Annual Report for Math off the Shelf
Year 4 (April 2010–March 2011)

Year 3 marked an important transition year for the Math off the Shelf project, as it proceeded from its initial phases of materials development and close work with ‘alpha region’ librarians, to doing outreach to increasing numbers of new librarians and regions throughout and beyond the Northeast. Some librarians have now been familiar with MotS for two to three years, with the novelty of the materials lessened and direct support from TERC decreased. All this is amidst a rough economic climate that is causing libraries to face increased organizational demands, tough programmatic choices, and serious budget and staffing cuts. …

Use of MotS was high both in regions new to the project, as well as in regions participating in MotS for several years. According to librarians, keys to MotS’ success lie in the materials’ high quality, its ease of use and adaptability, its wide range of activity and resource formats, and the highly enthusiastic response from children and parents alike. Librarians expressed how they particularly liked that the materials were fun, offered children clear and engaging connections to how mathematics related to the real world, and were easy to incorporate into their ongoing library programs, practices, and space.


This report covers the last four months of Year 3 and the first eight months of Year 4 of Math off the Shelf (MotS). The broad project goal is to build math capacity among public children’s librarians and other library-based informal educators. (For brevity, we refer to librarians and other library-based informal educators as LBIEs.) These LBIEs, in turn, bring informal math to elementary grade children and their families directly and indirectly, through outreach to other informal educators. With an unfunded extension, we anticipate project end in July 2012.

The project is being conducted in partnership with eight library regions: four Alpha Regions (CT, MA, Queens NY, and Westchester County NY, or, WLS) and four Beta Regions (AZ, FL, San Jose, CA, and St Louis). An additional cadre of 120 paid teen mentors and homework helpers at the Boston Public Library Homework Assistance Program (HAP) have joined as a ninth region.

Within each region, we collaborate on multiple levels: with a Regional (or state) Leader for recruitment of LBIEs, wider promotion of project resources and professional development opportunities, and development...
of institutionalization plans; in large cities, with a city- or district-wide head for local promotion and professional development as well as insuring continuity in event of branch closings; and with LBIEs who implement MotS at public libraries and conduct outreach.

In Years 1 and 2, selected LBIEs in Alpha Regions collaborated with us to shape and test materials for use with library patrons. Regional Leaders from Beta Regions served as project advisors during this period. By the end of Year 2, we had engaged 128 LBIEs, who reported bringing MotS to 6,750 children and 250 parents.

Year 3 work centered on: engaging selected Alpha Region LBIEs in MotS peer leadership and outreach; extending implementation and capacity-building to Beta Regions; and revising project materials based on Years 1 and 2 formative testing, evaluation data, and advisor input. In addition, our external evaluator, Char Associates, gathered data on initial impacts of project activities. In Year 3, we worked with 182 librarians and were able to get complete data on MotS use from 48% of them. These 87 librarians reported implementing MotS activities directly with 25,580 children and 4,651 parents. They estimate they reached a further 45,595 children and 11,390 adults with MotS.

Year 4 major activities to date have involved: extending to three further regions and beginning the transition to post-project levels of support for all regions; engaging a wide range of LBIEs (beyond children’s librarians); developing and implementing webinars for professional development and outreach; and supporting librarians in taking on more leadership in professional development for peers. Our external evaluator conducted an extensive mid-project impact evaluation, appended to this document. In Year 4, we worked with 354 LBIEs (directly, or indirectly, via close connection with their supervisor) and were able to get complete data on MotS use from 33% of them. These 131 LBIEs reported implementing MotS activities directly with 25,575 children and 3,689 parents. They estimate reaching a further 175,389 children and adults in this year alone with MotS activities, games, and projects that took place in the library but were not directly facilitated. They provided professional development to 2,925 library-based and other informal educators. As is detailed in Figure 3 and Section 1C, this reach represents only a fraction of LBIEs using MotS and of the children and families using MotS.

The external evaluation report on impacts to date reflects a data-gathering cycle completed in May 2010. Findings on impact of Year 3 activities served to guide our work in Year 4. The final external evaluation report, data for which is being gathered in April through June 2011, will demonstrate impacts of Year 4 activities described below.

Last year we noted a difficult economic climate for public libraries. This year was characterized by an even gloomier financial outlook, with deeper local and national cuts to library services (http://americanlibrariesmagazine.org/news/02152011/all-imls-lsta-funding-jeopardy). Yet, public libraries are ever-more well-used, especially in low-income communities with a scarcity of safe places for children to spend time after school and many residents without internet access at home (http://ala.org/ala/newspresscenter/mediapresscenter/americaslibraries2011/index.cfm). In this climate, MotS is flourishing.
1. Major Activities

1A. Partnerships and regional spread

IAi. Extending to three further regions and beginning the transition to post-project levels of support for all participating regions

In the first three years of the project, we worked primarily with six of the originally planned eight regions. As Figure 1 shows, a group of LBIEs in the four Alpha Regions received the most support and have been involved for the longest, collaborating in formative testing of project materials. A group in two Beta Regions joined early in Year 3, providing feedback to ensure that evolving materials and methods resonated with populations and organizational structures in their regions.

During the period covered in this report, as materials and methods became closer to final, we engaged the remaining two Beta Regions, with a nearly “hands-off” simulation of post-project conditions. Also in the last year, Boston Public Library HAP, offering homework help and enrichment, joined the project.

Over the last few months, TERC began decreasing support to all regions (with the exception of Peer Leaders, see Figure 3), enabling our evaluator to assess sustained project use and impact under more naturalistic conditions.

FIGURE 1:
ORIGINAL AND ADDITIONAL REGIONS: Support from TERC Years 1–4

<table>
<thead>
<tr>
<th>Role</th>
<th>Region</th>
<th>Joined</th>
<th>Support from TERC through Year 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha. Formative testing and development partners</td>
<td>CT (selected libraries)</td>
<td>Year 1</td>
<td>• In-person meetings/workshops 2-3 times per year</td>
</tr>
<tr>
<td></td>
<td>MA (selected)</td>
<td>Year 1</td>
<td>• Regular phone support and several site visits in Years 1 and 2; less in Year 3</td>
</tr>
<tr>
<td></td>
<td>WLS (selected)</td>
<td>Year 1</td>
<td>• Leadership training (selected participants)</td>
</tr>
<tr>
<td></td>
<td>Queens</td>
<td>Year 2</td>
<td>• General (below)</td>
</tr>
<tr>
<td>Beta 1. Refining project approaches</td>
<td>St Louis (all)</td>
<td>Early Year 3</td>
<td>• One in-person workshop</td>
</tr>
<tr>
<td></td>
<td>San Jose (all)</td>
<td>Early Year 3</td>
<td>• Site visit (selected sites)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Occasional phone and e-mail support</td>
</tr>
<tr>
<td>Beta 2. Simulated post-project conditions</td>
<td>AZ (selected)</td>
<td>Late Year 3</td>
<td>• Occasional phone and e-mail contact</td>
</tr>
<tr>
<td></td>
<td>FL (selected)</td>
<td>Late Year 3</td>
<td>• General (below)</td>
</tr>
<tr>
<td>Additional</td>
<td>Boston HAP</td>
<td>Late Year 3</td>
<td>• Occasional phone and e-mail support for program head</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• General (below)</td>
</tr>
</tbody>
</table>
Support from TERC: General—Years 1–3 and Year 4, all groups

- Color copies of selected materials
- Stipend for time spent on outreach beyond typical job responsibilities (selected participants)
- Small incentive for reporting data on use and participating in external impact study
- Monthly mailings (also available to any interested LBIE)

1Aii. Engaging a wide range of LBIEs (beyond children’s librarians)

With staff cuts and increasing demands on the remaining children’s librarians, our partners have turned to volunteers, teen helpers, and paraprofessionals to address the needs of the growing numbers of children whose parents send them to the library in absence of other free and safe places to spend time. In this past year, we’ve worked with those responsible for overseeing and training these non-librarian LBIEs.

*Queens NY* employs after-school educators to staff drop-in after-school programs (BOOST) housed in libraries. A Queens-wide educator oversees BOOST training and programming at all sites.

*St Louis MO* offers the services of homework helpers, paraprofessionals who provide library-based support in homework, tutoring, and educational enrichment. Librarians and a citywide coordinator oversee their work.

*Broward County FL* literacy coordinators concentrate on academic support; a countywide literacy coordinator trains them.

*Pima/Tucson AZ* includes family literacy specialists offering programs for families headed by teen parents and by Native Elders. Family literacy specialists have autonomy in programming.

*Boston MA* teen mentors (HAP) provide homework help and enrichment in math and literacy. A citywide educator trains and supports them.

*San Jose CA* programming team offers resources and programs at the city’s 19 branches. As a cost-cutting measure, the San Jose library system eliminated all children’s librarian positions, including the citywide children/youth services head. Librarians who retained their jobs after substantial citywide layoffs serve as generalists, providing services for all patrons.

Char Associates’ Year 3 impact evaluation report, attached, includes data gathered from a sample of BOOST LBIEs. The summative impact evaluation report will include a sample of LBIEs from each of the groups above.
1Aiii. Developing and implementing webinars for professional development and outreach (rather than only face-to-face workshops)

For the second consecutive year, library budget cuts dramatically curtailed librarians’ ability to travel to project meetings. Paradoxically, in these difficult economic times, “buying out” librarians’ time so that they could participate in a meeting off-site has not always been possible. Tighter budgets have meant fewer part-time workers available to cover time and limits in professional development/off-library work hours. Figure 2 illustrates the wide scope of challenges and changes among our partners.

**FIGURE 2: RESTRUCTURING AND LAYOFFS IMPACTING OUR WORK WITH ALPHA AND BETA REGIONS**

<table>
<thead>
<tr>
<th>Region</th>
<th>Changes in regional structure and contacts, Year 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT, AZ, Queens</td>
<td>Dramatically reduced regional services and support; staff, hours, and program reductions due to budget cuts</td>
</tr>
<tr>
<td>MA</td>
<td>Six MA regions combined into one, with one statewide (rather than six regional) children’s library leaders, so we are now working statewide, rather than just in Eastern MA</td>
</tr>
<tr>
<td>WLS</td>
<td>Regional children’s library head and staff laid off; librarian layoffs include some MotS project participants</td>
</tr>
<tr>
<td>FL, Broward County</td>
<td>MotS implemented by library staff with grant-funded positions; near complete turnover of staff during period between grants</td>
</tr>
<tr>
<td>San Jose, CA</td>
<td>Programming for all ages is now planned and led by a citywide team; all children’s librarian positions have been eliminated, with layoffs including some MotS project participants</td>
</tr>
<tr>
<td>St Louis</td>
<td>With the advent of library budget cuts, St Louis 4 Kids, a regional out-of-school time resource and training center, is taking on much of the training and support for children’s librarians</td>
</tr>
</tbody>
</table>

Diminished travel coupled with improvements in interactive webinar technology has led to increasing popularity of webinars for LBIE professional development. We have capitalized on this trend in our professional development and outreach efforts.

As described in 1Bi, below, we worked with a selected group of LBIEs from Alpha and Beta Regions to develop, pilot, refine, and implement MotS webinars. Our webinar materials, PowerPoint presentations, and handouts are designed so that individual LBIEs can customize them to fit their own presentation styles and particular audience needs. The first MotS webinar took place in December, 2010. To date, the project has supported seven LBIE-led or co-led webinars. We will continue to support webinars in the coming year. Summative evaluation will investigate impact of project activities on Peer Leaders.
1Aiv. Coaching and supporting Peer Leaders as they conduct workshops, webinars, and outreach to other informal educators

This year, we have been involving a group of Peer Leader LBIEs in conducting professional development and outreach to other LBIEs. We chose this approach over doing it wholly ourselves in order to build capacity, support institutionalization, and to assure LBIEs that peers find MotS useful and accessible.

Figure 3 summarizes the involvement of the 28 Peer Leaders and other project participants. We coached Peer Leaders in developing webinar and workshop presentation skills: choosing anecdotes about their own experiences with MotS/math to engage peers; facilitating group discussion of math in MotS activities; becoming familiar with webinar technology (Elluminate Live! when hosted at TERC, AT&T Connect when library-hosted); and customizing our template PowerPoint slides and print/virtual handouts. Although comfortable leading sessions with children and families, most had never before presented to peers.

Typically, we coached each LBIEs via several individual phone calls and practice webinar sessions. Although we conducted some group coaching sessions, varied LBIE schedules and time zones posed coordination challenges.

Regional or state leaders in Alpha and Beta regions identified opportunities for MotS sessions (e.g., in conjunction with meetings, conferences, or professional development programs), publicized project-supported webinars and workshops on listservs, mailing lists, and blogs, and in WLS and MA, offered PDP credits.

Webinars included one to three LBIEs presenting and leading activities, for instance, a recent webinar was co-led by the Broward County FL literacy coordinator, an AZ family literacy library-based practitioner, and a WLS children's librarian. All webinars were free to participants.

I was so hesitant at first about how I was going to be able to work math into our programs and I've learned so much and had such fun watching the kids have fun with it. The whole idea of showing the kids how to have a good time with basic math skills that they're going to need to use in their everyday life has been an enlightening experience for me! It's easy, it's fun and it's helpful—what could be better? It's a good feeling to think that we've been given another way to have the library play a supporting role for our families. And the presenting part has made me work outside my comfort zone, as well, so I'm growing, too!

Children's Librarian and MotS Peer Leader, personal communication, March 17, 2011

From a MotS webinar. Moderator posts a screen with “hands on” activities a few minutes before the webinar begins and encourages participants to share ideas as they wait for the webinar to begin.
<table>
<thead>
<tr>
<th>How did they learn of MotS?</th>
<th>Peer Leaders: LBIEs taking on MotS outreach</th>
<th>Engaged: LBIEs using MotS in Alpha or Beta Regions, some project contact</th>
<th>Broader Reach: other LBIEs using MotS, little or no project contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional Leader</td>
<td>Regional Leader</td>
<td>Regional or Peer Leaders</td>
<td>Regional or Peer Leaders; state and national (ALA) library groups; summer reading promotions; links to MotS on SMILE, DoE and other sites; web searches (See IC)</td>
</tr>
<tr>
<td>Who recruited them</td>
<td>Combination of self-selection and TERC, from among Engaged</td>
<td>Self-selected</td>
<td>Self-selected</td>
</tr>
<tr>
<td>Support offered from TERC</td>
<td>See Fig 1. Also: coaching via phone meetings and webinars; honorarium for time and travel</td>
<td>See Figure 1</td>
<td>None; for Year 4 external evaluation study, small incentive if willing to participate in survey</td>
</tr>
<tr>
<td>Regions</td>
<td>7</td>
<td>9</td>
<td>Alpha and Beta</td>
</tr>
<tr>
<td>Number of library-based informal educators</td>
<td>Year 3: 19 Year 4: 28</td>
<td>Year 3: 163 Year 4: 354</td>
<td>Tens of thousands</td>
</tr>
<tr>
<td>Number of states</td>
<td>6</td>
<td>7</td>
<td>50</td>
</tr>
</tbody>
</table>

Peer Leaders have conducted the following outreach beyond their own library systems in this past year. In addition to what’s listed below, nearly all regions have posted links to MotS on their summer reading or general websites.

**CT.** In this relatively small and densely populated state, some librarians are able to attend workshops with minimal travel time. Peer Leaders have conducted three regional and one statewide MotS workshops and an information session at the annual state library conference, with a total reach of 183. One Peer Leader has been incorporating MotS into training for regional Pre-School educators, to date reaching 10 educators through several workshops. She is planning to offer similar workshops for local parents in the fall and organizing a statewide webinar.

**MA.** As in CT, in-person workshops are much less well attended than in past years but still a viable option for some. Peer Leaders have led four workshops, engaging 72 LBIEs. A recent workshop was live-streamed, with call-in attendance from several librarians around the state. The MA Library System will be making the
recording available for others to watch. Three further workshops focused on Summer Reading are planned for the coming month, and Peer Leaders will be conducting webinars starting in the fall.

**WLS.** A group of Peer Leaders have been actively involved in workshops, webinars, and other forms of outreach. They have reached 79 librarians through a regional workshop, a webinar, a session at the annual NY State conference, and a professional development workshop in neighboring Nassau County. In addition, they continued and extended last year’s outreach to after-school educators at seven sites through the White Plains Youth Bureau, WLS Teen Ambassadors who support library efforts in the summer months, and YMCA staff in the region. These efforts engaged a further 52 LBIEs and other informal educators. A series of webinars will be offered in the coming year for both WLS and Nassau LBIEs. Peer Leaders were also active in getting regional press for their MotS efforts (http://www.westchester.com/news/westchesternews/schools/14133-westchester-library-programs-promote-positive-youth-development.html).

**St Louis.** Tim Fowler of St Louis 4 Kids, a regional out-of-school training and support center with a close library connection, has taken on MotS as part of regular professional development offerings. In this past year, Mr Fowler has given three workshops and one webinar on MotS to 108 LBIEs and other informal educators; another is planned at a Family Literacy conference in the coming month. In one of the sessions, Judith King, after-school programs coordinator for the city of St Louis joined him to share ways that after-school educators use MotS in out of school time programs and family events. St Louis 4 Kids plans to continue offering MotS workshops for informal educators throughout the MO and IL.

**San Jose.** As previously discussed, San Jose Public Libraries have gone through a dramatic budget and staff reduction accompanied by restructuring: all children’s librarian positions have been eliminated such that remaining librarians are generalists. Programming for all ages is handled by a citywide team, with team members serving as generalists rather than focused on children’s programs. On the positive side, the programming team has been circulating and running a MotS program monthly at each of the 24 branches, and each branch will hold at least one MotS family event by the end of the year. However, at the moment, the programming team structure offers little potential for peer led outreach beyond San Jose. On the wider regional and state level, Linda Crowe, Director of the Peninsula Library organized a MotS webinar attended by six librarians in the area, and will be working with us to better promote future webinars for CA in the fall. Heather Teysko of the statewide library support organization Califa, posted a blog entry recommending MotS, and Ruth Paget, a former San Jose librarian and MotS enthusiast blogged about the resources (http://ruthpaget.wordpress.com/2011/01/15/mixing-in-math-website-delivers-skills/) Each of those blog postings was
followed by a surge in visits to our website from CA, and adoption of our resources in CA informal education programs. For instance, the City of Irvine listed MoTS as their only recommended informal math resource, the Discovery Center for Science and Technology submitted a successful grant to Verizon to support a MoTS-based after-school program, and the City of San Francisco Department of Children, Youth and their Families reviewed the resources, linked them to Core Competencies, and listed them as one of only two recommended math resources.

AZ. In this past year, we brought on board LBIEs in rural Willcox, Tucson/Pima, and the Pascua Yaqui Nation, which maintains a library in Tucson. In AZ, where distances are great and the state is large, LBIE professional development is typically conducted by webinar. Three LBIEs have served as Peer Leaders: a librarian from Willcox; a library-based family literacy provider working primarily with Native populations from Tucson; and a Pascua Yaqui librarian, who presented information about the project to a gathering of librarians from Tribal Libraries. This effort and three webinars have attracted 54 participants. In addition, two of the attendees have distributed project PowerPoints and workshop notes to groups peers. Again, we will continue webinars in the fall.

FL. Also in this past year, we engaged librarians in Broward and Lake Counties in using MoTS. In Broward, MoTS serves as a resource for library-based literacy coordinators, who offer homework help and enrichment to a low-income, largely immigrant population. Vonda Bryant, Director of Learning Services, has to date trained two cadres of literacy coordinators, and she co-led a webinar for 14 FL librarians. Sandy Newell, statewide Library-Community Liaison and President of Volunteers for Florida Literacy will be giving a poster session on MoTS at the state library conference and providing information on MoTS at the VaLF conference, both in May.

Two regions with large non-librarian staff implementing MoTS have focused on ongoing internal staff training rather than outreach to other regions.

Queens. Three leaders (Daniel Nkansah, Leslie Taylor, and Lynn Cole) oversee distinct groups of LBIEs using MoTS: librarians, BOOST educators, and those implementing programming in the Queens Library Discovery Center (QLDC) in conjunction with the NSF-funded “Science in the Stacks.” In the last year, Ms Taylor took the lead in training approximately 140 LBIEs on MoTS: her staff (BOOST, Teen Tutors, and Youth Counselors working with middle school youth and supported by the Juvenile Justice System) participated in quarterly trainings; librarians and QLDC staff participated in one to two MoTS workshops. In addition, Ms Taylor made MoTS the focus of a Queens Public Libraries middle school summer program funded in part by grants from 21st Century Learning Centers and Department of Juvenile Justice. The newly hired Children’s Library head, Daniel Nkansah, is involved in training and oversight of the QLDC as it gears up for expansion.
in summer 2011, and will be scheduling a workshop on MotS for newly hired staff. In the final year of the project, he will work with us on further integrating MotS into QLDC programming.

**Boston HAP.** Ongoing staff development is a core component of the HAP program. The 120 paid teen mentors in 26 branches attend monthly two-hour training sessions in groups of 20, along with two-day workshops at the start of the year. Monthly trainings include teens leading MotS activities for peers, and discussion of how MotS can be used to support topics homework and school math topics with which children are having difficulty.

In the coming year we will be collaborating with Regional Leaders to promote and institutionalize project resources in ways that make sense given individual structure of each region. One of our Regional Leaders, Sarah Sogigian, the head Children’s/Youth Services Consultant for MA, is serving as our American Library Association (ALA) Liaison. A strong supporter of the project, she is committed to promoting MotS both statewide and nationally via ALA affiliates and the national Collaborative Summer Reading Program group, which provides summer reading resources for 48 states. Ms Sogigian does not take funds from our project, since promoting what she believes to be a stellar resource for libraries is part of her job. Likewise, Peer Leaders have been willing to accept project funds to support fewer than half of the outreach events described above, since for some, outreach within their city or region meshes with ongoing responsibilities. This view of promoting MotS as part of, rather than external to, ongoing job responsibilities bodes well for continued outreach and professional development post-project.

**1B. Materials**

In the past year, in accordance with our focus on supporting peer leadership and dissemination, our materials development has centered on professional development and outreach resources. As detailed in prior annual reports, we completed piloting, testing, and revision of materials for LBIEs to use directly with the public in Years 1-3 (http://mixinginmath.terc.edu/materials/index.cfm). These resources, as well as the resources discussed below are primarily at a 5th-7th grade reading level, for those LBIEs with lower literacy and the many with high literacy but little time to read.

Our work this year has been guided by several factors:

- input and feedback from peer leaders
- ad-hoc librarian surveys and advisor input
- findings from external evaluation report
- feedback from workshop and webinar participants
- focus group and advisor input.

**1Bi. Peer-led workshop and webinar materials that resonate with LBIE audience goals and interests—so that they will choose to use MotS resources**

When asked to choose up to three factors most likely to keep MotS going at their library, close to three-fourths of the librarians cited the interest/demand from children (73%), and their own commitment to providing math-related educational opportunities (70%).

As an important part of the community, I think the library should be a place that families can find math enrichment in our displays and our programs. (p. 24)
Findings. Among all LBIEs we have encountered, use of MotS is a personal decision: there are no library structures in place to mandate use of a particular resource. LBIEs have a autonomy in selecting resources to use with children and families. They base their selections on their own interests and values and their perceptions of community interests and needs.

For librarians, use of any math resources is also a personal decision: we have encountered no librarians required by a supervisor to offer math programs. The situation for LBIEs varies. Library-based homework helpers assist with homework children bring in, whether math or other subjects. If they have time to offer enrichment activities, they decide what to offer. Although BOOST staff are required to provide math activities on a monthly basis, they choose what resources to use—they do not have to use MotS.

Given the role of personal choice among LBIEs, if MotS outreach efforts are to be effective, they must resonate with individual LBIE goals and interests. Our work with Peer Leaders in Year 4 provided us with opportunity to hone our professional development materials to this end.

Response. Up through Year 3, TERC led or took primary responsibility for MotS workshops, webinars, and other outreach efforts. As described last year, we drafted a training module and accompanying PowerPoint designed for a 60-90 minute workshop session (http://mixinginmath.terc.edu/aboutMiM/reports/MotS_reportYr3_All.pdf). This formed the basis for TERC-led outreach efforts.

In Year 4, we worked with emerging peer leaders to revise the training materials for peer-led (rather than TERC-led) workshops and webinars (http://mixinginmath.terc.edu/training/libr_training.cfm). With peer leader input, we made the following changes:

- Restructure sessions to allow time for Peer Leader to share personal reasons for using MotS, beliefs about how it has addressed community needs, examples of appeal to children, and when relevant, any initial reservations or anxieties about offering math programming for the elementary grades.
- Organize presentation of MotS according to common ways it is used in libraries (e.g., as part of story time, or while children are waiting to be picked up to go home), rather than by theme (e.g., animals, nature) or by math topic.
- Address connections to upcoming Summer Reading themes. In many regions, children’s librarians begin preparing for upcoming Summer Reading programs as early as September of the previous year, so it’s never too early.
- Encourage interaction with MotS materials and webinar interaction via drawing tools and chat function. Librarians (vs other LBIEs) may be unused to “hands on” workshops and interactive webinars, and instead more accustomed to lecture format.
Char Associates corroborated the notion that librarians may be reluctant to engage in hands-on activities in professional development sessions. They compare attendees at two different MotS training sessions led by a regional leader in Queens, NY: one session attended by Queens Children’s Librarians and the other by BOOST (library-based after-school program) staff.

We observed quite striking differences in the training sessions offered to the two groups during the opening, unstructured “free choice” part of the session [in which half a dozen MotS activities were made available for participants to try]. During this time, BOOST staff eagerly explored and learned about the different MotS resources available in the room. In contrast, a number of children’s librarians took this time to chat and share other “library business” with their fellow librarians. (p. 49)

When we investigated webinar software, we sought features that would afford maximal audience interaction on a wide range of possible platforms, given that library budgets do not always allow for current equipment or software upgrades. We have developed webinars that include:

- Strategy games that pairs of participants play on the webinar screen for all to see
- Interactive maps (so participants can put a dot on their home region)
- Voting and polls
- Group brainstorming lists
- Group activities carried out by each participant writing on-screen and recording strategies

We chose to use webinar drawing and text tools for on-screen interactions, rather than built-in polling and graphing features. As participants use the drawing and text tools, the results can be messy—just as they are in real life with MotS activities such as Quick Questions (http://mixinginmath.terc.edu/activities/quickquestions.cfm). Thus, they enable us to raise questions and encourage discussion of issues that might arise when using MotS resources in children and families:

- Does the tallest column have the most responses?
- Does any column have more than half the responses? One response is half way between two columns. How should that count in the results?
- Someone said she voted twice. Knowing that, do any results change? Why or why not?

Participants share their thoughts through the webinar “chat” window and microphone (speaking) feature.

Next steps. Peer-led webinars will continue to be an emphasis in the coming year; workshops less so, because of the difficulties LBIEs have gathering in person. Sarah Sogigian, our ALA liason, will be promoting MotS resources to her peers in other states and at national summer reading planning meetings. In the fall, she will promote MotS webinars as well.
To date, all our webinars have been conducted in English, although many of our resources are available in English and Spanish. We will be contacting REFORMA, the National Association to Promote Library and Information Services to Latinos and the Spanish Speaking to determine interest in Spanish MotS webinars.

We have posted one workshop template and set of PowerPoint slides on our site. In the coming year, we will post webinar and other workshop templates and sets of slides, annotated to illustrate ways that particular LBIEs customized them to reflect presenter experiences and audience needs. We are in the process of updating informational resources for webinar and workshop leaders to distribute.

IBii. Resources for LBIEs to use in planning and organizing their MotS use

We now have about 200 English and Spanish resources (activities, games, projects, interactive displays, etc.) available for free downloading on our website (http://mixinginmath.terc.edu). This year, we’ve been investigating the criteria that our partner LBIEs use in sorting through and selecting among our resources, so that we can organize our website to make it easier for LBIEs to find what they need.

(IfBiia) Resources to support building children’s math skills

Findings. In this past year, LBIEs began using MotS in support of formal education. Although they used MotS regularly throughout story times, crafts, games, and other offerings, 69% reported frequent use during homework time (p. 13). We did not anticipate that LBIEs would make a strong MotS-formal math education link (nor did the issue arise in Char Associates’ Year 2 survey responses), and so we did not probe this in last year’s survey.
Anecdotally, LBIEs mentioned the following formal-informal connections: MotS providing a “hands on” and concrete understanding of measurement, time, and graphing, as well as regular and engaging practice with computation and estimation; capitalizing on the availability of homework helpers to offer more math enrichment once homework is done; providing an educational and fun “gear up” to homework time. In 2B, we postulate some reasons for informal-formal connections; we will explore these further in next year’s survey.

Response. To support the many LBIEs using MotS in conjunction with development of math skills for homework and school success, we extended and revised our math content chart (http://mixinginmath.terc.edu/skills_standards/content_chart.cfm) in several ways:

- Incorporated feedback from advisors on ways to revise our math content chart to better fit the needs of LBIEs while retaining the emphases in the NCTM Standards;
- Further revised to the math topics listed to ensure coincidence in topics with the Common Core Standards;
- Extended the chart: previously it included only our full-length projects and activities; now it includes all of our games, posters, short activities, and independent activities to meet the needs of a wider range LBIEs and library-based informal education settings.

Next steps. Year 4 summative impact evaluation surveys and TERC’s discussions with LBIEs will probe informal-formal connections with MotS: reasons for increased focus on math/homework; differences among different groups of LBIEs (librarians, library-based after-school educators, etc.); particular content areas focused on; use of math content chart and other math resources that MotS provides. Depending on findings, we may develop additional formal-informal connection resources.

(1Biib) Resources for using MotS materials with a wider age range, especially older children

Findings. As noted in previous years, LBIEs often serve a wide age range and can’t always predict ages of those who will attend their offerings. A program advertised for 6-8 year old children might draw children several years older or younger as well. While librarians surveyed report that they most often see 5-10 year old children in the out of school hours, the wider LBIE group—including homework helpers, tutors, and library-based after-school staff report serving many middle school children as well (p. 40). At BOOST programs,

The average group ranged in age from 6 to 13 years of age, although over a third (35%) reported having an oldest child between 14 and 16 years of age. (p. 40)
Many LBIEs used MotS materials with older children in one of these ways:

- Use the basic activity with older children who lack fundamental math skills.
- Use activities that can be approached at multiple levels of skill with a wide age range.
- Ask older children to lead MotS activities for younger ones, knowing that both groups need the math practice.
- Direct older children to the “harder” variations best suited to upper elementary and middle grades.

**Response.** To address this unanticipated finding that MotS activities were well-used with middle grades children, we made the following changes:

- We increased the age range listed on many activities and game sheets, especially since LBIEs sometimes gave older children the activity instructions to read and didn’t want them to see that they were above the suggested age.
- We packaged a set of MotS activities particularly well suited to children in grades 5–8 in response to those LBIEs who wanted ideas for older children at the ready (http://mixinginmath.terc.edu/Themes/index.cfm#grades58). These activities served as the focus of a Queens Public Libraries (QPL) middle school summer program funded in part by grants to QPL from 21st Century Learning Centers and Department of Juvenile Justice. Apart from Queens usage, these materials have been accessed 888 times on our site, with 33% of visits repeats, suggesting that they are a resource very much in demand.
- In our summer reading and theme sheets (discussed below) we have begun including a selection of activities particularly suited to the older range.
- Include options for engaging in MotS middle school/upper elementary grade activities in webinars and workshops if audience serves this group.

**Next steps.** We will continue to make sure that our summer reading and theme sheets, to be finalized in the coming year, include some activities and variations particularly well-suited for middle grades. As we finalize our website search function, we will enable searching for MotS activities for the middle grades. Developing activities expressly for middle grades is beyond the scope of this project; instead we will highlight MotS activities that LBIEs have used successfully with middle grade children.

We will make a set of parallel changes for inclusion of Pre-Kindergarten children (4–5 years old), since LBIEs often ask us to suggest MotS activities especially well-suited for these ages.
Findings. Summer reading is the focal point of annual children’s library planning and programming. Each year we’ve packaged a set of MotS activities that fit the current summer reading theme for easy access. Each includes a “cover sheet” such as the one shown above, with links to activities that fit the theme. For instance, clicking on “Cultural Calendar” above, brings the user to the activity with that name. Last year, our first summer with the ability to track downloads, we found extensive use of our Summer Reading 2010 materials, with nearly all participating LBIEs reporting using them. This summer, our materials aligned with Summer Reading 2011 are on track to be at least as popular, with 622 downloads in the last month alone.1 (See http://mixinginmath.terc.edu/Themes/Stories_World2011.cfm to view the front page of the Summer Reading materials and to download the entire packet.)

Last fall, we took an informal poll of our librarian partners and advisors to determine other themes into which they invest a lot of programming and planning time. We reasoned that they would make use MotS materials that could be integrated with each of these themes. We ended up with a list of about a dozen themes that occur annually (e.g., Earth Day, 100th Day of School) or periodically through the year (e.g., holidays, seasons) around which LBIEs report creating programs, displays, bulletin boards and handouts.

Response. We are in the process of organizing activities according to these themes, so that librarians can search for them on our website and download a set of thematic activities. We began with an Earth Day compilation of MotS activities. In choosing this set of activities, we sought a balance of math content, types of activities (e.g., games, projects, independent activities), and levels of difficulty.

In early March 2011, we posted a link to our Earth Day materials (http://mixinginmath.terc.edu/Themes/gogreenMiM_2011.cfm), promoted them on our website, and sent out a link on our mailing list. Since that time,

1 We gathered this and data on website usage cited in Section 2C in April 2011 from Google Analytics. If needed, we will provide access information.
multiple outside organizations have linked to and begun promoting it in conjunction with Earth Day, including National Girls Collaborative (April 2011 e-newsletter), University of Minnesota STEM Education Center, Utah Afterschool Network, and numerous home school sites. In the nearly six weeks since we posted them, they have been accessed 289 times, with 70% of downloads unique.

Next Steps. We will complete organization of activities and development of these packets, announcing them on our website and mailing list and then tracking access via Google Analytics. Before project’s end, we will develop packets of MotS materials aligned with Summer Reading themes through 2015. Future themes determined to date: Night, 2012; Underground, 2013; Science, 2014. Our ALA Liaison will promote these to children’s library heads in all 50 states. This fall, she will organize a meeting via conference call with the leaders of CLSP (Collaborative Summer Reading Program), the national summer reading program group, to discuss promotion and webinars involving MotS materials for upcoming summer reading programs.

1C. Dissemination and reach

We track reach among those with whom we are in direct contact (Peer Leaders and Engaged Librarians), and we estimate broader reach. Below we present data on reach to date, with the caution that we anticipate these figures are low. Because many MotS activities are offered in a public arena (for instance, libraries that offer our museum-type displays), tracking exact numbers who have participated is not always possible, nor is determining how many participants are repeats. Since materials are available for free download from our website, informal educators with whom we are not in contact have access to them.

1Ci. LBIE-led outreach

In Year 4, we worked with 354 LBIEs in Alpha and Beta Regions. Over the course of the year, we spoke directly or via individual e-mail exchange with 117 of them; others, such as BOOST and HAP staff were engaged via a supervisor with whom we communicated regularly by phone. In this past year, we were able to get complete data on MotS use from 33% of the 354. These 131 LBIEs reported implementing MotS activities directly with 25,575 children and 3,689 parents at programs for children and families.
They estimate that in the last year, they also reached a further 175,389 children and adults with MotS activities, games, and projects set up in museum-type stations in the library for independent use.

Our 131 respondents report providing professional development to 2,925 library-based and other informal educators who had not previously been involved in the project: 578 librarian participants in workshops and webinars described in 1A as well as 2,347 library volunteers, tutors, paid teen helpers, and paraprofessionals in their own libraries.

Our Year 3 report, pages 12-13, details some of the meticulous methods that librarians use in estimating attendance: record-keeping and preserving information is core to library work; librarians are required to report attendance at facilitated programs and to estimate attendance at unfacilitated events for local (city, county, town) records.

If our respondents’ responses are typical, extrapolating to the 354 LBIEs, about 80,000 children and adults would have participated in facilitated programs and 500,000 in unfacilitated programs. Some visitors may be double-counted, but because of project participation LBIEs actually offered many more math programs than reported—so reach could be even greater. As described in Section 2A below, LBIEs report that their experience with MotS has led them to create their own math activities for children and to engage in more math conversations with children and parents. The numbers above only count use of MotS activities; they do not include further math activities that MotS sparked LBIEs to develop and implement with children and families.

1Cii. TERC-led outreach

TERC staff led the following: a workshop at the Boston Children's Museum Family Literacy Festival, attended by children's librarians, family day care and childcare providers, family literacy providers and parents; a session at the Cambridge Science Festival, geared toward a public audience; information sessions at TERC's booth at the National and Northeast Regional NCTM conferences; an information session at TERC’s Investigations teacher leader retreat and at a workshop for Investigations teachers in Spanish-speaking areas of New Mexico. We estimate that altogether we reached about 1,000 informal educators and parents and 500 math educators.

In addition, we maintain a mailing list of over 1200 informal educators, including Engaged LBIEs and other informal educators who sign up, to whom we mail monthly English and Spanish math calendars, project updates, and suggested activity variations. We also occasionally solicit input or feedback. Several dozen of those on our list, in turn, send our mailings on to peers in their regions or professional networks. In the past year, 310 informal educators, many of whom are based in libraries, joined our mailing list.
1Ciii. Broader Reach
We track impact beyond those librarians with whom we are in contact in two key ways:

- our website
- web searches for use of or reference to our materials

(1Ciii.a.) Tracking access to our materials with Google Analytics
Below we report access to our website from March 16, 2010 through March 15, 2011.

**Who visits and for how long?**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Unique visitors</td>
<td>68%</td>
</tr>
<tr>
<td>Repeat visitors</td>
<td>31%</td>
</tr>
<tr>
<td>Average number of pages viewed per visit</td>
<td>4.9</td>
</tr>
<tr>
<td>Average time on site</td>
<td>3 min., 16 sec.</td>
</tr>
<tr>
<td>Bounce rate</td>
<td>46% (those who only visit the home page, suggesting 13,530 explored the site)</td>
</tr>
</tbody>
</table>

Data is similar to what we gathered last year.

**How do visitors come to our site?**

![Pie chart showing traffic sources]

- 37% direct Traffic
- 49% referring sites
- 14% Search engines

Compared to last year, many more visitors came from referring sites, reflecting the large number of sites now recommending our resources.
Where were visitors from?

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Origin</th>
</tr>
</thead>
<tbody>
<tr>
<td>89%</td>
<td>from the US</td>
</tr>
<tr>
<td>96%</td>
<td>from English-speaking or Spanish-speaking countries</td>
</tr>
<tr>
<td>45%</td>
<td>from Alpha and Beta Region states</td>
</tr>
</tbody>
</table>

Compared to last year, fewer visitors come from Alpha and Beta states, suggesting spread well beyond the regions in which we most closely work.

Top 10 MotS resources accessed (of hundreds)

<table>
<thead>
<tr>
<th>Web Page</th>
<th>Type of Resource</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geometric strategy games</td>
<td>independent activity</td>
</tr>
<tr>
<td>Monthly math calendars</td>
<td>independent activity</td>
</tr>
<tr>
<td>Math posters</td>
<td>independent activity</td>
</tr>
<tr>
<td>Math moments (quick activities)</td>
<td>independent activity</td>
</tr>
<tr>
<td>Around the Town</td>
<td>adult-led activity (maps)</td>
</tr>
<tr>
<td>Check the Clock</td>
<td>adult-led activity (time)</td>
</tr>
<tr>
<td>Math content chart</td>
<td>educator resource</td>
</tr>
<tr>
<td>Building Houses</td>
<td>adult-led project (geometry/engineering)</td>
</tr>
<tr>
<td>Catch the Beat</td>
<td>adult-led movement game (patterns)</td>
</tr>
<tr>
<td>Project background information</td>
<td>educator resource</td>
</tr>
</tbody>
</table>

Like last year, independent activities are particularly popular.

Although we have focused dissemination on LBIEs, a much broader range of informal and formal educators come to our site. Of the top 20 referring sites, several are home-schooling resource sites, and several are resource sites primarily for teachers.

One of the most popular referral sites is SMILE (www.howtosmile.org), an informal STEM resource site funded in part by NSF and NSDL. Last year, we received funding from SMILE to catalog 132 of our English and Spanish resources for the site. Our resources now comprise 60% of their math collection and 73% of their Spanish resources. Also among the top referral sites are www.free.ed.gov, www.nsdl.gov, www.nsta.org, and several state and county DoEs and library systems. Several of these sites, such as the FL DoE and NSDL, explicitly link particular activities or resources we have developed to science or math standards. AAAS (http://strandmaps.nsdl.org) connects our resources to science benchmarks. Of these, the only referral in which we were involved was SMILE; all the others identified, reviewed, and chose to link to and promote our resources independently.
(1Ciiib) Conducting web searches for use or reference to our materials

Through web searches, we have found links to our site or mention of our resources on the majority of state DoE sites and nearly all state library sites and state after-school organization sites. In addition, each year we find dozens of regional school districts, informal education resource groups, university education departments and STEM education centers, homeschooling groups, and libraries that link to our site or offer programs based on our resources. This year, we’ve found an increase in several types of recommendations.

**Tribal Libraries.** As discussed above, the Pascua Yaqui Tribal Library is participating as part of the AZ Beta region and conducting outreach to Tribal librarians in AZ.

**Museums.** Sunset Harris of TASC (The After-School Center) presented MoSs to science museum professionals at the ASTC 2010 “Meet the Numerati” session. TASC has incorporated our resources into NYC-wide training and support for a wide range of informal educators including LBIEs. TASC has also included our resources in study and evaluation of STEM resources. As noted in 1A, The Discovery Center for Science and Technology in CA included our resources in a successful grant for math programming outreach.

**Formal education.** Compared to previous years, more local and regional school districts have linked to our resources, recommended them for classroom, after-school, and at-home use, and offered workshops based on them. For instance, we learned that Karin Coburn of the Fairfax County VA School District offered workshops on our resources to 65 educators throughout the County. As noted directly above, NSTA and NSDL (particularly the AAAS resources site) has sent many visitors to our site. NSDL approached us recently about cataloging our resources for inclusion in the NSDL Common Core Mathematics Collection, having identified them as a resource that would serve the community of formal educators seeking engaging and rich math activities that meet the Core Mathematics standards.

**Family resource and research centers.** A contributor to the listserv for coordinators of the Even Start Family Literacy in each state included a recommendation to use our materials. Since that time, we have found links to our materials on statewide and district family literacy sites. For instance, the Family Resource center of South Dakota offered a series of workshops on our materials. The University of FL Department of Pediatrics recommends our resources as appropriate for practitioners dealing with children who have a host of multidisciplinary behavioral, learning, and other challenges.

We emphasize that these are only a very small sample of the many recommendations for our website, programs based on our materials, and professional development workshops we’ve discovered. These data, along with our Google Analytics data, indicates that many informal and formal educators are regularly accessing our resources, and that agencies other than TERC and our direct partners are playing a substantial role in spreading Math off the Shelf.

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4 Smith, C and Hoxie, A. 2010. Evaluation Findings from the Frontiers in Urban Science Exploration 2.5 Program. NYC: TASC.
1D. External evaluation (This section contributed by Char Associates. Please also see attached evaluation report.)

Annual Evaluation Update for Math off the Shelf Year 4
(May 2010–April 2011)

Char Associates, an independent evaluation firm based in Montpelier, Vermont led by Dr. Cynthia Char, is serving as the external evaluator for the Math off the Shelf project. Dr. Char has served in this capacity since the project’s outset in 2007. The current Year 4 is the final year of this NSF project.

As noted in our evaluation update last year, our evaluation efforts are framed by libraries’ natural yearly cycle based largely on the academic year, with the summer being the busiest season with summer reading programs. Thus, in the current month of April 2011, we are in the final months of data collection for what we consider “Project Year 4”. While we have engaged in a series of research activities the past 12 months (described below), we are currently amidst our major research effort for Year 4, which is a Spring 2011 librarian survey to multiple regions across the country participating in MotS over the past four years.

Evaluation Activities during Year 4

The first two quarters of Year 4 (May–November 2010) were largely focused on data collection, analysis and the preparation of our Year 3 report (Char and Berube, December 2010). We analyzed both quantitative and qualitative data yielded from a wide range of data sources collected during Year 3, including pre- and post-program survey data from participating MotS librarians, observations of workshops, meetings and library events, and interviews with regional library leaders. Survey data was gathered from 83 librarians representing 83 different cities and towns, from six different states (MA, NY, CT, CA, MO, and NJ).

Beginning in the fall, our evaluation work expanded to include two new states that have actively joined the project in Year 4, Arizona and Florida. Thus, our current Spring 2011 post-program survey is being distributed to librarians working in at least eight different states across the country.

The Year 4 evaluation will address the following four major research questions regarding program impact and outreach, and library infrastructure for professional development:

• **To what extent has children's librarians' MotS offerings and programs had a positive impact on the mathematical learning of children and families in local communities?** Can library-based staff responsible for homework help provide further channels of MotS outreach and assistance to support children's learning in mathematics?

• **Have MotS librarians and libraries been able to initiate and sustain their offering of mathematics materials and programs, given competing institutional priorities, decreased direct technical support offered by TERC, and the tough economic climate?** What factors seem to encourage initial and sustained use of MotS?
• Has MotS effectively encouraged select library professionals to adopt leadership roles to train and support their fellow librarians in fostering children’s mathematical learning?

• Can more technologically-based training and support, such as webinars and MotS website resources, provide effective mechanisms that enable MotS to reach new librarians and additional regions across the country, and successfully spark and support interest for MotS implementation in libraries?

Year 4 Survey Design and Samples: We will be administering three different versions of electronic surveys. The first survey is designed for librarians who first learned of MotS prior to December 2010, and thus may have had experience with using MotS in their libraries the past one to three years.

The second survey is designed for librarians who have learned of MotS the past five months (December 2010–April 2011), largely through webinars, and thus are relative “newcomers” to MotS.

The third survey is designed for librarians and adult and teen staff working in libraries who are responsible for providing homework help and other activities and assistance to children and youth after school.

All three surveys are designed to assess the impact of the MotS program on librarians and libraries, and the extent to which it has led to increased practices to encourage mathematical learning in children and families.

Evaluation Activities in 2011: During the past four months of Year 4 (January–April 2011), Char Associates has engaged in a range of evaluation activities and methods, including:

Electronic Surveys

• Development and administration of Spring 2011 post-program surveys to participating MotS librarians in 7 states (MA, CT, NY, MO, CA, AZ and FL; distributed to librarians in approximately 190 libraries) (February–April 2011)

• Development and administration of Spring 2011 post-program surveys to participating MotS after school homework helpers in 3 states (MA, NY, FL; distributed to staff in approximately 70 libraries) (March–May 2011)

Observations

• Observations of four of the project’s on-line webinars and live stream librarian workshop, involving participants in four different regions (Whately MA live video stream workshop, January 2010; Westchester, NY webinar, March 2011; Florida webinar, March 2011; Arizona webinar, March 2011)

Interviews

• Design of instrument for individual interviews conducted with regional and state library leaders (interviews to be conducted in May and June 2011)

The evaluator has also engaged in regular monthly phone meetings and e-mail communication with project staff throughout this past year.
We are currently engaged in data collection for our major Spring 2011 survey, with the first survey already launched on April 11, 2011. All survey data is anticipated to be collected by early June. Analysis of data from the surveys, along with other data sources collected throughout this past year, will be conducted this summer, with final phases of writing and final production work done in early fall. Our Year 4 evaluation report will be submitted in October 2011.

2. Findings

Findings are woven into the above and detailed in the attached report from Char Associates, external evaluator. Below we highlight several points relevant to our work in the final project year.

2A. Stability of impact findings despite project growth and change

Librarians reported regularly using MotS activities in their library programs for school age children and for families, as well as making MotS handouts and posters available for children’s more independent work. Moreover, librarians reported additional changes in their practice beyond use of specific MotS materials, in the ways they increasingly incorporated mathematics in how they asked children questions, presented books, and interacted with children and adults.

In addition to changes in behavior, project impact was also evidenced in librarians’ concepts and view of mathematics. Many librarians stated that their thinking about what mathematics actually entails, and the importance of promoting children’s mathematical learning—and the pivotal role libraries can play—had changed because of MotS. (p. 50)

Perhaps the most salient finding is the relative similarity of impacts between project years and among LBIEs with different levels of project support, different roles in the library, and variations in length of time using MotS. On a general level, impacts were similar among:

- Alpha Region LBIEs who were more intensively involved in shaping the project materials in Years 1 and 2, and those LBIEs who began using MotS later;
- Those who learned of MotS “second hand” from a MotS participant or Regional Leader, and those who learned of MotS directly from TERC;
- Traditional children’s librarians and BOOST library-based after-school educators;
- Those who received regular technical support phone calls from TERC and those who simply used the website and read the monthly group mailings.

As detailed in the attached report, in this past year’s sample, ¼ of respondents had learned of MotS over two years ago, ½ between one and two years ago, and ¼ in the last year (p. 4). About ½ learned directly through a TERC meeting or workshop; ¼ through a friend or colleague; ¼ other, including a meeting or workshop in which TERC was not involved or a
professional network such as an e-mail (p. 3). Only 20% spoke with TERC staff members at all on the phone in the past year, and of those, half did so only once or twice (p. 4).

By contrast, in the Year 2 sample, respondents learned of MotS on average 9.5 months ago, with a range of 3.6 to 16.6 months (p. 4), all had learned of MotS directly from TERC, and all had direct phone and e-mail contact with TERC in the past year.

Although exact comparisons are not always possible because of wording changes, many of the results are strikingly similar. For instance:

In Year 3, 53% of LBIEs surveyed reported going beyond MotS to create similar math activities (p. 19, 2010), in Year 2 45% did so (p. 19, 2009).

In Year 3, 59% regularly pointed out role of math in everyday life to children (p. 19, 2010); in Year 2, 45% did so (p. 18, 2009).

In Year 3, 91% indicated that librarians should learn more about integrating math into library offerings for the elementary grades (p. 24, 2010); in Year 2, 90% stated that including more math for K–6 is a strong priority (p. 21, 2009).

Of BOOST staff surveyed (Year 3 only), 94% reported that working with MotS had changed their thinking about the role of math in the library, comparable to findings cited above (p. 43).

In Years 2 and 3, the top three reasons for implementation success were the same—and given in the same order: quality of the MotS materials, range of formats, and access to the website (p. 27, 2010; p. 23, 2009). BOOST most frequently cited the top two factors in the same order (p. 44, 2010); their director sometimes provided printouts of MotS activities for them, so access to the website may have been less crucial,

Year 3 surveys also revealed an important difference in what motivates LBIEs with different amounts of support to use MotS. LBIEs were asked to choose up to three factors most likely to sustain their use of MotS in the future. Overall, whatever level of support they received from TERC, they most frequently reported interest/demand from children (73%) and their own commitment to providing math-related educational opportunities (70%). However, the percent selecting these factors differed by degree of project contact.

Those who learned about MotS on their own initiative rather than through project efforts—as will be the case with most who come to MotS post-award—all reported that their own commitment to providing math-related opportunities was critical. Those who had some project contact more frequently selected interested/demand from children or parents, with their own commitment coming second or third. (p. 31)

Thus, as we enter our final year with emphasis on dissemination and outreach, it will be especially important to focus on resonating with librarians’ own motivations for incorporating more math and MotS in particular.

The two findings below (2B and 2C) suggest why librarians might persevere using MotS.
2B. Why use MotS: LBIEs came to connect MotS to academic performance

Unlike in previous years, survey respondents and librarians with whom TERC was in regular communication reported that they used MotS expressly to bolster particular math skills for school success and to change children’s attitudes about math so as to improve academic performance.

Although we did not explicitly ask about the connection between MotS and homework, many LBIEs raised this spontaneously. We postulate several reasons for increased focus on math skills needed for school and homework success, which we will investigate in the final impact evaluation:

- Librarians in Alpha and Beta regions are collaborating with a wider range of LBIEs than in the past. This past year, 66% reported having staff or volunteers to help during homework time (p. 7). Perhaps this connection with homework helpers is leading librarians to greater awareness of specific math skills that MotS supports.

- Increased familiarity with MotS—both with the mechanics of the activities and the math content—among our more experienced librarians, perhaps freeing them up to consider specific topics in children’s learning. For instance, in Year 2, 90% of survey respondents noted that their attitudes about the role of math in children’s library programming had changed because of their experiences with MotS (p. 23, 2009); in Year 3, among the group with the project the longest, 96% agreed (p. 23, 2010).

- Yet another possibility is that this attitude change, coupled with changes in behavior—making MotS a regular part of programming—gave librarians a wealth of experience with children’s mathematical thinking and a foundation on which to build their own skills in implementing and developing math programming. For instance, 44% changed the types of books they chose to use in story times (p. 22); and 53% went beyond specific MotS materials to create their own math-related activities (p. 19). Awareness grew as well, with 59% now pointing out the role of math in everyday life to children, with 31% doing so weekly. (p. 19)

- Finally, in the last couple of years, national education standards (e.g., Common Core), and accountability and testing have taken a more prominent role in national dialogue. Perhaps this has led to a greater awareness of the importance of math.

As discussed above (IBii), Year 4 summative impact evaluation will probe informal-formal connections with MotS: reasons for focus on math/homework; differences among different groups of LBIEs (librarians, library-based after-school educators, homework helpers, etc.); particular content areas focused on; use of math content chart and other math resources that MotS provides. Summative impact evaluation will also investigate LBIEs’ perceptions of children’s and parent-child math learning.

One librarian also mentioned using MotS for her library’s outreach to homeschoolers through an open house for homeschooling families, saying that math seems to be the subject that most homeschooling parents ask for help with. (p. 17)

Math is a very important school subject. The neighborhood has a great number of non-performing students. (p. 37)

[MatS] has heightened my own awareness of how much math we use in our daily lives and that awareness has prompted me to bring it to the attention of the children I’m working with. (p. 19)

The children learned a lot about graphing and analyzing data, which has always been a weak point for them. (p. 42)

We need to do all that we can in the U.S. to promote science and math education. (p. 37)

The parents were extending the ideas and concepts on their own and talking math with their children. (p. 16)
2C. Why use MotS: LBIEs can shape their MotS experience to meet their own particular community’s needs, interests, and collection among our resources

MotS remains well-used across very different communities despite staff turnover, budget cuts, and the transition to less direct support from TERC. From the outset, we collaborated with Char Associates on extensive observations and communications with LBIEs, in order to better understand their realities and find ways to integrate math. We looked for what drew them to use particular resources, what led them to want to try something new, and what community-based needs they had that MotS might be able to fill.

Our formative research led us to identify characteristics shared by a wide range of children’s public library settings. Figure 4 summarizes these and shows how MotS addresses them. For comparison, we include characteristics of after-school environments, likely to be more familiar to the reader.

**FIGURE 4: GENERAL CHARACTERISTICS OF PUBLIC LIBRARY PROGRAMS FOR GRADES K–6 CHILDREN**

<table>
<thead>
<tr>
<th>Setting/staff characteristics</th>
<th>After-school</th>
<th>Library</th>
<th>How MotS addresses these</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programs allow for mess, noise, food, movement, outdoor activity</td>
<td>Y</td>
<td>Rarely</td>
<td>MotS is a resource bank; LBIEs choose what fits their needs</td>
</tr>
<tr>
<td>Participants leave before an activity ends and do not return to finish</td>
<td>Rarely</td>
<td>Often</td>
<td>Provides guidance on drawing out the math mid-activity, rather than only at wrap-up</td>
</tr>
<tr>
<td>Drop-in basis (attendance, age, and abilities not known in advance)</td>
<td>N</td>
<td>Y</td>
<td>Includes information on selecting and adapting for different needs, abilities, ages, and audiences</td>
</tr>
<tr>
<td>Children present when program or adult supervision is unavailable</td>
<td>N</td>
<td>Y</td>
<td>Offers many activities children can do alone or in pairs, without adult facilitation</td>
</tr>
<tr>
<td>Language, culture, background of children known in advance</td>
<td>Y</td>
<td>N</td>
<td>Designed to be readily customized and adapted by LBIEs</td>
</tr>
<tr>
<td>Spontaneous program changes (e.g., sunny day, so more time outdoors)</td>
<td>Y</td>
<td>N</td>
<td>Includes suggestions for adapting activities to different amounts of time</td>
</tr>
<tr>
<td>Holds family events/some families attend children’s programs</td>
<td>Rarely</td>
<td>Y</td>
<td>Offers variations for younger/older children</td>
</tr>
<tr>
<td>Venue serves as a public space; substantial foot traffic in area</td>
<td>N</td>
<td>Y</td>
<td>Capitalizes on public audience with museum-type interactive displays</td>
</tr>
<tr>
<td>Informal educators comfortable leading math activities</td>
<td>Rarely</td>
<td>Rarely</td>
<td>Draws upon adults’ “everyday math” skills by infusing math into existing programming</td>
</tr>
<tr>
<td>Informal educators have paid time for professional dev.</td>
<td>Rarely</td>
<td>Little</td>
<td>Designed to be accessible without training</td>
</tr>
<tr>
<td>Informal educators have funds for making copies, buying materials, etc.</td>
<td>Very little</td>
<td>Little</td>
<td>Uses readily available or recycled materials (e.g., scrap paper, cardboard boxes).</td>
</tr>
</tbody>
</table>

[Compared to what I otherwise do with children], the activities, the setting up, the explaining and doing the activities … is very similar. [MotS] is different in a sense that we use math as the foundation for the activities. (p. 43)
Informal educators choose which resources to use | Sometimes | Y | Visually appealing, accessible, free

Homeschoolers participate | Rarely | Often | Offers variations for different ages and abilities

Programs and displays are organized according to themes (e.g., holidays, seasons) | Often | Y | Activities can be adapted to different themes; website searchable by theme; theme sheets in development

Informal educators called upon to train other informal or formal educators | Rarely | Often | Provides PowerPoints, handouts, and templates for workshops sessions for free downloading

Figure 5 delineates characteristics of three common types of library-based programs for grades K–6: traditional library story times, homework help, and after-school programs. Partner LBIEs have also used MotS in family literacy programs, outreach visits to schools, school visits to the library, outreach visits to community housing projects, and more.

**FIGURE 5. CHARACTERISTICS OF THREE COMMON TYPES OF LIBRARY-BASED INFORMAL EDUCATION SETTINGS**

<table>
<thead>
<tr>
<th>Setting/staff characteristics</th>
<th>Library story times</th>
<th>Library-based homework help</th>
<th>Library-based after-school</th>
</tr>
</thead>
<tbody>
<tr>
<td>LBIEs comfortable with math</td>
<td>Rarely</td>
<td>Sometimes</td>
<td>Rarely</td>
</tr>
<tr>
<td>Middle schools children drop in, even if advertised for K–5</td>
<td>Rarely</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Homework drives agenda</td>
<td>N</td>
<td>Y</td>
<td>Sometimes</td>
</tr>
<tr>
<td>Requirement to include math</td>
<td>N</td>
<td>If children bring math homework</td>
<td>Sometimes</td>
</tr>
<tr>
<td>LBIEs have a high rate of job turnover</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
</tr>
</tbody>
</table>

As Char Associates’ findings demonstrate, LBIEs’ own personal engagement, motivation, and goals are critical elements in decisions to use MotS: they alone decide whether to offer math-related programming. LBIEs’ perceptions of what children and parents value and enjoy is one of the most important factors in programming decisions: MotS provides scaffolding for integrating math into activities based on books or themes that the particular children in their libraries find compelling. With limited budgets for new purchases and for programming, librarians strive to make better use of their existing collections: MotS enables them to use what they already have in new ways.

The ease with which LBIEs can choose among, adapt, and customize MotS resources allows them to meet community needs and provides them with a sense of ownership. They are not simply implementing a program: they are co-creating a set of resources tailored to their particular setting, and they are demonstrating that they have gained the skills and attitudes and awareness needed to do so successfully.

I always recommend the [MotS] website to parents so that they can look up the activities to do with their children at home. (p. 16)
Encouraging Children’s Mathematical Learning Through Public Libraries:

Evaluation Report for Math off the Shelf

Year 3

Cynthia A. Char and Suenita Berube
Char Associates
Montpelier, VT

December 2010
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EXECUTIVE SUMMARY

_Math off the Shelf_ (MotS) is a four-year, NSF-funded Informal Science Education (ISE) project designed to develop an infrastructure for mathematics learning utilizing public libraries across the country. The project is led by TERC, a not-for-profit education research and development organization in Cambridge, Massachusetts. Char Associates, an independent evaluation firm based in Montpelier, Vermont, is serving as the external evaluator for _Math off the Shelf._

The major focus of the current Year 3 evaluation has been to assess the impact of the MotS project on participating librarians’ attitudes and behaviors, and whether librarians offer mathematics-related resources and programs through their libraries in ways not previously made available to their patrons. Participating library systems were located in Massachusetts, Connecticut, New York, California, and Missouri.

The major research effort for Year 3 was a _Spring 2010 post-program librarian survey_ administered to librarians in multiple regions across the country who had utilized MotS materials during Years 1-3. 83 librarians, representing 83 different libraries across 7 different states, comprised the final survey sample. Additional data was collected through observations conducted of regional library MotS meetings, workshops and library events, and interviews with regional library leaders responsible for children’s librarians in their system. The study also examined how one region utilized library homework helpers to implement MotS, with data gathered through observations of workshops, focus groups, electronic surveys, and interviews with regional leaders.

EVALUATION FINDINGS

I. THE INCORPORATION OF MATHEMATICS IN MotS LIBRARIANS’ PROGRAMS AND PRACTICES

**MotS use:** A high proportion of the librarians (85%) reported that they have used MotS materials in their libraries during Year 3. Games and activities were amongst the most popular formats of MotS resources. The most common materials, _MotS games_ and _Quick MotS activities_, were used at least monthly by about half of the librarians. A third of the librarians used _Longer MotS activities_ at least monthly, while about a fourth used _Math Moments, MotS calendars_ or _MotS Posters_ at least monthly. Roughly a fourth of the librarians indicated that they had used MotS materials offered in Spanish.

Librarians mentioned a wide variety of specific activities they thought had been most successful with children. Amongst those seen as most successful were ones that were quick and easy for librarians to implement and adapt, such as a game called “How Many in a Minute?,” or activities that children could do independently on their own, such as “Mystery Jars.” Other popular activities were the library scavenger hunt, crafts activities that involved measuring, and activities that connected with specific books.
Incorporation of math in library programs and resources: MotS librarians incorporated math in their offerings for elementary school-age children fairly regularly in the past six months. The most common use was addressing mathematics during times set aside for homework assistance, with almost three-quarters of librarians reporting doing so at least monthly. A little over half used mathematics-oriented handouts/take-home sheets, and two-fifths featured mathematics in story times and craft programs on at least a monthly basis. This is in contrast to what librarians reported in Year 2 and 3 pre-program surveys, in which only about a tenth of librarians said they frequently used math in any of these formats. A fifth of the librarians incorporated math activities at least monthly in family programs, whereas only 2% of librarians in our Year 2 comparison group had indicated frequently utilizing mathematics in their family programs.

Librarians’ enthusiasm for utilizing MotS with their child patrons was also evidenced in our observations of regional library meetings and MotS library events.

Outreach to families and after-school groups: About a fourth of the librarians included MotS in a family program in the past 6 months. As with Year 2, librarians typically opted to feature a small set of MotS materials either as a series of short activities, or as simultaneous, on-going “activity stations.” Librarians reported receiving highly positive responses from children and parents alike.

Offering a MotS program to after-school groups was less common, with less than a fifth of librarians reporting doing so -- comparable our Year 2 level. Given shrinking library budgets, librarians often were hard-pressed to provide sufficient programs and support to their regular library patrons, let alone do additional outreach to after-school groups.

Nonetheless, some librarians mentioned doing MotS activities with Girl Scout and Boy Scout troops and after-school groups at the library, and through librarian visits to after-school programs in local schools and community centers.

Librarians’ math-related behavior: More than half the MotS librarians said that in the past three months they had at least on a monthly basis: pointed out the role of math in everyday life to children, incorporated math into materials and activities they provide for K-6 children, and created fun activities that include math to use with children.

Over two-fifths used children’s books with explicit math themes in story times, displays and programs on at least a monthly basis, while about a third used fiction and non-fiction books and storybooks without explicit math themes as a basis for math activities and mathematical discussions, or explained to children how math is relevant to using the library. In contrast, only a fifth or fewer librarians in our pre-program surveys reported that it was “mostly true” that they incorporated these math-related behaviors into their library practice.

MotS librarians talked about MotS not only with children, but also with adults. About a third mentioned MotS to patrons and to colleagues on at least a monthly basis. Moreover, half the librarians also assumed greater leadership and professional development roles, such as presenting MotS information to librarian colleagues and
after-school educators on at least one or more occasions. A number of librarians informed project staff that they had never assumed such librarian leadership roles with other adults before.

Similarly, our Year 2 evaluation found MotS librarians reporting a clear increase in their abilities to convey the importance of mathematics in library settings with their colleagues. In Year 2, half of the librarians stated that they could now explain to colleagues ways mathematics for K-6 supported their library’s mission, while roughly a fourth regularly discussed with colleagues the role of math in everyday life and library use, or shared ideas on using math in story times, displays and programs.

Importantly, many Year 3 librarians reported that their experience with MotS had changed the way they interact with patrons beyond the specific MotS programs/materials they offer. Over half said MotS had changed how they asked children questions and the way they led crafts or cooking activities. About two-fifths of the librarians stated that MotS had changed the type of books to feature in story times, the way they led story times, and how they talk about math with parents and other adults who come to the library. A comparable level of more generalized change in librarian behaviors beyond MotS had been observed in our Year 2 evaluation as well.

Librarians’ understanding and views of the role of math in the library: A high percentage of librarians (80%) stated that their thinking about the role of math in the library for grades K-6 changed through their use of MotS. Some librarians spoke about the expanded notions they had of what mathematics entailed, and many described how MotS had introduced them to ways math could be fun and engaging to children and adults. Others spoke of acquiring a new or renewed sense of the urgency and importance of mathematics learning for children, and an augmented role of themselves as librarians -- and of libraries as a community center -- in promoting children’s mathematical learning.

Librarians’ views were quite positive regarding the role of math in their libraries. The vast majority (91%) of librarians believed that it was important for librarians to learn more about how to integrate math in their library offerings. Most MotS librarians agreed that including more math for grades K-6 was a strong priority in their library, at rates more than double those of a comparison group. Most MotS librarians felt that they had time and staff to include math in their offerings, and that literacy, social studies and the arts were not necessarily a better fit with what they offer than math.

About half of MotS librarians held that direct academic assistance, such as homework help, test preparation and/or tutoring, seemed the most appropriate way for libraries to support children’s mathematical learning – as opposed to offering mathematical programming and enrichment activities. Librarians who favored fostering mathematics through direct scholastic assistance tended to come from large urban districts that had active homework helper programs at their libraries.
Elements optimizing implementation of MotS in the library: When asked what they found most important in optimizing their successful implementation of MotS in their libraries, three out of four librarians cited the quality of MotS materials and the range of MotS activity formats, while two out of three mentioned access to the MotS website. Even those librarians who indicated they were already inclined to try to incorporate mathematics in their library program expressed that it was now much easier to do so because of MotS.

About half stated that interest and support from local colleagues was important, whether it be from fellow librarian staff, from their library administrator, or from their regional library system’s youth coordinator. Less than a fifth pointed to listserv submissions and exchanges with other MotS librarians as important to their implementation.

When asked what might enable them to do a much better job implementing MotS, three out of four librarians cited having more time to plan MotS activities. Close to half also mentioned that they thought they could be helped by being able to see a video showing MotS use in a library while two-fifths thought having more training on how to use MotS would help. A third or fewer felt that they would have been helped if MotS had more extensive math background information or more extensive instructions. Concerning more personal aspects, about two-fifths of the librarians felt that they would have been more successful if they were more interested in math or more comfortable with math.

Factors helping sustain MotS use: When asked to choose up to three factors most likely to keep MotS going at their library, almost three-fourths of the librarians cited the interest/demand from children and their own commitment to providing math-related educational opportunities. Almost half cited interest/demand from parents, while two-fifths cited librarians’ own enjoyment of MotS.

Interviews conducted with the regional library leaders corroborated the sentiments expressed by librarians. They noted that for many children’s librarians, mathematics was somewhat outside of their comfort zone, and it was the librarians who generally were more eager to try and take on something new who first gravitated towards MotS. At the same time, they felt that many librarians, after being introduced to the materials, discovered how easy the materials were to use and how fun they were for children, and were then spurred on to use more materials and more frequently. Leaders appreciated the fact that there were so many different types of activities and formats from which to choose that could be incorporated into librarians’ ongoing programs.

Several leaders noted that one of the challenges was how to get librarians to incorporate MotS activities into their programs on a regular basis, as opposed to viewing them as special, optional things to do. One successful technique was focusing on what librarians view as required by their job, such as children’s book week, summer reading, and story time, thereby integrating MotS into things they were already doing.

The leaders acknowledged how providing programs and resources featuring MotS was initially a stretch for many librarians. Several described many librarians as being much
more comfortable with literacy and personally somewhat math averse. Some librarians felt that they already “did math” by using counting books with young children, while others considered themselves strong at math, but narrowly conceived math as entailing only computation, equations, and word problems. A few felt, given all the other demands for their programming time, that math should be mainly addressed in school. For these reasons, regional leaders regarded the training provided by TERC as extremely valuable for introducing librarians to new ways of engaging children with mathematics, and underscoring the importance of doing so. They also felt that some more reluctant librarians had made greater strides due to the direct encouragement and expectations expressed by their regional leaders.

Compared with previous years, Year 3 marked a clear shift in the nature of the MotS workshops, with a number featuring a core group of librarians assuming greater leadership roles in presenting sections of the workshops to their librarian colleagues. Drawing upon their experiences with MotS in Years 1 or 2, these library leaders enthusiastically modeled activities they had found particularly successful in their own libraries, and emphasized how easy MotS was to use and incorporate into on-going library practices.

Economic climate and impact on MotS: In the current tough economic climate, over three-fourths of the librarians reported that their library had experienced budget cuts, with most indicating that it had affected their library offerings and services for children and families. About half the librarians reported that the budget cuts had adversely affected the frequency with which they led MotS programs for children. Some also felt that the cuts had affected opportunities for connecting with peers about MotS and ways in which they promote and publicize MotS. Interviews with the regional library directors, as well as observations of regional library meetings, indicated that budget cuts were anticipated to be even more severe in the coming year.

Intended future use: Despite the economic challenges confronting libraries, most (85%) librarians plan to use MotS in the upcoming summer months. Librarians envisioned incorporating MotS into their regular summer programming and/or making available stand-alone MotS resources that allowed children to work independently.

Over three quarters of the librarians stated it is likely that they will use MotS in the upcoming school year. Librarians offered various reasons for the high likelihood of continued use, such as the materials being good and easy to implement, the fact that children and parents like it, and that they - as well as their library administrator and library system - were committed to encouraging children with mathematics. For librarians less certain they would use MotS next year, the reasons offered typically involved budget, staffing, available time, and prioritizing other areas as needing greater attention. Several regional leaders stated that making MotS materials available free of charge was truly an asset, given these hard economic times.
II. LIBRARY ACTIVITY ASSISTANTS AS AN ALTERNATIVE MODEL OF MotS IMPLEMENTATION

One large urban library system in New York chose to implement MotS using several different networks of adults working in the libraries: the children’s librarians, as well as after-school Activity Assistants offering enrichment and homework help to school-aged children.

As part of an after-school program called BOOST, activity assistants were responsible for addressing science and mathematics in their work with children at least several times a month. Almost all assistants work with children at the library five afternoons a week. They were encouraged by their supervisors to utilize MotS, who made it available as a recommended resource in mathematics.

All of the BOOST respondents indicated that they had used MotS materials with children in their libraries, compared with three-fourths of their librarian counterparts. Roughly a fourth of the activity assistants reported using MotS more than 7 times a month.

BOOST staff reported a high level of use of MotS materials across a variety of format types (e.g., MotS games, quick activities and longer activities, calendars, and posters.) When asked to comment on how MotS materials compared with what they typically use with children, a number said that the materials were generally similar in appropriateness of math concepts and skills and relevance to school, but that MotS allowed students to probe the mathematics more in-depth, and engage in math in a more fun, interesting, and relaxed way. BOOST staff felt that MotS fit well into the types of routines they already have with the children, with several mentioning that they found MotS easier to use.

BOOST staff were almost unanimous in their view that their thinking had changed about how children’s learning in mathematics might be supported in places such as libraries, as a result of working with MotS. Many described that they now realize how math can be presented in a way that is fun, as well as has value and connection to the real world, outside of school.

Facilitating factors for enhancing MotS implementation: When looking at the factors deemed most important for successful MotS implementation, the top factors identified by activity assistants and children’s librarians were fairly similar, and included quality of MotS materials, support from their program or youth services administrator, and access to the MotS website.

When asked what would allow them to do a much better job implementing MotS, however, quite different profiles emerged for the two groups. Librarians identified personal factors as most important, with having more time to plan MotS activities as the main factor affecting implementation, followed by their being more comfortable with math, and more interested in math. In contrast, BOOST staff saw as most important greater training and support in the materials, such as seeing a video showing MotS use in
a library, more extensive math background information included in MotS activities, and more training on how to use MotS.

**Intended future use:** Compared to the librarians, BOOST staff expressed greater likelihood that they would use MotS materials with children next year, with all staff indicating that such use was likely, compared with three-fourths of the librarians. The most common reason cited for this high likelihood of continued use was that the activities were fun and that students enjoyed them.

There are several significant structural differences between the two implementation models (children’s librarians vs. BOOST staff) worth noting, which could account for some of the differences in MotS use by the two groups and the generally higher levels of use by BOOST staff. First, use of MotS by children’s librarians is largely voluntary, with children’s librarians being encouraged, but not required, to use MotS during the regular programs and services as they see fit. In contrast, BOOST activity assistants report directly to their program administrator, who expected them to offer activities in mathematics and science at least several times a month and who encouraged them to use MotS.

Second, the children’s librarians have relatively few program hours per week specifically devoted to school-aged children, with many additional duties and responsibilities as part of their job. In contrast, for BOOST activity assistants, offering programs and support to school-aged children is the primary focus of their job, with most activity assistants working five full afternoons a week doing so. Furthermore, there is likely an interaction between the services offered by children’s librarian vs. BOOST staff, in a given library. The lower levels of MotS use by librarians may be partially due to the librarians “delegating” such use to the BOOST staff, or feeling less compelled to use MotS, since they knew BOOST staff were doing so.

**CONCLUDING REMARKS**

Year 3 marked an important transition year for the *Math off the Shelf* project, as it proceeded from its initial phases of materials development and close work with “alpha region” libraries, to doing outreach to increasing numbers of new librarians and regions throughout and beyond the Northeast. Some librarians have now been familiar with MotS for two to three years, with the novelty of the materials lessened and direct support from TERC staff decreased. All this is amidst a rough economic climate that is causing libraries to face increased organizational demands, tough programmatic choices, and serious budget and staffing cuts.

In spite of these challenges, our Year 3 evaluation found that there has been a consistent and regular “following” of librarians promoting MotS, with 85% of librarian survey respondents indicating that they have used MotS materials in their libraries during Year 3. Use of MotS was high both in regions new to the project, as well as in regions participating in MotS for several years. According to librarians, keys to MotS’ success lie in the materials’ high quality, its ease of use and adaptability, its wide range of activity
and resource formats, and the highly enthusiastic response from children and parents alike. Librarians expressed how they particularly liked that the materials were fun, offered children clear and engaging connections to how mathematics related to the real world, and were easy to incorporate into their ongoing library programs, practices and space.

Librarians reported regularly using MotS activities in their library programs for school age children and for families, as well as making MotS handouts and posters available for children’s more independent work. Moreover, librarians reported additional changes in their practice beyond use of specific MotS materials, in the ways they increasingly incorporated mathematics in how they asked children questions, presented books, and interacted with children and adults.

In addition to changes in behavior, project impact was also evidenced in librarians’ concepts and views of mathematics. Many librarians stated that their thinking about what mathematics actually entails, and the importance of promoting children’s mathematical learning -- and the pivotal role that libraries can play -- had changed as a result of MotS.

Further building of mathematical learning infrastructure in libraries continued during Year 3, with a number of librarians assuming greater leadership roles in the professional development of their library colleagues. An additional promising network of the learning infrastructure was also tapped in several regions that enlisted homework helpers and activity assistants to utilize MotS in the work with school age children.

Our Year 4 evaluation, during the final year of the NSF-funded project, will continue to examine whether MotS librarians are able to sustain their provision of mathematics-related programs and resources to patrons that was evidenced this year. It will also study how the MotS project reaches and trains librarians in additional regions in Arizona and Florida, as well as how it continues to attract and support librarians in current participating regions, through increased utilization of technology and the web (e.g., webinars and the project website), and through the growing cadre of library leaders in various communities across the country.
INTRODUCTION

*Math off the Shelf* (MotS) is a four-year, NSF-funded Informal Science Education (ISE) project designed to develop an infrastructure for mathematics learning utilizing public libraries across the country. The project is led by TERC, a not-for-profit education research and development organization in Cambridge, Massachusetts.

Char Associates, an independent evaluation firm based in Montpelier, Vermont, led by Dr. Cynthia Char, is serving as the external evaluator for the *Math off the Shelf* project. Dr. Char has served in this capacity since the project’s outset in 2007.

The major focus of the current Year 3 evaluation has been to assess the impact of the MotS project on participating librarians’ attitudes, librarians’ behaviors, and library practices fostering mathematics. During Project Year 3, our evaluation continued to monitor the use and impact of MotS on the four “alpha regions” in Massachusetts, Connecticut and New York that began participating in the MotS project during Years 1 and 2 (MetroWest and Northeast MA; Connecticut; Westchester, NY; and Queens, NY). Evaluation activities also expanded beyond the Northeast to include two new regions that actively joined the project in Year 3: San Jose, California, and St. Louis, Missouri.

As with Year 2, a primary focus of the Year 3 evaluation has been to examine whether librarians have continued to draw upon and use MotS materials to offer mathematics-related resources and programs through their libraries, in ways not previously made available to their patrons, and the project’s subsequent impact on children and families in local communities.

The major research effort for Year 3 was a *Spring 2010 post-program librarian survey* administered to librarians in multiple regions across the country who had utilized MotS materials during Years 1-3.

In addition to the post-program survey, Char Associates collected data from libraries through a variety of other means, including:

- A *Fall 2009 baseline electronic survey* to new Year 3 participating MotS librarians in two regions (Queens, NY, and San Jose, CA)

- Observations of six of the project’s *regional library meetings*, involving participants in six different regions (Queens, NY, October 2009; Chelmsford, MA (involving both MetroWest and Northeast MA regions), November 2009; Westchester, NY, November 2009 and March 2010; Connecticut, January 2010; and San Jose, January 2010)
• Observations of MotS library events and site visits in 3 regions (Framingham, MA November, 2009; and Thompson, CT, and San Jose, CA, January 2010)

• A Spring 2010 electronic survey to library-based after school homework helpers using MotS in one region (Queens, NY)

• Focus group sessions with librarians and homework helper staff (Queens, NY, March and April 2010)

• Interviews with seven regional leaders from six alpha and beta regions (Queens, NY, December 2009 and January 2010; and MetroWest and Northeast MA, Westchester, NY, San Jose, CA, and St. Louis, MO, May and June 2010)

Survey of Librarian Participants

A core set of research activities in Year 3 centered on the administration of electronic surveys to librarians who had been introduced to the MotS project. The timing of data collection efforts was based on the natural cycle of librarian participants and how they frame their work and programming. We found that librarians tend to organize programming by the academic year (i.e., going from September through August), with some of the busiest periods being the summer months with libraries’ summer reading programs.

During Fall 2009, we collected baseline surveys from a small group of librarians in two regions (Queens, NY, and San Jose, CA) who had newly joined the MotS project in Year 3. As with the baseline survey of Year 2, the survey was designed to gather background information on libraries’ current practices and the extent to which mathematics was featured in programming and librarian practice. Names of the librarians to receive the survey were provided by TERC staff. Surveys were collected from a total of seven children’s librarians (100% return rate).

This data was added to the set of baseline survey data previously gathered during Year 2. As described in our Year 2 report, the Year 2 baseline surveys were collected from 115 librarians representing 109 different cities and towns in the Northeast. The 115 librarians were comprised of two sets of librarians: 67 “alpha region” children’s librarians participating in MotS (from 61 different cities and towns in the Northeast), and a comparison group of 48 children’s librarians not using MotS (from 48 different cities and towns in Massachusetts).

Sample and method for post-program surveys and spring data: To gauge the project’s impact on promoting mathematics in libraries, a post-program survey was administered in Spring 2010 to approximately 140 librarians who have had some contact with the MotS project this past year. Our survey went out to a total of eight participating regions MetroWest and Northeast MA; Connecticut; Westchester, NY; Queens, NY; San Jose, CA; St. Louis, MO; and San Francisco, and Watsonville, CA.)
Ninety librarians responded to the post-program survey (64% return rate). These 90 librarians represented 87 different libraries in seven states. The seven states were comprised of MotS’s three “alpha region states” (Massachusetts, Connecticut, and New York); two Year 3 “beta region states” (California and Missouri), and one state (New Jersey) where a librarian had learned about MotS through its website.

The alpha region libraries represented the project’s engaged and focal sites that experienced either regular contact (engaged sites) or extensive contact (focal sites) with MotS project staff. The beta region sites had generally received a single MOTS workshop led by either TERC staff or a local library administrator, with follow-up access to the MotS website. Our Year 3 survey was also sent to several individuals who had learned about MotS through its website or listserve, or other more informal (i.e., non-training) points of contact.

Eighty-three librarians comprise our final Year 3 post-program survey sample. Seven of the 90 surveys were eliminated from the final data set: six surveys were incomplete, while one was a “duplicate” - submitted by a librarian from the same library as another respondent.

**Profile of Survey Respondents**

Survey respondents ranged in how long ago they had first learned about MotS, now in its third project year. As illustrated in the figures below, roughly a quarter (24%) of the librarians reported learning about MotS two or more years ago, while about half (52%) learned of MotS one to two years ago. The remaining quarter of the librarians learned of MotS the past year: either six months to a year ago (13%) or within the last six months (11%).

![When first learned of MotS](image)

Regarding how they had learned about MotS, more than half (55%) the librarians learned about MotS through a workshop or meeting that TERC offered. About a quarter (24%) learned about MotS through a friend or colleague. The remaining one-fifth of librarians learned about MotS from a workshop or meeting that someone other than a TERC staff member gave.
member gave (10%), a professional network such as a listserv (6%) or through other means such as being contacted directly by TERC to participate (5%).

When asked about the support they receive with using MotS materials, the most commonly cited form of support was e-mail communication with TERC (33%), followed by participating in local or regional meetings or workshops (24%). (See figure below.)

16% of the librarians said they received support by communicating with a supervisor or others who use MotS. More intensive support through regular phone calls from TERC (either at least three times a year, or once or twice a year), was relatively rare (12% and 8% of librarians, respectively). A very small proportion (3%) reported receiving no support at all.

Amongst those who indicated “other” as a form of support, a number of librarians made specific reference to the MotS website as a form of support. Thus, the website, although non-interactive in nature, was clearly identified as helpful and a form of support by some. As reported in a later section in the report, two-thirds (66%) of the librarians indicated that access to the MotS website was important to their successful implementation of MotS in their libraries.

![MOTS Support](image)

The forms of support reflected the differential treatment the various alpha and beta regions received, as the project progressed from Year 1 through Year 3. As illustrated in the figure above, the “high touch librarians” (Massachusetts, Connecticut and Westchester, NY) who had been involved in the project starting in Years 1 and 2, reported that their forms of support primarily comprised e-mail (33%), regular phone support (21%), and local meetings or workshops (23%). The “medium/high touch librarians” (Queens, NY) who were first contacted in Year 1 but became increasingly more involved in Year 3, reported support through local meetings and workshops (40%), e-mail (26%), and from their direct supervisor (17%).

New regions joining the project in Year 3 reflected the least direct contact from TERC staff, as appropriately intended for this year. The medium/low touch librarians (St.
Louis, MO, and San Jose, CA) reported primary support in the form of e-mail (30%), their supervisor (24%), and occasional local workshops (18%). And the low support librarians (Watsonville and San Francisco, CA) who had either attended a single workshop in late winter, or had mainly connected with the project through on-line communications, reported that their main support was via e-mail (67%). It should be noted that all the librarians seemed to consider any electronically transmitted project communication, such as project newsletters and announcements, as “e-mail.”

BACKGROUND PROFILE OF LIBRARIES AND LIBRARIANS

Profile of MotS libraries and librarians:
Type of library: Roughly two-thirds (64%) of respondents characterized their libraries as being in towns/cities that were urban, while about one-third (34%) were located in suburban areas. Only a few (2%) of the libraries were in rural areas.

The majority of MotS respondents (85%) had two or more libraries in their cities and towns, with most working at one of the branch libraries (65%), rather than the main branch (20%). Approximately 14% of respondents worked at the sole public library for their city/town. One librarian (1%) worked in a bookmobile.

When asked to describe the demographic of the communities that their libraries serve, over two-fifths (42%) of librarians reported that their libraries serve a majority of lower-middle to low-income patrons. Almost two-thirds of the librarians (63%) reported that the majority of children who use the library speak English at home, while about a third (35%) indicated that the majority of children speak languages other than English at home. Spanish appeared to be one of the predominant languages spoken in these communities, with almost a third (29%) saying a majority or sizeable minority of children speak Spanish at home.

The multicultural range of patrons served in libraries was highly evident. An impressive array of 28 different languages was mentioned by the 29 librarians who described in their...
surveys the various languages spoken at their libraries. The most frequently mentioned languages were Spanish (18 librarians; 5 regions), and Chinese (11 librarians; 5 regions). Other languages mentioned by at least six of the 29 librarians included Vietnamese, Haitian Creole, and Hindi. Single libraries often served patrons spanning a wide variety of cultures and languages. As one St. Louis librarian described, “We have a lot of Ethiopians, Kenyans, Vietnamese, Spanish, Indian languages, and a smattering of others.”

Queens, New York, one of the larger library systems participating in MotS, has a total of 64 different branches. Its library website reflects its multicultural communities, and is designed to accommodate the diverse linguistic range of its patrons. It enables users to select any one of six different languages (English, Spanish, French, Russian, Chinese, and Korean) for website information.

**Librarian’s role, staffing levels and background:** Almost half (47%) of the MotS librarians were the sole children’s librarian in their library. About a quarter (24%) were one of several children’s librarians, 19% were the head children’s librarian, and 10% held some other position (e.g., youth services manager; coordinator of children’s services).

For the vast majority of MotS libraries, there was a relatively lean level of staffing for children’s services. Three-quarters (75%) of MotS librarians reported having 3 or fewer FTE staff working in children’s services in their libraries: 13% reported even having less than 1 FTE, while 62% reported having 1-3 staff.

One-eighth had 4-10 staff (10% with 4-6 staff; 2% with 7-10 staff) and another eighth had 11 or more staff working in children’s services.
While many librarians had only 3 or fewer FTE staff working in children’s services, approximately two-thirds (66%) of the librarians reported that their libraries did have staff or volunteers specifically assigned to help students with homework. This opportunity to take advantage of either volunteer or staff homework helpers, for the provision of math-related activities, will be discussed in further detail in one of the report’s later sections.

Years of experience: Close to half (46%) of the MotS librarians were relatively new to their positions, with five or fewer years as a children’s librarian (17% having only one or two years in that position). About a fifth (18%) had six to ten years of experience as a children’s librarian. For those who indicated 1-10 years as a children’s librarian, the average was 4.6 years.

The remaining librarians (36%) had eleven or more years on the job (18% with 11-15 years; 11% with 16-20 years; and 7% with 21+ years).
EVALUATION FINDINGS

I. THE INCORPORATION OF MATHEMATICS IN MotS LIBRARIANS’ PROGRAMS AND PRACTICES

1. MotS Use

During the current reporting period for Project Year 3, a high proportion of the librarians (85%) surveyed report that they have used MotS materials in their libraries.

All (100%) of the librarians in the “high touch” alpha regions (MA, CT and Westchester, NY) that participated in the MotS project in Years 1 and 2, reported that they had used MotS this year. This is as one would expect, since one of the requirements of early project participation was a willingness to test out early versions of the activity on a monthly basis.

Use of MotS materials was also relatively high in the medium-high touch region of Queens (79%), a library system that received MotS training in Years 2 and 3, as well as in the “medium/low touch” beta regions of San Jose and St. Louis (92%) that had received training primarily in Year 3. Use of MotS was more moderate (44%) for the new “low touch” regions that had just recently received an introductory workshop on MotS in January 2010, or had learned about MotS through the Internet, or word-of-mouth.

Specific MotS components

To ascertain which specific MotS program components were most frequently used, librarians were asked how often they had used and/or displayed each of the various components (6-point rating scale: Daily (assigned a value of “5”); weekly (“4”); monthly (“3”); once every 2-3 months (“2”); several times a year (“1”); and never (“0”).

Games and activities were amongst the most popular formats of MotS resources. The most common materials, MotS games and Quick MotS activities, were used at least monthly by about half of the librarians (MotS games 50%; mean rating = 2.40, SD 1.33 and Quick MotS activities 48%; mean rating = 2.31, SD 1.19). A third of the librarians
used Longer MotS activities at least monthly (33%; mean rating = 1.76, SD 1.31), while about a fourth used at least monthly Math Moments (27%; mean rating = 1.66, SD 1.39); MotS calendars (27%; mean rating = 1.24, SD 1.38); or MotS Posters (24%; mean rating = 1.47, SD 1.41).

MotS activities deemed as most successful
Librarians were asked to describe which activities or materials they thought had been most successful with their children. As a testament to the richness of the materials, librarians mentioned a wide variety of specific activities. As in Year 2, an oft-mentioned activity was one that was quick and easy to implement, such as “How Many in a Minute?”, and the “Mystery Jars.”

*I used “How Many?” and had the children see how many stars they could draw in a minute. It was interesting how they drew the stars on paper and how they counted them. Most children simply counted by ones. A few actually grouped their stars in 10’s because it was easier to count. This helped the others see that there is more than one way to arrive at an answer.*

*Estimation jars have helped children develop that skill. I have posted on a bulletin board the comments children make as they make estimations. These comments have helped others become more successful.*

Other popular activities were the library scavenger hunt, and crafts activities that involved measuring and other mathematical skills when drawing, cooking or building.

*The scavenger hunt (which was cool, because it also gave the kids a tour of the library), because they measured our materials/building. Many didn’t know how to measure, so it was fun to teach them.*
The children really enjoyed making the math books. They came up with their own way of counting some by 10’s, some by 5’s, but some by 3’s. They really focused on this activity and enjoyed sharing their books and ideas with each other.

“Double or More” - we made playdough, quadrupling the recipe for each table of 4. It was useful for the kids to learn the units of measure (although by the time we quadrupled the recipe it was basically in whole cup measurements, but they did have to understand that four ¼ cups equals one cup), how to either add or multiply the units to get the desired result, and how to work cooperatively (they helped each other count and keep track when each of them had a chance to measure.)

“Build a Bridge” is fun and fresh for all the neighborhood children. Measuring is a very vital homework assignment for elementary school children. Most of them have problems figuring the answer out. This activity worked well to stimulate the children’s interest in measuring.

In addition to group-oriented activities and projects, some librarians specifically mentioned the most successful activities as ones that children could do independently on their own, without needing an adult to facilitate or orchestrate the activity. These were often colorful print materials posing a fun, mathematical challenge available in two different formats: “Math Moments” (a colorful 8 x 11” sheet placed in a plastic Lucite holder upon a library countertop, shelf or table) and interactive posters (large poster-size challenges that librarians could affix to a wall or bulletin board). While designed as an independent activity, a number of librarians mentioned it offering the opportunity for them to go over and interact with the children.

Math Moments work well for us. We leave the sheet out and encourage them to do quick activities while waiting for a turn on the computer. They got math programming without being forced into it and that makes it more fun for them.

I liked the materials in the plastic stand (Math Moments) - they were on the table, and children pick the stand up and read it. They thought about the questions, and I would notice that and spark up a conversation.

Several kids were interested in the “coin flip” experiment on one of the MiM* posters. They borrowed a coin and persisted for quite awhile, keeping track of their findings with tally marks, and were intrigued to find that the longer they flipped, the closer the distribution of heads/tails came to 50/50.

The “How Long Can You Stand on One Foot” poster was a big success, and children had a lot of discussion with other children and myself about estimates and increasing the time.

*Please note that a number of participating librarians refer to the MotS project as “Mixing in Math” (MiM), which was the name of TERC’s earlier NSF-funded after-school math project.
Given MotS use in a library setting, some librarians described as most successful those activities that connected well with books, computers, and other resources at the library.

_The distance game tied in perfectly with the book we’d read for book club that month. Using the game both showed the kids how maps work, but also gave them a greater sense of the character in the book’s struggle to overcome his challenge._

_We did a program on the construction of the Empire State Building (using the book “Sky Boys”) and then did construction projects on our own, using some of the ideas in your building unit._

_With one of my after school groups, we read the book “How Big is It?” by Ben Hillman. The book puts various things like the giant squid or polar bears or the pyramids of Giza into perspective using things children see every day such as houses and basketball courts. This helped children who thought that a polar bear was maybe the size of a cabinet to understand that on its hind legs, it could slam-dunk a ball. Then we did the activity, “Height Museum.” The grade levels in the classroom vary in age from K-6, but all ages really got into the activity of seeing who was the tallest, and checking if their predictions were right._

_We had a great time doing the counting/sorting activity with jelly beans. The large group of kids (30+) really got the whole idea of grouping like items and taking down their data. We then took them to the computers and let them make their own graphs, using the website, [www.onlinechartool.com](http://www.onlinechartool.com), which our MotS teacher at the library, had discovered. The parents and kids were very impressed with their graph results. And the kids enjoyed eating their beans._

_We just did “Size Riddle”s to display at a meeting and we used water animals to tie into our summer reading program, “Make a Splash, Read!” I love how the activity ties in using the library resources, reading, writing, taking information and pulling relevant facts out, and math - measuring and estimating._

**Spanish materials:** During Year 3, MotS staff made available a Spanish version of some of their materials, in response to the large numbers of Spanish speakers in some communities. As noted earlier, over a fourth (29%) of librarians indicated that either a majority or sizeable minority of children they serve speak Spanish at home.

Almost a fourth (22%) of the librarians indicated that they had used MotS materials offered in Spanish, with a tenth (10%; mean rating = 0.60, SD 1.16) using these Spanish materials at least monthly.

There was not, however, a simple 1:1 correlation between librarians indicating they have a majority/sizeable minority of Spanish speakers, and those that used Spanish MotS materials.
Of the 23 librarians who indicated that a majority of their patrons speak Spanish, only 8 (35%) indicated that they used the Spanish materials, while 12 (52%) said they never had. (3 did not respond to this question.) On the flip side, some librarians without a majority of Spanish speakers reported that they had used MotS Spanish materials, with seven librarians reporting doing so.

Further examination of other survey items pertaining to languages spoken by library patrons revealed quite diverse linguistic patterns, which may partially explain some of the librarians’ non-use of Spanish materials despite having a majority of Spanish speakers.

Six of the 23 librarians who indicated that a majority of their patrons speak Spanish also indicated that a majority speak English, possibly suggesting that a majority of their patrons are bilingual. Another seven of the librarians who reported a majority of Spanish-speaking patrons indicated a wide variety of other non-English languages spoken by their patrons (e.g., Russian, Creole, Khmer, Vietnamese, Chinese, Kurdish, Portuguese, Bengali, Arabic, and Hindi), evidence of a highly multi-lingual library community.

17 librarians indicated Spanish as just one of several languages regularly spoken at their library. One librarian commented during one of our site visits that given the variety of languages spoken by patrons, it did not seem appropriate to only make a Spanish version of MotS materials available.

A few of the librarians explained to us that some Spanish-speaking parents had expressed their desire for librarians to provide activities in English rather than Spanish, to further support their children’s learning of English.
II. MotS Program Impact: The Incorporation of Mathematics in MotS Librarians’ Programs and Practices

Incorporation of math in programs and resources
MotS librarians reported incorporating math in their offerings for elementary school-age children fairly regularly in the past six months.

The most common use was addressing mathematics during times set aside for homework assistance (69% of librarians; mean rating = 2.70, SD 1.52). (5-point rating scale: 4 = several times a week; 3 = about weekly; 2 = about monthly; 1 = about once or twice; and 0 = never).

Librarians also reported incorporating mathematics at least monthly in handouts/take-home sheets (53%; mean rating = 1.72, SD 1.28), in story times or book clubs (40%, with 21% reporting doing so about weekly; mean rating = 1.50, SD 1.10), in craft programs (40%; mean rating = 1.50, SD 1.02) and in posters, bulletin boards, or book displays (36%; mean rating = 1.32, SD 1.19).

This is in contrast to what librarians reported in our Year 2 and Year 3 pre-program surveys, in which only 12% or fewer librarians reported frequently using math in any of these formats.

A fifth (20%; mean rating = 0.90, SD 1.01) of the librarians reported incorporating math activities at least monthly in family programs. While the incorporation of math into family programs at least on a monthly basis may not appear to represent frequent usage, it is important to note that family-oriented programs are offered in some libraries relatively infrequently, only a few times a year. Furthermore, the report of a fifth of librarians offering math activities at least monthly in family programs is in sharp contrast to our Year 2 baseline data, in which only 2% of our comparison group indicated that they frequently utilized mathematics in their family programs.
Our Year 2 evaluation also noted a clear increase in the extent to which participating MotS librarians more frequently featured mathematics in their story hours, posters, crafts, handouts and family programs.

Some librarians described ways they have implemented MotS (which they often referred to MiM (Mixing in Math), TERC’s earlier after-school math project) in an on-going basis as part of their regular programs.

*We did the program every other week: we use MiM calendars, games, and quick and longer activities.*

*We offer science-based after school programs once a month and usually try to incorporate some MiM activity in those programs. We also use MiM during all our class visits - usually twice a week.*

*We use MiM materials monthly in our After School Program which meets twice a week during the school year.*

A number of the librarians proceeded to describe specific MotS activities they have used and/or ways they have been integrating math-related activities into their regular library programs.

*During Kids’ Club and Teen Tuesdays, we do math games, like “guess the number,” estimating and measuring activities (i.e., how many cookies in the cookie jar), and guessing how many times someone can do something in a given time. We recently did the April activity of naming words that rhyme with “day.”*

*I have taken some of the small “Math in a Minute” handouts and glued them in the back of books.*

*We have an ongoing display of non-fiction and fiction (Stuart Murphy, Greg Tang, etc.) math books since last August. Under a big poster we designed that asks “Who uses Math?” (with pictures of all sorts of professionals!), we display approximately 30 books in an area atop our picture books. Originally we planned to keep the display up only a month (which is what we do for most displays) but it has been so successful that we’ve yet to take it down. Circulation for our math books has skyrocketed and we have to restock the display a couple times a week.*

*Math isn’t scary and libraries can incorporate math activities with little preparation into already existing services such as school tours. We tend to use a lot of quick activities with tours as they are a good way to get the kids settled down and are worthwhile ways to use up time. For example, if a tour ends early we use a MiM quick activity to fill the time. But it isn’t just killing time, as the time [is] used for learning.*
Even librarians who are not able to utilize MotS regularly in their programming still described the usefulness of the program and its materials.

*Though our library doesn’t really have the space for any of the self-directed activities/charts and we don’t have any library-sponsored tutoring, we have used some of the ideas in our after-school programs. Lots of ideas! We only do one or two after-school programs a month, however, and we alternate between art, literature, math, science, and reader’s theater-type programs.*

Librarians’ enthusiasm for utilizing MotS with their child patrons was also evidenced in our observations of regional library meetings and in MotS events held at libraries in Massachusetts, California, and Connecticut. Librarians shared particular favorite activities that they had used, which were usually quick activities such as “How Many in a Minute”, interactive displays such as mystery jars, or graphing charts in which children responded to a particular mathematical or data collection question (e.g., what is your favorite holiday; and how many letters are in your name).

One of the site visits made by the evaluation team was to a library where the children’s librarian regularly incorporated MotS into her after-school program. The librarian met weekly with a core set of elementary school children, who eagerly took part in whatever activities she had planned for the afternoon. On the day of the observation, the librarian used a variant of the mystery jars activity, in which the children created their own mystery bowls. Children worked in pairs, with each pair given a small paper bowl and a certain sweet treat (e.g., small marshmallows, pretzel sticks, cereal, m&m’s, etc.). Pairs carefully and secretly counted out the treats, sometimes one by one and other times in groups of 10, to fill their bowls. The librarian further personalized the activity by suggesting that each pair give itself a team name and create a specially decorated “guessing sheet” that they decorated using colored pens and crayons. Then the teams walked around the room to place their guesses on the others’ mystery bowls. Children were generally quite good at estimating. For example, estimates of cereal in one bowl ranged from 98 to 125, for which the actual quantity was 132.

In addition to children’s librarians leading after-school programs, a special sub-set of after-school programs in libraries involved homework helpers and homework centers. These programs are often staffed by individuals (staff and volunteers) who are not the children’s librarians, but who are specially hired for homework assistance. Several librarians specifically mentioned MotS being used by these homework helpers.

*Our homework helpers have a math puzzle every Friday afternoon.*

*Homework helpers use math games when homework is complete.*

One librarian spoke about how MotS is now “instituted” as a regular part of their homework help.
At our library, we have instituted “Mad Minute” in which we use ideas from the MiM quick activities and ask the children a different question each day that has to do with math. For example, we’ve asked them to count the number of people who live in their house, or how many hands long a particular piece of string is, or we put out fake coins and ask the children to count how much money there is. If they answer correctly, we give them a stamp on their hand.

We try to ask questions that tend to stump the children when they are doing homework and we’ve discovered that they have an easier time with their homework after they successfully complete the mad minute. The children are now used to having a mad minute and will complain bitterly if one day we don’t put one up.

A later section of this report will examine in further detail one library system that has regular homework helpers in all of its library branches and has chosen to implement MotS using a “dual model” through both their children’s librarians and their homework helpers.

**Outreach to families and after-school groups**

About a fourth of the librarians (26%) reported including MotS in a *family program* in the past 6 months. As with Year 2, librarians opted to feature a small set of MotS materials either as a series of short activities, or as simultaneous, on-going “activity stations”. Several described the positive response from not only children, but parents as well.

*We incorporated 3 MiM Math Moments as a “station” at a family event that was held in the library one weekend. Many children stopped and participated and had a lot of fun counting how many colors they were wearing, how many steps it took them to cross the room, and how high they could count while standing on their tiptoes...The response was very enthusiastic, and parents were active participants.*

*I usually do 2 to 3 activities with children and parents every month. I have many repeaters, because the children enjoy the activities. They find it fun. The parents are very supportive, for they see the importance of engaging children in problem solving and doing math activities. I always recommend the MiM website to parents so that they can look up the activities to do with their children at home.*

*Monday Funday (intended just for kids, but parents also participated): We used “Height Museum,” “How Many in a Minute?,” “Catch the Beat”: Both the children and adults were enthusiastic about all of the activities. They were all very creative in thinking of different things to count in a minute, or how to create a beat. The parents were extending the ideas and concepts on their own and talking math with their children.*

Some librarians, however, did acknowledge the challenge in actively engaging parents in mathematical activities.
The parents were lingering, but not participating. They thought MiM programming was very cool, though.

It was Family Fun Night where I included two MiM activities: “Guess My Book” and “Holding the Most.” It was not well-attended. Holding the Most was the most used. Both parents and children seemed fascinated to find out the true order of containers.

We did estimates of time, sorting, building, how many. We find parents are not doing these activities at home with their children - the child has no or very little experience...Children benefit by being exposed to math concepts at story time and at the library that they may not be getting at home...Parents love it when we provide these activities at the library. [But they] never seem to do the activities at home with their child, even though we provide hand-outs. Most parents seem to be afraid of math. Not the kids.

One librarian also mentioned using MotS for her library’s outreach to homeschoolers through an open house for homeschooling families, saying that math seems to be the subject that most homeschooling parents ask for help with.

The evaluation team also observed several libraries offering MotS family programs during the team’s site visits to libraries in Massachusetts and California. For example, one Massachusetts librarian has regularly organized some highly successful MotS pizza parties, drawing large numbers of children and families. The event we observed took place in October and had a Halloween and fall theme, with multiple activity stations arranged about the room. Each station was facilitated by either a staff member, or an adult or teen volunteer, which enabled the stations to run smoothly. Stations featured such math activities as predicting which pumpkin out of a small set was the heaviest, following a recipe for making bubble solution to take home, visiting a pretend store and determining what candy or small trinkets one might wish to buy with a dollar, and a “How Many in a Minute?” activity, with children seeing how many times they could jump in a minute, and whether they jumped more times after eating candy (given the sugar rush.) The event was well-attended, with parents and children highly engaged in the MotS activities, and most taking part in the majority of activities about the room. Even younger siblings as young as two years participated, with one young toddler seen trying to jump up and down like his older brother for the “How Many in a Minute” activity.

The Massachusetts librarians requested that parents fill out a family survey before they left the family event. When asked to describe what they thought of the activities and event, parents said:

[These were] ingenious ways to learn/use math concepts while having fun and socializing. My children learned that math is fun, how to estimate, how to budget, and charting and graphing.

[I liked that] they were learning, and doing math without thinking about it. Children are developing a love of math, and seeing different ways that math is in everyday life.
I liked that the activities got us together with other kids, and of different ages, and allowed them to learn about spending money, and measuring.

My five-year old liked mixing bubble mix, and finding out the weighing (of the pumpkin) results. He learned that the biggest pumpkin is not always the heaviest!

After-school groups: Offering a MotS program to after-school groups was less common than family programs, with 18% of librarians reporting doing so. This Year 3 level was comparable to that reported in Year 2, when 20% indicated that they offered such programs to after-school groups during the past three months.

As expressed in Year 2, given shrinking library budgets, librarians often were hard-pressed to provide sufficient programs and support to their regular library patrons, let alone do additional outreach to after-school groups. One librarian spoke candidly about wishing to have a greater connection with after-school groups, but finding it difficult to do so:

One of the reasons that I originally wanted to participate in MiM was because of the connection with after-school programs. However, due to the nature of both after-school programs and the library after school (full of children doing homework, needing assistance, etc.) it became clear both to the after-school educators and to us that it wasn’t practical in our setting to have after-school programs come to the library for MiM activities. We tried, but just not practical for either of our programs, I believe.

Nonetheless, of the fifth or so of libraries that did offer programs to after-school groups, librarians mentioned offering the programs to Girl Scout and Boy Scout troops, to after-school groups who came to the library, and through librarian visits to after-school programs housed in neighborhood schools.

An after-school group [run by our local youth bureau] came to visit three times in the last 6 months. My colleague did storytimes and a quick MiM activity (“Quick Questions,” “Mystery Jars,” “How Many in a Minute?”, and “Catch the Beat”) with them each time. The children and the after-school teachers thoroughly enjoyed the visits and were particularly appreciative of the interactive nature of the activities.

I used “Could it Happen” as an ice-breaker with a Daisy Troop who came to learn about “Personal Responsibility.” The girls had to hold hands and stretch across the library wall-to-wall. They had to work together and watch for other library patrons who might need to get through their chain. The girls were excited to do something physical and to guess if they could stretch out far enough.

We tend to use a few of the quick MiM activities as warm-ups for visits to the school’s after school programs. We visit a local after school monthly. In February we used “How Many in a Minute” as part of our Olympics theme. This month we used a “Line Up” activity because we were talking about how books are arranged specifically in a
library by call number or genre. So after that discussion we had them organize themselves by birthday.

**Librarians’ math-related behavior**

Librarians were asked how frequently they engaged in a variety of possible behaviors promoting mathematics with children (5-point rating scale: 4 = about daily; 3 = about weekly; 2 = about monthly; 1 = about once or twice; and 0 = never).

More than half the MotS librarians indicated that in the past three months they had at least on a monthly basis: pointed out the role of math in everyday life to children (59%, with 31% doing so weekly and 9% doing so daily; mean rating = 1.99, SD 1.19), incorporated math into materials and activities they provide for K-6 children (59%; mean rating = 1.89, SD 1.09), and created fun activities that include math to use with children (53%; mean rating = 1.63, SD 1.05).

Math is everywhere, all around, in stories, everyday life. Let’s use it and talk about it as it happens.

I think that MiM has raised consciousness in me…and perhaps one or two other staff members, about talking with children about the math concepts involved in daily activities, stories and crafts.

I’m much more aware of how well the library and the activities we can provide are suited to including math concepts. It’s easy to include the quick activities as part of a themed storytime, and the longer activities have been fun and different programs for us to offer. Mixing in Math has heightened my own awareness of how much math we use in our daily lives and that awareness has prompted me to bring it to the attention of the children I’m working with.

I am now aware of how to incorporate math into almost any program, from reading to an art activity.
I never would have thought to use math before MiM. Now, when we use it in programs, it is usually something the kids gravitate to and find fun or interesting.

Over two-fifths (44%; mean rating = 1.47, SD 0.98) used children’s books with explicit math themes in story times, displays and programs on at least a monthly basis, while about a third (34%; mean rating = 1.19, SD 1.04) used fiction and non-fiction books and storybooks without explicit math themes as a basis for math activities and mathematical discussions, or explained to children how math is relevant to using the library (35%; mean rating = 1.32, SD 1.24).

Now when I see books I’ve ordered (not counting books), I think that’s a math book because it deals with cooking or sharing or measuring or estimating or some other math concept.

We try to be more conscious of pointing out the math in a story or book and ask related questions. I’m more apt to bring a ruler or different sized objects to illustrate a part of a story.

I try to use math during my picture book programs.

There are ways to tie math into what we do beyond the calculation of library fines.

I am much more aware of math and its presence in the library - ways to use it and incorporate it into our activities.

This is in contrast to what librarians reported in our pre-program surveys, in which only 20% or fewer librarians reporting that it was “mostly true” that they incorporated these math-related behaviors in their library practice. The main exception was that 36% of pre-MotS librarians indicated that they often used children’s books with explicit math themes in story times, displays and programs. (As noted in our Year 2 report, however, some of these librarians were describing their use of children’s books such as counting books with young preschool-aged children (rather than K-6).)

MotS librarians also indicated that they talked about MotS not only with children, but also with adults. About a third of the librarians indicated mentioning MotS to patrons (30%; mean rating = 1.13, SD 1.04) or to colleagues (31%; mean rating = 1.30, SD 0.89) on at least a monthly basis.
At first I never connected math and the library. Now, I see the importance of showing children, and adults, that math is an intricate part of our lives.

We set out a variety of MiM activities and explained them to parents.

I think MiM is a great program; unfortunately the children who attend our library are not English proficient. Consequently, their priority and their parents’ are to complete school assignments. Many of them do not participate in MiM activities because it takes them longer to complete school assignments and because their parents do not see their value. I will plan a MiM activity for parents and the children.

We now occasionally show the MiM website to parents and teachers.

I try more ways to add math to all my programs. I have mentioned math to patrons more often as well. I think math readiness is as important as reading readiness, but I probably still am more comfortable with reading readiness.

About half of the librarians also assumed leadership and professional development roles regarding MotS on at least one or more occasions. About half of the librarians (51%) presented MotS information/materials to other library colleagues, with roughly 1 in 8 librarians, doing so on at least a monthly basis (13%; mean rating = 0.68, SD 0.75). This is in contrast to what librarians reported that they normally do, with a number of librarians informing project staff that they had never assumed such librarian leadership roles with other adults before.

Slightly less than half of the librarians (45%) presented MotS information/materials to others who work with children, such as after-school educators, with 1 in 10 librarians doing so on at least a monthly basis (10%; mean rating = 0.58, SD 0.75).

Our Year 2 evaluation also had found that MotS librarians reported a clear increase in their abilities to convey the importance of mathematics in library settings with their colleagues. In Year 2, half (50%) of the librarians indicated that they could now explain
to colleagues ways mathematics for K-6 supported their library’s mission, while roughly a fourth reported that they regularly discussed with colleagues the role of math in everyday life and library use (25%) or sharing ideas on using math in story times, displays and programs (20%).

Many Year 3 librarians reported that their experience with MotS had changed the way they interact with patrons beyond the specific MotS programs/materials they offer (4-point rating scale: 3 = a lot of change; 2 = some change; 1 = a little change; and 0 = no change).

Over half reported that MotS had changed how they asked children questions (57%; mean rating = 1.60, SD 0.97) and the way they led crafts or cooking activities (54%; mean rating = 1.50, SD 0.96).

Close to 40% of the librarians reported that MotS had changed the type of books they chose to feature in story times (44%; mean rating = 1.24, SD 0.99) or the way they led story times (40%; mean rating = 1.12, SD 1.00). About a third (32%; mean rating = 0.95, SD 0.99) indicated that MotS changed the way they show children around the library.

MotS librarians also reported changes in how they talk about math with parents and other adults who come to the library with children (41%; mean rating = 1.65, SD 1.38).

*I’m learning how to help children think through problems, instead of giving children answers.*

*It has helped me redefine what math is, and how it can be incorporated in fun ways that are age appropriate for different groups.*

A comparable level of more generalized change in librarian behaviors beyond MotS had been observed in Year 2 alpha librarians as well.
Librarians’ understanding and views of the role of math in the library

A high percentage of librarians (80%) reported that their thinking about the role of math in the library for grades K-6 changed through their use of MotS. Percentages reported appeared to reflect somewhat the region’s “touch level”, and the degree to which they had been actively engaged in the MotS project to date, with the highest percentages reported in the “high touch” region that has received the most project support and longest period of involvement with MotS. Nonetheless, almost 3 out of 4 librarians in the “medium/high” and “medium/low” regions also reported that their thinking about the role of math in the library had changed, due to MotS. (“high touch” = 96%; “medium/high” = 74%; “medium/low” = 70%; and “low” - insufficient sample size to provide percentage comparison.)

Some librarians spoke about the expanded notions they had of mathematics.

*In a way that makes me think of math not just as numbers, but as a way to solve problems. It has also changed the way I talk about math.*

*Math is going on in any given moment, and it’s around us daily.*

*It’s really opened up my eyes to all the different ways we use math in our daily lives.*

Others spoke about the urgency and importance of fostering mathematics learning in children.

*I am more aware of the urgency of including math in children’s programs. I am realizing the importance of MiM and will consciously incorporate more math into every program I do.*

*I hadn’t really thought [off] math as an important part of library activities until pretty recently. It’s pretty clear, however, that kids need lots of help with math. Lots of the kids who come to the library on a regular basis can’t do the basics - they can’t add without counting on their fingers, sometimes even in middle school. So, I’m learning the importance of reinforcing math skills in the library and it helps to have MiM materials.*

*I have 8 years of experience with my public library system. This was the first time I incorporated math in the library program. There is a great number of non-performing students in the neighborhood. We started to incorporate math activities in programming.*

Some librarians emphasized how MotS introduced them to ways in which math could be fun and engaging to students and to adults.

*It expanded the ways kids learn math through games and exploration.*
It’s important for kids to experience math in a fun and non-stressful way and doing little activities prepares them to deal with math in their daily lives. Beyond counting books, I hadn’t really used math in the library. I find MiM not just good for homework help, but also compelling for older students.

Some librarians expressed the change in their thinking in terms of a more expanded role they have of themselves as librarians in promoting mathematics learning in children.

I have always thought that building a collection of math books was an important part of my job. Now I see my role as broader than that. Many people would like math to become more integrated in everyday activities, so children would learn to enjoy it. As an important part of the community I think the library should be a place that families can find math enrichment in our displays and our programs.

I had not thought of math as a common topic for programming prior to MiM.

I now think of ways to incorporate learning of all types into programs at our library. It was much easier than I thought it would be to include concepts not typically used in a library setting.

Librarians’ views were quite positive regarding the role of math in their libraries. The vast majority (91%; mean rating = 2.18, SD 0.61) of librarians believed that it was important for librarians to learn more about how to integrate math in their library offerings. (4-point rating scale: 3 = strongly agree; 2 = agree; 1 = disagree; and 0 = strongly disagree)

Most MotS librarians (68%; mean rating = 1.77, SD 0.63) agreed that including more math for grades K-6 was a strong priority in their library, at rates much higher than those of a combined Years 2 and 3 pre-test and comparison group (68% Year 3 Post-MotS vs. 29% Y3-Pre/Massachusetts Comparison Group)
MotS librarians were also more likely to disagree with negative views towards mathematics’ role in libraries, and disagreed with the statement that they had no time or staff to include math in their offerings (MotS Post Y3 379% vs. 57% in Pre Y3/MACG; Y3 mean rating = 1.15, SD 0.64), and that literacy, social studies and the arts are a better fit with what they offer than math (MotS Post Y3 57% vs. 36% in Pre Y3/MACG; Y3 mean rating = 1.48, SD 0.74).

It [math] is an important part of lifelong learning, and that is what our library is trying to provide for our community.

Offering math enrichment classes can be an integral part of what libraries do.

Similar increases in the positive views of mathematics by MotS librarians were found in our Year 2 evaluation as well.

About half (49%; mean rating = 1.59, SD 0.79) of MotS librarians disagreed with the statement that “homework help, test preparation and/or tutoring seemed the most appropriate way for libraries to support children's mathematical learning.”

The lowest incidence of disagreement came from large urban districts that had active homework helper programs at their libraries [Queens (25%; mean rating = 1.92, SD 0.65), San Jose (45%; mean rating = 1.73, SD 0.79), and St. Louis (43%; mean rating = 1.43, SD 0.79)].

This higher level of acceptance of the use of homework help as an appropriate way for libraries to support children’s mathematical learning is in contrast to our combined Pre Y3/MA comparison group, where almost two-thirds (67%) of librarians disagreed with this statement. This difference may be largely due to the fact that our comparison group was made up of numerous, small libraries in Massachusetts with no homework help offered by their staff or volunteers.
A later section of this report will focus specifically on one region (Queens, New York) that employed both models of MotS implementation, utilizing both their children’s librarians and special after-school “homework helpers” to use MotS with children who visited the library.
III. Implementation Factors

Elements optimizing implementation of MotS in the library
When asked what they found most important to optimize their successful implementation of MotS in their libraries, librarians most commonly cited the quality of MotS materials (77%; mean rating = 3.09, SD 0.96), the range of MotS activity formats (75%; mean rating = 3.04, SD 1.00), and access to the MotS website (66%; mean rating = 2.91, SD 1.04). (rating scale: 4 = very important; 3 = important; 2 = somewhat important; 1 = a little important; and 0 = not at all important.)

![Important Factors for Successful MotS Implementation](image)

Librarians expressed how the quality, range of formats, and website had made a difference to their implementation.

At first I did not think that math in the library could be used successfully, but after doing some of the MiM programs I found that some activities were useful in teaching some skills (e.g., counting, measuring.)

It is easier to use math now that I have these activities on hand.

Now that I have the MiM materials available to me, it is easy to incorporate math activities into my everyday work with children.

I am now aware of how to incorporate math into almost any program, from reading to an art activity.

It gave me concrete and fun ideas to quickly implement with the kids! I was very pleased with the diversity and quantity of ideas; there was a lot to choose from.

I have picked up things from the monthly e-mail, such as the poetry activity for April, and use them or adapt them as needed.

Math off the Shelf, Year 3 Evaluation, Char Associates
Even those librarians who indicated they were already inclined to try to incorporate mathematics in their library program expressed that it was now much easier to do so because of MotS.

*I have always tried to incorporate math into library activities but I think that I am more aware of using math. The materials from MiM have always been a source of good ideas and I adapt them to use with different age groups.*

*Although I have always used math-related activities and themes as part of my programs, MiM materials and ideas help me to do this better.*

About half cited support of their library administrator/director (51%; mean rating = 2.54, SD 1.25), interest and support from fellow staff at their library (50%; mean rating = 2.54, SD 1.06), or support from their regional library system’s youth/children’s coordinator (46%; mean rating = 2.55, SD 1.23) as important positive factors.

Less than a fifth (18%; mean rating = 1.57, SD 1.06) pointed to listserv submissions and exchanges with other MotS librarians as important to their implementation.

Librarians’ responses were fairly similar across three of the four “touch regions”, with the high touch, medium/low touch and low touch librarians deeming the quality of materials, range of activity formats, and access to the MotS website as amongst the most important factors for successful MotS implementation. Librarians from the medium/high touch region tended to rate all factors as generally less important and included support from regional library youth coordinator as an important factor, along with quality of materials and access to the website.
When asked what might enable them to do a much better job implementing MotS, most librarians (75%; mean rating = 2.03, SD 0.77) agreed that an important factor would be if they had more time to plan MotS activities. (4-point rating scale: 3 = strongly agree; 2 = agree; 1 = disagree; and 0 = strongly disagree)

Close to half also mentioned that they thought they could be helped by being able to see a video showing MotS use in a library (56%; mean rating 1.59, SD 0.60), while slightly fewer (41%; mean rating = 1.46, SD 0.63) thought having more training on how to use MotS would help.

A third or fewer felt that they would have been helped if MotS had more extensive math background information (34%; mean rating = 1.34, SD 0.64) or more extensive instructions (27%; mean rating = 1.28, SD 0.64).

Concerning more personal (rather than materials-related) aspects relating to themselves, about two-fifths of the librarians felt that they would have been more successful if they were more interested in math (43%; mean rating = 1.40, SD 0.69), or more comfortable with math (40%; mean rating = 1.38, SD 0.75). About a third (30%; mean rating = 1.25, SD 0.64) felt that their MotS work would have been more successful if their library leadership had been more supportive of their implementing MotS and math-related activities.

Librarians’ responses were fairly similar across “touch regions,” with all indicating that two factors that would have most enhanced their MotS implementation were having more time to plan MotS activities and viewing a video of MotS being used in a library. The three regions that joined MotS in Years 2 and 3 also indicated that having more training, and being more interested in math were important factors. The medium-high touch region also reported that being more comfortable in math and having more supportive library leadership were important.
I like being able to incorporate math into our ongoing programs, displays and activities. I wish we had the time, space and staff to do more.

The major factors affecting MotS use are time, space and staffing.

We have only two full-time staff members here and the building is open four days a week, so it is already hard to do all the things we need to do as well as other things we would like to do. The building is small, also, with limited room for displays.

Math is not my strength and I prefer to do more literacy programs than math.

I would like more activities for the grades 1-2 range. Some of the activities seem difficult for them, but perhaps it is my own weakness in math.

One of the continuing challenges in the library setting is providing the range and flexibility needed - both for age groups, and for programming. Some librarians requested materials that could work with their predominantly younger patrons of preschoolers and toddlers, while others requested more materials for middle school and high school students. While many liked using the very short activities, others requested longer ones that could provide enough for an entire program, such as the building bridges activity.

Other suggestions offered by librarians included: having bookmarks featuring MotS puzzles and activities, along with MotS information and website, as a give-away at their circulation desk;

Factors most helping sustain MotS use
When asked to choose up to three factors most likely to keep MotS going at their library, close to three-fourths of the librarians cited the interest/demand from children (73%), and their own commitment to providing math-related educational opportunities (70%). This was followed by interest/demand from parents (45%), and the librarians’ own enjoyment of MotS (38%).
Relatively less important factors were expectations/pressure from co-workers or supervisor (27%) and interest/demand from others who work with children (12%).

There were some interesting similarities and differences between what factors librarians from various touch-levels deemed as important. First, it appeared that all librarians, regardless of touch level, regarded interest and demand from children as an important factor in determining their future prospects of MotS programming.

As one might expect, the “low touch librarians” who primarily learned about MotS recently on their own initiative (rather than through direct outreach from MotS or a regional director partnering with MotS staff), designated as highest factors their own commitment to providing math-related opportunities, and the interest and demand from both children and from parents.
The “medium/low touch” librarians who joined the MotS project in Year 3 largely through contacts from their regional director, identified expectations of co-workers or supervisor as a primary factor, along with interest from children, their own commitment to providing math-related opportunities, and their own enjoyment of MotS.

The “high touch” librarians, now in their second or third year of MotS implementation, designated as highest factors their own commitment to providing math-related opportunities, their own enjoyment of MotS, and interest/demand of children.

Interviews conducted with the seven regional library leaders from the various participating regions largely corroborated the sentiments expressed by librarians. They noted that for many children’s librarians, mathematics was somewhat outside of their comfort zone, and it was the librarians who generally were more eager to try and take on something new who first gravitated towards MotS. At the same time, they felt that many librarians, after being introduced to the materials, discovered how easy the materials were to use and how fun they were for children, and were then spurred on to use the materials more frequently and to try additional activities. Leaders appreciated the fact that there were so many different types of activities and formats from which to choose that could be incorporated into librarians’ ongoing programs. For example, some librarians love offering elaborate family programs and would host and orchestrate multi-station MotS activities for large groups of families. Others would slip in a short “How Many in a Minute?” activity at the beginning of story hour to let kids “get out the wiggles.”

One leader noted how in one of her libraries the “response has been overwhelmingly positive. Where there was once only 5-6 kids regularly coming to the library, now there are 30. The word of mouth [regarding MotS] has traveled and hugely upped her attendance.” She also felt that the handouts and monthly newsletters, and the translations of materials into Spanish, offered highly valuable resources for her members.

Several leaders noted that one of the challenges was how to get librarians to regularly incorporate MotS activities into their programs, as opposed to viewing them as special, more optional, things to do. As one leader expressed,

*What some librarians normally do a lot of, aside from story hours, is crafts, holiday crafts, holiday parties, movie showings, and homework help. So what we’re asked to do for MiM is a little more focus on an academic topic. We might do a science fair workshop, but that’s only once a year. We tend to be very episodic: “I did that once and now I’m done with it.” Here’s it’s “Let’s keep at it.” MiM asks them to keep repeating and revising the same concepts and kinds of activities. That’s a shift -- not an easy shift.*

Another leader pointed out that one of the more successful techniques was focusing on things that librarians view as required by their job, such as children’s book week, summer reading, and story time, and integrating MotS into whatever they were already doing.
The leaders also acknowledged how providing programs and resources featuring MotS was initially a stretch for many librarians. Several described many of their librarians as much more comfortable with literacy and personally somewhat math averse. Other librarians felt that they already “did math” by using counting books with young children. A small number of librarians considered themselves strong at math, but conceived of mathematics rather narrowly as entailing computation, equations, and word problems. A few felt, given all the other demands for their programming time, that math should be mainly addressed in school. For these reasons, the leaders felt that the training provided by TERC had been very valuable in introducing librarians to new ways of engaging children with mathematics, and underscoring the importance of doing so. Similarly, they felt that some of the librarians had made greater strides due to the direct encouragement and expectations expressed by their regional leaders.

The evaluation team observed six different regional library meetings and workshops, held during Year 3 in four of the participating states (NY, MA, CT, and CA). Compared with Year 2, Year 3 workshops marked a clear shift in the nature of the MotS workshops, with a number featuring a core set of local librarians assuming greater leadership roles in presenting and leading sections of the workshops with their fellow librarians. These library leaders drew upon their experiences with MotS in Years 1 or 2, and enthusiastically described and presented activities that they had found particularly successful in their own libraries, adeptly modeled and led their peers through a variety of MotS activities, and conveyed how easy MotS was to implement and incorporate into ongoing library programs and practices.

**Economic climate and impact on MotS**

In the current tough economic climate, most librarians (79%) reported that their library had experienced budget cuts.

Of those who reported budget cuts, about three-fourths of the librarians indicated that it had had some effect on library offerings (74%; mean rating = 0.93, SD 0.85) or services (71%; mean rating = 1.15, SD 0.85) for children and families. (3-point rating scale: 2 = yes; 1 = to some extent; and 0 = no)

About half the librarians reported that the budget cuts had adversely affected the frequency with which they led MotS programs for children (53%; mean rating = 0.85, SD 0.89) or for families (49%; mean rating = 0.78, SD 0.87). Librarians also felt that the budget cuts had affected opportunities for connecting with peers about MotS (43%; mean rating = 0.67, SD 0.84) and the ways in which they promote/publicize MotS (39%; mean rating = 0.59, SD 0.81).
Interviews with the regional library directors, as well as observations of regional library meetings, indicated that budget cuts were anticipated to be even more severe in the coming year (2010-11). In one state, two of the regional directors we interviewed had jobs that actually were cut, in order to be consolidated into more of a single region state-wide. In another state, the regional director indicated that there would no longer be children’s librarians based in each of the branch libraries who would offer children’s programming. Rather, children’s programs were going to be centralized at the district level, with a team of district librarians going out to offer programs at the branches, much like “circuit riders.”

**Intended future use**

*Likelihood of use in upcoming summer:* Despite the economic challenges confronting their libraries, most (85%) librarians indicate that they plan to use MotS in the upcoming summer months (Summer 2010). Levels of anticipated future use of MotS were consistently high across various “touch regions” (high touch = 86%; medium/high = 84%; Medium/low touch = 83%; and low touch (n = 4 only) = 100%).

When asked to describe how they might use MotS in the summer, a number of librarians described how they would incorporate it into regular summer programming.
I plan to incorporate math activities into storytime and arts and crafts programs.

A weekly math program on Thursday afternoons for 6-8 weeks.

I am starting a program for the summer. Every Monday (Maritime Monday, because our summer reading club theme is “Make a Splash”) we will do a MiM activity.

We have a cooking class with the children every summer, and we’ve made measuring and ratios a big part of the program.

Activities with summer camps - like building bridges and measuring, weighing.

We’ll continue to use the quick activities with tours and as ice breakers.

We have a MiM program on the calendar for July (an evening Family Math Night) and one in August. We’ll be tailoring it to fit with our “Make a Splash” theme for the summer.

Other librarians described gravitating more towards the MotS materials that could be used more independently with children.

I’ll use the games during downtimes with the children in the library.

Probably some of the quick activities that we can have available for kids to pick up and take home or can respond to a display.

I am planning to use the posters on a table changing the activities on a weekly basis.

I will distribute to branches anything that can be used in the plexiglass holders.

The kids loved the weekly MiM trivia posters in the past, so we are hoping to use those again. We also put out handouts/activity sheets on a variety of topics during the summer, and some of them may use MiM activities (including the math calendars.)

Several librarians described how they would offer a combination of regular programming, along with stand-alone materials for children.

Many of the kids in our neighborhood do not attend summer school so I anticipate many kids in the library looking for activities on a daily basis. We’ll continue our display board and offer weekly activities. We will continue to integrate MiM into programs.

Likelihood of use in upcoming year: Librarians were asked how likely they were to use MotS in the upcoming school year. Over three quarters of the librarians (79%) report that it is likely that they will use MotS in the upcoming school year (2010-11),
with most (55%) saying it was very likely (24% somewhat likely; mean rating = 2.45, SD 0.84.) (4-point rating scale: very unlikely = 0; somewhat unlikely = 1; somewhat likely = 2; and very likely = 3)

Levels of anticipated future use of MotS were generally comparable across various “touch regions” (high touch = 78%; medium/high = 75%; medium/low = 88%; and low = 67%).

Reasons given for why it was very likely they would continue using MotS were varied. The four reasons commonly offered were that: 1) children and parents like it; 2) the materials were good, and easy to implement; 3) the librarians themselves had a personal commitment to promoting mathematics with children; and 4) their library system or administrator supported promoting mathematics with children.

Because the children and parents seem to like the activities. They are fun and creative while promoting math.

I think the children and parents that I serve enjoy the program and like finding math in a library setting.

There is support from library administrators, and there has been enough positive feedback from children and parents to convince us that the programs are definitely worth continuing.

It’s a great program experience to offer the kids, and you already have the program ideas set up and thought out.

They are a simple way to introduce variety into the library format.

Some of the materials are easy to pull out and use. No major planning is involved.

I like the website and see the possibilities of including the ideas in more programs.
It’s important because kids have limited math skills. It’s also required in my library system.

Some of the librarians expressed their personal convictions regarding the importance of mathematics, and the effectiveness of the MiM materials.

Math is a very important school subject. This neighborhood has a great number of non-performing students. Over past few years, the branch only focused on literacy. It is time to think about math.

I see the importance of implementing math in everyday life and daily routines. I have a desire to do more.

I believe math is a very important skill and needs to be reinforced every possible chance.

In part because our system is really pushing our involvement but also because I think our young patrons benefit from these activities.

It is so easy to implement, and it is so good for the kids. We need to do all that we can in the U.S. to promote science and math education.

Some librarians described some specific ways they anticipated implementing MotS materials in the upcoming year.

They work especially well on some of our big program days like Family Day, El Dia, Train Day, etc., and also during our summer reading activities and crafts.

I will continue to use the bulletin board displays and games, as that is what appeals to kids.

We tend to use the quick activities a lot.

I think it’s important to demystify math, and we’ll be looking for interesting ways to present projects and book displays for our kids in this area.

I will continue to add MiM activities to my after-school program’s plans. The kids love them. They are easy to follow and the kids are exposed to math in a fun way.

For the 16 librarians who indicated either it was unlikely or hard to say whether they would use MotS next year, the reasons offered almost always involved budget, staffing, available time, and the necessity of prioritizing the areas they perceived as deserving the greatest attention.

Due to the budget situation, we’ll be offering less programs this year because of staffing reductions.
Budget cuts since starting this program has made it more difficult to plan and present programs for this age.

Our building is slated to be closed for the next year for renovations, so I wouldn’t be able to do any activities. I might use them before the renovation begins. It depends on time and having participants the right age.

Children spend a great deal of time on math at school, and I don’t see them using it here.

With all the projected job cuts, I may not be around to implement any programs, and of those remaining, the number of programs will be heavily decreased, so we will have to pick and choose our programs more carefully.

Until very recently I was the only librarian assigned here, and all programs needed to be simple. When we hold programs for the kids I not only need to be involved in the program but the parents want reference help at the same time, so math activities were a very low priority.

Programming (and staff hours) are severely cut in my library and I only work with the public one day a week. We do have plans [however] to use MiM activities in our Summer Reading program.

Despite budget cuts and their negative effect on staffing, several librarians offered further suggestions of how MotS could continue to be used in their libraries:

I once found a source for bookmarks with math puzzles and activities on them. Having bookmarks like that, with MiM info and website on them would be a great giveaway at our Circulation desk.

We are short two staff in the children’s room, and may have even more cuts next budget. [But] MiM is free and a wonderful resource - we just need to make the time for it. We may rethink programming and offer more drop-in activities to children and families. Set up a math corner just like our craft table. It is an idea!

Several of the regional leaders commented that the fact that the MotS materials were available free of charge was truly an asset of the project, given these hard economic times. One added that, given the drastic upcoming budget cuts, her district was now critically scrutinizing how their various branch libraries do programming, which further highlighted the value of MotS for her region.

We’re doing a lot of analysis of our programming, and going to completely change the way we do programs. We’re looking at how much time it takes to do planning, as well as doing programs. Planning eats up a lot of time. So, when the activities are already pre-planned, ready to go, like MotS, it actually streamlines the program process. It makes it more cost-effective, so we can do more of them. That’s good.
II. LIBRARY ACTIVITY ASSISTANTS AS AN ALTERNATIVE MODEL OF MotS IMPLEMENTATION

As noted in TERC’s Year 3 Annual Report (April 2010), one region – Queens, New York – chose to implement MotS using several different channels and networks of adults working in the libraries. The regional leader in charge of children’s librarians across the 64 branches in Queens encouraged the children’s librarians to assume an active role in implementing MotS programs and materials in their local libraries, in ways similar to what children’s librarian administrators had done in the three other MotS alpha regions.

Moreover in Queens, the regional leader in charge of after-school staff has also been actively encouraging the use of MotS through an additional channel: The program, called BOOST (Best Out of School Time), utilizes Activity Assistants who offer enrichment and homework help to school-aged children in all Queens library locations. A brief history of BOOST, as noted on the Queens library website:

*In 1989, Queens Library piloted a Latchkey Program in response to the growing problem of unattended children in the library, apparently sent there after school because parents perceived the library to be a safe haven with adult supervision. Latchkey and Homework Assistance Programs were given in approximately half of Queens Library locations... The concept was folded into an upgraded BOOST (Best Out of School Time) program in 2005. BOOST provides a framework for better trained Activity Assistants in the community libraries, as well as more enriching activities for the children. All Queens Library locations participate in the BOOST program.*

Since we were interested in examining the two different models of implementation in Queens, the evaluation team administered electronic surveys to both the children’s librarians as well as the BOOST Activity Assistants. We also observed workshop training sessions offered to both the children’s librarians and BOOST activity assistants, and conducted several small focus groups with BOOST activity assistants.

Completed surveys were submitted by 17 BOOST Activity Assistants, and 24 Queens children’s librarians (QCL).

The two groups were fairly comparable in when and how they had first learned of MotS, with roughly two-thirds of each group learning about the program 1-2 years ago (59% BOOST and 67% QCL), and through a workshop or meeting given by TERC staff (65% BOOST and 71% QCL).

About two-thirds (65%) of the Activity Assistants reported working with BOOST for at least two years (30% for two years and 35% for three years or more). The backgrounds of individual BOOST staff were varied as far as their past experience working with children, and included working as camp counselors, tutors, library staff members in other capacities, and working for the NYC school system.
Regarding the children with whom they worked, both BOOST and QCL reported about half or more speak languages other than English at home (59% BOOST and 58% QCL). Both groups mentioned non-English languages spoken by their children as Spanish, Chinese, Bengali, Urdu, Arabic, and Haitian Creole. Children’s librarians also mentioned some additional languages, such as Korean, Hebrew, Russian, Hindi, and South Asian languages. BOOST staff reported a slightly higher proportion of children being a majority or sizeable minority who spoke Spanish at home (29% BOOST and 21% QCL), and of a majority of lower-middle to low income patrons (47% BOOST and 38% QCL).

When asked about the size of group they typically worked with, about half the BOOST staff (53%) reported that they personally worked with about 11-15 children on a typical BOOST afternoon, with an additional quarter (24%) saying that they personally worked with a smaller group of 6-10 children. The average group ranged in age from 6 to 13 years of age, although over a third (35%) reported having an oldest child between 14 and 16 years of age.

As a point of comparison, 65% of the MotS librarians reported in Year 2 they had a “core group” of school aged children who regularly came to the library. The average core group consisted of about 15 children, and ranged in age from 5 to 10 years old. Thus, each BOOST Activity Assistant typically worked with about the same size group as the Year 2 children’s librarians’ core group, while having a group spanning a wider age range and including more older, middle school-aged children.
MotS Use and Program Impact

As part of their program, BOOST activity assistants were responsible for directly addressing science and mathematics in their work with children, at least several times a month. They were encouraged by their supervisor to utilize MotS, who made it available as a recommended resource to offer children support in mathematics. Almost all assistants (94%) worked with BOOST children five afternoons a week.

All of the BOOST respondents (100%) indicated that they had used MotS materials with children in their libraries, compared with about 8 out of 10 Queens librarians (79%).

The largest number of BOOST staff (mode, 7 individuals out of 17) reported using MotS with children two afternoons per month, although about a fourth (24%, 4 out of 17) reported using MotS more than 7 times a month (range 1-15 times a month; mean = 4.7, SD 4.0.)

More than half the BOOST respondents (53%) reported using MotS for the same length of time that they have worked with BOOST (which ranged anywhere from 3 months to 2 years), and thus much of their work history with BOOST included their use of MotS.

BOOST staff indicated a high level of use of MotS materials across a variety of format types. As with the Queens librarians, BOOST staff indicated the MotS games, quick activities and longer activities as amongst the most popular formats, and each was used at least monthly by 88% of BOOST staff.

Moreover, the MotS Calendars, MotS moments, and posters were also used at least monthly by roughly two-thirds or more of the BOOST staff (75%, 69% and 60%), while these items were used at much lower rates by the Queens librarians.

A fifth (20%) of BOOST staff also indicated that they used the MotS materials that were available in Spanish at least monthly (compared with 5% of Queens librarians.) As noted earlier, BOOST staff reported a slightly higher proportion of children being a majority or
sizeable minority who spoke Spanish at home (29% BOOST and 21% QCL), and mentioned slightly fewer types of non-English languages spoken by their children, compared with children’s librarians.

When asked to describe a MotS activity they felt was successful in promoting children’s math learning, BOOST staff described a wide variety of activities, a testimony to the appeal of a diverse range of materials. A total of 15 different MotS activities were mentioned by the 17 BOOST respondents, with a few mentioning several favorites that they had. The quick activities were amongst those most frequently described, while other longer activities and projects were also mentioned.

*I felt the Quick Question of the Week was most successful because the children were completely engaged in it. The children learned a lot about graphing and analyzing data, which has always been a weak point for them.*

*We did Give me a Minute that I feel helped the children really learn a lot in a fun, exciting way. Not only did they enjoy the activity as a game, they learned how to share information, count and measure time, etc.*

*Children made Counting Books based on a theme or a specific math application. We used counting by 1’s for the younger children and used counting by 2’s, 3’s and 7’s for the older children. The children benefited by sharing their knowledge of math with each other while also helping each other with useful ways to remember math themes.*

*It is hard to pinpoint just one activity that helps the children. All the programs help the children with their math skills. Our children have a fear of math and their skills are very low but this program encourages them to not be afraid.*

BOOST staff were also asked to comment on how they viewed MotS materials and activities as similar to, or different from, what they typically did with students after school. A number of BOOST staff commented on how the two sets of materials and activities were generally similar in appropriateness of math focus of concepts and skills and relevance to school, but that the MotS materials tended to allow students to probe the mathematics more in depth, and engage in math in a more fun, interesting, and relaxed way.

*They are similar in that the purpose is to help the student learn and think for himself. MiM activities are often more fun than the homework questions the kids have to deal with. Also, there is no pressure to find “the answer” to a problem. This makes it more comfortable to learn while doing and having fun.*

*The activities are similar in their homework assignments. MiM just adds that extra element of fun. Sometimes the activities we do are not as interesting or simple as MiM activities.*
The MiM activities and materials provide reinforcement and extensions of what Activity Assistants normally do with students after school. The MiM activities are different because they take the math learning further and focus on bringing concepts to the awareness of children, while the children are involved in a fun activity.

Regarding ease of use, a number of BOOST staff commented on how well the MotS materials fit into the types of routines they already have with the children, with several mentioning that they found MotS easier to use.

For the most part it is the structure of the activities, the setting up, explaining and doing the activities that is very similar. They are different in a sense that we use math as the foundation for the activities.

Many of these Mixing in Math activities are similar to games, yet the children still learn and enhance their skills. This is similar to what I do as an Activity Assistant.

[It is similar in that] there is some sort of hands-on activity that I always have the kids do, otherwise they will not be interested. These programs are quicker than programs I usually use.

It is similar to other programs that I do because they’re fun and pertain to something they need to know...They are different from [what] I normally do because they don’t require much preparation and effort because the lesson is already organized for you.

BOOST staff were almost unanimous (94%, 16 out of 17) in their view that by working with MotS, their thinking had changed about how children’s learning in mathematics might be supported and encouraged outside of school, in places such as libraries (compared with 74% of Queens librarians.).

When asked to describe how their thinking had changed, a number pointed to how math can be presented in a way that is fun, as well as has value and connection to the real world, outside of school.

Math is always disliked by many children as boring, school[work] that they HAVE to do. Mixing in Math is proving otherwise, making learning math very interesting and enjoyable.

They don’t see it as a task or them being bored doing math. They now see it as a fun and energized learning experience.

Math can always be introduced into any activity. By making the concepts and applications fun, they get encouraged to attempt different math problems.

It is so easy to incorporate math into any area of life, from eating an apple (counting the seeds) to shopping (estimating the bill before checkout). MiM is a great way to get the minds of children of all ages working without even realizing they are doing math.
You can demonstrate that the math the children are learning in school has a practical purpose in the activities that the children do.

A few BOOST staff commented on the ways in which they felt the program had had a positive impact on children.

*The program teaches children that math is fun. They are not being stressed about getting every answer right.*

*The children have been able to do math questions faster in their head and on paper. It has helped them raise their grades in math.*

*I noticed that by using some of the MiM activities, the children enjoyed learning math. Many of the kids said that these exercises have made a difference in how they approach the subject.*

**Implementation Factors**

BOOST staff strongly expressed the importance of a variety of factors to optimize their implementation of MotS at their library. Over 80% of the BOOST staff said that the range of MotS activity formats (88%) and the quality of MotS materials (82%) was either important or very important to their successful implementation of MotS. Almost two-thirds (65%) also indicated that access to the MotS website was important.

The majority of BOOST staff also indicated that the support of their administrator or director was quite important (82%) as well as support from the children’s librarian at their library (53%).

BOOST staff described all these factors, of materials and staff support, as being important at much higher rates than their librarian counterparts.
When looking at the factors deemed most important for successful MotS implementation, the top four factors identified by BOOST and Queen’s children’s librarians were fairly similar, and included quality of MotS materials, support from their program or youth services administrator, and access to the MotS website.

### Elements Optimizing* Implementation of MotS in the Library

<table>
<thead>
<tr>
<th>BOOST</th>
<th>Queens Librarians</th>
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<tbody>
<tr>
<td>Range of MotS activity formats (88%)</td>
<td>Support from my regional library system’s youth/children’s coordinator - 53%</td>
</tr>
<tr>
<td>Quality of MotS materials (82%)</td>
<td>Quality of MotS materials – 47%</td>
</tr>
<tr>
<td>Support of my BOOST administrator (82%)</td>
<td>Access to the MotS website - 47%</td>
</tr>
<tr>
<td>Access to the MotS website (65%)</td>
<td>Interest and support from fellow staff - 42%</td>
</tr>
<tr>
<td>Interest &amp; support from children’s librarian (53%)</td>
<td>Range of MotS activity formats - 37%</td>
</tr>
<tr>
<td></td>
<td>Support of my library administrator - 37%</td>
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</table>

*Rated as “important” or “very important”*

The main difference was that many BOOST staff (88%) identified the range of MotS activity formats as important, while only about a third of Queens librarians did. As noted earlier, a number of BOOST staff commented on the ease with which they could use MotS activities.

*The activities are great for planning a lengthy lesson as well as a short game if another activity was completed early.*

*Mixing in Math is easy to do. It is convenient to do with a small budget, time constraints, or a small area to work in.*

*Many of the MiM activities require supplies that the library already has.*

**Factors for enhancing MotS implementation:** Both BOOST and librarians were presented with a series of statements, that began “We/I would do a much better job implementing MiM if…,” followed by a variety of factors that might influence their implementation, and were asked the extent to which they agreed with each statement.

Quite different profiles emerged for the two groups, in response to this question. Queens librarians identified personal factors as most important, with having more time to plan MotS activities as the main factor affecting implementation (74%), followed by their being more comfortable with math (63%), and more interested in math (58%), in ways similar to the total pool of MotS librarians.
In contrast, BOOST staff saw as most important greater training and support in the materials, such as seeing a video showing MotS use in a library (65%), more extensive math background information included in MotS activities (59%), and more training on how to use MotS (53%).

<table>
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<tr>
<td>See a video showing MotS use in a library (65%)</td>
<td>More time to plan MotS activities (74%)</td>
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<td>More extensive background information included in MotS activities (59%)</td>
<td>More comfortable with math (63%)</td>
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<td>More training on how to use MotS (53%)</td>
<td>More interested in math (58%)</td>
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<td>See a video showing MotS use in a library (58%)</td>
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<tr>
<td>More extensive instructions included with MotS activities (47%)</td>
<td>More training on how to use MotS (48%)</td>
</tr>
<tr>
<td>Library leadership more supportive of my implementing MotS (29%)</td>
<td>More extensive background information included in MotS activities (42%)</td>
</tr>
<tr>
<td>More comfortable with math (29%)</td>
<td>Library leadership more supportive of my implementing MotS (42%)</td>
</tr>
<tr>
<td>More interested in math (23.5%)</td>
<td>More extensive instructions included with MotS activities (26.3%)</td>
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**Use of MotS next year:** Compared to the Queens librarians, BOOST staff expressed greater likelihood that they would use MotS materials with children next year (the 2010-11 school year), with all staff (100%) indicating that such use was either somewhat likely or very likely. As one BOOST staff member stated, “MiM is a successful program in the Queens Public Library, and I am sure that we will continue to use it.”
For the Queens librarians, 75% indicated that they thought it was likely they would use MotS, while 21% indicated that it was hard to say, reflecting their level of uncertainty regarding future programming and priorities.

When asked for reasons underlying their anticipating a high likelihood of using MotS next year, the most common reason cited by over half the BOOST staff involved the fact that the activities were fun and that students enjoyed them (9 out of 17 staff; 53%).

The next most common reasons, involved either their educational nature, or the fact that the programs were easy to implement and flexible (each cited by 5 out of 17 BOOST staff, or 29%).

*The information is very accessible and easy to use. The children love doing these activities and at the same time learn a lot.*

*They are fun - the children like them. They can be introduced for 15 minutes or can be used for several sessions. It is also required by our administrator.*

*It is simple to implement and math is a skill every child should strengthen.*

*I like that the programs are easy - the kids learn things while having fun.*

**Discussion:** There are several significant structural differences between the two implementation models (children’s librarians vs. BOOST staff) worth noting, which could account for some of the differences in MotS use by the two groups, and the generally higher levels of use by BOOST staff. First, use of MotS by children’s librarians is largely voluntary, with children’s librarians being encouraged, but not required, to use MotS during the regular programs and services as they see fit. The leader in charge of children’s librarians primarily serves a consulting or advisory role, rather than an administrative supervisory role overseeing programs and practices. Furthermore, this administrator in charge of children’s librarians retired midway through Year 3.
In contrast, BOOST activity assistants do report directly to their program administrator, who can state certain expectations how the after school program should be run. Thus, activity assistants knew that they must administer activities in mathematics and science at least several times a month and are provided with a set of materials, including MotS, that they might use. Given this requirement to provide activities in mathematics and science, BOOST staff discovered MotS an engaging, easy to implement resource that was successful with children. This requirement to provide mathematics activities monthly also undoubtedly contributed to 100% of BOOST staff indicating they were likely to use MotS next year.

Second, the children’s librarians have relatively few program hours per week specially devoted to school-aged children, with many additional duties and responsibilities as part of their job (e.g., ordering and checking out books, helping patrons find books, offering programs to toddlers and preschoolers, offering family events, planning and running summer reading programs, etc.). Furthermore, over three-quarters (83%) of the Queens children’s librarian respondents report that they are the sole children’s librarian at their branch (as opposed to 48% of our total MotS librarian sample), thus making it difficult to delegate these librarian tasks to others. Thus, it is not surprising that children’s librarians reported “more time to plan MotS” as one of the major facilitating factors in their implementation of MotS.

In contrast, for BOOST activity assistants, offering programs and support to school-aged children is the primary focus of their job, with most activity assistants working five full afternoons a week doing so. Thus, it is not surprising that the frequency of using MotS materials should be higher with BOOST staff, compared to children’s librarians.

Third, there is likely an interaction between the services offered by children’s librarian vs. BOOST staff, in a given library. The vast majority (79%) of QCL reported that they have staff/volunteers specifically assigned to help students with homework, with almost half (46%) indicating that such staff run activities other than homework help. 13% of the QCL (3 of the 24) specifically mentioned that their homework helper uses MotS activities in their after-school program. A few of the children’s librarians informally relayed to their regional leader that they were under the impression that since their BOOST activity assistant was using MotS with children, that they themselves did not necessarily need to do so as well. Thus, it is possible that the lower levels of MotS use by librarians may be partially due to the librarians “delegating” such use to the BOOST staff, or feeling less compelled to use MotS, since they knew BOOST staff were doing so.

Comments from children’s librarians, both through the surveys and in the focus groups seemed to corroborate this. When asked about the likelihood of implementing MotS next year, one librarian replied, “It depends if we have our activity assistant. She is very good at implementing math related games and activities. I have many more programs I am providing and I feel more comfortable doing - so these are my priority.”

Fourth, there were some general differences in the background profiles of children’s librarians and BOOST staff worth noting. Our observations of training sessions
confirmed that compared with the children’s librarians, the BOOST staff typically were younger, in their twenties. As noted earlier, most of the BOOST staff had held their position for only two or three years, with many using MotS for the entire duration of that position. Contrast that with a librarian with over 11 years of experience (43% of Queens children’s librarians reported working 11 or more years), who has been asked to try out MotS only in the past year or two, building on 10 years of previous routines and practices. We observed quite striking differences in the training sessions offered to the two groups, during the opening, unstructured “free choice” part of the session. During this time, BOOST staff eagerly explored and learned about the different MotS resources available in the room. In contrast, a number of children’s librarians took this time to chat and share other “library business” with their fellow librarians.

Given this difference in background and outlook, it is perhaps not surprising that the BOOST staff saw as most important greater training and support in the materials (e.g., seeing a video showing MotS use in a library, more extensive math background information included in MotS activities, and more training on how to use MotS), while librarians identified having more planning time, and their own interest and comfort with mathematics as most important factors.
CONCLUDING REMARKS

Year 3 marked an important transition year for the Math off the Shelf project, as it proceeded from its initial phases of materials development and close work with “alpha region” libraries, to doing outreach to increasing numbers of new librarians and regions throughout and beyond the Northeast. Some librarians have now been familiar with MotS for two to three years, with the novelty of the materials lessened and direct support from TERC staff decreased. All this is amidst a rough economic climate that is causing libraries to face increased organizational demands, tough programmatic choices, and serious budget and staffing cuts.

In spite of these challenges, our Year 3 evaluation found that there has been a consistent and regular “following” of librarians promoting MotS, with 85% of librarian survey respondents indicating that they have used MotS materials in their libraries during Year 3. Use of MotS was high both in regions new to the project, as well as in regions participating in MotS for several years. According to librarians, keys to MotS’ success lie in the materials’ high quality, its ease of use and adaptability, its wide range of activity and resource formats, and the highly enthusiastic response from children and parents alike. Librarians expressed how they particularly liked that the materials were fun, offered children clear and engaging connections to how mathematics related to the real world, and were easy to incorporate into their ongoing library programs, practices and space.

Librarians reported regularly using MotS activities in their library programs for school age children and for families, as well as making MotS handouts and posters available for children’s more independent work. Moreover, librarians reported additional changes in their practice beyond use of specific MotS materials, in the ways they increasingly incorporated mathematics in how they asked children questions, presented books, and interacted with children and adults.

In addition to changes in behavior, project impact was also evidenced in librarians’ concepts and views of mathematics. Many librarians stated that their thinking about what mathematics actually entails, and the importance of promoting children’s mathematical learning -- and the pivotal role that libraries can play -- had changed as a result of MotS.

Further building of mathematical learning infrastructure in libraries continued during Year 3, with a number of librarians assuming greater leadership roles in the professional development of their library colleagues. An additional promising network of the learning infrastructure was also tapped in several regions that enlisted homework helpers and activity assistants to utilize MotS in the work with school age children.

Our Year 4 evaluation, during the final year of the NSF-funded project, will continue to examine whether MotS librarians are able to sustain their provision of mathematics-related programs and resources to patrons that was evidenced this year. It will also study how the MotS project reaches and trains librarians in additional regions in Arizona and Florida, as well as how it continues to attract and support librarians in current...
participating regions, through increased utilization of technology and the web (e.g., webinars and the project website), and through the growing cadre of library leaders in various communities across the country.