

Exploring Early Childhood Teachers' Perceptions of Computational Thinking: A Collaborative Action Research Study in Türkiye

Contribution

Given the rapid advancements in contemporary education, there has been a notable increase in integrating computing into early childhood education (ECE), including initiatives introducing coding tools to children as young as two (Critten et al., 2021). The growing interest in computing education and coding tools designed for young children has also brought a strong emphasis on research on computational thinking (CT), which lies at the heart of computing education endeavours. Strategies applied to improve CT skills in learners are generally divided into two groups in the literature. (Martin, 2018; Saxena et al., 2020). The first strategy is based on incorporating CT into the curriculum as a standalone computing subject, using coding tools extensively. However, this demands teachers with specialised training and classrooms with specific materials (Merino-Armero et al., 2021). Therefore, it is not the most practical strategy for integrating CT in ECE. The second strategy takes a broader view of CT and provides opportunities for early childhood education to benefit from the cross-curricular use of CT (Lee et al., 2023). However, ECE researchers seem to overlook the practicality aspect of CT education, focusing instead on the cognitive abilities that students can develop with coding tools (Gerosa et al., 2021; Hall & McCormick, 2022; Yang, 2024). It is known that there is a need to develop programs tied to the curriculum that support long-term learning-by-doing opportunities for teachers to integrate CT into their practices effectively (Saxena & Chiu, 2022).

Additionally, in the aforementioned studies, CT activities were often introduced to young children by researchers rather than teachers. Thereby, the roles of early childhood teachers in integrating CT into education were not examined in depth. Previous research indicates that early childhood teachers draw inspiration from computing education developments in primary education (Otterborn et al., 2019) and integrate CT activities into their practice with their own initiative (Otterborn et al., 2020). However, how they connect CT activities to their pedagogy still needs to be explored. Unlike existing studies, this pilot study focused on understanding the meanings teachers derive from CT activities and their strategies while implementing CT activities with their pupils.

Method

Following a collaborative action research design, this study involved four early childhood teachers teaching children aged four to five in Türkiye. Due to the collaborative nature of the study, opportunity sampling was used to choose participants. In collaboration with teachers, this pilot study examined teachers' perspectives on CT through pre- and post-interviews. After conducting the pre interview, foundational CT skills were introduced to teachers using the framework proposed by Lee et al. (2023, p. 463). This framework was chosen for its accessibility to teachers with limited technical expertise. Teachers were then provided with six CT activities designed by CSinSF (2018), along with their links to the early learning goals in the Turkish Preschool Education Program (MoNE, 2013). During this process, teachers were not restricted in terms of their delivery strategies, and they were encouraged to adapt activities according to their understanding of CT concepts. Collaborating teachers implemented these activities and provided written feedback after each activity for further refinement.

Findings

The pilot study revealed that while teachers may not be formally familiar with the concept of CT, they naturally incorporate CT subskills into their teaching practices. Sequencing emerged as a foundational CT subskill perceived by teachers, highlighting its importance in ECE. Teachers noted that CT activities have the potential to enhance transferable skills in young children. These skills were namely, creative thinking skills, problem-solving abilities, self-regulation, and metacognition. This finding aligns with the second strategy for improving CT in early childhood education, which posits that CT is not limited to computing education. Drama was the primary delivery approach chosen by teachers for CT activities. Teachers attributed this to the problem-solving essence of CT activities in which children were asked to imagine themselves in a problem; therefore, the drama technique seemed most appropriate. Through this iterative process, CT activities were co-crafted with teachers to align with the play-based nature of ECE. Refined activities were later used in the researcher's main PhD study.

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