

Addressing the Teacher Shortage: A Data-Driven Exploration of Computer Science Teacher Capacity in Wisconsin High Schools

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Abstract

The rapid evolution of technology and its integration across virtually every field has made computer science (CS) education a crucial component of modern curricula. Despite the increasing demand for CS skills and being the top source of new wage creation in the U.S., CS education remains undervalued and underrepresented in high school systems. This disparity is particularly evident in Wisconsin (WI), where the lack of certified CS teachers creates significant barriers to student access and equitable participation in CS courses. Although WI implemented a CS teacher certification requirement over 30 years ago and was among the earlier states to adopt academic standards for CS in K-12 schools, there is no one to mandate this law, leading to insufficient qualified teachers. This dissertation investigates the state of CS education in WI public high schools, focusing on teacher certification, student enrollment trends, and the broader implications of these dynamics for equity in education.

Drawing on data from the WI Department of Public Instruction and national education datasets, this research comprehensively analyzes the CS education system in WI public high schools between the 2017 and 2023 academic years. While it is broadly understood that there is an ongoing teacher shortage throughout the U.S., and in our state, gaps in CS are dreadful and are on the verge of worsening. This research is a statewide effort with the overall objective of increasing the CS teacher supply to meet enrollment demand and to engage new teachers in acquiring a license in CS. This dissertation presents a novel approach utilizing the various data sources to give a holistic view of the certified CS teachers and CS enrollment in the WI Public High School system. The results highlight that certified CS teachers in WI are diminishing and on the path to a declining supply of certified CS teachers. While student enrollment in CS is growing every year, our data sources reveal a large and growing number of high schools offering these courses by a teacher who lacks certification, impacting equitable access to CS education. Ultimately, this dissertation aims to provide data-driven recommendations for policymakers and educational stakeholders to address the shortage of certified CS teachers in WI, ensuring that all students, regardless of geographic or demographic background, have access to high-quality CS education. In the end, every student deserves to have a highly qualified teacher.