

## Chapter 4

# The Impact of the Professional Development Training of Primary Education Teachers on Issues of Educational Robotics as a Learning Tool

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### ABSTRACT

*Studies reveal a number of factors which influence teachers' decisions to use educational robotics (ER) in the classroom. One of these factors is teachers' professional development training (PDT). PDT is considered to be an encouraging factor that obstructs the successful application of educational robotics (ER) among the teachers. This chapter addresses the importance of professional development training (PDT) by examining its effectiveness in integrating educational robotics (ER) in the educational practice for teaching and learning purposes in various cognitive subjects. The sample of the study consisted of 23 elementary school teachers. The data used in this research was collected via pre and post structured questionnaires and classroom observations. The findings reveal the importance of PDT and suggest that PDT for teachers in ER were valuable in contributing to improve teachers ER skills and knowledge.*

### INTRODUCTION

The rapid development of Information and Communication Technology (ICT) has brought significant changes in the 21st century as it has affected the demands of modern societies (Buabeng, 2012; Schina,

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Esteve-González & Usart, 2021). ICT have become part of our lives so they could not be missing from the field of education. When referring to technology in education, it means the digital tools that are used in the learning process, in order to enhance the teaching practice. One of these technologies is Educational Robotics (ER). ER has been already employed in formal educational settings, becoming a powerful tool in the hands of the teachers. ER when appropriately integrated it can facilitate and contribute to the achievement of various learning goals. However, ER seems to be used by a relatively small number of primary school teachers in the Cypriot educational system, as there are various factors that affect this integration.

Over the years, several studies (Baek, Jung & Kim 2008; Tondeur, 2008; Buabeng, 2012; Player-Koro, 2012; Agyei & Voogt 2014; Ames, 2016; Khasawneh, 2018) have focused on investigating the factors that influence the integration of ICT into education. However, little research has been found to examine the factors that influence teachers' integration of ER in the teaching and learning practice (Papadakis, Vaiopoulou, Sifaki, Stamovlasis, Kalogiannakis & Vassilakis, 2021).

Professional development training (PDT) is able to positively influence teachers' attitudes towards the integration of ER as an educational tool as well as the various internal and external factors that discourage teachers in integrating ER in school settings. Such factors may be the lack of familiarity of teachers with ICT (Haydn & Barton 2007; Sang, Valcke, Braak & Tondeur, 2009), the time required to prepare a technology-supported course (Askan & Eryilmaz, 2011; Hadjithoma & Eteokleous, 2007; Eteokleous, 2008; Vrasidas, et al., 2010), the technical problems that arise (Preston, Cox & Cox, 2000), the work environment (Cuban, 2001; Fullan, 2007) and teachers' attitudes (Cox, et al., 2000).

Research has shown the need for PDT. Specifically, according to Abuhmaid (2011), training courses usually aim at the development of two levels of skills: 1) digital literacy skills and 2) the pedagogical use of these skills. The role of the training regarding the smooth introduction of ICT is considered to be particularly important in education. The professional development programs that involve teachers in lessons' collaborative design, are considered to be promising in regards to the development of teachers' knowledge and skills, as well as achieving increased level of sustainability over time (Agyei & Voogt, 2012; Agyei and Voogt 2014; Alayyar, Fisser & Voogt, 2011; Jimoyiannis, 2010). Some of the skills that teachers develop are the following: thinking skills, social skills, problem solving skills, design skills in terms of content, appearance, accuracy, testing, processing and testing of data, metacognitive skills (Rogers, 2003; Sullivan, 2008), activation of observation and creative thinking skills (Bers, 2018).

## **BACKGROUND**

### **Educational Robotics (ER)**

The evolution of ER and its application in the classroom have increased its presence in recent years (Arís & Orcos, 2019). In recent years both teachers and researchers have shown great interest in robotics, as a useful tool in the hands of the teacher during his/her teaching. ER is identified as an educational tool through which digital skills can be accomplished (Schina, Estev-Gonzalez & Usart, 2021). Robotics also helps to develop both the cognitive and social skills of students of different ages. In other words, robotics responds to a wide range of ages, ranging from preschool to university (Alimisis, 2013; Chan et al., 2013). ER has the potential to take place in classrooms as it can support learning in many disciplines (Taylor, 2016) such as science, mathematics, technology and computer science (Alimisis, 2009; Chan et



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