

Michigan Mathematics and Science Centers Network, Michigan Virtual University,
and the Michigan Department of Education

ALGEBRA FOR ALL STATEWIDE EVALUATION AND REVIEW

Highlights of Findings from Year One *2009-2010*

Prepared by SAMPI—Western Michigan University and the Center for Evaluation Research
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Algebra for All (AFA) is an intense professional development program that builds the algebra content and pedagogical knowledge of middle and high school teachers so that mathematics classroom instruction meets the learning needs of all students. It takes a functions-based approach to algebra instruction. Broad goals include:

- deepening teachers' understanding of the functional approach to learning algebra,
- teachers believing that all students have the capacity to learn algebra, and
- teachers experiencing new methods of engaging students that will impact the learning of all students as well as the use of technology as a teaching and learning tool.

Algebra for All was developed and implemented by a consortium of partners: the Michigan Mathematics and Science Centers Network, Michigan Virtual University, and the Michigan Department of Education. The program built upon professional development materials and processes designed and delivered by the Wayne Regional Educational Service Agency (RESA) and the University of Michigan Dearborn's Center for Mathematics Education (CME) over the past several years.

In the first year of the project, fourteen Math/Science Centers across Michigan served over 750 middle and high school teachers of algebra including special education teachers. Sites ranged from 15 to over 100 participants. The project included coaching for a randomly chosen 25 percent of participants. Each AFA session was led by the two lead facilitators from the Wayne RESA Mathematics and Science Center who were available live via the Internet. MVU provided online resources for participants including social networking with peer leaders as well as access to all project materials online.

The evaluation design included continuous formative assessment for the first year with an emphasis on qualitative data collected through focus groups, surveys, and interviews. Quantitative data included pre/post algebra content tests administered to students and baseline performance of teachers on the Learning for Mathematics Teaching Scale (LMT). A stratified cluster sample of 118 randomly selected teachers provided data in the form of classroom observations, surveys, and an end-of-year interview. Interviews were also conducted with all 32 of the site facilitators, 14 of the 15 site coordinators, and all 11 members of the project management team.

Impact on Teachers:

- Focus groups from ten sites suggest that teachers believe their students benefited from the program due primarily to three factors: collaboration with colleagues, the cognitively challenging classroom activities presented during the sessions, and the power of the graphing calculator. Barriers to implementation included four factors: student characteristics (prior knowledge, special education students, student motivation); lack of teacher motivation to change; time constraints; and technology knowledge and availability.

- Focus group teachers reported approximately 90 percent implementation of AFA activities at varying levels. When asked how their *teaching had changed* as a result of AFA, teachers reported more use of real world applications and use of technology in their classrooms.
- In a pre/post survey, teachers report higher level of technology skills, especially related to graphing calculators, database software, PowerPoint software, and online social networks.
- A pre/post survey of teacher graphing calculator skills showed teachers reporting improvement on all 14-items.
- Teachers were asked about using technology to: gather and collect information, analyze data, and communicate with others. Teachers showed a statistically significant increase on items related to the frequency of gathering data on the internet, using spreadsheets, and using computers and digital cameras to create presentations.
- Results of the LMT showed a statistically significant gain ($p < 0.0001$) in the pre- to post-test in all teachers. Teachers' overall confidence in their responses also increased.

Impact on Students:

- Students were administered a 19-item pre- and post-assessment; those results show a statistically significant gain in the pre- to post-test scores ($p < 0.0001$).
- In the focus groups, *97 percent of teachers* reported implementing at least one strategy from AFA in their classroom. The most common was graphing in a variety of forms: reading graphs, shapes of algebra, time-distance, data collection, and writing stories to match graphs. A teacher said, "I was amazed at how they [the students] grasped the concepts." Using small groups and different ways to form groups was included as well.

Results from Interviews:

Interviews were conducted with facilitators, site coordinators, and the project management team. As a result of feedback from sites, the AFA instructional format was changed for Year 2. Rather than live distance learning, sessions are taped beforehand, allowing sites to adjust the timing to their own context. Similarly, teachers found that the online component was difficult to navigate; this was simplified for Year 2.

Recommendations:

- **Clearer communication between project management team and facilitators/site coordinators** – Schedule regular meetings of project management team with facilitators and site coordinators. Suggestions to improve communication include: schedule more phone conferences; utilize Adobe Connect; create and use a List Serv email; have a clearer email subject line; create a FAQ webpage to address common questions; and provide contact information for troubleshooting.
- **Develop plans for program sustainability.** Through participating Math Science Centers, establish an action plan to continue motivating, monitoring, and supporting teachers in the implementation of program philosophy and strategies.
- **Continue to:**
 - Generate high motivation in teachers to implement the program
 - Include activities that teachers will implement in their classrooms
 - Consider strategies for lower achieving students
 - Provide teachers with opportunities to share and collaborate
 - Provide classroom support

For more information about this report and the project evaluation, contact Kristin Everett (kristin.everett@wmich.edu or 269-387-3791) or Dr. Frederica Frost (frostf@resa.net). For more information about the Algebra for All program, contact Libby Pizzo, Wayne RESA Math and Science Center (pizzol@resa.net or 734-334-1375).