

# Michigan Teacher Perceptions of Barriers to Implementing High Quality Mathematics and Science Curricula

A Report of Findings from a Survey of Michigan K-12 Teachers Receiving  
Professional Development Services Fully or Partially Funded  
by the Michigan Eisenhower Professional Development Program

June 2001

□ **Background.** A review and assessment of the Michigan Eisenhower Professional Development Program began in Fall 1999. The purpose of the evaluation was to determine effects of the Eisenhower program, as well as to take a "snapshot" of the status of mathematics and science teaching and learning in Michigan. The Michigan Department of Education identified a set of performance objectives for which evaluative information would be gathered to guide the assessment. The work was conducted between November 1999 and June 2001. A variety of data collection procedures were identified, including a statewide survey of teachers who had participated in Michigan Eisenhower-funded programs provided by higher education and local grantees (Michigan Mathematics and Science Centers). One item on the survey asked: "What do you see as the primary barriers to implementing high quality mathematics and/or science curriculum in your school?" The survey was conducted in Fall 2000. A report based on the other 50 items on the survey is available from the Michigan Department of Education. This report is a summary of responses to the "barriers" question.

□ **Summary of Findings.** The barriers described by respondents have been analyzed and grouped into seven related categories. The categories and specific barriers are described below. Several of the categories are best understood by examining subcategories, also described below.

➤ **Respondents.** Approximately 1300 teachers completed the entire survey. Of those, 1,086 provided responses to the "barriers" question. Of those, 1,067 (98%) identified one or more specific barriers to implementing high quality mathematics and/or science curricula in their schools. The other 19 respondents (2%) replied that there were no barriers. Respondents who identified barriers described from one to five different barriers each, with an average of two per respondent. Twelve respondents (1%) stated there were no barriers in mathematics, but identified barriers in science; six (0.5%) stated there were not barriers in science but identified barriers in mathematics.

➤ **Overview of Responses.** Inadequacies in **Resources** and **Time** were by far the most frequently mentioned barriers to implementing high quality mathematics and/or science curricula. About one-half of all respondents (48%) said inadequacy of physical resources (e.g., equipment, funding, facilities) presents a barrier in their schools. One-third of all respondents (33%) said insufficient time (so much to do, not enough time) stands in the way of implementing quality programs in their schools.

The next two categories of barriers, inadequacies in **Curriculum/Methodology** and insufficient **Teacher Training**, were both identified by just under one in five respondents, at 19% and 18% respectively. About one in six (16%) identified barriers associated with the **Students** (student

preparedness, student attitude). Slightly more than one in ten (11%) identified similar barriers associated with the **Teachers** (unwilling attitude, lack of preparation). Just under one in ten (9%) identified barriers associated with **Classroom Management** (class size, managing activities).

It is worth noting that two other major stakeholder groups were mentioned: parents and/or students' home environment (5%) and administration/leadership (4%). These figures show that while some respondents did identify barriers associated with these groups, relatively few name them as major barriers to implementing high quality mathematics and/or science curricula in their schools.

Categories of Barriers	% of Respondents Who Identified the Barrier
Physical Resources	48%
Time	33%
Curriculum/Methodology	19%
Teacher Training	18%
Students	16%
Teachers	11%
Classroom Management	9%

- **Barrier #1: Physical Resources.** Almost half of all respondents said a lack or inadequacy of physical resources and/or funding to acquire them presents a barrier. This problem stands out by far as the most frequently named barrier.

Within this category, lack of adequate equipment is the primary subcategory, named by more than one-third of all respondents (37%). These respondents said their schools lack adequate supplies of textbooks, printed materials, perishables, equipment, computers and other technology (and associated software), especially related to updating methodologies. They spoke of having to search for or try to create their own materials. They also reported barriers associated with outdated or inferior textbooks, equipment, or technology. They also identified problems with management, storage, and upkeep of sufficient quantities of equipment and supplies.

Examples of comments: *"I have only 8 textbooks in biology for a class of 25 and 10 textbooks in math . . . We are in desperate need of science equipment (microscopes, prepared slides, balances, etc.)."*

*" We lack materials. I lack basic knowledge of how to create hands-on activities ... Our textbooks do not align with Michigan's math and science standards, benchmarks, and curriculum. We always have to invent and gather materials out of the air."*

Other barriers in this category were primarily associated with funding and facilities, named by 8% and 6% of respondents respectively. Respondents reported "lack of money" generally, or lack of funds for specific purposes such as field trips (funding for equipment was included above). Those who identified barriers related to facilities stated their schools lack such necessities as science and

computer labs, facilities in the classroom, or space in the classroom to conduct experiments or meet in small groups.

A sample comment: *"Classroom space and accommodations for investigations (running water, electric outlets, storage space)."*

- **Barrier #2: Time.** Fully one-third of all respondents (33%) reported that lack of time is a major barrier. Teachers described demands to cover more and more materials and competing needs to spend time covering the basics: reading, writing, and basic math.

Sample comment: *"Time! There are only so many hours in the school day. It takes more time to do hands-on than old-fashioned lectures. It is tough to cover all subject matter."*

Teachers report they have little or no time to collaborate with each other, to plan or prepare lessons, labs, or enriching activities, or to collect or create materials for hands-on learning. They described small group work, inquiry projects, and hands-on activities as time-intensive methodologies. They reported they do not have adequate time in the class period or the school day to fit these activities in and give them the time they need.

Examples of comments: *"We keep adding curriculum and programs . . . my planning has tripled with no increase in planning time."*

*"I have five different preps a day. It is very difficult to prepare the lessons, organize the lab activities, prepare for the MEAP, assess student learning, and align curriculum to state standards all at the same time."*

- **Barrier #3: Curriculum/Methodology.** About one-fifth of all respondents (19%) named inadequacies or problems with curriculum or methodologies as barriers. Respondents described having too many demands in the curriculum and barriers created by continuously growing and frequently changing mandates for teaching.

Examples of comments: *"Too much curriculum. District loves to add curriculum, but never takes any away."*

*"The state changing what we need to teach so often. It's hard to develop many engaging lessons in many subjects when the requirements are changing."*

Teachers described lack of curriculum, curriculum that is created but ignored, and curriculum that is outdated, poorly designed, not aligned with state standards, problematic for the students, or not consistent from one grade to the next. They described required curricula as covering subjects "an inch deep and a mile wide." About 3% of all respondents specifically named the pressure to "teach to the MEAP" or other standardized assessments as a barrier. Barriers related to inappropriate methodologies and assessment techniques were also identified.

Examples of comments: *"Developing a K-12 curriculum that has continuity and that is consistent from teacher to teacher."*

*"Too many students who . . . although they may be learning at a slower rate than others, they are tested at the same time as others. The whole class is assessed not allowing for the levels of learning (MEAP). The old ways were more adaptable for some."*

- **Barrier #4: Teacher Training.** Just under one-fifth of the teachers (18%) reported that inadequate teacher training presents a primary barrier. They identified a need for more training generally, training for all the staff, and specifically training in hands-on or inquiry-based methodologies and classroom management when using these methodologies. They described inadequacies in the timing, content, and delivery of available training, and expressed a particular need for training with follow-up reinforcement and support.

Examples of comments: *"We may get training, but there's seldom follow-up or support. In addition, much of our recent training has been irrelevant or poor quality."*

*"Being able to find release time for in-depth training in both areas [math and science]. When you find that time, marking the training valuable and worthwhile. Don't waste valuable time with unorganized training or with someone trying to 'sell' a program. . . "*

- **Barrier #5: Students.** About one in six respondents (16%) named issues associated with students as barriers. These fell into two primary subcategories: Student Preparedness (identified by 7% of respondents) and Student Attitude (also identified by 7% of respondents). Student preparedness concerns include lack of grade-appropriate preparation, skills, competence, and life or world experience, as well as barriers associated with extremes of academic preparedness and/or ability within the same classroom.

Examples of comments: *"Students need to read at grade level or even a half-year ahead to be able to read instructions, word problems, experiments, etc. Science texts are at grade level or beyond, which makes everything else difficult for at least 60% of students."*

*"Trying to move to a deeper understanding without losing the huge number of low-level students present in some of the classes. The strong students are ready to move on while others are not . . . "*

Barriers related to student attitude include unmotivated students, students who expect high grades with little effort, and disciplinary or behavior issues.

Examples of comments: *"Too many kids do not have basic math skills. They do not practice at home, they try to learn in 40-minute lessons, but need extensions outside of school."*

*"Biggest problem is that many . . . students want all A's but expect to do little to get it."*

Other barriers related to students centered around developmental issues, such as students who are not developmentally ready for the demands placed on them by the curricula, students who are not ready to handle cooperative learning, and young children losing their ability to focus by the end of a long day.

- **Barrier #6: Teachers.** Slightly over one-tenth of the respondents (11%) identified barriers associated with the teachers, which again fell into the two primary subgroups of Attitude and Preparation. These barriers were identified by relatively small numbers of respondents. Teacher Attitude was named by 6% of all respondents and Teacher Preparation by 3% (note, however, that 18% of respondents named a need for teacher training, see above). Barriers associated with teacher attitudes were described as unwillingness to change and different philosophies or methodologies. Teacher preparation barriers were described as lack of preparation or lack of confidence.

Examples of comments: *"Teachers that are unwilling to change--they believe that a textbook is a curriculum and have little or no understanding of the Michigan Curriculum Framework."*

*"Too many teachers who are not prepared to teach science or do not know how to teach it."*

- **Barrier #7: Classroom Management.** Approximately 9% of all respondents identified issues grouped into this category, including barriers created by class size, lack of staffing assistance for teachers in the room, or classroom management.

One comment: *"It is hard to do more hands-on projects and investigations with a large class size. I teach 3rd grade and I have 26 students. It is hard to spread myself around to facilitate/ support investigations."*

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