


# Chapter 12

## Implementation of Coding and Robotics in South African Public Schools, Fostering Teachers' Self-Directed Learning: A Scoping Review

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### **ABSTRACT**

*This study utilizes a scoping review of literature to explore the implementation of coding and robotics and its potential to foster and enhance teachers' self-directed learning skills through the implementation of coding and robotics within the South African educational context. This chapter presents a comprehensive synthesis of scholarly articles, reports, and studies published from 2013 to 2023. The study further aims to provide an extensive examination of the current status quo of coding and robotics implementation, as well as the possibilities that arise for professional development as well as the development of self-directed learning skills, also identifying gaps that will guide further studies in this field and later produce a systematic literature review. This scoping review utilizes a methodical and rigorous methodology to identify the current body of literature, discern significant themes, and provide a concise summary of the results.*

### **INTRODUCTION**

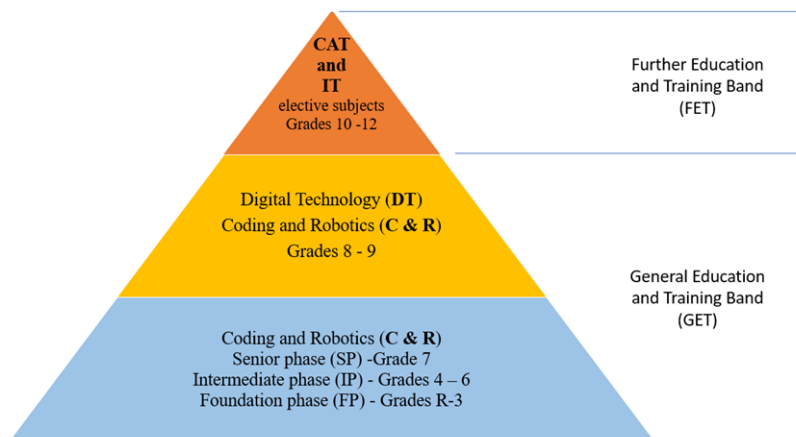
Information Technology (IT) and Computer Applications Technology (CAT) initially comprised the South African public-school Computer Science Education (CSE) curriculum. These two subjects were implemented in the South African public school system for Grade 10 in 2006 (Chiles, 2013) and the Grade

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12's sat for the inaugural paper in November 2008 (Havenga and Mentz, 2009). The CSE curriculum was expanded when two new CSE subjects, Digital Technology (DT) (Botha, 2020) and Coding and Robotics (C & R) (Department of Basic Education, 2021a), were introduced as part of the Curriculum and Assessment Policy Statement (CAPS). CAT and IT are presented as elective subjects in the Further Education and Training band (FET) for grades 10-12 while DT was introduced in the Senior Phase (SP) for grades 8 and 9. However, C & R has been introduced in the General Education and Training band (GET), which includes the Foundation Phase (FP) for grades R-3, the Intermediate Phase (IP) for grades 4-6, and the SP for grades 7-9 (Figure 1).

This curriculum change marks a dynamic paradigm shift in the teaching and learning of CSE subjects, where the elective CSE subjects, CAT and IT, taught mostly by a small percentage of subject specialists (Van Wyk, 2012) to a small percentage of grade 10-12 learners (Gustafsson, 2014), pivot to what will become a mandatory subject, C & R, taught to every learner entering the South African public school system in the FP (Department of Basic Education, 2023). This move of the Department of Basic Education (DBE) essentially establishes the base of the CSE pyramid (BoCSEP) and the foundation of the South African CSE (Figure 1), where the fundamentals of information and communication technology (ICT) and digital skills (DS) will be introduced and subsequently form the foundation for future teaching and learning of the DT, CAT, and IT subjects in the upper education levels (Figure 1). Furthermore, this curriculum change infers that the onus of teaching the foundations of CSE also shifts to the BoCSEP and becomes the responsibility of all FP teachers.

*Figure 1. Base of the Computer Science Education Pyramid (BoCSEP)*  
(Author)



## **Computer Science Education in the South African Public School system**

FP teachers encounter challenges when introducing new subjects and educational programs. Makeleni & Sethusha (2014) identified several challenges faced by teachers during curriculum implementation while Geldenhuys & Fatar (2021) identified factors crucial for an efficient introduction of the C & R curriculum in South African schools, obstacles encountered by educators, and aspects requiring attention

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