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APPENDIXES
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Regional Educational Laboratory Northeast
At Education Development Center, Inc.

Teacher Preparation and Employment Outcomes of Beginning Teachers in Rhode Island

See https://go.usa.gov/xG47Y for the full report.

Appendix A. About this study

Education policy experts continue to debate how the United States can best produce well-prepared teachers who will stay in the schools that may need them most. There are agreement and empirical support for the idea that the quality of teaching matters to student learning (for example, Bill & Melinda Gates Foundation, 2013). Students of certified teachers outperformed students of teachers who were teaching out of field or who were undercertified (teaching under an emergency, temporary, or provisional certification) in Houston (Darling-Hammond et al., 2005), Arizona (Laczko-Kerr & Berliner, 2002), and North Carolina (Clotfelter et al., 2007).

A commitment to ensuring that all students have access to highly qualified teachers was at the forefront of education policies during the No Child Left Behind era (2002–15). After 2015 that commitment shifted to ensuring that students have equitable access to effective teachers with appropriate certification (U.S. Department of Education, 2015a). Yet teacher turnover hinders this effort, especially in certain subject areas and in schools with high percentages of students living in poverty (Ingersoll, Merrill, & Stuckey, 2014). Research indicates that teacher turnover is associated not only with conditions within schools but also with teacher preparation (Ingersoll et al., 2012) and that turnover is highest among beginning teachers (Borman & Dowling, 2008; Guarino et al., 2006).

Recent national data suggest that 17 percent of beginning teachers leave the profession within their first four years (U.S. Department of Education, 2015b). In addition, research demonstrates that turnover is negatively associated with student achievement (Boyd et al., 2005; Guin, 2004; Hanushek et al., 1999; Ronfeldt et al., 2013). Teacher turnover can also be negatively associated with school climate and organization in such areas as professional development, class size, scheduling, curriculum planning, and collegiality and can have a substantial fiscal impact on schools and districts (Guin, 2004).

A growing number of studies have examined teacher turnover and retention as they relate to teachers' point of entry into the profession, by way of various preparation programs and certification fields. For example, beginning teachers' education and preparation were significantly associated with retention of math and science teachers after one year and were found to depend on factors such as pedagogical preparation, amount of practice teaching, opportunities to observe other teachers, and amount of feedback teachers received on their teaching (Ingersoll et al., 2012). Several measures of teachers' subject-matter education and pedagogical preparation were examined using a nationally representative data sample of math and science teachers (Ingersoll, Merrill, & May, 2014).

Results indicate that the type of college, degree, entry route, or certificate was not significantly associated with beginning teacher attrition but that the substance and the content of new teachers' pedagogical preparation were significant factors. Those with more training in teaching methods and pedagogy—especially practice teaching, observation of other classroom teaching, and feedback on their own teaching—were much less likely to leave teaching after their first year on the job. In addition to analyzing teachers across certification fields, the current study complements this work, examining retention by program characteristics but also by other potential factors related to attrition within a statewide context.

District, school, and teacher characteristics such as gender and race/ethnicity are associated with teacher retention (Guarino et al., 2006). For example, schools with higher proportions of racial/ethnic minority, low-income, and low-performing students tend to have lower teacher retention rates (Guarino et al., 2006). Additionally, disparities exist in mobility and retention by a teacher's race/ethnicity. For example, in 2012/13 nearly 22 percent of Black public school teachers nationally changed schools or left the profession, compared to about 15 percent of White, non-Hispanic teachers (U.S. Department of Education, 2014). Earlier research showed the opposite, finding higher attrition for White teachers than for racial/ethnic minority teachers and for female teachers than for male teachers (Ingersoll, 2001; Kirby et al., 1999). Evidence on whether teachers with higher degrees stay in teaching longer is mixed, however, with some studies correlating postgraduate degrees with lower attrition (Kirby et al., 1999) and others finding the opposite (Adams, 1996).

This study extends the current research base on teacher preparation and retention by examining beginning teachers who were trained in Rhode Island across teacher certification fields and by using three years of longitudinal data. It also examines mobility and retention for teachers by teacher preparation program type (undergraduate, graduate, nondegree, and alternative) and teacher certification field. Finally, this study contributes to the limited literature on the association between preparation programs and beginning teacher outcomes such as mobility, retention, attrition, and out-of-field teaching.

References

Adams, G. (1996). Using a Cox regression model to examine voluntary teacher turnover. *Journal of Experimental Education, 64*(3), 267–285. https://eric.ed.gov/?id=EJ533521.

Bill & Melinda Gates Foundation. (2013). *Ensuring fair and reliable measures of effective teaching: Culminating findings from the MET Project's three-year study* (Policy and Practice Brief). https://eric.ed.gov/?id=ED540958.

Borman, G. D., & Dowling, N. M. (2008). Teacher attrition and retention: A meta-analysis and narrative review of the research. *Review of Educational Research, 78*(3), 367–409. https://eric.ed.gov/?id=EJ896364.

Boyd, D., Grossman, P., Lankford, H., Loeb, S., & Wyckoff, J. (2005). *How changes in entry requirements alter the teacher workforce and affect student achievement.* American Education Finance Association. https://eric.ed.gov/?id=ED490843.

Clotfelter, C. T., Ladd, H. F., & Vigdor, J. L. (2007). *How and why do teacher credentials matter for student achievement?* (NBER No. 12828). National Bureau of Economic Research Working Paper. https://eric.ed.gov/?id=ED501923.

Darling-Hammond, L., Holtzman, D. J., Gatlin, S. J., & Heilig, J. V. (2005). Does teacher preparation matter? Evidence about teacher certification, Teach for America, and teacher effectiveness. *Education Policy Analysis Archives, 13*(42), 1–51. https://eric.ed.gov/?id=EJ846746.

Guarino, C., Santibanez, L., & Daley, G. (2006). Teacher recruitment and retention: A review of the recent empirical literature. *Review of Educational Research, 76*(1), 173–208. https://eric.ed.gov/?id=EJ751152.

Guin, K. (2004). Chronic teacher turnover in urban elementary schools. *Education Policy Analysis Archives, 12*(42), 1–30. https://eric.ed.gov/? id=EJ853508.

Hanushek, E. A., Kain, J. F., & Rivkin, S. G. (1999). *Do higher salaries buy better teachers?* (NBER No. 7082). National Bureau of Economic Research Working Paper. https://eric.ed.gov/?id=ED437710.

Ingersoll, R. (2001). Teacher turnover and teacher shortages: An organizational analysis. *American Educational Research Journal, 38*(3), 499–534. https://doi.org/10.3102/00028312038003499.

Ingersoll, R., Merrill, L., & May, H. (2012). Retaining teachers: How preparation matters. *Educational Leadership, 69*(8), 30–34. https://eric.ed.gov/? id=EJ988729.

Ingersoll, R., Merrill, L., & May, H. (2014). *What are the effects of teacher education and preparation on beginning teacher attrition?* (Research Report No. 82). Consortium for Policy Research in Education, University of Pennsylvania. https://eric.ed.gov/?id=ED575353.

Ingersoll, R. M., Merrill, L., & Stuckey, D. (2014). *Seven trends: The transformation of the teaching force.* Consortium for Policy Research in Education, University of Pennsylvania. https://eric.ed.gov/?id=ED566879.

Kirby, S., Berends, M., & Naftel, S. (1999). Supply and demand of minority teachers in Texas: Problems and prospects. *Educational Evaluation and Policy Analysis, 21*(1), 47–66. https://eric.ed.gov/?id=EJ592462.

Laczko-Kerr, I., & Berliner, D. C. (2002). The effectiveness of "Teach for America" and other under-certified teachers on student academic achievement: A case of harmful public policy. *Education Policy Analysis Archives, 10*(37), 1–53. https://eric.ed.gov/?id=EJ667240.

Ronfeldt, M., Loeb, S., & Wyckoff, J. (2013). How teacher turnover harms student achievement. *American Educational Research Journal*, *50*(1), 4–36. https://eric.ed.gov/?id=EJ995828.

U.S. Department of Education, National Center for Education Statistics. (2014). *Teacher attrition and mobility: Results from the 2012-13 teacher follow-up survey*. https://eric.ed.gov/?id=ED546773.

U.S. Department of Education. (2015a). State plans to ensure access to excellent educators: Frequently asked questions. http://www2.ed.gov/programs/titleiparta/equitable/eafaq2015.pdf.

U.S. Department of Education, National Center on Education and the Economy. (2015b). *New findings on the retention of novice teachers from teaching residency programs.* https://eric.ed.gov/?id=ED560735.

Appendix B. Methods

This appendix describes the data elements for each research question, the sample, and the methods used to analyze each research question. Note that research question 3 is not discussed in the main report or the corresponding brief and snapshot. The results are discussed in a separate infographic, which is available at https://go.usa.gov/xG47Y.

Data elements

Table B1. Data elements, by research question

Data element	Description	Research question 1	Research question 2	Research question 3
Teacher characteristic				
Educator identification	Numeric code specific to each teacher and associated with that teacher for his or her entire tenure in the Rhode Island public school system.	X	X	X
Race/ethnicity	Minority or nonminority.		X	
Gender	Male or female.		X	
Certification field	The original 100-plus certification fields were collapsed into the following categories: early childhood; elementary; middle grades; secondary; special education; world languages; dual-language, bilingual, or English as a second language; electives;[a] and nonteacher related (such as administrator).	X	X	X
Certification code	Numeric code that identifies the subject matter and grade ranges that a teacher is certified to teach (for example, grade 7–12 biology teacher). Codes were grouped using the same categories as certification field, described above.	X	X	X
District and school assignment	Numeric code associated with an individual school and district; codes remain the same each year.	X	X	
Mobility	Calculated variable to indicate stayer (teacher who stayed in initial school after one or more years), mover (teacher who moved to a different school after one or more years), leaver (teacher who no longer taught in the Rhode Island public school system), and role-changer (teacher who became an administrator or other educator).	X	X	
Preparation program characteristic				
Preparation program provider identification	Numeric code for each of the 11 teacher preparation program providers in Rhode Island.	X	X	
Program type	Categorical variable that refers to the route through which individuals enter the teaching force in Rhode Island. A teacher is eligible to teach in the Rhode Island public school system after completing a state-approved undergraduate, graduate, nondegree (certificate), or alternative teacher preparation program. Teachers who have not completed such a program may be granted preliminary certification to teach while they complete state requirements for a particular certification field.	X		

Data element	Description	Research question 1	Research question 2	Research question 3
Preparation field	Program fields in a teacher preparation program, such as early childhood or special education. For this study, preparation fields were collapsed into the following categories: early childhood, elementary, middle grades, secondary, special education, world languages, electives,[a] and nonteacher related (such as administrator).			X
Preparation program provider type	Dichotomous variable that refers to either a private or a public teacher preparation program provider. Alternative teacher preparation programs are categorized as private because they are affiliated with private providers. For the logistic regression analyses, preparation program provider types include Provider 4, a public provider and the reference group for the analysis; Provider 5, a public provider; private providers, excluding providers that offered only alternative programs; and private providers offering alternative programs.	X		X
School characteristic				
School type	Elementary, secondary, combined grades		X	
Enrollment	Continuous		X	
High-need district	Dichotomous variable that refers to a district in which both the percentage of students who quality for the national school lunch program and the percentage of racial/ethnic minority students is greater than 75 percent.		X	

a. In addition to secondary career and technical education, electives refers to the following certification fields across all grades: art, health, library media, music, physical education, nursing, technology, and theater education.
Source: Authors' analysis of Rhode Island Department of Education data for 2012/13–2017/18.

Sample

For all the research questions the primary sample included 1,164 beginning teachers who ever taught in the Rhode Island public school system from 2012/13 through 2016/17 and who were trained at any of the 11 teacher preparation program providers in Rhode Island. This represents 38 percent of the 3,045 teachers who were trained in Rhode Island during this timeframe.

The sample does not include teachers who were trained in Rhode Island from 2012/13 through 2016/17 who did not go on to teach in the state public school system (approximately 60 percent of teachers who were trained in that timeframe). The sample also does not include beginning teachers in Rhode Island who were trained in another state (approximately 4 percent of newly certified teachers in the state; Rhode Island Department of Education, 2017). Although the Rhode Island Department of Education (RIDE does) have comparable program preparation data for this group of teachers, the data are not collected in a way that is easily analyzable. The sample also does not include beginning teachers who received certification through a route other than through a Rhode Island–approved program—for example, through a reciprocity agreement with another state.

Teachers who did not start teaching in the state public school system until the 2017/18 school year were removed from the mobility analyses because employment data were not yet available beyond their first year of teaching. Similarly, only teachers for whom four years of employment data were available were included in the three-year mobility analyses. Thus, the subset of the primary sample used to calculate mobility, retention, and attrition outcomes includes four cohorts of teachers for which these outcomes can be examined after one year, and three cohorts of teachers for which these outcomes can be examined after three years (table B2). Therefore, the analytic

sample size for mobility, retention, and attrition outcomes is 946 teachers after one year and 453 teachers after three years.

Table B2. Overview of analysis period for each cohort of beginning teachers who were trained in Rhode Island, 2012/13–2017/18

Beginning teacher cohort	Years outcome data are available		Number of teachers for whom outcome data are available	
	One year	Three years	One year	Three years
1: 2012/13	2013/14	2015/16	309	256
2: 2013/14	2014/15	2016/17	226	155
3: 2014/15	2015/16	2017/18	226	42
4: 2015/16	2016/17	—	169	—
5: 2016/17	2017/18	—	16[a]	—
Sample size			946	453

— is not available.

Note: The years in which outcomes are available are the earliest years for which employment-based outcomes are available for teachers from each cohort. For example, teachers completing their training in 2012/13 could be employed in 2013/14. However, many teachers did not work in the Rhode Island public school system in the year immediately following program completion but rather gained employment two or more years later (see table D2 in appendix D). Outcome data for one year are available for teachers who taught for at least two years in the state, and three-year retention data are available for teachers who taught for at least four years in the state.

a. This number represents teachers who were teaching during their preparation program. Outcome data are not available for the majority of teachers in this cohort because 2017/18 was their first year of employment. Therefore, outcomes for this cohort are analyzed only for teachers who were teaching during their year of preparation (2016/17).

Source: Authors' analysis of Rhode Island Department of Education data for 2012/13–2017/18.

Methodology

Data preparation. With the exception of teacher certification fields, all teacher preparation program and employment-related characteristics (as presented in tables C1 and C2 in appendix C) reflect only the first program a teacher completed and the first school at which he or she taught. This made tables easier to understand and was required in some cases in order to have a reference data point for the regression analyses. For many characteristics, however, the first program provider was reflective of most characteristics of a teacher's subsequent program provider because teachers generally attended the same program provider for their multiple certifications. For example, background analyses revealed that nearly 30 percent of teachers were trained in more than one certification field, and in all but 10 cases they were trained at the same program provider for all certifications. In cases where training for the subsequent certifications was through a different program type from that of the first certification, the analysis reflects only the first certification and program type. Similarly, 51 teachers in the sample used more than one certification in their first year of teaching, but only the first position that appears in the RIDE dataset is reflected in the analysis of teacher mobility by certification field (see figure 3 in the main report). For calculating whether teachers were teaching in their certification field (research question 3), however, the constructed variable looked across all positions. So teachers who were teaching in a field in which they had a certification for at least one of their positions were considered a "yes" for that analysis.

Research question 1. What percentages of beginning teachers moved to another school in the state public school system, stayed in their initial school, and left teaching in the state public school system after one year and after three years? Do the percentages differ by teacher preparation program provider, teacher preparation program type, teacher preparation field, or teacher certification field?

For research question 1 the study team created a mobility variable that indicated whether a beginning teacher moved to another school in the state public school system (mover), stayed in his or her initial school (stayer), was no longer employed in the state public school system (leaver), or changed roles (role-changer). Less than 3 percent of beginning teachers who were trained in Rhode Island changed roles; to keep the results more concise, results for role-changers are not presented in the findings. Cohorts were pooled to produce mobility rates after one year

and after three years of teaching in Rhode Island. These rates were calculated from October of the base year to October of the follow-up year because RIDE collects data on teacher placements every October. Descriptive tables and graphs were produced to provide the mobility rates disaggregated by teacher preparation program characteristics and by teacher characteristics (see tables C1 and C2 in appendix C and figures 2 and 3 in the main report). Tests of statistical significance were not performed to compare differences in retention, mobility, and attrition across teacher preparation fields because teachers can be prepared in more than one field.

A series of Pearson chi-square tests was used to examine the significance of the association between the mobility category (that is, mover, stayer, leaver) and categorical variables such as the teacher preparation program provider and teacher characteristics. A significant Pearson chi-square statistic indicates a significant relationship between the mobility categories and the categorical variable. When a significant chi-square value was observed, the study team employed a *z*-test with a Bonferroni adjustment to the adjusted standardized residuals for the multiple comparisons made within each frequency table. The adjustment is calculated for each analysis by dividing $\alpha = .05$ by the number of cells in the frequency table used for that analysis and finding the corresponding *z*-critical value. This *z*-critical value then becomes the metric to which adjusted standardized residuals are compared in order to highlight instances where actual cell counts deviated significantly from expected cell counts. Only those instances where the adjusted standardized residual was higher than the *z*-critical value are discussed in the findings.

Research question 2. Is there a relationship between the teacher preparation program provider or program type in which a beginning teacher was trained and the teacher's likelihood of being retained in the state public school system?

Data were first analyzed descriptively, producing estimated frequencies and percentages, as appropriate, for each variable. The study team used Spearman's rho to test for correlation between each of the explanatory and control variables. There is no absolute guidance on what level of correlation is too high to include both variables in the same regression. According to Hamilton (1990), correlations of ± .5 are moderate and those of ± .8 are strong. Two variables, central city locale and high-need district, had a moderately high negative correlation of –0.67; thus, only one of these was included in a model at a time.

The models included the variables in table B1. Logistic regression[1] was used to examine both of the outcome variables of interest: teacher retention after one year and after three years (research question 2) and employment in the teacher's certification field (research question 3). Each outcome was analyzed separately using logistic regression. Logistic regression results are presented in tables C3, C4, and C8 in appendix C. The logistic regression model can be summarized as:

$$ln\left(\frac{D_i}{1-D_i}\right) = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} \ldots + \beta_k X_{ki}$$

where D_i is a dummy variable for which 1 = outcome of interest (teacher retained in a school after one year/three years, teacher is employed in the field in which he or she had a certification, or teacher is teaching in a high-need district) and 0 = teacher was not retained in the school after one year/three years, teacher was not employed in the field in which he or she had a certification, or teacher did not work in a high-need district; β_0 is a constant term; $\beta_1 - \beta_k$ are the coefficients for the explanatory and control variables; and $X_{1i} - X_{ki}$ are the values of the explanatory and control variables for each variable and each observation. An odds ratio of less than 1 indicates

1. Logistic regression is an analysis method used when the outcome variable is binary (that is, one of two outcomes)—for example, remained in teaching or left. It is used to describe the relationship between one binary outcome variable and the independent variable or variables of interest. In this study logistic regression was used to examine teacher preparation program characteristics and their association with the likelihood of a teacher staying in the same school or moving to another school in the state public school system.

that the outcome is less likely, an odds ratio of 1 indicates an equal likelihood of the outcome, and an odds ratio of more than 1 indicates that the outcome is more likely. An odds ratio of 0 can be a statistically significant finding.

In addition to examining the significance of the overall model, the study team ran two goodness-of fit-tests after each logistic regression to assess the fit and quality of the models: the Hosmer-Lemeshow chi-square and the Pearson chi-square.

Research question 3. Are beginning teachers prepared in Rhode Island teaching in the fields in which they were prepared, regardless of their mobility?

To answer research question 3,[2] which concerns out-of-field teaching, the study team calculated the percentage of beginning teachers who were trained in Rhode Island who were working in their certification field and the percentage who were working outside that field. The percentages were calculated across cohorts to examine whether the percentages were consistent or differed over time—specifically, after one or three years. The percentages were then disaggregated by the field in which the teacher taught in his or her first teaching position.

The study team then conducted chi-square analyses for the outcome of a teaching position in the field in which the teacher was certified. The analyses were used to examine whether there were statistically significant differences in the outcome by preparation program providers and program types and by teacher certification. As in the analyses for research question 1, Bonferroni adjustments were used, and only instances where the adjusted standardized residual was higher than the *z*-critical value are discussed in the summary of findings. As mentioned in the section above, logistic regression was used to address this question.

The study team collapsed more than 100 preparation fields into overarching categories, including early childhood, elementary, middle grades, secondary, special education, and electives (see table B1 for the complete list). Middle grade teachers were omitted from these analyses because the information needed to accurately compare these teachers with their fields of preparation was incomplete. Specifically, a teacher in Rhode Island can be certified to teach in middle school grades through a middle grades certification, an elementary school extension, or a secondary school extension. Because of the overlap, the results led to underestimation of the percentage of out-of-field middle school teachers.

References

Hamilton, L. C. (1990). *Modern data analysis: A first course in applied statistics.* Brooks/Cole Publishing Company.

Rhode Island Department of Education. (2017). *Regulations governing the certification of educators in Rhode Island.* http://www.ride.ri.gov/Portals/0/Uploads/Documents/Teachers-and-Administrators-Excellent-Educators/Educator-Certification/Cert-main-page/Regulations-Governing-the-Certifcation-of-Educators-in-Rhode-Island.pdf.

2. Research question 3 is not discussed in the main report or the corresponding brief and snapshot. The results are discussed in a separate infographic, which is available at https://go.usa.gov/xG47Y. However, tables C5–C8 in appendix C reflect the analysis for research question 3.

Appendix C. Supporting analyses

Tables C1–C4 support the figures and narrative in the findings section of the main report. Tables C5–C8 relate to research question 3, whose results are discussed in a separate infographic, which is available at https://go.usa.gov/xG47Y.

Table C1. One- and three-year mobility, retention, and attrition rates of beginning teachers who were trained in Rhode Island and who taught in the state public school system for at least one year, by program provider, program provider type, and program type, 2012/13–2017/18

	Sample size		Mover		Stayer		Leaver		Role changer	
Category	One year Number	Three year Number	One year Percent	Three year Percent	One year Percent	Three year Percent	One year Percent	Three year Percent	One year Percent	Three year Percent
Overall sample	946	453	22.7	34.0	62.2	31.4	14.5	33.8	0.6	0.9
Excluding teachers who were trained in alternative programs	830	360	25.0	40.0	59.4	35.0	14.8	23.9	0.7	1.1
Preparation program provider[a,b]										
Provider 1	37	14	16.2	14.3	73.0	57.1	10.8	28.6	0	0
Provider 2	23	15	17.4	46.7	73.9	40.0	8.7	13.3	0	0
Provider 3	78	39	24.4	30.7	59.0	38.5	12.8	28.2	3.9	2.6
Provider 4	391	160	25.3	41.3	59.9	36.3	14.6	21.3	0.3	1.3
Provider 5	222	103	27.5	43.7	55.9	29.1	16.7	27.2	0	0
Provider 6	[c]	[c]	[c]	[c]	[c]	[c]	[c]	[c]	[c]	[c]
Provider 7	23	10	13.0	56.7	65.2	40.0	21.7	30.0	0	0
Provider 8	48	15	31.3	26.7	54.2	26.7	12.5	20.0	2.1	0
Provider 9	[c]	[c]	[c]	[c]	[c]	[c]	[c]	[c]	[c]	[c]
Provider 10	15	15	13.4	40	66.7	26.7	20.0	33.3	0	0
Provider 11	101	78	5.0	5.2	84.2	15.4	10.9	79.5	0	0
Preparation program provider type[d]										
Private	333	190	16.5	22.7	69.1	28.4	12.9	47.9	1.5	1.1
Public	613	263	26.2	42.2	58.4	33.5	15.3	23.6	0.2	0.8
Preparation program type[e]										
Undergraduate	541	243	27.6	42.4	58.6	36.6	13.7	20.6	0.2	0.4
Private	89	34	23.6	44.1	59.6	41.2	15.7	14.7	1.1	0.0
Public	452	209	28.3	42.1	58.4	35.9	13.3	21.5	0	0.5
Graduate	237	92	19.4	35.9	59.9	31.5	19.0	30.4	1.7	2.2
Private	82	38	17.1	26.3	65.9	42.1	13.4	29.0	3.7	2.6
Public	155	54	20.7	42.6	56.8	24.1	21.9	31.5	0.7	1.9
Nondegree	52	25	25.0	32.0	65.4	32.0	7.7	32.0	1.9	4.0
Alternative	116	93	6.0	10.8	81.9	17.2	12.1	72.0	0	0

a. Providers 4 and 5 are public providers, and the rest are private providers. Providers 9, 10, and 11 are private providers of the alternative program type.
b. The overall chi-square test of equality of distributions of mobility patterns between preparation program providers was statistically significant at $p < .05$ after one year (chi-square = 135.3) and after three years (chi-square = 162.0). In the examination of differences between providers, only Provider 11, which offers the largest alternative program, was significantly different from the others in the percentage of stayers, movers, and leavers.
c. Data have been suppressed to protect privacy because of the small number or percentage of subjects in the cell.
d. The overall chi-square test of equality of distributions of mobility patterns between public and private providers was statistically significant at $p < .05$ after one year (chi-square = 19.6) and after three years (chi-square = 32.8). However, the differences were not significant after three years when teachers who were trained in alternative programs were removed (chi-square = 3.07).
e. The overall chi-square test of equality of distributions of mobility patterns between preparation program types was statistically significant at $p < .05$ after one year (chi-square = 43.3) and after three years (chi-square = 87.1).
Source: Authors' analysis of Rhode Island Department of Education data for 2012/13–2017/18.

Table C2. One- and three-year mobility, retention, and attrition rates of beginning teachers who were trained in Rhode Island and who taught in the state public school system for at least one year, by teacher preparation field and certification field, 2012/13–2017/18

	Sample size		Mover		Stayer		Leaver	
Category	One year Number	Three year Number	One year Percent	Three year Percent	One year Percent	Three year Percent	One year Percent	Three year Percent
Preparation field[a]								
Early childhood	47	18	12.8	33.3	83.0	55.6	4.3	11.1
Elementary	342	144	26.9	38.0	59.4	27.1	13.7	34.7
Excluding teachers who were trained in alternative programs[b]	299	114	29.4	46.4	56.5	31.6	14.1	21.9
Middle grades	92	54	21.7	38.1	65.2	35.2	13.0	29.6
Secondary	318	180	18.2	22.3	68.9	32.2	12.6	41.1
Excluding teachers who were trained in alternative programs[b,c]	245	117	22.5	30.3	64.5	38.5	12.7	27.4
Special education	270	130	27.4	53.0	61.9	36.2	10.4	18.5
World languages	19	[d]	15.8	[d]	47.4	[d]	36.8	[d]
Electives	118	50	25.4	38.0	55.1	34.0	19.5	28.0
Nonteachers (for example, building administrators)	[d]	[d]	[d]	[d]	[d]	[d]	[d]	[d]
Certification field[e]								
Early childhood	42	16	11.9	25.0	11.9	62.5	4.8	12.5
Elementary	206	98	28.7	36.7	28.7	22.5	18.9	40.8
Excluding teachers who were trained in alternative programs[b,e]	177	78	32.3	44.9	32.3	25.6	20.3	29.5
Middle grades	80	38	21.3	39.5	21.3	18.4	11.3	39.5
Secondary	227	124	16.8	21.8	16.8	34.7	12.3	42.7
Excluding teachers who were trained in alternative programs[b]	178	80	20.8	27.6	20.8	42.5	12.9	28.8
Special education	194	87	26.3	43.6	26.3	32.2	11.3	21.8
World languages	21	[d]	14.3	[d]	14.3	[d]	33.3	[d]
ESL/bilingual/dual language	44	25	20.4	36.0	20.4	32.0	6.8	32.0
Electives	118	51	26.3	39.2	26.3	33.3	18.6	27.5
Nonteachers (for example, building administrators)	[d]	[d]	[d]	[d]	[d]	[d]	[d]	[d]

ESL is English as a second language.

Note: Percentages for role-changers are not displayed to protect privacy because of the small percentage of subjects in the cell.

a. The overall chi-square test of equality of distributions of mobility patterns between teachers in different preparation fields was statistically significant at $p < .05$ after one year (chi-square = 56.2) and after three years (chi-square = 41.7).

b. Statistics for teachers who were trained in alternative programs could be provided only for elementary and secondary because these are the only two fields in which alternative programs train and certify teachers.

c. After teachers who were trained in alternative programs were removed, the overall chi-square test of equality of distributions of mobility patterns between teachers in different preparation fields was statistically significant at $p < .05$ after one year (chi-square = 55.2) but not after three years (chi-square = 30.3).

d. Data have been suppressed to protect privacy because of the small number or percentage of subjects in the cell.

e. Statistical tests examining differences in the mobility, retention, and attrition rates by teacher certification fields could not be conducted because teachers could be certified in multiple fields.

Source: Authors' analysis of Rhode Island Department of Education data for 2012/13–2017/18.

Table C3. Logistic regression results for retention in teachers' initial school among beginning teachers who were trained in Rhode Island and who taught in the state public school system for at least one year, after one year, 2012/13–2017/18

Variable	Coefficient	Odds ratio	Standard error of coefficient	Significance (ρ)
Constant	1.32	3.73	0.68	0.05*
Independent variable				
Using certificate in field in which prepared	–0.08	0.92	0.23	0.73
Teacher demographic characteristic				
Not White (compared with White)	–0.19	0.83	0.33	0.58
Race not reported (compared with White)	0.13	1.13	0.41	0.75
Not Hispanic/Latino (compared with Hispanic/Latino)	–0.74	0.48	0.55	0.18
Race/ethnicity not reported (compared with Hispanic/Latino)	–0.91	0.40	0.54	0.09
Male (compared with female)	–0.01	0.99	0.18	0.95
Gender/sex not reported (compared with female)	–0.82	0.44	0.56	0.15
Preparation program provider type[a]				
Provider 5 (compared with Provider 4)	–0.20	0.82	0.19	0.29
Private providers (compared with Provider 4)	0.03	1.03	0.19	0.14
Alternative programs (compared with Provider 4)	0.87	2.41	0.29	0.002***
School characteristic				
High-need school[b]	0.38	1.47	0.18	0.04*
School enrollment	0.00	1.00	0.00	0.56
Secondary school (compared with elementary school)	0.26	1.29	0.19	0.17
Combined grades (compared with elementary school)	0.14	1.15	0.30	0.64

* Significant at $p < .05$; *** significant at $p < .001$.

Note: $n = 841$. Overall model is significant with a Wald chi-square (14)= 42.81, $p < 0.00$. Goodness-of-fit tests: Hosmer & Lemeshow chi-square (8) = 8.37, prob > chi-square = 0.21; Pearson chi-square (790) = 819.15, prob > chi-square = 0.13.

a. For the logistic regression analyses, preparation program provider types include Provider 4, a public provider and the reference group for the analysis; Provider 5, a public provider; private providers, excluding providers that offered only alternative programs; and private providers offering alternative programs.

b. A school or district in which the percentage of students eligible for the national school lunch program and the percentage of racial/ethnic minority students are both greater than 75 percent.

Source: Authors' analysis of Rhode Island Department of Education data for 2012/13–2017/18.

Table C4. Logistic regression results for retention in teachers' initial school among beginning teachers who were trained in Rhode Island and who taught in the state public school system for at least one year, after three years, by school, teacher, and preparation program characteristics,2012/13–2017/18

Variable	Coefficient	Odds ratio	Standard error of coefficient	Significance (ρ)
Constant	–0.54	0.58	0.30	0.28
Independent variable				
Using certificate in field in which prepared	–0.21	0.81	0.30	0.58
Teacher demographic characteristic				
Not White (compared with White)	0.88	2.42	1.14	0.06
Race not reported (compared with White)	0.75	2.12	0.84	0.06
Not Hispanic/Latino (compared with Hispanic/Latino)	–0.10	0.91	0.49	0.85
Ethnicity not reported (compared with Hispanic/Latino)	–0.08	0.93	0.22	0.76
Male (compared with female)	–0.28	0.76	0.22	0.33
Gender/sex not reported (compared with female)	0.22	1.25	1.02	0.78
Preparation program provider type[a]				
Provider 5 (compared with Provider 4)	–0.28	0.75	0.23	0.36
Private providers (compared with Provider 4)	0.12	1.13	0.31	0.66
Alternative programs (compared with Provider 4)	–1.30	0.27	0.11	0.00**
School characteristic				
High-need school[b]	–0.01	0.98	0.31	0.96
School enrollment	0.00	1.00	0.00	0.49
Secondary school (compared with elementary school)	0.09	1.09	0.34	0.79
Combined grades (compared with elementary school)	–0.14	0.86	0.61	0.83

** Significant at $p < .01$.

Note: $n = 389$. Overall model is significant with a Wald chi-square (14)= 21.75, $p < 0.08$. Goodness-of-fit tests: Hosmer & Lemeshow chi-square (8) = 9.36, prob > chi-square = 0.31; Pearson chi-square (356) = 378.77, prob > chi-square = 0.19.

a. For the logistic regression analyses, preparation program provider types include Provider 4, a public provider and the reference group for the analysis; Provider 5, a public provider; private providers, excluding providers that offered only alternative programs; and private providers offering alternative programs.

b. A school or district in which the percentage of students eligible for the national school lunch program and the percentage of racial/ethnic minority students are both greater than 75 percent.

Source: Authors' analysis of Rhode Island Department of Education data for 2012/13–2017/18.

Table C5. Alignment between teachers' preparation fields and teaching fields for beginning teachers who were trained in Rhode Island and who taught in the state public school system for at least one year during their first and third years of teaching, by first year of teaching cohort, 2012/13–2017/18

First year of teaching cohort	First year teachers	Teachers teaching in preparation field during first year of teaching		Third year teachers	Teachers teaching in preparation field during third year of teaching	
	Number	Number	Percent	Number	Number	Percent
Overall	1,064	932	87.6	469	423	90.1
2012/13	54	49	90.7	30	26	86.7
2013/14	157	137	87.3	119	104	87.4
2014/15	204	170	83.3	154	139	90.3
2015/16	225	198	88.0	166	154	92.8
2016/17	226	204	90.3	—	—	—
2017/18	198	174	87.9	—	—	—

— is not available because teachers had not reached their third year of teaching at the time of this analysis.

Note: Middle grade teachers were omitted from these analyses because the information needed to accurately compare these teachers with their fields of preparation was incomplete. Specifically, a teacher in Rhode Island can be certified to teach in middle school grades through a middle grades certification, an elementary extension, or a secondary extension. Because of the overlap, the results led to underestimation of the percentage of out-of-field middle grade teachers.

Source: Authors' analysis of Rhode Island Department of Education data for 2012/13–2017/18.

Table C6. Beginning teachers who were trained in Rhode Island and who taught in the state public school system for at least one year and alignment of teachers' certification field with their preparation field, by certification field, 2012/13–2017/18

	Frequency of teachers in first teaching position		Alignment of certification field with preparation field	
Certification field	Number	Percent[a]	Number	Percent of certification in first teaching position
Early childhood	59	5.1	49	83.1
Elementary	264	22.7	239	90.5
Middle grades	100	8.6	[b]	[b]
Secondary	268	23.0	264	98.5
Special education	231	19.9	212	91.8
World languages	26	2.2	23	88.5
Electives	150	12.9	145	96.7
Nonteachers (for example, building administrators)	12	1.0	0	0

Note: *n* = 1,110. This table shows the number of teachers using a particular certification in their first teaching position. It also compares the alignment of their certification with their field of preparation. The overall chi-square test of equality of distributions of certification alignment patterns between field of certification in use was statistically significant at $p < .05$ (chi-square = 520.3).

a. Percentages do not sum to 100 because teachers working in a certification related to English as a second language or dual-language instruction are omitted. No teacher preparation programs in Rhode Island offered formal training in this certification field from 2012/13 through 2016/17.

b. Rates could not be calculated for middle grades certification because the information needed to accurately compare these teachers with their fields of preparation was not available due to the overlap of the certificates used to teach in the middle grades. Specifically, a teacher can be certified to teach in the middle grades using a middle grades certificate, an elementary extension, or a secondary extension.

Source: Authors' analysis of Rhode Island Department of Education data for 2012/13–2017/18.

Table C7. Beginning teachers who were trained in Rhode Island and who taught in the state public school system for at least one year whose certification field aligned with their preparation field, by program provider, program provider type, and program type, 2012/13–2017/18

	Frequency of teachers in first teaching position	Certification field aligned with preparation field	
Category		Number	Percent
Preparation program provider			
Provider 1	45	43	95.6
Provider 2	24	23	95.8
Provider 3	95	86	90.5
Provider 4	463	398	86.0
Provider 5	237	211	89.0
Provider 6	[a]	[a]	[a]
Provider 7	29	24	82.8
Provider 8	56	53	94.6
Provider 9	[a]	[a]	[a]
Provider 10	14	12	85.7
Provider 11	92	75	81.5
Preparation program provider type			
Private	364	323	88.7
Public	700	609	87.0
Preparation program type			
Undergraduate	631	559	88.6
Graduate	265	227	85.7
Nondegree	62	59	95.2
Alternative program	106	87	82.1

Note: *n* = 1,064. The overall chi-square test of equality of distributions of certification alignment patterns between preparation program providers was statistically significant at $p < .05$ (chi-square = 27.9).

a. Data have been suppressed to protect privacy because of the small number or percentage of subjects in the cell.

Source: Authors' analysis of Rhode Island Department of Education data for 2012/13–2017/18.

Table C8. Logistic regression results for out-of-field teaching for beginning teachers who were trained in Rhode Island and who taught in the state public school system for at least one year, after one year, 2012/13–2017/18

Variable	Coefficient	Odds ratio	Standard error	Significance (ρ)
Constant	–1.67	0.19	0.23	0.00***
Teacher demographic characteristic				
Not White (compared with White)	–0.64	0.53	0.50	0.20
Race not reported (compared with White)	–1.09	0.33	0.39	0.01**
Not Hispanic/Latino (compared with Hispanic/Latino)	1.01	2.74	0.52	0.05
Ethnicity not reported (compared with Hispanic/Latino)	0.41	1.50	0.21	0.05
Male (compared with female)	–0.57	0.56	0.24	0.02*
Gender/sex not reported (compared with female)	0.14	1.15	0.75	0.85
Preparation program provider type[a]				
Provider 5 (compared with Provider 4)	–1.19	0.30	0.30	0.00***
Private providers (compared with Provider 4)	–0.74	0.48	0.28	0.01**
Alternative programs (compared with Provider 4)	–0.65	0.52	0.36	0.07
School characteristic				
High-need school[b]	0.52	1.68	0.23	0.03*
School enrollment	0.00	1.00	0.00	0.54
Secondary school (compared with elementary school)	0.24	1.27	0.26	0.35
Combined grades (compared with elementary school)	–0.80	0.45	0.41	0.05

* Significant at p < .05; ** significant at $p < .01$; *** significant at $p < .001$.

Note: n = 1,014. Overall model is significant with a Wald chi-square (13) = 46.70, $p < 0.00$. Goodness-of-fit tests: Hosmer & Lemeshow chi-square (8) = 3.48, Prob > chi-square = 0.90; Pearson chi-square (913) = 947.11, prob > chi-square = 0.21.

a. For the logistic regression analyses, preparation program provider types include Provider 4, a public provider and the reference group for the analysis; Provider 5, a public provider; private providers, excluding providers that offered only alternative programs; and private providers offering alternative programs.

b. A school or district in which the percentage of students eligible for the national school lunch program and the percentage of racial/ethnic minority students are both greater than 75 percent.

Source: Authors' analysis of Rhode Island Department of Education data for 2012/13–2017/18.

Appendix D. Other analyses

Teacher mobility and retention were the main focus of this study; however, stakeholders in Rhode Island also want a better understanding of the pipeline from teacher preparation programs to employment in state public schools. To provide this information, the study team analyzed the full set of data, including teachers who were trained in Rhode Island who were not teaching in the state public school system after graduating (tables D1 and D2), to determine the percentage of teachers who were trained in Rhode Island teacher preparation programs and whether this percentage varied by preparation field (tables D3 and D4). This information will allow stakeholders to better understand whether there is a recruitment problem in certain preparation fields (that is, whether teachers who were trained in high-demand fields are not employed in Rhode Island public schools in the years after they graduate).

Table D1. All teachers who were trained in Rhode Island and beginning teachers who were trained in Rhode Island who taught in the state public school system for at least one year, by cohort, 2012/13–2016/17

	All teachers who were trained in Rhode Island		Beginning teachers who were trained and teaching in Rhode Island	
Teacher cohort	Number	Percent of total	Number	Percent of number trained
2012/13	762	25.0	327	42.9
2013/14	611	20.1	240	39.3
2014/15	595	19.5	258	43.4
2015/16	562	18.5	210	37.4
2016/17	515	16.9	129	25.1
Total	3,045	100	1,164	38.2

Source: Authors' analysis of Rhode Island Department of Education data for 2012/13–2017/18.

Table D2. Percentage of beginning teachers who were trained in Rhode Island who taught in the state public school system for at least one year, by cohort and by years after preparation program completion, 2012/13–2016/17

	All teachers who were trained in Rhode Island (number)	Beginning teachers who were trained and teaching in Rhode Island (percent by year after preparation program completion)				
Teacher cohort		Year 1	Year 2	Year 3	Year 4	Year 5
2012/13	762	24.8	33.6	38.3	40.6	42.9
2013/14	611	25.4	33.2	37.0	39.3	—
2014/15	595	28.7	38.0	43.4	—	—
2015/16	562	30.1	37.4	—	—	—
2016/17	515	25.1	—	—	—	—
Total	3,045	26.7	33.6	36.6	37.6	38.2

— is not available.

Note: A small percentage of teachers within each cohort began teaching during their year of preparation, typically through a preliminary certification. The total number of unique new teachers over 2012/13–2017/18 is 1,164, but because of attrition or late entry into the workforce, the maximum number in any year was 909.

Source: Authors' analysis of Rhode Island Department of Education data for 2012/13–2017/18.

The percentages of all teachers who were trained in Rhode Island and of beginning teachers who were trained and teaching in the state varied by preparation program provider and program provider type. The two largest preparation program providers produced more than half of all teachers who were trained in the state and two-thirds of beginning teachers who were trained and teaching in the state (see table D3). Provider 4, a public undergraduate program, produced 30 percent of all teachers who were trained in the state and 44 percent of beginning teachers who were trained and teaching in the state.

The most common program type for teachers who were trained in Rhode Island from 2012/13 through 2016/17 was an undergraduate degree program, which produced 67 percent of all teachers who were trained in the state and 61 percent of beginning teachers who were trained and teaching in the state (see table D3). Alternative programs produced the smallest percentage of all teachers who were trained in the state (4 percent) but a larger percentage of beginning teachers who were trained and teaching in the state (10 percent). Although similar percentages of teachers were trained at public and private providers (that is, within 10 percentage points), the percentage of teachers who taught the state was higher among those who were trained at public providers (68 percent) than among those who were trained at a private providers (32 percent).

Table D3. All teachers who were trained in Rhode Island and beginning teachers who were trained in Rhode Island and who taught in the state public school system for at least one year, by program provider, program provider type, and program type, 2012/13–2017/18

	All teachers who were trained in Rhode Island		Beginning teachers who were trained and teaching in Rhode Island		
Category	Number	Percent	Number	Percent of all teachers	Percent of beginning teachers
Sample	3,045	100.0	1,164	38.2	100.0
Preparation program provider					
Provider 1	189	6.2	45	1.5	3.9
Provider 2	36	1.2	24	0.8	2.1
Provider 3	466	15.3	97	3.2	8.3
Provider 4	915	30.0	506	16.6	43.5
Provider 5	743	24.4	281	9.2	24.1
Provider 6	a	a	a	a	a
Provider 7	266	8.7	30	1.0	2.6
Provider 8	267	8.8	56	1.8	4.8
Provider 9	a	a	a	a	a
Provider 10	16	0.5	15	0.5	1.3
Provider 11	105	3.4	101	3.3	8.7
Preparation program provider type					
Private	1,387	45.6	377	12.4	32.4
Public	1,658	54.4	787	25.8	67.6
Preparation program type					
Undergraduate	2,028	66.6	705	23.2	60.6
Graduate	771	25.3	279	9.2	24.0
Nondegree	124	4.1	64	2.1	5.5
Alternative program	122	4.0	116	3.8	10.0

a. Data have been suppressed to protect privacy because of the small number or percentage of subjects in the cell.
Source: Authors' analysis of Rhode Island Department of Education data for 2012/13–2017/18.

Teachers with elementary and secondary certifications represent the highest percentage of all teachers who were trained in Rhode Island and of beginning teachers who were trained and teaching in the state for at least one year (see table D4). Teachers with special education certification and teachers with electives certifications had the next highest percentages of all teachers who were trained in the state and of beginning teachers who were trained and teaching in the state for at least one year. In other words, teachers with these certifications were hired at a higher rate in Rhode Island than their peers with other certifications.

Table D4. All teachers who were trained in Rhode Island and beginning teachers who were trained in Rhode Island who taught in the state public school system for at least one year, by teacher certification field, 2012/13–2017/18

	All teachers who were trained in Rhode Island		Beginning teachers who were trained and teaching in Rhode Island		
Teacher certification field	Number	Percent	Number	Percent of all teachers	Percent of beginning teachers
Early childhood	235	7.7	64	2.1	5.5
Elementary	1,269	41.7	430	14.1	36.9
Middle grades	238	7.8	123	4.0	10.6
Secondary	854	28.1	377	12.4	32.4
Special education	703	23.1	316	10.4	27.2
World languages	67	2.2	23	0.8	2.0
Electives	350	11.5	153	5.0	13.1
Nonteacher (for example, building administrators)	112	3.7	22	0.7	1.9

Note: Teachers may have more than one certification field; the data in this table reflect each teacher's field of certification if they had more than one.
Source: Authors' analysis of Rhode Island Department of Education data for 2012/13–2017/18.