



**EDUCATION
& HUMAN DEVELOPMENT**
TEXAS A&M UNIVERSITY

April 9, 2012

Dr. Max Warshauer
Mathworks
Texas State University
San Marcos, TX

Dear Max,

I am pleased to endorse the Mathworks curriculum. As an outside independent evaluator of the project for the past few years, I have had the opportunity to observe first hand and to evaluate data that attests to its effectiveness in preparing Texas students for further mathematics success.

The characteristic I like best about the *Math Explorations* textbooks and what encourages and interests me in following it as an evaluator is that it's an example of a curriculum that's NOT a mile-wide and an inch-deep. The exercises, the examples, and the development of concepts addresses mathematics in a deep and thoughtful way. The textbook conforms with, and aligns with, many of the best ideas, and more recent research about mathematics curriculum. The word "explorations" is in the title of the *Math Explorations* books and it's in the materials. That exploration is one of the strongest research-based features of the curriculum. It builds on what students know, then lets them explore ideas and concepts before they're given the formal definition or an example to practice. The notion of letting kids explore, working informally, and then building on this abstractly is something at which the *Math Explorations* textbook excels.

The teacher development component of Mathworks is a key to its success. Often, teachers attend a short workshop, or even in a longer summer course, they work on mainly individually. When they return to their classrooms, teachers may or may not try the new ideas. If they do try, there is little guarantee that the ideas will work. Educational psychologists have identified an important learning tool called "scaffolding," which is essential to building new knowledge and practice. The Mathworks program uses scaffolding to build teaching knowledge and support its implementation in the classroom. As teachers learn during the workshop, they observe the same math being taught by a master teacher. When teachers return to the classroom, the Mathworks staff and experienced teachers work with them to provide a scaffold, supporting teachers' early attempts to implement the *Math Explorations* curriculum. This strategy is largely responsible for the success of the program.

My evaluation found that the Math Explorations textbook is impressive in its preparation of students for Algebra I. Students made excellent progress on the Orleans-Hanna Algebra aptitude test. The 6th and 7th graders scored at the same level as 8th graders nationally. It turned out that two-thirds of the 7th graders were ready for algebra, and half or more of the 6th graders scored at a level that you'd expect 8th graders to score. On the TAKS test, the students' average scores were at or above the level of the state. One interesting example is that in McAllen, which has a mainly Hispanic population, the kids scored well above the Texas average for Hispanic kids. That's really important, because it's a nation-wide and state-wide problem. There is a large achievement gap between African-American or Hispanic kids and white kids. It's closing slightly and slowly nationally, but it's still a problem. If the *Math Explorations* data continues to hold up and improve, as program implementation continues, it is probably one of the most exciting things for the future of math education.

The question of whether a curriculum is research-based has a two-part answer and, like most educational research questions, is multi-faceted and difficult to answer in a simple way. First, research-based curricula are developed by authors who are involved in and aware of research and best practices on student mathematics learning. What I like about the Mathworks curriculum is that not only is it based on research, it incorporates the best ideas from research in the way that it allows students to investigate and explore ideas before they are given procedures, and then encourages the students to reflect on what they are learning. These are the critical hallmarks of the best and most effective curricula, and two of the greatest strengths of the Mathworks program. The second part of research-based curriculum is that careful data-based pilot study evaluation is done to guide the development and revision of the curriculum. As I outlined above, the Mathworks team has worked hard to collect, analyze, and use evaluation data to examine the effectiveness of the curriculum. The writing team has used these results, along with an examination of research on student math learning, and feedback from classroom teachers to make revisions and improvements. This strategy, which Mathworks has followed, is a model of how a research-based curriculum should be developed.

I look forward to following future implementation of the Math Explorations curriculum and wish you every success.

Best regards,

A handwritten signature in black ink, appearing to read "Gerald Kulm". The signature is written in a cursive style with a large, sweeping initial "G".

Gerald Kulm
Senior Professor