

Professor creates tool to help identify young students with math demotivation

July 27 2016, by Mike Krings

As many math-averse adults can attest, the thought of tackling a mathematical problem can be intimidating. Research has shown that students as young as second-graders show signs of being demotivated by the subject as well. A University of Kansas professor has created and validated a tool that can measure young students' math motivation and help educators to identify students who experience demotivation and to help address the problem before they fall behind.

Michael Orosco, associate professor of [special education](#), published a study in the *International Journal of Science and Math Education* that confirmed the validity of a tool that can measure students' [math](#) motivation quickly. The tool was shown effective for culturally diverse students and did not show [gender bias](#).

The tool, the Beliefs, Engagement and Attitude Math Motivation Scale, or BEAMMS, comes at a critical time. Education has become increasingly focused on proving students' achievement in math and reading. Yet math, especially in special education, has not been widely studied.

"Historically we've looked mostly at reading learning disabilities and difficulties," Orosco said. "But now that we're putting more focus on education in STEM fields, math learning disabilities are getting more focus and with that comes studies in motivation."

For the study, 183 second- and third-grade students from ethnically

diverse California public schools completed the BEAMMS assessment. The free tool measures math motivation by gauging a student's feelings about math. It measured positive and negative associations with their beliefs ("I really like math"), attitudes ("I really want to do well in math—math is important") and engagement ("I like spending my energy doing math.") The students selected whether they agreed with the statements. Statistical analysis of the psychometric properties of the results confirmed the instrument's validity.

Orosco said the instrument has several advantages and can help educators and schools reach students who may struggle with math at an early age. Conventional thinking held that students don't become frustrated or disillusioned with math until junior high or when reaching more difficult algebra-type classes, but recent research has shown that students can check out much earlier.

"With the instrument you can look at math motivation, it's reliable and gives school personnel a good indicator if their students are having math demotivation," Orosco said. "If the child isn't motivated, if the teacher isn't able to motivate them, they're just not going to learn."

BEAMMS also has several advantages over other assessments. Traditionally instruments would have 80 to 100 questions before being deemed reliable. Students may score poorly on such assessments simply because they are bored with the process. Additionally, many teachers would not have the time to administer such a lengthy assessment.

Perhaps most importantly, the instrument proved valid for an ethnically diverse sample, many of whom were from low-income backgrounds and did not show gender bias. The economic factor is important as students from disadvantaged backgrounds face significant challenges that can often lead to being labeled or placed unnecessarily in special education classes. The gender component is equally important as research has

shown young girls usually decide by fourth grade if they are interested in math-related fields of study.

"In STEM fields, historically, females have been underrepresented," Orosco said. "Especially at the secondary level. Now we can look at that earlier on at the elementary level."

The instrument can also give educators a good idea of why a student is not motivated for math. That can help them adjust teaching methods or make simple adjustments that don't require labeling a student with a learning disability or unnecessarily placed in special education classes. Orosco compares the tool to a blood pressure test. It's a quick, efficient way of determining if a problem is apparent. When a doctor detects high blood pressure, he or she most likely would prescribe medications or recommend lifestyle changes. If educators detect math demotivation, they can determine whether they should turn to interventions to address the problem or alter teaching methods, all before a student is labeled.

"If you can pinpoint students early on who are not motivated for math," he said, "you can probably avoid spending a lot of time and resources that so often are used when [students](#) are labeled with disabilities."

Provided by University of Kansas

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