EDUCATION

Teacher Prompting: Investigating a Way to Help Students Develop Critical Thinking Skills

Student researcher: Stephanie Wicke, Senior

For students to succeed in STEM education, it is important for teachers to support their development of critical thinking skills by helping them learn to check their understanding, attend to important information, and identify and remedy knowledge gaps. Flexible scaffolding strategies such as using probing and prompting questions, providing meaningful contexts, and asking students to explain their thinking have been suggested as ways to help learners develop these skills. The goal of this qualitative case study is to investigate the relationship between a teacher's scaffolding strategies and a student's use of critical thinking skills during mathematical problem solving. I employed purposive sampling to select one case from a sample of engineering students who participated in task-based interviews where they worked to model a linear programming problem using a computer program called the Purdue Optimization-Modeling Education Tool (POET), which is currently being developed at Purdue. I analyzed this case in order to understand the progress of one student's critical thinking behaviors over the course of the assignment. Using a framework regarding scaffolding, I identified that an interviewer's prompts that proved most helpful to this student were those that related the problem to a real-world scenario and those that were specific enough to suggest a problem-solving strategy but that still left room for individual judgment. Findings suggest that when prompting questions are used in conjunction with other types of scaffolding, they can be effective at

helping students develop critical thinking skills. This study provides groundwork for further research needed to investigate the effects of general versus specific prompting-type questions.

Research advisor Rachael Kenney says, "Stephanie thoroughly unpacked one student's work with a mathematics problem to identify ways of helping him overcome obstacles in his understanding. Such detailed, qualitative analysis provides powerful insight for developing tools that can help students build and reflect on conceptual understandings of the mathematics needed to succeed in STEM fields."

Analyzing a student's learning on the POET.

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