Chapter 2
Interdisciplinary Approaches in Computer Science Teaching:
Foundations, Integration, and Transformation of Education

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ABSTRACT

This section highlights the importance of an interdisciplinary approach in teaching Computer Science (CS). This approach integrates various disciplines such as social sciences, mathematics, and technology to create holistic learning that is relevant to complex real-world challenges. An integrated curriculum model guides students in understanding the relationships between concepts from various fields, thereby increasing their engagement and deepening their understanding. This approach also encourages character and competency development, as well as supporting innovation in solving social and environmental problems. Although it offers many benefits, interdisciplinary implementation requires careful planning and sufficient resources, as well as addressing concerns related to technical depth. Overall, this approach is key to preparing graduates who are able to face global dynamics and advance the field of computer science in a sustainable manner.

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INTRODUCTION

The rapid evolution of technology demands that Computer Science (CS) education transcends its traditional technical boundaries to address complex socio-technical challenges. While the value of interdisciplinary approaches is widely acknowledged, a critical gap persists between theoretical advocacy and the practical, evidence-based guidance needed for curriculum design. This chapter addresses this gap by providing a critical, structured analysis of interdisciplinary curriculum models specifically for CS education. Its primary contribution is a novel analytical framework that synthesizes, contrasts, and critiques five integrated curriculum models (Shared, Webbed, Integrated, Sequenced, and Threaded) within the authentic context of CS. Moving beyond descriptive aggregation, this chapter argues for a contextual and critical selection of models, driven by clear pedagogical objectives rather than trends. The analysis is grounded in a structured narrative review of literature and offers practical insights for educators and curriculum developers seeking to implement interdisciplinary CS education with rigor and depth.

The teaching of CS uses interdisciplinary approaches, which involve the incorporation of ideas or techniques from different areas for the enhancement of comprehension, interpretation, or application of computational ideas. Teaching or learning CS, for instance, will be made even more beneficial with the following explanation on the definition, scope, or application of the teaching principle. To have a well-rounded view of technology, its impacts, and its implementations, the field of CS uses an interdisciplinary method involving notions from different areas, including economics, neuroscience, philosophy, or psychology (Mishra & Siy, 2020). This leads to better comprehension of computing systems, with greater stress on the integration of theoretical notions with practical implementations (Krüger et al., 2024).

The interdisciplinary approach provides the students with complex, interest-driven problems, hence increasing their involvement in the study of CS, especially those from disadvantaged backgrounds (Happe & Marquardt, 2023). The interdisciplinary approach also leads to cooperation between different disciplines, for example, the merging of law with technology to create programs that equip the current workforce with the necessary skills required in the current work environment (Otoyo et al., 2022). Socio-scientific problems, as well as the enhancement of computer science educational methodologies, are explored in the interdisciplinary approach (Lorenzo, 2020).