

Supplementary Information: **Table S1**

Summary of all included studies in the review

Author(s)	Participants	Methods	STEM discipline	Recruitment or Retention	Recruitment or retention outcomes
1. Abell et al. (2006)	50 + participants	Qual	Math, Science	Recruitment	The study found that the SMAR ² T alternative certification program helped recruit 86% of applicants in the first year (19 out of 22) and 83% in the second year (39 out of 47). Analysis of data revealed that gatekeepers, whether acting intentionally or unintentionally, constrained or facilitated the program application process, thus influencing recruitment efforts.
2. Artzt & Curcio (2008)	81 participants	Qual & Quant	Math	Recruitment	The study found that most participants were recruited into the Teaching Improvements through Mathematics Education (TIME 2000) program, a four-year tuition-free undergraduate secondary math teacher preparation program, by hearing about it from their teachers who recommended them for it (32%) or from personal letters sent to them by the program after being accepted to the university (22%). The study also found that the program had a high retention rate of 96%. Of the 68 pre-service math teachers who graduated from the program since 2002, only 3 have left the field.
3. Borgerding (2015)	5 Noyce Interns	Qual	Science	Recruitment	The study found that some early STEM majors are now considering a teaching career after their summer teaching internship. For some interns, participating in the internship did not affect their interest in pursuing a career in teaching.
4. Boyd et al. (2012)	600 + teachers	Quant & Qual	Math	Recruitment	The study found that Math Immersion teachers tend to exhibit higher attrition rates than their College-Recommended peers, but are much less likely to leave teaching compared to Teach For America teachers. They also found that Math Immersion teachers are more likely to teach in some of the most challenging schools in New York City.

5. Bozeman et al. (2013)	385 teachers	Quant	Science	Retention	Their study found no statistically significant relationship between teacher satisfaction and retention in the teaching profession.
6. Brantlinger (2021)	600 teachers	Quant & Qual	Math	Recruitment & Retention	Their results demonstrated consequential amounts of involuntary and mid-year turnover. Additionally, it revealed that the primary reason these math teachers joined the teaching workforce was that they wanted to make a social difference.
7. Brantlinger & Grant (2024)	378 teachers	Quant	Math	Retention	The study found that teachers' socioeconomic status (SES) was significantly associated with retention at five years, and that teachers' SES explained their retention independently of teacher race.
8. Brantlinger et al. (2023)	617 teachers	Quant	Math	Retention	The study found that community insiders, graduates of New York City high schools, had significantly higher odds of being retained in their district at 3-, 5-, and 8-year marks compared to community outsiders. They also found that Black community insiders who entered teaching with prior experience had especially high odds of being retained in their district.
9. Brantlinger & Grant (2022)	617 teachers	Quant	Math	Retention	Their study found that the Black and Latinx community insiders demonstrated significantly higher rates of first-school retention compared to both graduates of elite colleges and other NYCTF math teachers.
10. Callahan & Brantlinger (2023)	388 teachers	Quant	Math	Recruitment & Retention	Their study found that job benefits and alternative certification were reasons why individuals became math teachers and were entry factors predictive of retention. Altruism and a meaningful job were also listed as entry factors, but were not predictive of retention.
11. de la Cruz & Goldman (2023)	9 teachers	Qual	Math	Recruitment	Their study found that an experiential learning program offering early teaching experiences helped inspire participants to consider a career in teaching.
12. Feng & Sass (2017)	726,000 + teachers	Quant & Qual	Math, Science	Retention	Their results revealed that the loan forgiveness component of the program effectively reduced average attrition rates among middle and high school math and science teachers.

13. Fisher & Royster (2016)	4 teachers	Qual	Math	Retention	The study developed a framework similar to Maslow's to illustrate the expressed needs of teachers, both content-specific and non-content-specific, to strengthen support systems and improve retention. Teachers also voiced a strong desire for specialized professional development opportunities.
14. Fraser-Abder (2010)	5 teachers	Qual	Science	Retention	The study found that teachers' ability to understand and care for their students was a key factor in their success in teaching and long-term retention in the teaching profession.
15. Goodpaster et al. (2012)	6 teachers	Qual	Science	Retention	The study found that community interactions, professional development, and school structures were three key factors associated with rural teacher retention.
16. Grant & Brantlinger (2022)	608 teachers	Quant	Math	Retention	Their study found that teacher turnover peaked during years 3 to 5 of teachers' careers rather than in the first three years, as commonly assumed.
17. Grant & Brantlinger (2023)	620 teachers	Quant	Math	Retention	Their study found that teacher turnover intention and observed teacher turnover were not strongly associated.
18. Han & Hur (2022)	1,000 + participants	Quant	Math, Science	Retention	Their study found that lower job satisfaction with advancement opportunities was associated with a greater likelihood of STEM teachers leaving. This relationship was especially pronounced among experienced teachers who switched schools (internal mobility) and novice teachers who left teaching altogether (external mobility).
19. Harrell et al. (2019)	76 teachers	Quant	Math, Science	Retention	The study found that factors such as school poverty levels, minority student composition, and state exam pass rates did not significantly influence teachers' decisions to transfer schools after their first year of teaching. They also found that nearly 20% of teachers moved to a different school, and 11% left the profession entirely. In addition, their findings revealed that teachers in schools with a high proportion of disciplinary infractions were much more likely to transfer to a new school.
20. Hurst & Brantlinger (2022)	366 teachers	Quant & Qual	Math	Retention	The study found a strong association between teachers' critical incidents and their retention.

21. Ingersoll & May (2012)	40,000 + teachers	Quant	Math, Science	Retention	The study found that although math and science teacher turnover has increased over the past two decades, it has not consistently differed from that of other teachers. It was also found that math and science teachers were not more likely to leave for non-education jobs in the tech or industry. In addition, they found that turnover is significantly higher in high-poverty, high-minority, and urban schools, with a notable annual migration of math and science teachers from poor to non-poor schools, from high-minority to low-minority schools, and from urban to suburban schools.
22. Ingersoll & Perda (2010)	500,000 + teachers	Quant	Math, Science	Retention	The study found that while the supply of new math and science teachers, primarily from math and science degree holders and the reserve pool, has kept pace with rising demand from graduation requirements and retirements, high pre-retirement attrition creates a tight balance between supply and demand. They also found that a large proportion of new math and science teachers are hired from reserve pools and that a substantial amount of reshuffling occurs in math and science teaching assignments.
23. Kim et al. (2021)	2,131 teachers	Quant	Math, Science	Retention	They found that targeted late-career salary bonuses and deferred retirement plans were associated with retention.
24. Larkin et al. (2022)	231 teachers	Quant	Science	Retention	They discovered that alternative certification preparation programs attracted a higher proportion of secondary science teachers who identified as non-White or Hispanic; however, these teachers had a lower 5-year retention rate compared to their peers from traditional programs.
25. Lawrence et al. (2020)	4 participants	Qual	Science	Recruitment	They found that STEM majors of color who chose to pursue teaching often experienced internal conflict stemming from pressure to meet familial expectations of a career in medicine.
26. Marco-Bujosa et al. (2024)	14 pre-service teachers	Qual	Science	Recruitment	The study found that undergraduate science majors chose teaching careers because they were not interested in traditional science careers and valued socially oriented career goals.

27. Marder et al. (2020)	53,000 teachers	Quant	Math, Science	Retention	The authors found that math and science teachers from standard certification pathways exhibited higher retention rates than their peers who were alternatively certified.
28. Marder et al. (2022)	202 Noyce scholars	Quant	Math, Science	Retention	They found that Noyce Scholars were more likely than other STEM graduates from the same universities to teach marginalized student populations and that their students demonstrated higher value-added gains in math compared to peers taught by other teachers in the same schools. However, Noyce Scholars had shorter teaching tenures and were more likely to transfer out of schools serving low-income students.
29. Martinie et al. (2023)	6 Noyce scholars	Qual	Math	Recruitment & Retention	They found that the Noyce scholarship and related program activities served as effective mechanisms for recruiting math teachers and supporting their retention as novice teachers.
30. Newton et al. (2020)	58 participants	Qual	Math, Science	Retention	They found that intrinsic motivators, such as a love of math and science, a passion for teaching, and a desire to influence others, as well as personal factors like marital status, number of children, advanced degree, and age, influenced participants' decisions to enter and stay in teaching.
31. Nguyen & Redding (2018)	42,010 teachers	Quant	Math, Science	Retention	They found that STEM teachers were more likely to be female, attend selective colleges, hold graduate degrees, and possess STEM-specific qualifications; however, this pattern differed between high- and low-poverty schools. They also found that turnover rates for STEM teachers differed by school type.
32. Olitsky (2020)	1 teacher	Qual	Science	Retention	They found that teachers experienced identity conflicts when school structures conflicted with their professional identities, which prompted them to consider leaving the teaching profession.

33. Olitsky et al. (2019)	4 teachers	Qual	Math, Science	Retention	They found that teachers who prioritized student- and pedagogy-centered identities over subject-centered ones were more likely to remain in their positions, provided that these identities were supported through school structures and positive relationships with colleagues, supervisors, and students.
34. Palermo et al. (2022)	2,410 teachers	Quant	Science	Retention	They found that professional age (years since certification), students' performance in chemistry, and teaching in isolation were all factors that predicted teacher attrition.
35. Redding et al. (2019)	64 teachers	Quant	Math	Retention	They found that high levels of administrative support were more influential in reducing new teacher turnover than more direct supports, such as teacher mentors or professional development.
36. Smith (2021)	10 teaching fellows	Qual	Math, Science	Recruitment	They found that the NCTFP was most compelling to individuals whose college, academic, and career aspirations are already closely aligned with the program's goals. Their findings also provide some evidence that the NCTFP funding influenced some participants to consider careers in teaching.
37. Tai et al. (2006)	671 teachers	Quant	Math, Science	Retention	They found that alternatively certified teachers had comparable retention rates to their traditionally certified peers.
38. Tai et al. (2007)	745 teachers	Quant	Math, Science	Retention	They found that older teachers were more likely to stay teaching in urban and suburban school districts. They also found that rural districts struggle the most in retaining math and science teachers.
39. Viviani et al. (2023)	307 teachers	Quant	Math	Retention	They found that subject-specific (e.g., math sequencing) and subject-general (e.g., classroom management) measures of math teachers' perceived initial preparedness were significant predictors of their 5- and 8-year retention in their first schools, their 8-year retention in their first district, and their overall 8-year retention in the teaching profession.

40. Whitfield et al. (2021)	29 Noyce scholars	Quant & Qual	Math, Science	Recruitment & Retention	They found that the Noyce program did not substantially influence participants' decisions to become teachers since most had already planned to do so. They even had previously considered teaching in high-need settings, indicating that most participants would have become teachers and taught in high-need schools even without the Noyce program.
41. Wong & Luft (2015)	35 teachers	Quant & Qual	Science	Retention	They found that teachers who remained in the profession tended to hold more student-centered beliefs.
42. Worsham et al. (2014)	34 interns	Qual	Science	Recruitment	They found that internships were not effective in recruiting interns to become science teachers, despite many expressing potential interest in becoming teachers in the future. Reasons listed for not pursuing teaching included concerns about salary and classroom management.
43. Zahner et al. (2019)	158 teachers	Quant	Math	Recruitment & Retention	They found that the Noyce scholarship was generally successful in recruiting individuals with STEM majors to become math teachers in high-need schools. They also found that Noyce scholars had lower attrition rates compared to Teach For America corps members who were alternatively certified.

Total number of studies = 43