GRADUATE STUDENT SPOTLIGHT

MAHTOB AQAZADE

NEGATIVE NUMBERS, POSITIVE RESULTS

by Rebecca Hill

From her first day as a master's student at Purdue, Mahtob Aqazade knew she wanted to do something with technology and mathematics.

Aqazade, now a College of Education PhD candidate in mathematics education, arrived at Purdue with a degree from Sharif University of Technology in Tehran, Iran. But her background wasn't in education — it was in mathematics, what she calls industrial mathematics.

After working with her Purdue advisor on a children's book on negative numbers, however, Aqazade discovered a way to combine her two interests into an entirely new learning experience for children — an electronic, interactive storybook about negative numbers. She believes this unique storybook format could create positive student experiences with a difficult topic and lead to increased retention.

"The hard part of negative numbers is that there are not many everyday contexts in which you use them," Aqazade says. "Mostly, they're found in the context of temperature or money. I hope my storybook makes negative numbers more accessible."

In most U.S. schools, Aqazade says, children don't learn negative numbers until the sixth grade. But she believes students are capable of learning negative numbers at an earlier age — soon after they begin learning whole numbers — and that waiting until the sixth grade creates a learning gap.

"Fifth graders have been learning about whole numbers so long that they may become resistant to changing their thinking when they are taught about negative numbers," Aqazade says.

"Some studies show that first graders and fourth graders are capable of learning about negative numbers. Therefore, teachers can integrate information about negative numbers when they are teaching whole numbers."

Aqazade began to develop her idea in spring 2018 and found a software program, Storyline 3, that was suitable for her purposes. Now, all she has to do is finish with the illustrations.

When finished, the book will allow students to learn about integers in the context of temperature and select embedded features to see related math problems. For instance, a student might click on a thermometer, then match the temperature to the embedded story problem. By working their way through the book and answering the problems, Aqazade believes students will learn at their own pace, and that the interactive features will help them remember more.

Aqazade also sees long-term benefits in teaching negative numbers at an earlier age.

"Children may be better at understanding algebra and other higher math if they learn these things earlier," she says.