Chapter 53
A Review on the Opinions of Teachers About the Development of Computational Thinking Skills in K-12

Fatma Gizem Karaoğlan Yılmaz
Bartın University, Turkey

Ramazan Yılmaz
Bartın University, Turkey

Hatice Yıldız Durak
Bartın University, Turkey

ABSTRACT

This study aims to reflect the opinions of expert teachers from different branches about the definition of computational thinking skills, how and through which methods and instruments they should be acquired, their integration into the curriculum and the present condition of schools in terms of administrators, teachers, parents and infrastructure. In this study that was designed with qualitative method, semi-structured interview form was applied to teachers who had received in-service training for the development of computational thinking skills. Qualitative data were coded with content analysis. According to the results reached in the research, it is prevalent to think that information processing thinking is generally defined by teachers as problem solving skills, knowledge processing thinking is the most important contribution of the student to production, and that the training of information processing skills should be started in primary school with an interdisciplinary approach.

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INTRODUCTION

In our contemporary period, digital technologies are employed frequently in our daily life and numerous operations are implemented through these technologies. Now individuals are required to use digital technologies from a critical point of view in order to develop their knowledge, skills and to resolve the problems in their educational life (Wing, 2006; Czerkawski, 2015; National Research Council [NRC], 2010). The term of computational thinking (CT) skill includes comprehensive intellectual skills which address thinking skills, applications and approaches for meeting requirements and solution of complex problems (Wing, 2006; NRC, 2010). As a solution of problem "What sort of education should be provided to students to develop CT skills so that they overcome the problems encountered with the technology in the 21st century?" CT concept should be examined. According to Czerkawski (2015), the information that will be gained by individuals must bear features which allow them to cope with problems encountered in the 21st century and which allow them to establish fundamentals of applications and computer structures instead of the knowledge gained through short-period applications. Moreover, society needs individuals who are aware of what they could accomplish with digital technologies and who could develop tools in line with their needs. On the other hand, numbers of educators emphasize that CT must be part of K-12 curriculum so that CT skills could be accessible (Fluck et al., 2016; Goode, Chapman, & Margolis, 2012; Hazzan, Lapidot, & Ragonis, 2011) and that CT must be developed from the very early ages (Barr & Stephenson, 2011; ISTE, 2007; Kumar, 2014; Lu & Fletcher, 2009; UKEd13, 2013).

In the beginning, CT was acknowledged as a skill appropriate for computer scientists and engineers (NRC, 2010). However, Wing (2006) described CT as a "basic skill for everyone". After this point, it was started to be discussed that whether CT must be given as a separate discipline in the K-12 curriculum or as an integrative part of other areas (Barr & Stephenson, 2011; Hazzan, Lapidot & Ragonis, 2011). On the other hand, it was observed that researchers were concentrated on discovering strategies and tools to teach CT skills to students at pre-school, elementary, secondary and high school levels (Fluck et al., 2016).

According to the relevant literature, integration of CT to the K-12 curriculum would introduce various issues and limitations. Educational difficulties concerning acquisition of the CT are considered as which subjects and tools need to be taken at various education levels for development of CT; and whether current teachers are sufficient for teaching computer knowledge to teach CT and whether it is possible to gain this skill within the basic framework of computer curriculum (Angeli et al., 2016). For instance, the European Commission emphasized that number of European countries such as the GB would need for skilled Information Technology Specialists for development of CT and accordingly an economic stress will be encountered (Husing & Korte, 2010). Furthermore, introduction of CT to the K-12 curriculum either as an individual subject or as an integrative subject of other areas is viewed as a complex issue bringing up legislative, administrative, political and educational difficulties. At this point, the STEM education came to prominence as a solution. In fact, the STEM which emphasizes multi-disciplined approach could be perceived as one of the primary contemporary education movements (Daugherty, 2013). As an abbreviation of the Natural Sciences, Technology, Engineering and Math education, developments on the STEM (Science, Technology, Engineering and Mathematics) education are considered significant in the domain of education (Berlin & Lee, 2005; Reiss & Holmen, 2007). From this point, it is possible to state that the STEM is more than the four disciplines comprised of its backbone and a new holistic discipline (Ostler, 2012). There are various studies on description of the STEM. In the description drawn by Chute (2009), the STEM is an education system which creates opportunities for students to resolve their real-life problems within the framework of innovation. According to Merrill and Daugh-