Chapter 5
Virtual Professional Development Enhances Elementary Teacher' Coding Skills and Self–Efficacy:
A Comparison of Three Models

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ABSTRACT

This chapter presents results from a study addressing the growing importance of coding skills in early childhood education. Focused on virtual professional development (PD) models, this study explores the effectiveness of synchronous and asynchronous approaches in enhancing coding skills and self-efficacy among educators. In comparing these models, results reveal significant growth in both, with synchronous models excelling in fostering self-efficacy growth. Noteworthy is the impact of facilitators, with peer-led models enhancing coding skills and expert-led

models boosting self-efficacy. The compensatory pattern observed in educators with coding experience adds nuance. However, mediation analyses indicate that factors beyond self-efficacy contribute to educators' competency. Implications include advocating for virtual PD adoption, tailoring programs to specific coding experiences, and further exploration into the multifaceted dynamics of educators' competency and self-efficacy.

INTRODUCTION

Recently, there has been an increase in the integration of developmentally appropriate computer science education in early childhood, mirroring the societal recognition of coding and computational thinking (CT) as important skills (Author, 2017; Author et al., 2022). Coding tools specifically designed for young children have benefits that extend beyond an exposure to programming and might prove valuable across diverse subject areas and problem-solving domains (Author, 2017; Mihm, 2021). ScratchJr, the leading introductory programming language, is a developmentally appropriate interactive platform that provides a coding playground for kids aged 5-8 during the teaching of coding concepts and the development of CT (Author, 2020; Author & Resnick, 2015). CT skills encompass problem-solving skills like deconstruction, abstraction, pattern recognition, and algorithms (Hudin, 2023; Resnick, 2018; Wing, 2011).

However, in order to integrate the use of tools such as ScratchJr in the classroom, pedagogical approaches that are consistent with play-based, creative learning are needed. The Coding as Another Language (CAL) curriculum recognizes the power of expression through creating meaningful, shareable computational projects in addition to the benefit of learning to code and developing critical thinking and CT skills (Author, 2019). CAL recognizes coding not only as a tool to solve problems, but as a literacy through which kids can tell stories, express themselves, and learn about themselves and the world. CAL contains lesson plans to support K-2 teachers as they integrate the pedagogy and coding tools into their classrooms in a developmentally appropriate and playful way (Author et al., 2023). This guiding framework and pedagogy are necessary resources for teachers to learn how to introduce technology tools such as ScratchJr in a way that positively impacts their students' development. To read more about the CAL approach and view the curriculum, please visit: sites .bc.edu/codingasanotherlanguage.

While there is widespread support among teachers, principals, and superintendents for incorporating computer science (CS) into school curricula, a significant challenge arises from the reported lack of educators equipped with the necessary skills and training to teach CS (Mouza et al., 2022). Teachers often express a lack

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