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.

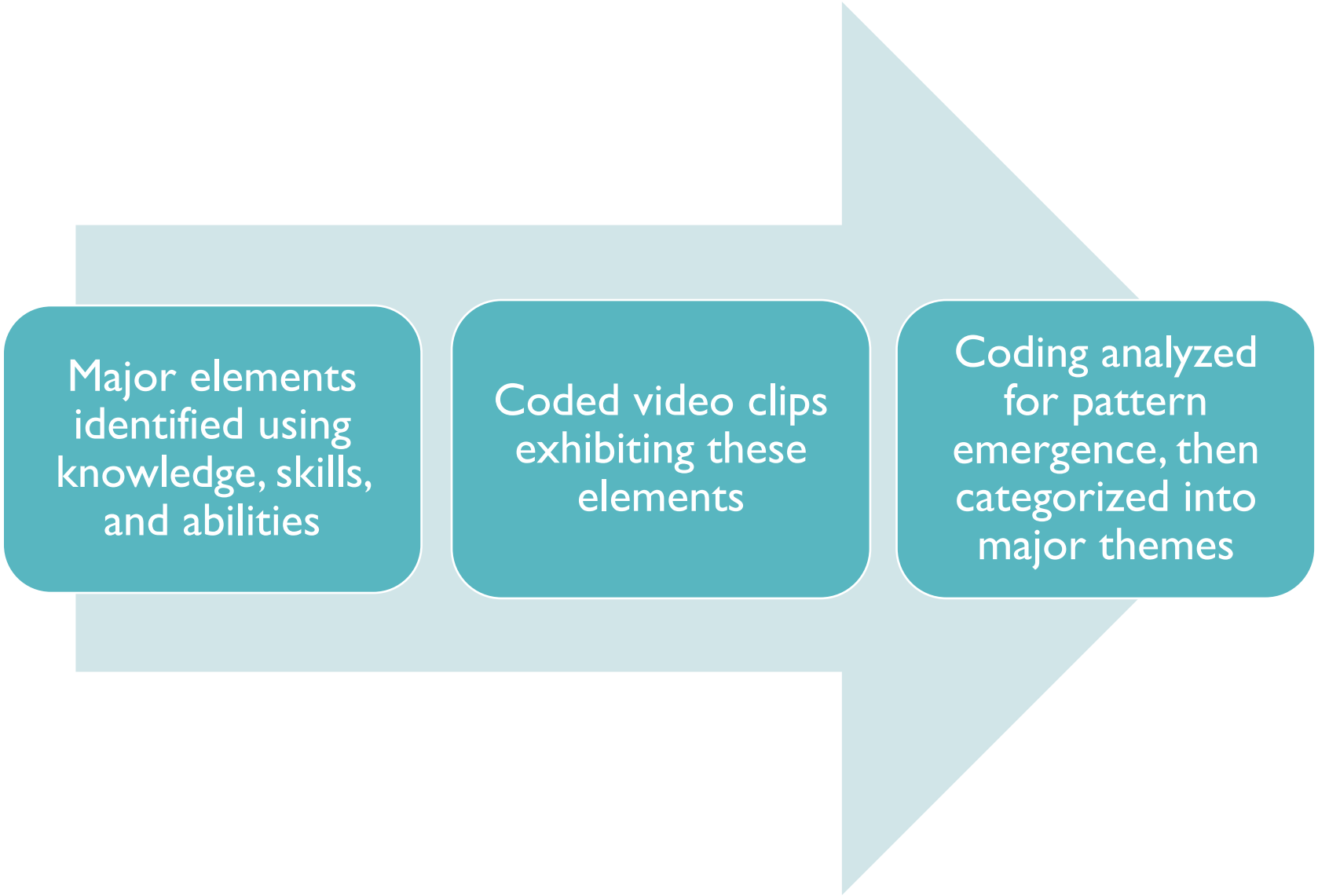
Tasks

- Programmer Says
- ~~Get Moving~~
- Crack the Code
- Introduction to Code-a-pillar
- Code-a-pillar Challenges

Data Source

Each task, with the exception of the first, was video-taped with both a stationary and a roving camera.

Data Analysis



Results and Conclusion

Results

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:

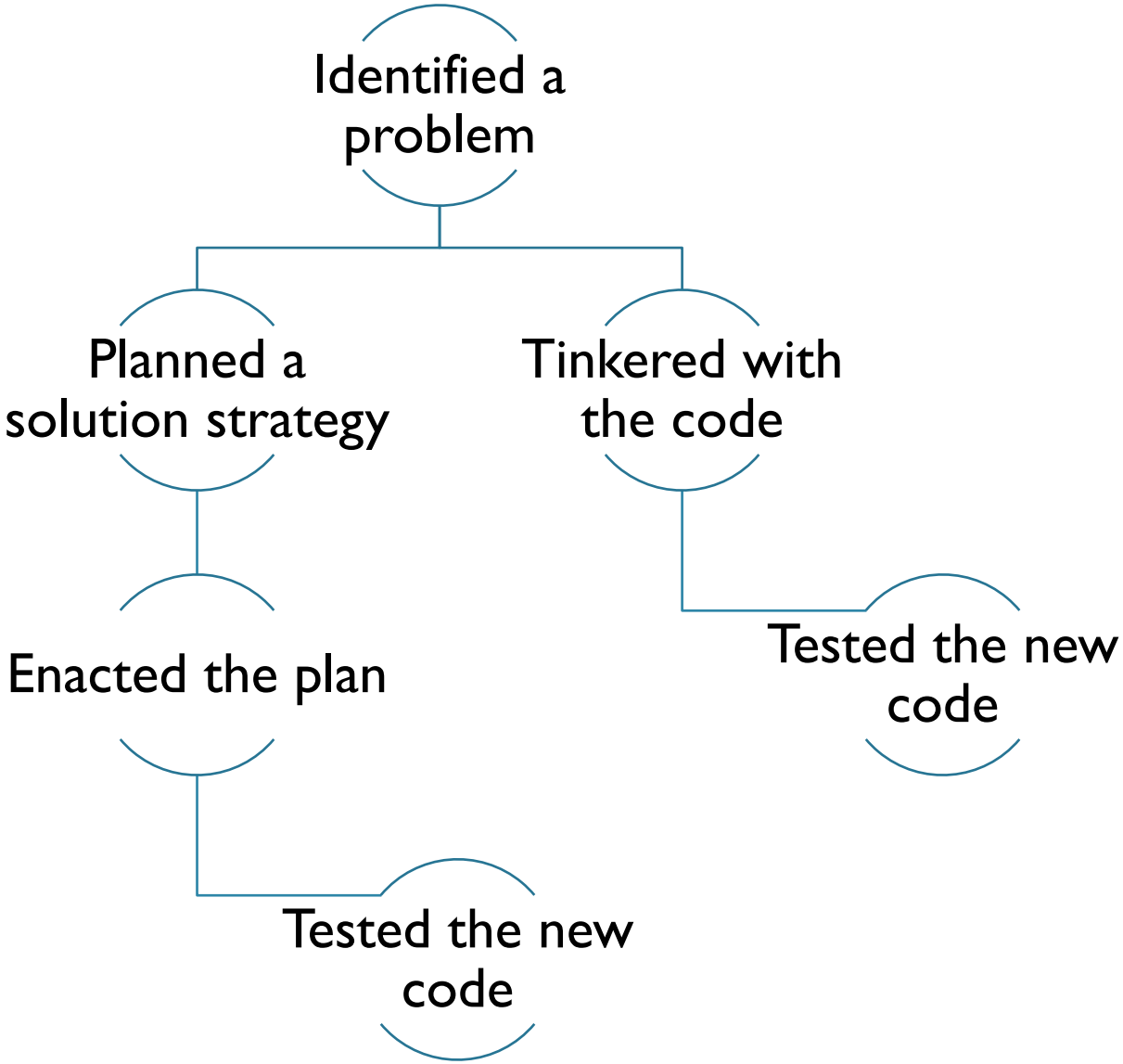
- Debugging and Problem-Solving

MT

Iterations and Spatial Reasoning

CT

Debugging and Problem-Solving



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

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