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STEM teacher qualification gaps in high-poverty schools persist but are slowly narrowing

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OVERVIEW: Three decades of national data show STEM teachers in high-poverty secondary schools remain less qualified than peers in wealthier schools on experience, certification, and STEM degrees — though these gaps are slowly narrowing.

KEYWORDS: Policy | STEM Education | Teacher Education

AUDIENCE: Administrators (K-12) | District Science Coordinators | Policymakers | Teacher Educators

KEY POINTS

- STEM teachers in high-need secondary schools remain less experienced, less likely to be certified in field or to hold STEM degrees than those in low-need schools.
- Qualification gaps between high- and low-need schools have narrowed slightly over three decades.
- Computer science and physical sciences rely far more on underqualified teachers than math or biology, regardless of school poverty level.
- Qualification gains in high-need schools primarily come from certification-only teachers, not those with academic STEM degrees.
- Small schools and charter schools predict greater reliance on underqualified STEM teachers.

INTRODUCTION Maintaining a qualified STEM teacher workforce in U.S. high-need secondary schools has been a persistent challenge. Prior evidence shows STEM teacher turnover is high, the supply of new STEM teachers has declined sharply, and demand for STEM instruction continues to grow. The authors hypothesize these converging pressures would widen STEM teacher qualification gaps between high- and low-need schools over time. Using nationally representative data from SASS and NTPS (spanning the 1993-94–2020-21 school years), they compare STEM teachers in top vs. bottom quartiles of school poverty on experience, master's degrees, full certification, STEM degree holding, and field-specific qualification alignment (math, biology, physical science, computer science).

FINDINGS Surprisingly, the STEM teacher workforce in high-need schools did not deteriorate. Instead, qualifications remained stable or improved modestly on most measures, and gaps relative to low-need schools narrowed slightly over time—a trend driven primarily by improving qualifications among teachers in high-need settings, not by declines in low-need schools. However, large gaps persist as high-need STEM teachers are significantly less likely to be experienced, hold a master's degree, be fully licensed, or hold a STEM degree. Field differences are striking. Over half of computer science teachers in high-need schools lack any field-aligned qualification. Physical sciences also fare poorly, while math and biology show higher qualification levels in both high- and low-need schools. Notably, much of the improvement in high-need schools comes from certification-only teachers (no academic degree in the field), this trend highlights a lower standard. Biology diverges from other fields, with qualifications in high-need schools declining over time.

TAKEAWAYS Persistent qualification gaps mean students in high-need schools still receive systematically less qualified STEM instruction. For administrators and policymakers, the field-specific findings are critical. Computer science and physical sciences need targeted recruitment and support, not just general STEM efforts. Certification-only qualifications are expanding but represent a lower standard than holding an academic STEM degree. For district science coordinators and instructional designers, small schools and charters warrant extra attention, as they rely more heavily on underqualified STEM teachers. Future investments should prioritize subject-specific degree attainment, not just any credential, and monitor biology's unexpected decline. The modest narrowing of gaps over three decades is insufficient; active, field-specific, equity-focused policies remain urgently needed.

The Evolution of the Secondary STEM Teacher Workforce's Characteristics and Qualifications in American High-Need Schools Over Three Decades
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