

Comparison between Master Teaching Fellows (MTFs) and non-MTFs: STEM teacher retention and related factors

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Project

A collaborative research project (NSF NOYCE Track 4) to study the impact of Noyce MTF programs on teacher retention through motivation, leadership, and social networks. Eight universities are involved.

Problem Statement

Teacher turnover presents significant challenges for U.S. public schools for over decades, particularly for science and mathematics in high-need schools¹. Factors such as self-efficacy, leadership, autonomy, and social networks may help mitigate the adversities feeding into teacher turnover.

Theoretical Framework

Teachers' Self-efficacy for Teaching

Teachers' self-efficacy beliefs is an important factor in fostering constructive learning, student motivation, and higher academic performance², which impact job satisfaction and retention or attrition in the profession³.

Teacher Leadership Skills

Opportunities to develop leadership skills and engage in collaborative school-work environment to improve school culture and instruction can support and sustain high-qualified teacher in the profession⁴.

Teacher-School Fit

Most of the teachers leave the profession for reasons including dissatisfaction, lack of support, autonomy, and lack of collaboration opportunities⁵.

Diversity Dispositions

Positive diversity dispositions are associated with persisting in teaching in high-need schools⁶.

Professional Social Networks

Some features of teachers' social network (e.g., density) support their persistence and correlated with their self-efficacy^{7,8}.

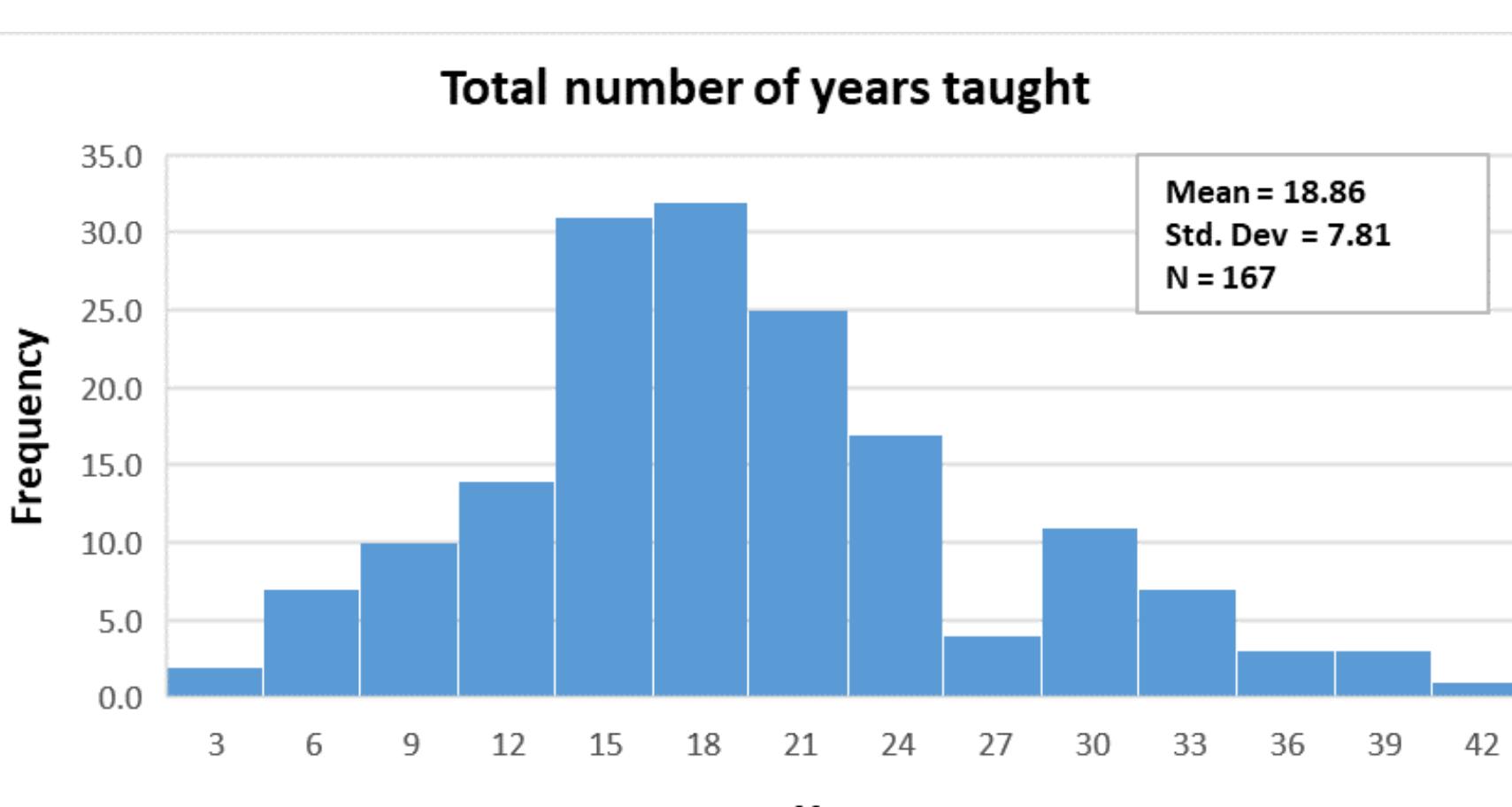
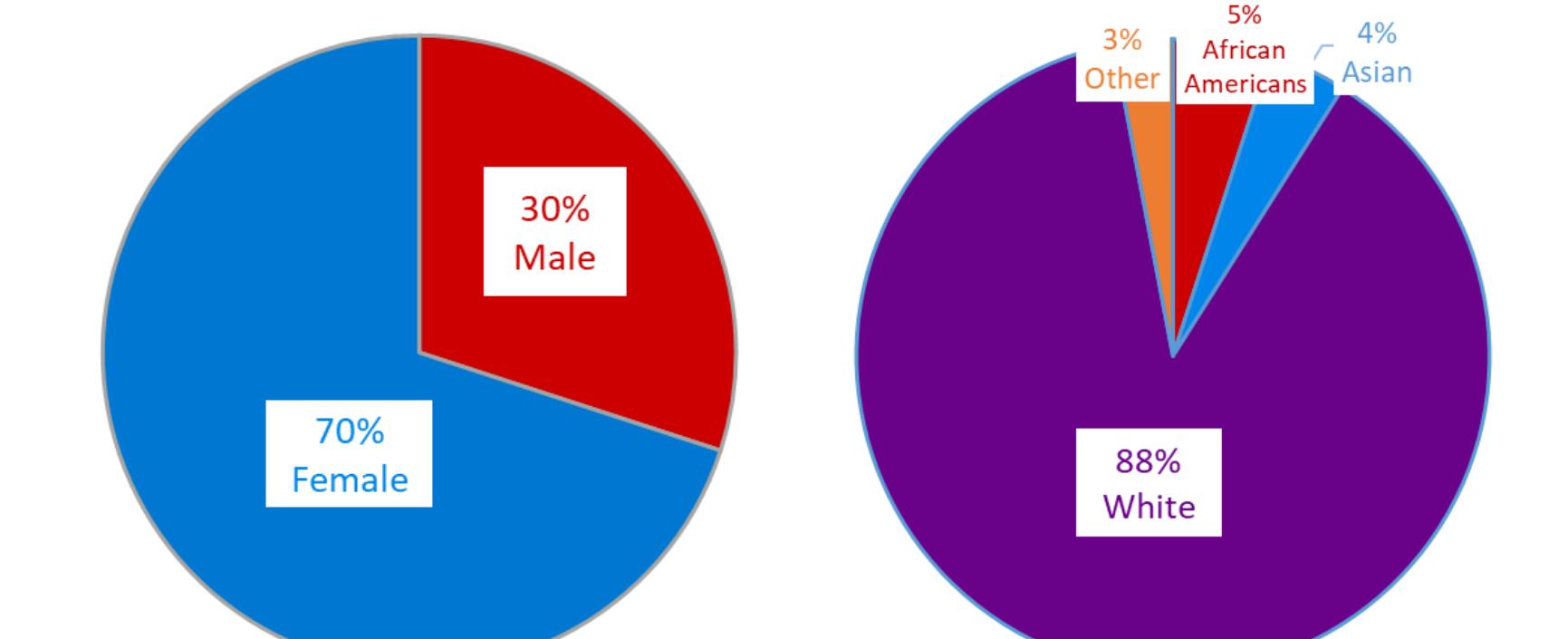
Research Questions

- (1) How do Master Teaching Fellows (MTFs) compare to non-MTFs in terms of their self-efficacy, leadership engagement, diversity dispositions, school-work environment, social network characteristics, and retention?
- (2) To what extent do these factors relate to their retention? Is there a difference between MTFs and non-MTFs regarding this relation?

Methods

- Survey of 167 science and mathematics teachers (85 MTFs and 82 non-MTFs)
- Multinomial logistics regression analysis on retention as the outcome (3-levels)

Demographics



Role	Retention status				Total
	Non-MTF	Stayer ^a	Shifter	Leaver	
Non-MTF	67	12	3	82	
MTF	51	24	10	85	
Total	118	37	12	167	

^aImplies staying in teaching and includes mover teachers (~12%).

Results

Comparison (MTFs and non-MTFs)

Variables	t	df	p	Mean dif.	S.E.	95% C.I.	
						Low.	Up.
Self-efficacy	2.32	165	.02	0.18	0.08	0.03	0.33
Leadership engagement	1.13	165	.26	0.12	0.10	-0.08	0.32
Teacher-school fit	-0.83	165	.41	-0.10	0.12	-0.33	0.13
Diversity dispositions	1.81	165	.27	0.06	0.03	-0.01	0.12
Community connections	0.40	165	.69	0.05	0.11	-0.18	0.27
Teaching network (TN) size	0.65	165	.52	0.45	0.69	-0.92	1.81
Leadership network (LN) size	3.18	165	.00	1.91	0.60	0.72	3.10
TN geographic reach	3.52	165	.00	0.21	0.06	0.09	0.33
LN geographic reach	2.91	165	.01	0.28	0.10	0.09	0.46
LN bridging	2.72	165	.01	0.44	0.16	0.12	0.77
Retention							
Staying	-3.22	165	.00	-0.24	0.07	-0.38	-0.09
Shifting	2.24	165	.03	0.14	0.06	0.02	0.27
Leaving	1.42	165	.16	0.06	0.04	-0.02	0.14

- MTFs' self-efficacy, leadership network size, and leadership bridging role are significantly higher than those of non-MTFs.
- MTFs' geographic area of networks is significantly greater than that of non-MTFs.
- MTFs are more likely to assume formal leadership roles; non-MTFs are more likely to remain as classroom teachers.

Regression Results

Variables	Shifter ^a			Leaver ^a		
	B	S.E.	Exp (B)	B	S.E.	Exp (B)
Intercept	-14.38	7.25		1.88	7.01	
Experience	-0.09	0.05	0.91*	0.06	0.05	1.06
Self-efficacy	0.96	0.58	2.60	1.77	0.98	5.88
Leadership engagement	1.31	0.34	3.67	0.88	0.52	2.40
Teacher-school fit	0.77	0.52	2.16	-1.33	0.53	0.27
Diversity dispositions	-0.97	1.39	0.38	-3.63	2.41	0.03
Community connections	-0.51	0.38	0.60	0.92	0.76	2.50
Teaching network (TN) size	0.32	0.15	1.37*	-0.15	0.13	0.86
Leadership network (LN) size	0.30	0.10	1.12	0.14	0.11	1.15
LN geographic reach	0.90	0.42	2.46	0.10	0.63	1.11
TN bridging	0.34	0.20	1.40*	1.07	0.38	2.87
LN bridging	0.94	0.26	2.50	0.99	0.40	2.70

^aThe reference category: Stayer. *Only for MTFs

- MTF shifters has less experience than MTF stayers.
- Higher level of leadership activities were associated with shifting to a formal leadership position.
- Leavers had lower degrees of teacher-school fit compared to stayers.
- Leadership network size and geographic reach are positively associated with shifting to a formal leadership position.
- Shifters and leavers had more bridging roles in their both teaching and leadership networks in their last year as classroom teachers.

Discussion

- MTFs have higher self-efficacy and better network characteristics than non-MTFs.
- MTFs are more likely to leave classroom teaching (contrary to Noyce Track 3 goals?)
- Engagement in leadership activities and having larger networks attracts shifting.
- Teacher-school fit has a negative impact on teacher retention.

References

- [1] Cross, F. (2017, June). *Teacher shortage areas nationwide listing 1990–1991 through 2017–2018*. U.S. Department of Education Office of Postsecondary Education.
- [2] Stipek, D. J., Givvin, K. B., Salmon, J. M., & MacGyvers, V. L. (2001). Teachers' beliefs and practices related to mathematics instruction. *Teaching and Teacher Education*, 17(2), 213–226.
- [3] Yost, D. S. (2006). Reflection and self-efficacy: Enhancing the retention of qualified teachers from a teacher education perspective. *Teacher Education Quarterly*, 33, 59–76.
- [4] Dauksas, L., & White, J. (2010). Should I stay or should I go? How teacher leadership can improve teacher retention. *AASA Journal of Scholarship and Practice*, 7(2), 27–32.
- [5] Carver-Thomas, D., & Darling-Hammond, L. (2019). The trouble with teacher turnover: How teacher attrition affects students and schools. *Education Policy Analysis Archives*, 27(36), 1–27.
- [6] Williams, D. L., Edwards, B., Kuhel, K. A., & Lim, W. (2016). Culturally responsive dispositions in prospective mathematics teachers. *Discourse and Communication for Sustainable Education*, 7(2), 17–33.
- [7] Ofem, B., Polizzi, S. J., Rushton, G. T., Beeth, M., Couch, B., Doering, J., ... Sheppard, K. (2021). Looking at out STEM teacher workforce: How to model self-efficacy. *Economic Development Quarterly*, 35(1), 40–52.
- [8] Polizzi, S. J., Zhu, Y., Reid, J. W., Ofem, B., Salisbury, S., Beeth, M., ... & Rushton, G. T. (2021). Science and mathematics teacher communities of practice: social influences on discipline-based identity and self-efficacy beliefs. *International Journal of STEM Education*, 8(1), 1–18.