Request #: 504 - TEAL - Dissertation

Mathematics Knowledge Exhibited by Kindergarten Students in a Computational Thinking Assessment

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Background

This data set comes from a larger, NSF funded project known as Coding in Kindergarten (CiK). Its purpose is to explore the computational thinking and mathematics skills kindergarten-aged children exhibit in coding robot toy tasks. Its purpose is to develop supporting curriculum and a computational thinking assessment for this population. A pilot assessment was developed and tested in November, then revised and tested again in February. The 27-item assessment was arranged by four domains of computational thinking skills (spatial reasoning, algorithmic thinking, decomposition, debugging). All of this occurred with the same students in the same school.

Sample

Participants • Sample size: 60 kindergarten students from the same school Main Data Source: Computational Thinking Assessment Data (collected Mid-February, 2020) • 60 videos (each a unique participant), each 15 minutes long. Videos capture a researcher administering the interview-based assessment to a kindergarten student • Children's individual assessment results from the videoed assessment (correct/incorrect per item) Possible Secondary Data Source: Mathematics Background REMA: assessed basic mathematics knowledge in patterning and sequencing, some algorithmic thinking (same sample, collected Mid-September, 2019) • 60 videos (each a unique participant), each 15 minutes long. • Children's assessment results by item, to be analyzed by REMA team for general scores

Hypothesis

Main Research Question: What mathematics knowledge are used/observed/required when Kindergarten students engage in a computational thinking assessment? Supporting Questions: - What is the relationship between students' mathematics knowledge and their CT performance? - When students provide incorrect responses to an item, what role does their mathematics knowledge play in the incorrect response? - In what ways does mathematical knowledge influence their performance on CT domains? (spatial reasoning, algorithmic thinking, decomposition, debugging) Possible sub-questions: - What is the relationship a student's REMA score and their use of math knowledge on a CT assessment? (OR What is the relationship of their kindergarten-entry mathematics knowledge and their mid-year CT knowledge?)

Progress

I've conducted a pilot qualitative analysis using a priori coding to code student use of math skills in the videoed data using MAXQDA 2020. This has allowed the identification of overlapping instances of math skills with specific testing items and quantified math skill occurrence.

Request

I'm wondering what statistical tools I can use to analyze this data, and what types of visualizations I can apply to dig deeper into the data. This will inform the quantitative direction of this study.

Timeline

I would like to begin my dissertation proposal soon, so I'd like to have direction by the end of this semester.