Findings from a Multi-year Study of CT in K-2 Students in Formal and Informal Settings

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ABSTRACT

For the past four years, our research group has conducted a series of NSF funded studies on Computational Thinking (CT) involving elementary school students, parents, and teachers. We developed curriculum, trained teachers, observed classrooms, created museum exhibits, followed students and families, explored theory, and utilized the diverse skills of a large multi-disciplinary research group to understand the intersection of STEM, literacy, and CT. As we close out this grant, we are looking to disseminate our findings, share lessons learned about research methods and data collection, and build collaborations for future research.

CCS CONCEPTS

- Social and professional topics → Computational thinking
- Social and professional topics → Computer science education

KEYWORDS

Computational Thinking, P-12, Formal and Informal Instruction, Professional Development

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1 Introduction

The INSPIRE research institute received NSF grant No. DRL 1543175 and ECC 1442416 to investigate the development of CT in very young learners from grades K-2. Early efforts built upon an established engineering design curriculum to enhance elements that introduce CT and allowed for a better understanding of the capabilities for this very young age group [1]. In-service teachers learned about CT through professional development activities.

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Researchers followed the learning progress of children in the classroom [2], homeschooling [3], and through informal play activities including a newly designed museum exhibit on CT [4], [5].

2 Lessons on CT Research

In addition to the findings of CT development in children, parents, and teachers we also captured experiences about the process of conducting CT research. The research protocols involved hundreds of hours of observations and video data across scores of classrooms, homes, and informal learning environments. Defining effective processes in which to collect, store, and organize this data became critical [6]. Through the project, we worked on evolving and codifying the moving target that is CT. We analyzed the various ways CT is defined in the literature and attempted to create working definitions [7] and provide data [8].

3 Future Research

This summer brings an end to our grant cycle of research but starts the next phase of our investigations into CT. We hope to share some of these ideas and find partners who are also motivated to understand how CT develops in learners.

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