Addressing the STEM Teacher Shortage in High Needs Schools: Insights from Recent Research

The STEM teacher workforce is under acute stress as schools experience increasing demand for additional STEM instruction. Research is particularly warranted in high-need schools, where the availability of qualified teachers is not keeping pace.

David Devraj Kumar, Ed.D., professor of science education and founding director of the STEM Education Laboratory at Florida Atlantic, co-authored a National Science Foundation funded study, published in the Annenberg Institute at Brown University's EdWorkingPapers series. Collaborating with Michael Hansen, Ph.D., first author and senior fellow in the Brown Center on Education Policy and the Herman and George R. Brown Chair on Education Policy at the Brookings Institution, Li Feng Ph.D., professor of economics at Texas State University, and Nicolas Zerbino, M.P.P., senior research analyst at the Brookings Institution, the team applied descriptive methods to examine characteristics and qualifications of the STEM teacher workforce, using high-poverty schools to examine differences over time.

Conducting an analysis on nearly 30 years of national workforce surveys, results indicated that STEM teachers in high-need settings are more likely to possess a master's degree than in prior decades. Math and physical science teachers are more likely to hold any degree in their aligned field than previously and are more likely to hold any field-aligned qualification in computer science. These gains are observed in high-need schools even as qualification levels in low-need schools stymy or decline.

Though prior studies examined these variables individually, there is a literature gap pertaining to how the STEM workforce in high-need settings may be changing, irrespective of other workforce segments. Contrary to belief, the STEM workforce in high-need settings has been resilient, maintaining qualification levels while modestly improving dimensions like physical sciences, math, and computer science. Further, significant need-based gaps in qualifications have persisted for nearly three decades across the board. Therefore, modest improvements must be viewed in context with a long-standing history of unequal access to qualified teachers. Gains in field-aligned teachers over time have been driven by those who are certified in-field only, a relatively weak qualification when considering subject matter knowledge.

Interestingly, most teachers in high- and low-need settings, who led physical sciences and computer science courses in 2020, were either unqualified to teach the field or were weakly qualified with field-certification, but no academic degree. The metrics for math teachers fared slightly better, but more than 20% across settings lacked an alignment of qualifications. "In this context, we still have a long way to go in making quality STEM education available for students across all socioeconomic barriers in our schools," said Kumar.

Prior evidence indicates that significant staffing challenges in schools that serve socioeconomically disadvantaged students have led to declining teacher qualifications and instructional quality. These findings have serious implications for the quality of and access to robust STEM instruction for students across school settings.

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A weak STEM teacher supply impacts STEM industries, including those that propel economic growth and support national security. Weaker STEM instruction in high-need areas limits students' access to rigorous content and lucrative college majors and careers. Inadequate teacher compensation contributes to high turnover and results in reliance on an inexperienced workforce. Addressing these issues is crucial for providing equitable access to quality STEM education and ensuring that all students, regardless of socioeconomic background, can succeed in STEM fields.