The Importance of Teachers’ Instructional Goals for Computational Thinking in a Virtual Robotics Classroom

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Background and Problem Context

- Computational thinking (CT) is an important component of teaching generalizable computer science skills to all students.
- Virtual robotics curricula often offer engaging K-12 learning environments shown to teach generalizable programming knowledge and skills.
- However, robotics programs are taught in a variety of lesson planning levels by teachers certified in a wide range of disciplines.
- Variation in instructional learning goals in these environments may contribute to observable differences in lesson enactment, student learning, and attitudes towards programming.

Research Questions

RQ1: How do robotics teachers conceptualize and articulate instructional goals around CT in their classrooms?
RQ2: Are student programming attitudes and learning of CT related to the instructional goals endorsed by robotics teachers?

Research Design and Methods

Measures

- Qualitative interviews, classroom observations and a goal-setting task
- CT Goal Endorsement Survey (α=.74)
  - Robotics educators, various U.S. regions (N=10)
  - "During class this week, my goal was that students would learn... (that programs execute command in sequence, to use seconds to operate the claw motor, etc.)."
- CT Assessment (α=.73)
  - 6th-8th grade robotics students (N=206)
  - "Which lines can be removed from the program to improve efficiency, without changing the code output?"

Attitudinal Surveys

- Interest (α=.87)
  - e.g., "I wonder about how computer programs work"
- Identity (α=.88)
  - e.g., "My family thinks of me as a programming person"
- Competency Beliefs (α=.83)
  - e.g., "I could do advanced work in programming"

Theoretical Framework

- Instructional goals are likely to be emergent processes that are responsive to particular learning contexts.
- Goals explicitly stated at the lesson planning level may improve instructional design, and therefore increase student achievement.
- However, in complex learning environments like robotics, teachers may possess a hierarchy of multiple and often conflicting goals.

References