Coding to Develop Early Mathematical and Computational Thinking in Kindergarten: A Case Study

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Introduction
Problem and Purpose for this Case Study

**Problem:**
- Increasing need to meaningfully integrate computer science skills with mathematics (Weintrop et al., 2016)
- The integration of computational thinking and mathematics skills is an area lacking in early childhood.

**Purpose:**
- Investigate a situation in which CT and mathematics skills might manifest in a complementary way
- Describe how CT and mathematics skills interplay within a technology task
Computational Thinking

**Definition:**
“The conceptual foundation required to solve problems effectively and efficiently (i.e., algorithmically, with or without the assistance of computers) with solutions that are reusable in different contexts” (Schute, Sun, & Asbell-Clarke, 2017).
Methodology
Research Question

What mathematical thinking (MT) and computational thinking (CT) skills arise when a pair of five-year-old kindergarten students participate in a series of robotics coding tasks?
Participants and Setting

One pair of students (Bowen and Chloe)*

Five-year old children

Private preschool kindergarten

*Each child is given a pseudonym for anonymity. The pair of students in this study are not pictured in this presentation.
Tasks

Programmer Says

Crack the Code

Get Moving

Introduction to Code-a-pillar

Code-a-pillar Challenges
Each task, with the exception of the first, was video-taped with both a stationary and a roving camera.
Data Analysis

- Major elements identified using knowledge, skills, and abilities
- Coded video clips exhibiting these elements
- Coding analyzed for pattern emergence, then categorized into major themes
Results and Conclusion
Research Question

What MT and CT skills arise when a five-year-old kindergarten student participates in a series of robotics coding tasks?

MT and CT Themes

MT:

• Iterations and Spatial Reasoning

CT:

• Debugging and Problem-Solving
Iterations and Spatial Reasoning
Identified a problem

Planned a solution strategy

Enacted the plan

Tinkered with the code

Tested the new code

Tested the new code
Other work by the Coding in Kindergarten (CIK) research team, funded by a USU Research Catalyst grant.


Further questions may be directed to our team at lisewelch@hotmail.com.


