tools.”</p> <p>“You have to be organized. You have to read your material way ahead of time.”</p> <p>“Math kits can be set up for table groups rather than each student to help teach things better.”</p>
Use of games	<p>“Why games are so important.”</p> <p>“Games are great for review and assessment.”</p> <p>“How to organize games in the classroom.”</p> <p>“Some math games that are EM that I can use now.”</p>
Different teaching techniques and tips	<p>“How to teach math algorithms various ways.”</p> <p>“Helpful suggestions for place value.”</p> <p>“Math vocabulary is important for just about every lesson.”</p> <p>“How important having students be able to explain how they get answers.”</p> <p>“A word wall for math terms and symbols.”</p> <p>“Do not skip around with EM, no matter how frustrated you get.”</p>
Mathematical concepts and strategies	<p>“Adding from left to right.”</p> <p>“Strategies for solving problems.”</p> <p>“What are “algorithms”?”</p>
Assessment	<p>“Outlining secured skills for teachers to observe/assess, students to know/be responsible for, parents to see programs.”</p> <p>“Ideas on assessment – putting grades on anecdotal records. Portfolio assessment ideas – flip charts, post-it notes, charts of profiles from EM.”</p> <p>“It takes time to notice the gains from EM.”</p> <p>“EM exceeds what is needed to achieve competency on standards-based assessment.”</p> <p>“Say No to Written timed math facts tests.”</p>
School change process	<p>“Importance of administration’s support of EM.”</p> <p>“Different ways to involve parents.”</p> <p>“Not to be frustrated in the 1st year of implementation.”</p> <p>“Boosters/Barriers to implement EM.”</p>

Regarding their hopes as educators following this conference, about a third of teachers hoped they would now be implementing EM more effectively and efficiently, often citing specific techniques they planned to use (e.g., “Implement the ideas I’ve learned, be aware of secured skills, and better use the assessment handbook. I also want to get games more organized, laminated and ready for next year;” “Attempt to structure or build in ongoing assessment to keep track of students’ understanding.”)

Roughly a third of the participants hoped they would bring a better understanding of *EM* to their teaching, more confidence and energy in implementing the curriculum, and be better prepared for their lessons. (e.g., “Be able to view the learning of math skills and concepts in a much broader sense, and involve problem solving strategies with increasing frequency in my classroom;” “Feel confident enough with alternate algorithms to encourage kids to develop their own.”)

Regarding their hopes for their schools following this conference, a third of the participants expressed strong hopes for adopting *EM* in their school, or to at a minimum, to use *EM* at all grade levels and coordinate efforts across classroom and grades. As two educators expressed:

Our school is implementing EM K-1 next year and plans to add a grade each year following. So I hope everyone will buy into the program and have faith in it to know it will work!

Coordinate in grade levels how we can divide up our curriculum in a time line fashion for a year and identify skills that must be mastered to support the spiral.

Teachers also hoped they would receive more professional development and training, and receive the actual materials they needed for implementation (e.g., “Focus on professional development regarding *EM* and support the program with materials acquisition and leadership in math directives;” “Math study groups using the resource book;” “Order new or revised, we have first edition and need the new edition. Give us training.”)

Being highly positive about the conference, participants offered few recommended changes to the workshop. The main suggestions offered pertained to having more specific grade-level sessions or speakers, more hands-on demonstrations (particularly ones that would give participants a better “real-time sense” of how a lesson might be conducted), and the opportunity to attend both the algorithm and assessment sessions (which were held concurrently.)

For those geographically isolated schools in the northern region of New Mexico, the offering of such a conference in their own district meant a great deal to educators, and also increased the numbers and kinds of teachers who could attend. As the principal hosting the event expressed,

Mary Kay is going to be coming out in August and we are going to do a 4-day summer institute here in (our district.). It's a big deal for my teachers that the workshop will be here. Being a rural community, we always have to travel. I'm encouraging all my teachers to come no matter what they are teaching because of the content aspect. [Even] my middle school teachers will be there.

Two follow-up conferences and courses were also held in the Northern Network region in Summer 2004.

VI. THE REALITIES OF SCHOOLS ENGAGED IN MATHEMATICS REFORM: CHALLENGES AND OPPORTUNITIES

When asked what had been difficult or challenging with their mathematics efforts this past year, the core BCC members interviewed offered a wide-ranging set of issues and concerns, reflecting their individual perspectives on the particular circumstances at their schools and districts. A principal and teacher within the same school rarely focused on the same issue when discussing what had been most challenging; even a separate analysis of administrators versus teachers did not reveal common themes that emerged from one group more than the other. This diversity of responses reflects the complexity of the school change process in general, and certainly also around mathematics. This underscores the importance of understanding the specific as well as the broader context of districts when embarking on curricular reform, and the great value and service that the BCC provided by being able to respond flexibly and “customizing” the professional development offered. A number of concerns did emanate from a core set of issues, as discussed below.

Limited Time: First, there was the issue of time, of juggling the pressing day-to-day demands placed upon teachers and administrators, while attempting the substantial undertaking of teachers learning about new methods, curricula, and approaches to standards-based mathematics. Furthermore, this focus on mathematics was within a broader agenda of other curricular initiatives, and often competed with district priorities in literacy. One teacher talked about initially trying to get familiar with the program without receiving any training (“we were sort of just given the program”); her principal appeared to recognize the need for math training, but did not want his teachers to feel overwhelmed with training in mathematics, given that they had already devoted all 21 of their training days to reading and literacy. Similarly, a principal in a second district spoke about the difficulty of scheduling time for training and discussion, but the absolute necessity of doing so.

Interviews with the ARC consultant confirmed this problem of time, with a major challenge she confronted in some districts being the difficulty of simply arranging a time to meet with teachers when she was in town. Some of the problems were structural, as in one year-round school with ten classes at each grade level, which made it impossible to meet with the entire staff all at once. In another district, both the administrator and the teachers often failed to respond to calls and e-mails, making it difficult to set up a meeting, much less an agenda in advance. In several cases, districts were feeling inundated by other curriculum initiatives in reading and science, and thus making mathematics a priority for time and training was difficult. The ARC consultant described several districts as “primed but lacking focus.” She recognized the great difficulty that schools had in arranging time for staff to get together and share information and discuss issues, and that they often were already focused on new initiatives in reading, socialization programs, and science.

Geographic Isolation: The problem of limited time was further exacerbated by the significant distances that separated some participating districts from one another, and the geographic isolation of schools. While teachers expressed interest in seeing how a

piloted curriculum might be used in another district, such a visit sometimes required many hours and miles of travel. Similarly, professionals providing on-site support to teachers required specialists to travel many hours to get to schools. For this reason, the ARC consultant took good advantage of the circuit riders from the Northern Network to bolster much of the BCC work in the northern schools.

Somewhat paradoxically, the ARC consultant found that it was sometimes easier to entice school groups to participate in BCC professional development efforts if these activities were more formalized and/or held in conjunction with other schools, rather than part of their own on-site activities. For example, several schools had not made the time to meet with the ARC consultant for training, nor to visit a nearby school using the same curriculum materials they were piloting. However, they did make the time to do so when it was part of a large multi-school curriculum conference (i.e., the Spring 2004 curriculum conference that the ARC consultant organized), or when it was part of a visit that another BCC school, coming from many miles away, had arranged to a nearby school. This underscores the value that teachers place upon learning from colleagues, and seeing and hearing first-hand from fellow teachers of the challenges and successes of using standards-based curricula.

Teachers were especially desirous of meeting with teachers teaching the same grade level as themselves. For small districts in which there were only one or two teachers per grade, it was particularly helpful for teachers to meet other same-grade colleagues from other schools, to share insights, experiences and solutions. While not actively explored in the current project, follow-up communication via e-mail or moderated list-servs may help isolated teachers continue to network and feel connected with peers, despite geographic distances.

Limited Funds and the Challenges of Obtaining Resources within the State Adoption Cycle: Educators spoke about problems related to limited amounts of funding, the complexities of acquiring the necessary curriculum materials, and the necessity of knowing how to make informed decisions about purchasing materials given limited funds. Several districts expressed how they had wished to proceed with a pilot, but did not having the district funds to purchase the materials. Others stressed the important role the ARC consultant played in helping administrators understand the critical nature of materials such as manipulatives, and identifying and locating materials for them. Administrators described scrambling for funds and identifying sources for this initial year, but not being sure how they would find funds for next year.

My role (in the project) was to try and find money for (name of school.) The school didn't have resources to put into math and that it still the problem – finding resources to get materials, teacher sub days so the teachers could go to training...I had great hopes for next year butt the district is in bad shape over money. I hoped to have additional money to put into work with the math curriculum – that is not going to happen [A week ago the school district announced that it was short millions of dollars.] ...I have begged and promised money from other accounts and now the money is gone. Not only that but my job will have additional duties – I will have less time. (School District Administrator)

One principal voiced his frustration with being a small district not viewed by marketing reps as a sufficiently important publishing customer, given their low numbers of students. He also stated the problem of having the older edition purchased several years ago during the last adoption cycle that was now looking outdated, but it not yet being an adoption year in which he had funds to buy the new edition.

Both the state sales rep and the ARC consultant echoed this problem of sales to small New Mexico districts. The sales rep described how, unlike large districts, it was not economically viable to pick up small districts as pilot sites. With large districts, he could hope to make a number of additional sales to other classrooms in a pilot school as well as to other schools in the district, if a pilot test resulted in the district's adoption of the curriculum.

The ARC consultant addressed this issue of small districts by offering the curriculum conference in April that brought together roughly 16 schools from a number of districts to focus on *Everyday Mathematics*. Thus, the curriculum conference not only provided educational benefits to the participants through this specific curricular focus and networking with other like-minded schools, but it offered an "economy of scale" and sole product focus that would be attractive to the sales rep and publisher.

The ARC consultant also effectively addressed the broader, complex situation posed by the state adoption cycle and its associated funding opportunities and limitations. Since New Mexico is mid-cycle and received a new math program three-to-four years ago, the state will not infuse money for mathematics again for another three years, thereby significantly limiting the amount of funds administrators have to put towards mathematics. Furthermore, even if districts are able to free up money they may have set aside for the language arts adoption now occurring, there was problem posed in the current edition of *Everyday Mathematics* not being on the state adoption list, but only the previous edition. The ARC consultant described a major triumph in convincing the sales rep to make the effort to get the new EM text on the state adoption list, so that districts could use additional funds to purchase the new edition. While it may look as though one is losing money by listing the new edition, the sales rep came to realize, through discussions with the ARC Consultant, that since the consumable student books need to be repurchased each year, listing the new series is in fact an economically profitable strategy.

Multi-Tiered Educational System Involved in Mathematics Reform, and the Critical Role of School Administrators: A number of educators spoke about the various tiers of administrators and the educational system that were involved in mathematics reform, and the need to actively involve school administrators in the process. Several educators described the pitfalls of administrators who were uninformed, uninvolved, or disinterested in efforts to have standards-based mathematics in their districts, making it difficult for teachers to make much progress in moving away from more traditional ways to teach mathematics. One teacher voiced the problem of not being in a decision-making role, and how she could only make recommendations to influence decisions made at the administrative level. Both teachers and administrators spoke about their disappointment at having voted to purchase or pilot materials, only to learn that there were significant district funding shortfalls precluding the purchase of new materials.

Given the district-wide process involved in mathematics reform, it was critical that the ARC consultant was sufficiently experienced and adept at dealing with all players in the system, and knew how to work effectively with teachers, school principals, superintendents, and others in the district office. The ARC consultant spent a fair amount of energy in a few districts prompting follow-through from school principals and trying to re-engage administrators in the process, whether it be to find funds to purchase materials, find release time for teachers to meet with the consultant or visit nearby schools piloting materials, or allot time in regular staff meetings to discuss mathematics instruction.

If work with the principal still failed to produce results, the ARC consultant proved resourceful in drawing upon contacts from the central office (e.g., the superintendent or director of instruction) who had previously participated in the BCC Summer Institute. In one school, a principal kept canceling meetings that had been pre-arranged with the ARC consultant. Given previous contact with the superintendent through the BCC institute, the ARC consultant was able to contact the superintendent. Upon learning that the ARC had not yet successfully arranged a meeting at the school, the superintendent called the two school principals and organized such a meeting. During this meeting, the ARC consultant was able to successfully recruit teachers for a pilot test in the fall, with all teachers volunteering to participate.

Aside from the problem of a few disengaged or distracted administrators requiring special perseverance from the ARC consultant, a number of the Phase II districts were faced with high administrative turn-over both in the school building and in the district. In one district, both the director of instruction and assistant superintendent were new, while the principal and circuit rider left at the end of the year. A second district had a new superintendent, a new director of instruction, and a new building principal. Thus, it was essential that the BCC Phase II districts had adopted a distributed educational leadership model with school teams, and had strengthened inter-district networking and sharing of professional development resources. This enabled teacher leaders to continue the momentum and initiatives begun during the past school year, despite the departure and replacement of principals who had championed mathematics reform for their teachers.

Supporting Mathematics Reform Throughout a School and Across a District: Educators described the challenges of moving a whole school or district forward, rather than simply isolated teachers piloting here and there. One teacher talked about the importance of having patience with both herself and her colleagues as they embarked on trying to use *Everyday Mathematics* in their school:

You have to be patient with getting people actually to change. Some people start very enthusiastically, but they have gotten wallowed down. One teacher has not yet opened the book. We have provided everything that was necessary to promote this, and yet some teachers are wallowing in the mire of everyday education. People don't always have the opportunity to follow through the way they would like to. Even I've been guilty of keeping my traditional teaching a couple of days a week.

A principal acknowledged that one of the reasons their pilot had gone well this year was because she had involved her best teachers, while another principal pointed out the difficulty in “getting some of the older teachers or people to change their way of teaching.” One school district administrator of a large district described the problems with targeting just a core group of teachers for training who then are “on fire and committed”, while having a district that attempts to have an entire school staff move forward as a whole group.

Given the complexity of having a whole school and district make progress in standards-based mathematics curricula, it was essential that the BCC and the ARC consultant called upon a wide repertoire of techniques and strategies for working with districts. As articulated in the ARC consultant’s conceptual framework of support services outlined earlier, the consultant worked tirelessly to engender buy-in from various segments of the school and district – classroom teachers, building administrators from the various elementary and middle schools, the central office. She engaged them in a variety of program efforts, including observing her model lessons in classrooms, professional development training in workshops and conferences, and sitting in on meetings and planning sessions.

To find the resources needed by districts for both curriculum materials and training, the ARC consultant masterfully established partnerships with a wide range of educational groups and individuals. She actively worked with the sales reps and publishers to obtain free and discounted materials, and sponsor conference events; recruited the services of the Northern Network circuit riders and administrators to help sponsor a curriculum conference and offer on-site school support; arranged to have a large district like Albuquerque make available trainers and slots in professional development events to smaller New Mexico districts; and found other business and educational partners to help sponsor conferences and piloting work.

Even when having access to good on-site professional development as offered by the BCC, a number of factors appeared to facilitate, or hinder, successful use of such services, as summarized below.

Facilitating Factors	Hindering Factors
Strong active presence and support by administrators at school building and district level	Uninformed, disengaged, or disinterested school administrators, with little follow-through in actions to support mathematics initiatives
Strong, stable administrative support of mathematics initiative, and fostering of distributed educational leadership to include teachers.	High administrative turn-over, with limited shared leadership with teachers.
School having clear priority, and focus on moving towards standards-based mathematics teaching and learning.	Schools focusing on issues and areas other than mathematics and learning.
School administrators that value and promote having a faculty be a community of teachers sharing information and ideas.	Schools not allowing time or incentives for teachers to meet and share ideas and information.
School administrators supportive of	Limited access for trainers or professionals to

professional development of teachers; and puts resources towards those efforts.	meet with teachers during and after school; limited communication with teachers and principals.
Opportunities to visit, observe, and talk with teachers in other schools using standards-based curricula.	Being geographically isolated and far from other schools using standards-based curricula, with no opportunities for cross-school exchanges.
Adequate funds for professional development and mathematics initiatives; resourceful and flexible administrators regarding resources and budgets; good partnerships with other schools, educational groups and businesses.	Inadequate funds for professional development and/or mathematics initiatives; lack of networks and partnerships to share, exchange or pool resources, or to share/divide expenses.

Additional Contextual and Programmatic Factors to Facilitate and Advance School Reform in Mathematics: The ARC consultant also offered additional perspectives on factors or strategies that increased the likelihood of successful piloting or exploration of standards-based curricula by BCC districts. Some strategies were programmatic features or components of the BCC Phase II work with districts, while others were facets of the broader educational context in New Mexico. These strategies included:

- A year-long plan that schools need to formulate for exploration and implementation (“making the team sit down and identify what they wanted the year to look like, where resources were going to come from, what my job was, what their job was”);
- Multi-member school teams requested for institute and conferences, and requiring an administrator attend the BCC Summer Institute as part of the school team
- Local professional development experts in mathematics, that could provide training and on-going, on-site support in schools
- Follow-up on-site support by a professional experienced in promoting personal change in mathematics programs, who understands administration and district perspectives, the kinds of problems and issues faced and the various impediments to change and how to resolve or address them.
- Schools successfully using standards-based curricula that other teachers and schools could visit;
- A set of state standards that are almost identical to the NCTM standards, and a criterion-referenced state test that relates to NCTM standards.

Building Upon and Strengthening New Mexico’s Mathematics Education Infra-Structure: Perhaps one of the BCC’s most significant accomplishments this year was the way it effectively drew upon, as well as strengthened, the local and state mathematics education infra-structure in New Mexico. In working closely with major groups and individuals active in mathematics education in the state, the ARC consultant developed a wide range of mutually beneficially partnerships and arrangements that

helped schools, participating organizations, and individuals. All participating groups and individuals spoke extremely highly of ways they had professionally benefited from the work with the ARC consultant, and how her presence had positively influenced the schools and districts in which they worked.

From the outset of the project, the ARC center involved key educators from New Mexico in the planning and design of its programs. For example, two state and local mathematics leaders – one a professor at a New Mexico university and the second a math instructional coordinator from the Albuquerque school district-- attended the April 2003 design retreat to help with the planning of the BCC Summer Institute, and were featured as presenters at the Institute for the New Mexico mathematics state framework and assessment session.

During Phase II of the BCC, the ARC consultant worked closely with a number of different organizations, including four major New Mexico groups – the district office of the Albuquerque school district, the Northern Network and the New Mexico Tribal Coalition (both Rural Systemic Initiatives,) and the curriculum publishers.

Initially meeting when designing the BCC Summer Institute, the ARC consultant continued to work closely with the Albuquerque math specialist throughout Phase II, finding her in-state knowledge invaluable in the design and implementation of BCC work in schools and districts. She was particularly helping in enabling the ARC consultant to meet key professionals in New Mexico – providing names, contacts, and sometimes “pairing up” on meetings that had been arranged. The ARC consultant also was able to arrange to have teachers from some of the small BCC schools take part in training offered by the large Albuquerque district, to supplement the offerings that the BCC was specifically able to offer Phase II teachers piloting the materials. Similarly, she arranged to hire one of the Albuquerque staff trainers over spring break to do a district-wide session in one of the northern schools in which pilots reported on their experience to the K-5 staff from the three elementary schools in the district.

As for benefits to the Albuquerque school district, the math instructional coordinator and her assistant - while expertly trained and highly competent – constituted the total two-person staff serving the mathematics needs of the entire K-12 school district; concerning elementary education alone, there were 83 district elementary schools and approximately 4,000 elementary school teachers that needed to be served by these two individuals. While there were instructional coaches set up in each of the schools to provide some local, in-school support, these instructional coaches were often trained primarily in language arts, and thus did not yet possess the requisite skill set to help their colleagues explore, much less learn deeply, standards-based mathematics. Thus, to have someone like the ARC consultant focus specifically and intensively on even a subset of Albuquerque elementary schools was extremely beneficial to the district.

The Albuquerque instructional coordinator also described learning a lot from working with the ARC consultant. One thing she specifically mentioned was the importance of schools coming up with a plan, one that was systematic and tiered. These plans can mitigate against what happens “in life in general, where it is more willy nilly, and dependent more on circumstance, than intentional implementation. Mary Kay has modeled – and pioneered – the use of the plan because she continually has to go back and

nurture that idea. Where is the plan – the plan changes from visit to visit. Her modeling of that has been very helpful.”

The instructional coordinator also said that the ARC consultant modeled some useful piloting strategies one could offer districts before the adoption year comes up. She hopes that next year she can teach her instructional coaches about the piloting process so that some schools can pilot both EM in the fall, and a unit from Investigations in the spring. In this way, she hoped that the adoption process could be more than the typical “flipping through books,” and that perhaps six teachers in each school would have tried the curricula and could report on what they found. A second training model that she would like to emulate is the curriculum conference model.

What I'd like [the ARC consultant] to do is work with some of my most advanced EM teachers to develop some professional development curriculum for EM. Then we could use that model for Investigations, for Connected Math, and Math In Context. So the district has offerings in all of these four curricula. Every summer teachers can come – teachers who then have a new curriculum have some support, rather than adopt and have no support. And every summer a principal can send new teachers, or teachers can come again if they're changing grade. Now we don't have professional development specific to a curriculum.

Another specific lesson the instructional coordinator said she learned was that she did not necessarily need to pay her teachers to attend summer workshops, and that if the workshop was sufficiently rewarding professionally, teachers would even pay to attend.

A second major alliance within the state was with the Northern Network, As described on their web-site, the Northern New Mexico Network was formed about 20 years ago to provide a collective voice for small, rural school districts of Northern New Mexico, now focused on creating positive learning environments in Northern New Mexico schools. It utilizes master teachers called circuit riders who are “assigned specific schools for mentoring and are charged with the task of assuring that learning derived from Network-wide professional development are applied locally.” Three of the BCC Phase II districts were located in the northern region of New Mexico, and a fourth was added during the year, and as such, were some of the 26 school districts covered by the Northern Network (NN). Circuit riders from the NN were already regularly visiting teachers in these districts on a weekly basis, and would often model lessons of standards-based mathematics. One circuit riders also had previously offered a video streaming course in mathematics to teachers.

In one district that had proven difficult for the ARC consultant to arrange to visit classrooms, the consultant contacted the circuit rider and requested to shadow her for the day during one of circuit rider's weekly visits. This enabled the ARC consultant her first direct access to observing classrooms and working with those teachers. In a second district, the ARC consultant worked closely with a circuit rider with the plan that the circuit rider would be the primary person modeling Investigations lessons with teachers. Unfortunately, this circuit rider ended up resigning, and the ARC consultant needed to step in and provide the classroom modeling herself.

Two of the circuit riders had been trained in *Investigations*, and on occasion modeled lessons from this curriculum for teachers. Their focus, however, was to model a type of practice and be responsive to teachers' needs and requests, rather than planned or systematic implementation of a certain curriculum. Thus, the circuit riders did not leave specific *Investigation* materials with teachers, nor follow-through to see how teachers' use of specific lessons might have been received by students. For these reasons, the ARC consultant's efforts to obtain materials for teachers that remained in classrooms, and prompting them to directly implement the materials, with follow-up from the ARC consultant or circuit rider, was a significant improvement in helping schools achieve clearer progress in integrating standards-based curriculum in their school. One of the circuit riders also acknowledged that she tended not to have schools come up with a year-long plan of what they wished to accomplish, and by working with the ARC consultant, learned the value of such planning. An educator familiar with the Phase II work but outside of the Northern Network felt that the ARC work was a significant contribution to the RSI work, noting,

The Rural Systemic Initiatives never would have gotten to reform curriculum [on their own.] They are mainly doing more "peripheral" stuff – aligning standards, the role of leadership, some mentorship and cognitive coaching; a lot of process things but not much regarding content, curricula and assessment. What they are not doing is how to base the learning on classroom practices and the need for a good curriculum.

Through work with the ARC consultant, and requests percolating up from Phase II districts with whom she worked that were part of the NN region, the Northern Network began to offer more curriculum-oriented services and support. The ARC consultant enlisted their support and sponsorship for the April 2004 curriculum conference serving NN districts, and also helped them design a curriculum conference for Summer 2004 hosted by the NN to introduce 26 districts and their elementary and middle school schools to standards-based math curricula, fashioned after the BCC Summer Institute from the year before. The ARC consultant is also helping the NN circuit riders acquire the skills and training needed pertaining to the specific elementary mathematics curricula.

The third group was the Northern New Mexico Tribal Coalition. Because one of the Phase II schools was a member of the coalition, the consultant was able to connect with their RSI coordinator to help support staff development for the school and many others. Travel, stipends, and substitute pay were made available so many Native American teachers were able to attend both the April Users meeting and a five-day math content course. All of these teachers are in very small schools in remote areas.

The fourth major group with whom the ARC consultant partnered were the publishers of the standards-based mathematics curricula. Key developers from each of the three curricula – *Everyday Mathematics*, *Investigations*, and *Math Trailblazers* – actively took part in the Spring 2003 design retreat and served as presenters at the BCC Summer Institute. During the Phase II work, the ARC consultant worked closely with the sales representative from one of the curricula – EM – that a number of the Phase II schools chose to pilot. Through her work with the sales rep, the ARC consultant was able to obtain more materials for BCC Phase II districts and get sponsorship for the April 2004

EM conference. She also convinced the sales rep to take action to get the new edition of EM on the state adoption list, thereby increasing the available funds districts could put towards purchasing the materials. The ARC consultant also encouraged him to train strong math teacher leaders from two New Mexico districts as grade-level consultants, and expand the type of in-service training he could provide throughout the state, to further extend the professional development opportunities in New Mexico. His contacts in Texas also enabled him to identify several El Paso teachers who served as speakers in the BCC's EM conference. Some participants cited these El Paso educators as some of the most worthwhile conference speakers since they could speak of successes with standards-based curricula with similar, Hispanic student populations.

The sales rep was extremely positive about the ARC consultant and how they had been able to work together to forward the standards-based mathematics agenda in the state, which also helped him as a publishing rep. He described how the consultant's knowledge, passion and dedication to standards-based mathematics allowed her to persevere productively in working with districts in ways that he could not, for fear that it look like he was exerting inappropriate "marketing pressure" on schools. He also laughingly acknowledged that her being from out-of- state was an asset, and that she brought her "Northeastern level of energy" to the task that helped the "manana" approach sometimes characteristic of the southwest. He described how she mustered so much interest in the pilot work that he regularly received calls from schools requesting materials and wishing to be involved:

People ask, "Can I be part of what Mary Kay is doing?" I say, "Sure." I get phone calls all the time – new schools contacting me. If they're unfamiliar, I know they must have been working with Mary Kay. And for old schools, they'll say, "Mary Kay was just here, this is what we need." I wish I could have four of her – I could use her the rest of my life – if only she could work more in the state.

None of my consultants are as strong as Mary Kay. She can tell them, "You must do these things." She brings the burning desire of math change, and genuine interest in improving New Mexico Schools. No schools she's worked with want to go back to what they had.

With regards to getting New Mexico school districts interested in trying out standards-based mathematics curricula, the sales rep unabashedly claimed that the ARC consultant single-handedly accomplished in six months what would have taken him two years.

By working in collaboration with these four groups – math coordinators in large districts, the Northern Network and its circuit riders, the Northern New Mexico Tribal Coalition, and business partners such as publishers and their sales representatives – the ARC consultant was able to leverage successfully the scope and impact of the BCC's work with Phase II schools and strengthen the state's support structure for mathematics education. This tapping -- and broadening -- of the mathematics infra-structure in New Mexico was particularly critical given the state's rural character, with schools often many miles and hours from another district. As the ARC consultant remarked, "One of the big challenges in New Mexico is the dearth of math experts in the state – so few – where everyone is so spread apart."

VII. NEXT STEPS AND A LOOK TO THE FUTURE

Following the completion of Phase II on-site consulting work, with several districts also benefiting from the April curriculum conference, all six Phase II districts intended to proceed with active piloting of one or more of the standards-based curricula in the coming 2004-05 school year. As illustrated in Figure 2, each of the districts was proceeding in slightly different ways, ranging from initial piloting of curriculum (District A) to full implementation at the lower grades in all classrooms (District F.)

The figure also illustrates the different types of support that the ARC consultant envisions will be needed in the upcoming summer and fall months, to sustain and extend the remarkable growth and level of activity achieved this past school year. In addition to requiring expedient decisions and actions to purchase necessary curriculum materials, a number of districts also need further professional development in the form of mathematics content courses for their teachers, and orientation and training specific to the particular curriculum they will be piloting.

Figure 2: Phase II School Districts' Implementation Efforts During 2003-04 School Year and Plans for Future Actions

	Implementation Efforts during 2003-04 school year	Future Actions
District A	Exploration with EM materials in small number of classrooms; teachers taking part of lesson study group, some non-piloting teachers came to April BCC EM conference and inspired to pilot.	Pilot will begin in fall, involving 2 teachers at each grade level (rather than one, as originally planned), including all teachers in K, 1 and 2. Will meet in June to review and expand pilot plans: all 1st & 2 nd grade teachers possibly using EM next year. Need to identify who pilot teachers are, and make sure have materials and support they need. Ass't cluster leader hoping to move all 8 elems schools toward EM; more schools considering EM. So AC teaching 6-session Bridges math content course. Discussions with sales rep about providing training for 3 all-day workshops. School has committed to sending their whole pilot group (12 teachers) to training.
District B	Piloting of Investigations in the spring by 2 teachers in each grade. Teachers took part of 2-day kick-off (Bridges work on data; & unit exploration; modeling of lessons).	Wish to pilot a second curriculum, EM, in the fall. . Plan is for school to choose between INV and EM after the fall pilot and to finish next year using the chosen program. Need 1-2 day orientation to EM this summer, and opportunities for staff to meet with AC throughout fall. New circuit rider providing leadership training in EM, and teachers attending workshop in Albuquerque district.
District C	AC offered initial meetings and introduction to EM this year. All T's attended	Plan for AC to teach Bridges type math content course, open to all teachers on the Pueblos. Hoped that most of school's teachers will attend so can become more immersed in EM approach, and that other Pueblo

	EM user's conference & responded favorably.	schools may follow their lead. Teachers also interested in attending EM training course in Denver. Recommends that school receive quarterly visitations and meetings with EM consultant to address difficulties of 1st year implementation.
District D	Increased awareness of standards-based curriculum in school, and recruited teachers to participate in fall pilot of Investigations.	Piloting of Investigations in the fall. However, 3 of the teachers most interested in math change are leaving (2 retiring, one going to middle school.) Inv. materials need to be purchased and plan for supporting and evaluation of pilot should be developed. Decision about whether to try Math Trailblazer as well needs to be made. Some teacher interest about extending the work through the use of CMP into the middle school needs follow-up.
District E	Piloting of Invest. in grades 4 & 5. Worked with 2 other schools in district modeling lessons and meeting with teachers to explain advantages of sb math pgm re: new state standards and testing.	Inv. Trainer from APS and piloters will meet with all K-5 teachers in May, to present benefits of Inv. Hope that 2 teachers from each grade level willing to pilot at least 2 units next fall. However, limited funds available. If happen, teachers will need training in advance, and support in fall. Parents & students should be informed about reason for pilot. Teachers in district would benefit from course in contemporary ideas in math. Hoped that REC will sponsor such this summer.
District F	One teacher from each grade level piloted EM. All piloters and K-1 teachers attended EM conference.	Principal has already ordered sufficient materials for full implementation of EM at grades K/1 in the fall, and one teacher at grades 2, 3, 4 & 5. Sales rep agreed to provide staff dev. for those grades during the summer. AC offering staff 4-day math content course in Aug.

When asked what type of support would be needed to accomplish their plans for next year, educators indicated the necessity of good teacher training opportunities in the summer, as well as important follow-up support throughout the upcoming school year.

We need an introduction for everyone in K, 1 and 2 like we had at the seminar. Everyone needs to be on board. They also need to see some lessons – they need to try some out together and then compare how they worked in their classes. [We need] training updates – someone from the outside coming every couple of months. (Teacher)

They need people in the beginning of the year to guide them through the start. Everyone is going to feel like they are floundering...And having someone demonstrate lessons occasionally, and answer, “what kind of questions do you ask?” (Teacher)

There needs to be more support during the work day, to see that the training is happening. The support needs to be in the classroom – demonstrations of lessons, observing teachers. (Principal)

The principal is going to need support in terms of understanding, truly understanding how important it is that the teachers get together and plan. He's not aware of that now. (Regional facilitator)

One teacher reflected upon the tremendous progress her district made this past year with the support of the ARC consultant, and was concerned about how they would be able to build upon the gains they achieved thus far, without the BCC and ARC.

Our district is full of teachers who have taught for many, many years. Younger teachers are more willing to change; older teachers need to be led through the process so they understand. There needs to be a lot of workshops and serious training so teachers will get familiar and comfortable using this. That's going to be the biggest downfall - if the program is required and there is no training for the teachers, the program will be unsuccessful. Once in the classroom, we're going to need someone to come in and help us and guide us through it. We're going to need a lot of help. We have to figure out how to get that help. (Teacher)

The ARC consultant concurred that the BCC districts will very much need some level of continued support and professional development to sustain the progress they achieved this past year. With the BCC project ending, she was concerned about how the resources – both financial and local professional staff in the state - would be found to support such work.

While the ARC center will need to decrease the level of support they extend to BCC schools in the coming year, the ARC consultant did make considerable progress in strengthening the professional development capabilities of various New Mexico groups so that they are better poised to serve not only the original BCC schools, but additional schools in the state. First, as discussed earlier, the BCC project strengthened the professional development staff, capabilities, and models of training of:

- the Albuquerque public school district office, by modeling different summer institute and workshop formats, and schools' use of a year-long plan;
- the Northern Network, by increasing the skill set of its circuit riders to become more familiar with the specific standards-based elementary curricula and use of the year-long plan, and by encouraging them to host more curriculum-specific conferences and showcases in the region;
- the New Mexico Tribal Coalition, by encouraging the director to bring geographically remote teachers together at a user's conference and a summer math content course; and
- the publishers, by recruiting additional teachers who can officially serve as trainers for the curriculum, establishing partnerships for co-hosting curriculum conferences, and having new materials better aligned with state adoption funding requirements.

Fruitful collaborations and partnerships were identified and fostered between schools, districts, educators, and educational agencies, organizations and businesses, through the BCC's arranging school visits to like-minded schools, securing resources for schools, sharing of training opportunities between districts, and offering the highly successful curriculum conferences showcasing specific mathematics curricula. Thus, not only such collaborations have been modeled, but actual working relationships have been established and experienced, which should lead to further collaborations in the future.

It is indeed impressive that six of the ten original BCC districts chose to actively explore or pilot standards-based curricula this past school year, achieved considerable progress, and plan to continue this work in the coming year. Furthermore, one of the Phase I-only BCC schools has also now chosen to proceed with piloting work this next year. As the ARC consultant expressed, this "wait one year while we get ourselves organized" is probably a more typical strategy of interested schools, to allow them time to take stock of their resources and funding, and whether they're ready to proceed with such a formidable step given the considerable undertaking involved in piloting new standards-based curricula. Moreover, the spread of interest in standards-based mathematics programs has extended beyond these seven original BCC districts, with additional New Mexico schools and districts now exploring reform curricula as a result of their participation in the April curriculum conference and other BCC-led workshop and training events held in Summer 2004. This is testimony both to the drive and determination of these New Mexico schools and districts, and to the expertise and effective delivery of programs and services of the ARC Center and its leading ARC consultant.

Concluding Remarks

As documented in a recent national study of mathematics curricular decision making (St. John, Tambe, Fuller & Hirabayashi, 2004), there is a small, but significant portion of American schools across the country interested and willing to pursue curricular change that goes beyond the incremental, and seriously embark on new methods of teaching and learning mathematics. Responding both to external (system) and internal pressures, these mathematics education leaders must make curricular decisions that meet public, professional and personal standards.

Professional development plays a critical role in informing major curricular decisions, and on-going curricular and leadership support is essential to helping schools move closer towards a standards-based mathematics practices. (Fuller, St. John, Tambe, Evans & Lopez, 2003; Goldsmith, Mark & Kantrov, 1998; Schoenfeld, 2002.) Those offering professional development and support need to recognize the particular circumstances of individual schools, districts, and educators, and involve professionals who recognize, value, and possess expertise in the complexities of K-12 mathematics reform. Our evaluation of the ARC Center and its work this past year has shown the Building Capacity for Change project to be an exemplary model of how such professional development efforts can and should be conducted with school districts that are newly engaged in standards-based mathematics. In order to serve school districts across the country as they strive towards making standards-based mathematics learning available to all children, we strongly recommend that efforts like these continued to be supported and be more widely replicated.

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