SMITH, SHANNON MARSHALL, Ph.D., August 2019

A COMPARISON OF COMPUTER-BASED AND ROBOTIC PROGRAMMING INSTRUCTION: IMPACT OF SCRATCH VERSUS COZMO ON MIDDLE SCHOOL STUDENTS’ COMPUTATIONAL THINKING, SPATIAL SKILLS, COMPETENCY BELIEFS, AND ENGAGEMENT (249 pp.)

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ABSTRACT

The purpose of this study was to examine the effects of coding activities supported by the artificially intelligent, animated emotional-educational robot Cozmo on middle school students’ computational thinking, spatial skills, competency beliefs, and engagement compared to the more traditional computer-based program of Scratch. Two versions of the coding curriculum unit were developed. Both versions shared the same content and instructional features, but differed in the code blocks used in the Scratch and Cozmo programs. Two intact seventh grade classes at a public middle school in the Midwest participated in the study during their regularly scheduled Technology course. One class received the Scratch coding curriculum (N = 21), and the other class received the robotics coding curriculum (N = 22).

Results revealed non-significant differences in computational thinking, mental rotation skills and competency beliefs among the Scratch and Cozmo interventions. However, students found Cozmo to be more engaging than Scratch. Both interventions
significantly improved students’ computational thinking skills, mental rotation skills, and competency beliefs from pre- to post-test.

This study contributes to the scarce literature on programming education in a public school setting with a diverse group of students. The positive gains in both the cognitive and affective domains of learning found in this study are encouraging and can serve as a point of reference for researchers, curriculum designers, and educators with the desire to introduce students to programming.