

Improving Mathematics Education in Missouri: *There are no silver bullets*

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Today's K-12 schools offer students unprecedented opportunities to learn and prepare for their future.

They are staffed by many dedicated and knowledgeable professionals.



Challenges

- Low expectations for some students.
- Shortage of people interested in teaching mathematics.
- Mathematics content and pedagogical knowledge of some teachers.
- Well-intentioned but misguided policies (algebra for all 8th graders, math every year of high school, more rigorous math, ...).
- Accountability measures that are driving current decision making.



Opportunities

- Curriculum materials that bring interesting contexts into the mathematics classroom.
- Policies that encourage/require students to take more mathematics.
- New technologies to support student learning.
- Visibility and importance of math recognized by community and government officials.
- Increased interest in teacher leadership (coaching, mentoring, specialists,...)



Mathematics Education Reform (efforts during my career)

- Moving back-to-basics ('70s)
- A call for problem solving ('80s)
- Textbook innovation ('90s)
- Accountability, high stakes assessments (current decade)



Some things I've noticed...



Some things I've noticed...

There is an assumption (mostly by politicians and media) that our schools are failing.

However

Parents generally agree that “their” school is a good school.



Some things I've noticed...

Students have an unprecedented set of opportunities to study and learn mathematics.

However

Students also have an unprecedented set of opportunities to do “other” things - sports, arts, work...



Some things I've noticed...

Teachers are busier than ever before.

However,

Teachers spend 90% of their time worrying
about 10% of their students.



Some things I've noticed...

Most people think math is very important.

However....

Most people don't like math and admit they are not very good at it.



Some things I've noticed...

Since everyone went to school (K-12),
everyone is an “expert” on education.



Some things I've noticed...

Schools are urged to improve.

However,

Schools are criticized if they change instructional methods and content emphasis.



Some things I've noticed...

Society urges schools to prepare students for the current high-tech, data-rich work environment.

However,

Some urge schools to continue to teach the same curriculum as was taught to them a half century ago.



How do we improve student learning opportunities for Missouri students?



Several “silver” bullet solutions
have been offered....



Get “back to basics.”



Focus on problem solving.



Leave no child behind.



Offer a “rigorous”
mathematics curriculum.



Require algebra for all
students in grade x.



Use technology.



Don't use technology.



Hold schools accountable.



While each of these may be important “ingredients” for improvement, none alone will produce students who know or want to learn more mathematics.



What is needed is a new “recipe”
(not a silver bullet).



1. Teachers matter.



Teachers Matter

- **Knowledgeable** about mathematics and teaching.
- **Supported** by the community and by the district.
- **Committed** to helping all students learn mathematics.
- Given the **time and resources** to succeed.
- **Supported** in their effort to improve.



Teachers Matter

- *We must find ways to recruit more people into the mathematics teacher workforce.*
- *We must support teachers with access to ongoing professional development, on-site support and time to prepare and do their work.*



2. Teaching matters.



Teaching Matters

- Engages students in worthwhile mathematical tasks.
- Encourages students to wrestle with important ideas.
- Focuses on “why” as well as “how.”
- Listens to and builds on student thinking.
- Motivates and supports students.



Teaching Matters

“Effective teaching requires deciding what aspects of a task to highlight, how to organize and orchestrate the work of students, what questions to ask students having varied levels of expertise, and how to support students without taking over the process of thinking for them.” (PSSM)



Teaching Matters

Teachers need to be willing to change -- to use instructional strategies and curriculum materials different from what they used as a student of mathematics.



3. Curriculum matters.



Curriculum matters

- **Standards** that organize coherent, focused and reasonable expectations for all students.
- **Textbooks** that present important mathematics and help students understand, learn, and appreciate mathematics.
- Aligned **assessments** that monitor progress in attaining the learning goals.



Curriculum matters

“The data call into question the practice common to most US education systems of using curricula that deliver consistently small amounts of instructional attention to large numbers of topics at most grades.”

Source: TIMSS



Access to curriculum matters.



Access to curriculum matters

“The data strongly suggest that US students, while they may vary somewhat in how well they make use of the educational possibilities available to them, achieve differently because they are given access to different curricula, curricula that shape and limit what they may achieve even with their best efforts.”

Source: TIMSS



4. Student attitudes/beliefs matter.



Students' Attitudes Matter

- Committed to learning.
- Willing to work.
- Respectful.
- View mathematics as important and interesting.



5. School leadership and community support matter.



School Leadership

- Administrators who provide the resources and time for teachers to improve.
- Teachers who work with and support their colleagues (young and not so young).
- Staff who worry about all the kids in their school.
- School boards who advocate for what is needed.



Recipe for Success

1. Knowledgeable, committed and well-supported teacher workforce.
2. Teaching that engages students.
3. Coherent and focused curriculum and high quality, reasonable accountability measures.
4. Student attitude, beliefs, work ethic.
5. Leadership and parental support.



Everyone has a role.

- Teachers (new and experienced)
- Curriculum Coordinators
- Teacher Educators, Teacher Leaders
- School Administrators
- Parents/Community



Improving mathematics education in Missouri

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There are no “silver bullets”
but there is a recipe for
success.

