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Trajectories into Teaching of Arkansas Educator Preparation Programs Enrollees

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Abstract

Teaching is one of the largest and most important professions in the United States, but there are important concerns about the current health of the profession, including some acute geographic and subject area shortages, declining professional prestige, dwindling student interest in pursuing teaching as a career, and a marked drop in enrollment in traditional Education Preparation Programs (EPPs). As a result, it is increasingly important to understand how teachers move through their preparation programs and into the teaching workforce. A better understanding of the early teacher pipeline could help states design policies and programs that strengthen the pipeline and alleviate teacher shortages. In this respect, prior research from Washington State found that a significant proportion of recently certified teacher candidates start their public school careers in non-teaching positions but transition to teaching within 5 years (Goldhaber et al., 2022). If such a "bench" of teachers exists in a state like Arkansas, which has documented teacher shortage areas, policies could potentially be designed to help place these qualified teachers in areas of need. In this paper, we present a comprehensive analysis of Arkansas EPP enrollees' labor market trajectories, using rich, statewide, linked administrative data capturing the universe of traditional public and charter school employees from higher education to the labor force. Our results indicate the presence of a "bench" of teachers in Arkansas who start their careers in non-main teacher positions (4%), but of a much smaller size than the one reported in prior work. We then study factors associated with the "bench" of teachers and find that this bench is partially explained by certification area and salary differentials across school districts.

Keywords: Teacher preparation, teacher candidates, labor trajectories

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1 Introduction

Teaching is one of the largest and most important professions in the United States, with approximately 3.8 million K-12 teachers (Bureau of Labor Statistics, 2022; National Center for Education Statistics, 2022). Research has shown that teachers have a significant impact on student learning and later life outcomes (Chetty et al., 2014). However, research has also raised concerns about the current health of the teaching profession, including some acute geographic and subject area shortages, declining professional prestige, dwindling student interest in pursuing teaching as a career, and a marked drop in enrollment in traditional Educator Preparation Programs (EPPs) (Kraft & Lyon, 2024). This puts the teaching profession in a challenging position, a situation that may have been exacerbated by the pandemic (Camp et al., 2024). At the same time, a growing number of teachers are trained in Alternative EPPs (Carver-Thomas, 2018), and an increasing number of states are exploring relaxing licensure requirements as well as creating new routes into teaching.

Given these concerns about the health of the teaching profession and the changing labor market environment brought by the pandemic, strengthening the teacher pipeline is a top priority for U.S. education policy. In this respect, it is increasingly important to understand how teachers move through their preparation programs and into the teaching workforce. However, the available literature and our understanding of the early teacher pipeline remain limited. On this matter, Bartanen et al. (2023) study the teacher pipeline from college application to initial employment using data from a large Texas university from 2009 to 2019. The authors find a sharp decline in interest in teaching during this period and substantial underrepresentation in teacher preparation among students of color, men, and those with higher SAT scores. Similarly, a recent report by Kilbride et al. (2023) uses data from Michigan to document how enrollment in undergraduate teacher education courses declined over time. Moreover, they find that only a fraction of students who take an initial education course continue to become student teachers. The authors also document how those who complete a teacher preparation program and become certified are more likely to enter Michigan's public school teaching workforce and more likely to remain in the profession.

However, individuals who obtain certification may not enter the teaching profession immediately. Goldhaber et al. (2022) examine the career trajectories of EPP enrollees in Washington State who did their student teaching between the 2004-5 and 2014-15 school years. They find that while approximately 75% of these prospective teachers appear to be working in the education sector the first year after their student teaching experiences, only one-third work as K-12 public school teachers the first year after student teaching, and an additional one-third of prospective teachers never work as a public school teacher within five years of completing student teaching. Interestingly, they found that 30.5% of certified teacher candidates start their public school careers in teaching-adjacent "bench" positions (e.g., substitute teachers, paraprofessionals). The authors conclude that this share of certified teachers who do not immediately enter a main teacher position may do so because of a lack of available positions rather than individual preferences. It is also possible that these teacher candidates are waiting in teaching-adjacent positions to assess if teaching is their desired profession or in hopes of gaining a "foot in the door" for positions with higher teacher salaries in the future. In their follow-up work, however, Goldhaber et al. (2023) find that those certified teacher candidates who entered the profession in non-teaching positions in public schools earned considerably less, on average, than those who initially became public school teachers.

We contribute to this available literature by studying the Arkansas early teacher pipeline. Arkansas presents a new context of study with both extensive teacher geographic and subject-related shortage areas, in more rural parts of the state and certain subjects, and higher average turnover than in Washington State (Camp et al., 2024). If such a "bench" of teachers exists in a state like Arkansas, with documented teacher shortage areas, policies could be designed to incentivize the placement of these qualified teachers in areas of need. We examine this issue using rich, statewide, linked administrative data provided by the Arkansas Department of Education. These data cover the universe of traditional public and charter school employees. We merge these data with higher education and licensure information, which enables us to provide a comprehensive analysis of Arkansas EPP enrollees[1]' labor market trajectories throughout their

[1] Throughout this paper we make comparisons with results described in Goldhaber et al. (2022). This paper examines career transitions for individuals after they complete student teaching while ours examines career transitions after exiting (as a completer or non-completer) an educator preparation program. This distinction is necessary as educator preparation programs in Arkansas do not universally include a student teaching experience.

time in the Arkansas education workforce. In particular, we seek to answer the following research questions:

1. How do EPP enrollees move through their training programs and into the workforce, and is there a "bench" of teachers in Arkansas?
2. Does the type of EPP (traditional vs. alternative) affect the likelihood of enrollees holding a teaching position within five years?
3. How do labor market trajectories and the potential "bench" of teachers vary by location and teacher certification area?
4. Do other factors, like EPP location and school district salary differentials with nearby districts, relate to the likelihood of enrollees holding a teaching position?

Our results indicate that to the extent that a "bench" of teachers exists in Arkansas, it is much smaller than what was documented by Goldhaber et al. (2022) in Washington State. We observe that while a larger proportion of Arkansan EPP enrollees begin working as a teacher one year after completion (52.7% as compared with 40.5%), a smaller proportion of EPP enrollees (4.1% as compared with 30.5%) begin their careers in public schools in teaching-adjacent roles. We find that alternative preparation program enrollees are more likely to take on a teaching position immediately after EPP separation. Additionally, we find that higher salary differentials between nearby districts and distance from EPP partly explain the likelihood of enrollees working in a non-teaching position in the first year after EPP completion.

2 Data

We use administrative data provided by the Arkansas Department of Education and maintained by the Office for Education Policy at the University of Arkansas, which connects higher education to the labor force for enrollees of education preparation programs in Arkansas. This dataset encompasses public and charter school employees throughout the state. Our research sample comprises approximately 20,500 individuals who were enrolled in or completed[2] an

[2] We include individuals who were enrolled in, but did not complete, an EPP as various waivers and alternative licensure programs in Arkansas would have allowed them to serve as teacher of record in an Arkansas public school. We associate each completer with the year they are reported as having completed their EPP and each non-completer with the last year in which they were enrolled in the EPP.

Arkansas EPP between the 2011-12 and 2019-20 school years. We then match these EPP records with job enrollment records from the universe of Arkansas traditional public and charter schools from the 2015-16 through 2021-22 school years.

These comprehensive data enable us to investigate the career paths of EPP enrollees (completers and non-completers) in the Arkansas public education sector with a particular focus on the labor outcomes of both teachers and those in teaching-adjacent roles over time. From now on, we will refer to these individuals who indicated a moderate degree of interest in the teaching profession as prospective teachers regardless of whether they completed the EPP or if they separated from the EPP before completion. Although we observe these individuals for up to five years, we examine the first, second, and fifth years following their exit from their EPP. Based on prior research by Goldhaber et al. (2022), we anticipate that these are critical years during which enrollees are most likely to make career transitions.

Our sample includes prospective teachers who become main teachers in Arkansas schools, those who take on other roles within the Arkansas education system, and those who leave the education sector entirely or leave the state. For prospective teachers who remain within the Arkansas education sector, we categorize them as either "Teacher in AR" or "Teaching-adjacent position in AR." Prospective teachers who transition out of public education or leave the state are labeled as "Not in AR public education." One limitation of our dataset is that we are unable to track the career trajectories of individuals "not in AR education" who have moved out of the state. Despite this limitation, our analysis is still able to provide valuable insights into the early educator pipeline and the role of EPPs in the state's education system.

Our data also contains information about prospective teachers' demographics, certification status, and the type of EPP (traditional vs alternative). For those who find employment in Arkansas public education, we merge these data with information on school districts' salary schedules to create a variable that represents the difference between a beginning teacher's salary and the average salary in other nearby public and charter schools within their respective education service cooperative (co-op)[3]. This variable allows us to estimate the

[3] Established by the State Board of Education, the Education Service Cooperatives (co-op) in Arkansas are intermediate service units in the state's elementary and secondary education system. Each of Arkansas's 16 co-ops are comprised of geographically and demographically similar member districts and, so, constitute a plausible local teacher labor market.

relationship between the likelihood of a prospective teacher accepting a teaching position in a particular school district and how competitive that district's salaries are compared with surrounding districts. Additionally, we consider the distance between a prospective teacher's EPP location and their current district's office to assess the impact of geographical proximity on career decisions. We construct this variable as the "as the crow flies" (geodesic) distance between a teacher's district's home office building and their EPP's location for traditional preparation programs. For alternative preparation programs which often do not operate with a fixed physical location, we assume a distance of 0 miles.

We additionally examine the relationship between a prospective teacher's intended certification area while enrolled in their EPP and the likelihood of working in a school as a teacher or teaching-adjacent position. Using the intended certification area while enrolled in the EPP allows us to both consider non-completers as well as investigate the relationship between intending to obtain credentials to teach subject-area shortage courses (e.g., special education or STEM courses) and the likelihood of working as a teacher. These estimates offer insight into the role potential staffing challenges play in inducing individuals to teach or teaching-adjacent roles. Specifically, we examine the relationships between pursuing[4] a certification in STEM or SPED and labor outcomes.

The Arkansas Context & Descriptive Statistics

Figure 1 presents the number of new EPP enrollees in Arkansas by program type and year, from 2011 to 2022. As it has been reported is the case in many states (Saenz-Armstrong, 2023), enrollment in traditional EPPs has declined over time in Arkansas despite an increase in the number of enrollees in alternative programs. As of 2022, 58% of EPP enrollees came from traditional programs while 42% came from alternative programs. The number of alternative enrollees has grown rapidly, increasing from 18% in 2011 to approximately 40% in recent years. The growing popularity of alternative programs may be attributed to several factors including their accessibility, particularly for individuals who are already employed in or outside of the public education workforce. Many alternative programs in Arkansas offer coursework that can be

[4] The SPED and STEM variables denote that the enrollee is taking courses towards a credential in these areas. While they are pursuing these credentials, it does not mean that they will become certified.

completed online and at a more flexible pace. In contrast, traditional teacher preparation programs are typically integrated into undergraduate studies.

<< ***Figure 1 - Educator Preparation Program Enrollees, 2011-2022*** >>

In addition to the decline in enrollment in teacher preparation programs described above, Arkansas is a state with documented teacher shortages in certain subjects and areas of the state. Figure 2 presents the proportion of teachers holding a licensure exemption during the 2021-22 school year to illustrate teacher shortages in the state. Emergency credentialed teachers are individuals who have not completed an EPP but are called upon to fill teaching vacancies due to the pressing need for educators. Therefore, a higher proportion of teachers on licensure waivers indicates the difficulty of school districts to fill their open positions with qualified teachers. Teacher shortages appear especially acute in Eastern and Southern Arkansas. In addition to these geographic shortages, Arkansas experiences widespread shortages in certain subjects. The Arkansas Department of Education has identified the following state-wide subject areas of teacher shortage: Foreign Language, Secondary English Language Arts, Secondary Mathematics, Secondary Science, Secondary Social Studies, and Special Education.[5]

Finally, Arkansas is a state with relatively high rates of yearly teacher turnover. When measured as the proportion of teachers who either move schools, switch to other roles in the Arkansas education sector, or leave the education sector, Camp et al. (2024) document average teacher turnover rates between school years 2014-15 and 2019-20 of about 22%. This rate of teacher turnover in Arkansas increased to an average of 23% during the first three pandemic school years (2020-21, 2021-22, and 2022-23). Overall, these results indicate that, like many other areas in the country, Arkansas is a state where the teaching profession is in a challenging position. Having a better understanding of the early teacher pipeline can help inform the design of targeted policies to alleviate teacher staffing challenges across the state.

[5] https://dese.ade.arkansas.gov/Files/23-24_Doc_with_all_geographic_and_ESC_by_subject_EEF.pdf

<< ***Figure 2 - Percentage of Teachers on Licensure Waivers by District, 2022*** >>

We next study the composition of our analytical sample of Arkansas prospective teachers who separated from EPP programs (i.e., completed or exited without completing) between the 2011-12 and 2019-20 school years. In Table 1, we present sample statistics for prospective teachers during their first year after separation. In the first row, we present the percentage of prospective teachers who pursue different pathways in the workforce one year after they exit their EPP program. Among all prospective teachers in the sample, 53% immediately transitioned into teaching roles within Arkansas public schools, while 4% of the sample assumed teaching-adjacent positions within public schools in the state. The remaining 43% are not currently employed in Arkansas school districts.

In comparison with Washington State (Goldhaber et al., 2022), the proportion of prospective teachers with a license who transition into main teaching positions in public schools in the first year is much larger at 78%, compared with 41% in Washington State. However, the proportion of prospective teachers holding a license and taking a non-teaching position in public schools, which we consider the "bench" of teachers, is much lower in Arkansas (4% compared with 31%). Finally, while 19% of prospective teachers holding a license are not in the AR education sector their first year after exit, 29% of license holders were not observed in Washington public schools one year after teaching. These results indicate that although we observe a "bench" of teachers in Arkansas, it does not appear to be as large as the "bench" reported in Washington State. This could be due to numerous differences across the two states in terms of job market opportunities, inside and outside education, for EPP enrollees.

<< ***Table 1 - Summary Statistics, Year One After EPP Separation*** >>

Table 2 reproduces the summary statistics in Table 1 five years after prospective teachers separate from their EPP. Consistent with Goldhaber et al. (2022), we find that the proportion of individuals working in teaching-adjacent positions has decreased somewhat over the five years since EPP separation (3.4% as compared to 4.1% in year 1). Similarly, we see evidence of early career attrition from the teaching profession as 46% of prospective teachers are observed in teaching positions at this time, a decrease of 7 percentage points since one year after EPP separation.

Upon further examination of the demographic composition of our samples in Tables 1 and 2, we observe that approximately 74% of our sample of prospective teachers are female and 80-82% are white, which appears representative of the teaching profession nationally (National Center for Education Statistics, 2022). Interestingly, Black prospective teachers appear approximately 1.5 and 3 percentage points more likely than white prospective teachers to hold a non-teaching position in Arkansas schools one and five years after EPP separation, respectively. Black EPP prospective teachers also appear approximately 1 percentage point more likely than white prospective teachers to be employed in the public school workforce the year after EPP separation.

One year after EPP separation, a majority of EPP completers (64%) and especially those holding an education license (78%) start their careers in a main teaching position in Arkansas schools. However, about 4% of those prospective teachers hold a teaching license but start their careers in a non-main teacher position. We consider these individuals, who are fully credentialed to hold a teaching position, as the "bench" of teachers. While various reasons may account for these individuals working in teacher-adjacent roles, evaluating their potential to help address teacher shortages is informative for policy design. In this respect, our results show that while there is a "bench" of teachers in Arkansas, this phenomenon appears to be less frequent than what Goldhaber et al. (2022) documented was the case in portions of Washington State. In Arkansas, if these individuals were induced into teaching roles, it would only constitute approximately 50 additional teachers per year (0.16% of the statewide teacher workforce).

Other interesting patterns appear in these summary statistics. Not surprisingly, those who pursued a STEM or SPED certification, an area of shortage statewide, are more likely to start their career in a main teaching position than those without STEM or SPED certifications. Looking at the composition of our sample of prospective teachers 5 years after EPP separation, in Table 2, we observe that the demographic composition of prospective teachers in different employment categories remains fairly stable, and the "bench" of licensed teachers in non-teaching positions reduces by approximately 1.7 percentage points. Our next section will further describe these employment transitions for our sample of prospective teachers, as well as factors associated with the probability of employment in main teacher positions over time.

<< ***Table 2 - Summary Statistics, Year Five After EPP Separation*** >>

3 Methods & Results

In this section, we return to our research questions and further describe the transitions of prospective teachers through their training programs, licensure, and into the workforce, how these trajectories and the potential "bench" of teachers vary by location in the state/certification area, and which factors are related to the likelihood of prospective teachers holding a main teacher position. We start with a descriptive analysis of the trajectories of prospective teachers and then use statistical logit models to study the factors associated with the probability of holding a main teacher position, as we describe below.

Employment transitions of EPP enrollees

Figure 3 displays the pathways that prospective teachers take one year after separation from their EPP. The majority (78.1%) complete their EPP, while 21.9% do not. Among those who complete their EPP, 73.4% go on to become licensed, while 26.6% do not obtain a teacher license. This graph then shows where the enrollees end up, holding a main teaching position in AR public schools, holding a non-teaching position in AR public schools, or not becoming employed in an Arkansas school district. We observe that, as described above, about 4% end up in non-teaching positions in AR public schools. These teacher candidates make up our "bench" in Arkansas.

<< ***Figure 3 – Career Trajectories of EPP Enrollees, Year 1*** >>

Figure 4 focuses on a subset of our analytic sample who have taken on teacher-adjacent roles in Arkansas schools and remain employed by Arkansas schools five years after EPP separation. This figure visualizes what positions they have taken their first year after EPP exit and follows them through year 5. Results show that a majority (66.6%) of these candidates in teacher-adjacent positions begin in instructional support positions (e.g., paraeducators and instructional aides). Similar to trends documented by Goldhaber et al. (2022) for Washington State, a large proportion of those who enter public education in teacher-adjacent positions transition into teaching roles five years after EPP separation. Overall, approximately 55% of those adjacent teaching positions in AR schools in year one made the transition to a main teaching position by year 5.

<< ***Figure 4 - Transitions of Enrollees in Non-Teaching Positions, Year 1 to Year 5*** >>

We next study the geographical distribution of those enrollees in main and non-main teacher positions one year after exiting their EPP in Figure 5. Comparing this map with that representing shortage areas in Figure 2 above, we observe that, unsurprisingly, there is a lack of overlap between the two. The areas that hire a higher proportion of EPP enrollees in teaching and adjacent-teacher positions correspond to areas in the Northwest and Central parts of the state. These correspond with the most urban areas in the state, with districts offering higher teacher salaries at the time. In our empirical analysis below, we will further study how these salary differentials could help explain a higher probability of holding a main teacher position.

<< ***Figure 5 - Maps of Percentage of Enrollees in Teaching and Non-Teaching Areas, Year 1*** >>

We next study the trajectories of prospective teachers one, two, and five years after exit for prospective teachers with different credentials in Figure 6. The first groups we consider are those prospective teachers who pursued a STEM certification and those who pursued a SPED endorsement, two areas of shortage in the state. We compare their job trajectories with those of those pursuing an elementary school license and those who do not intend to obtain either a STEM or SPED certification or an elementary license. This latter group includes middle or high school enrollees without a focus on STEM or SPED. As we can see in Figure 6, over 50% of those enrollees planning on a STEM endorsement start their careers in a main teaching position in Arkansas one year after exiting their program, while 3.5% and 40.1% start in a non-teaching position or leave the Arkansas education sector, respectively. This distribution is very similar for the second year after EPP separation for those planning on a STEM endorsement, but five years later, we observe an increase in the percentage leaving the education sector for this group. This increase in the percentage of enrollees out of the Arkansas education sector five years after exiting the program is also observed among those holding a SPED endorsement or those without a STEM or SPED endorsement or an elementary license. Interestingly, this is not the case for those holding an elementary school license. For this latter group, the percentages of enrollees not in Arkansas schools remain stable over time.

Similar to those pursuing a STEM endorsement, we see that a relatively small proportion of those pursuing a SPED endorsement start their careers in adjacent teaching positions, although we observe that the proportion transitioning to teacher-adjacent roles begins to increase during the second year post-EPP separation. However, five years after separation, the proportion no longer working in Arkansas schools increased from 40.6% the first year to 51.7% indicating high attrition amongst those prepared as SPED teachers. Finally, it is interesting to observe that among those holding an elementary school license, we also observe a transition from adjacent teacher positions to teaching positions two years after exiting the programs, before increased attrition results in nearly 48% of prospective teachers no longer working in Arkansas public education five years after separating from their EPP.

<< ***Figure 6 - Transitions of Enrollees in Non-Teaching Positions, Year 1 to Year 5*** >>

Factors associated with the probability of prospective teachers holding a main teacher position one, two, and five years after EPP Separation

We next use statistical multinomial and binary logit models to study the factors associated with prospective teachers in different employment categories, one, two, and five years after exiting the program. We first use the entire sample of prospective teachers and use a multinomial logit model to study the likelihood of a prospective teacher being observed in any of the three employment categories we consider (i.e., Teacher in Arkansas school, Non-teacher in Arkansas school, and Not in Arkansas school) and factors relating to these possible employment options.

In our multinomial logit specification in (1), $\boldsymbol{Y_{it}}$ is the employment decision made by the teacher $\boldsymbol{i}$ entering year $\boldsymbol{t}$ after EPP exit. The vector $\boldsymbol{X_i}$ includes individual characteristics of teacher $\boldsymbol{i}$ that relate to their labor transitions including race (dummies for a teacher identifying as Black, Hispanic, Asian, and Other, with white teachers as reference), gender (A dummy for the teacher identifying as female), planned certification areas (dummies for STEM, SPED and Other certification), information about EPP type (A dummy for traditional EPP enrollee with alternative programs enrollee as a reference), license and completion status (A dummy for completing their EPP, an interaction term between traditional EPP and completion, and a dummy for holding an education license).

$$\Pr(Y_{it} = j|Y_{it}) = \frac{exp\ (X_i'\beta_j)}{\Sigma_{l=3}^{m} exp\ (X_i'\beta_l)} \tag{1}$$

$$\text{where } j = \begin{cases} 1\ Teacher\ in\ Arkansas\ School \\ 2\ Non-teaching\ Position\ in\ Arkansas\ School \\ 3\ Not\ in\ Arkansas\ School \end{cases}$$

Secondly, we focus on those prospective teachers who are observed working in the Arkansas education sector and use a binary logit model to study factors associated with the probability of holding a main teacher position relative to a non-teacher position in Arkansas schools. This model includes all the variables in $\boldsymbol{X_i}$, described above, along with a variable capturing the difference between the school district's entry salary for those holding a bachelor's degree and the average salary in surrounding districts that belong to the district's co-op (measured in \$1,000). This variable helps us study to what extent the level of competitiveness of a district's beginning salary plays a role in EPP enrollees' labor transitions. In this case, we also include a variable capturing the distance (in 10s of miles) between the EPP and the school district a candidate works at after separating, to study the potential effect of geographical proximity on career decisions. For both our multinomial logit and binary logit models, we present results as average marginal effects to ease interpretation.

Table 3 presents the marginal effects of our multinomial logit model described in (1). The estimated coefficients for the variable *Traditional* capture the differences in probabilities for non-completers traditional EPP enrollees as compared with non-completers alternative enrollees. In this case, we observe that non-completer alternative enrollees are more likely to hold a main teacher position than traditional non-completer enrollees (37 percentage points more likely) one year after exiting the program. However, this difference is reduced to levels that are not meaningfully different from zero two and five years after separation. We also observe how traditional non-completer enrollees are also much more likely not to be employed in Arkansas schools than alternative non-completers one year after separation (37 percentage points) and slightly less likely to hold an adjacent teacher position in Arkansas schools (2-3 percentage points) two and five years after separation. This could be a result of the design of alternative programs, as these programs often include teaching under a licensure waiver in their design.

Focusing on EPP completers and adding the terms for *Traditional* and *Traditional Completer*, we observe that prospective teachers from traditional programs are about 8.1 percentage points less likely to hold a main teacher position and 7.6 percentage points more likely to be out of Arkansas schools one year after exit, as compared to completers of alternative programs. This difference is reduced to statistically insignificant levels in years 2 and 5. Again, these results suggest that alternative program enrollees are better retained in Arkansas schools and in main teacher positions in the initial year after exiting their program. Finally, having a teacher license is associated with a higher probability of holding a main teacher position and a lower probability of exiting Arkansas schools.

<< ***Table 3 - Factors Associated with EPP Enrollees Labor Transitions 1, 2, and 5 Years after Exit (Multinomial Logit-Average Marginal Effects)*** >>

Looking at the intended concentration area, we observe that those who pursued STEM certifications are more likely to secure teaching positions in Arkansas and less likely to work outside of the state's schools the first two years after separating from their EPP, compared to those not planning on a STEM credential. In year one, those who pursued STEM are 6 percentage points more likely than those who did not pursue a STEM credential to hold a main teaching position. They are also 1.3 percentage points less likely to work in a teaching-adjacent position and 4.6 percentage points less likely to seek employment outside of Arkansas schools. This is likely because STEM teachers are in high demand due to their relative scarcity in the state. Interestingly, despite special education being a statewide teacher shortage area, SPED certifications are not significantly associated with differential probabilities of becoming a teacher, working in a teaching-adjacent position, or not working in Arkansas public schools one year after EPP separation.

Focusing on teacher diversity, we observe that, keeping other things constant, Black prospective teachers are more likely to hold a main teacher position and more likely to leave Arkansas schools than white teachers one year after EPP separation. Five years after separation, however, we observe that Black prospective teachers are 3.5 percentage points less likely than white prospective teachers to work in Arkansas public education and 1.8 percentage points more likely to work in teaching-adjacent positions. This result is consistent with well-established differential attrition by race in the Arkansas educator workforce (Camp et al., 2024).

<< ***Table 4 - Among Those in AR Schools, Factors Associated with an Enrollee Taking on a Main Teacher Position (Logit Model-Average Marginal Effects)*** >>

Focusing on EPP enrollees who remain in Arkansas schools, Table 4 shows our results for a logit model studying the probability of holding a main-teacher position as compared with the probability of being in a teaching-adjacent position. The advantage of this specification, as compared to the multinomial model results discussed above, is that in this case, we can study the role that the district's salary competitiveness and distance from the EPP may have in these labor transitions. Focusing on salary differentials, we observe that a $1,000 increase in initial teacher salaries in the district compared with nearby districts is associated with a decrease in the probability of taking a main teaching position of about 0.8 percentage points and 0.5 percentage points, one and two years after exit, respectively. We do not find a significant association, however, 5 years after exit. These results may suggest that prospective teachers are willing to take teacher-adjacent positions in school districts with relatively more competitive salaries or that prospective teachers are responsive to the opportunity cost of pursuing a "foot in the door" strategy for their ideal teaching placement. Looking at the estimated coefficient for measures of distance between the EPP and the school district of employment, our results suggest that prospective teachers whose EPPs are located further away from the district they work in are less likely to hold a main teacher position during the first two years after exiting the program. The rest of the results go in line with those presented for the multinomial logit model in Table 3 above.

4 Discussion and Future Work

Teaching is one of the largest and most important professions in the United States, but there are important concerns about its current health, including some acute geographic and subject area shortages, declining professional prestige, dwindling student interest in pursuing teaching as a career, and a marked drop in enrollment in traditional Education Preparation Programs. As a result, strengthening the teacher pipeline is a top priority for U.S. education policy. In this paper, we present a comprehensive analysis of Arkansas EPP enrollees' labor market trajectories, using rich, statewide, linked administrative data capturing the universe of traditional public and charter school employees from higher education to the labor force.

Our results document how EPP enrollees take various career paths after exiting their programs. We observe that about 4% of enrollees start their careers in non-teaching positions. These enrollees constitute what Goldhaber et al. (2022) referred to as a "bench" of teachers and represent prospective teachers who could be available to teach in main teaching positions but opt not to do so. Although present in Arkansas, this "bench" of teachers appears much smaller than the 31% of teacher candidates documented by Goldhaber et al. (2022) in parts of Washington State. Future research may seek an explanation for these differences in the context of each study. Arkansas is a state with higher levels of teacher shortages, and so, main teacher positions might be more readily available for qualified prospective teachers. Arkansas also has a long history of alternative education preparation programs, and our results suggest that teacher candidates in these programs are more likely to hold main teaching positions. Moreover, job options outside the classroom might not be as appealing in Arkansas. For instance, the average salary for paraeducators in the state at the time of this study was about $31,000 per year, in contrast with an average teacher salary of $41,000 during the 2022-23 school year.

Despite the differences in the size of Arkansas's "bench" of teachers compared to that documented in Washington State, we find similar results to Goldhaber et al. (2022) in that a majority of those starting in a teaching-adjacent position ultimately transition into main teaching roles within five years. Our results also show how salary differentials compared with nearby districts could partially explain the likelihood of holding these adjacent teacher positions. Here, it is important to note that our study period in this paper is before the introduction of new minimum teacher salary legislation in Arkansas through the LEARNS Act of 2023, which has equalized beginning teacher salaries across the state (Zamarro et al., 2024). In future work, we plan to study the implications of Arkansas's minimum salary increases under LEARNS on the "bench" of teachers in the state. We anticipate that the result will probably be an even smaller share of teachers in adjacent-teacher positions. On the other hand, prospective teachers also appear to be willing to locate further away from their EPPs to hold these adjacent teaching positions, a tendency that might have also changed under the new minimum teacher salaries with the LEARNS Act.

The difference between the size of the "bench" of teachers found in Washington State and Arkansas has several potential explanations, each of which has direct implications for policy formation. First, it is important to note that these studies not only take place in different states but also at different times. The last cohort of student teachers included in Goldhaber et al. (2022) student taught during the 2014-15 school year, while we do not observe any prospective teachers working in schools until the 2015-16 school year. Importantly, Goldhaber et al. (2022) observe a consistent trend indicating that teacher candidates entering the education sector increasingly work as K-12 public school teachers from 2010-11 onwards. While only a quarter of teacher candidates who student taught during the 2010-11 school year worked as a K-12 public school teacher one year after their student teaching experience, Goldhaber et al. (2022) find that nearly 70% of those who student taught in 2014-15 worked as K-12 public school teachers one year later. The authors attribute this trend, at least in part, to labor market conditions created by the Great Recession. One possible interpretation of this trend, and our results, is simply that the "bench" of prospective teachers has rapidly shrunk in recent years.

A second and perhaps equally likely explanation is that Arkansas and Washington State differ substantially in terms of job opportunities and credentialing pathways both inside and outside of the education sector. For example, in May 2022 (the latest year in our analysis), the mean annual wage among short-term substitute teachers in Washington State was $48,190 (Bureau of Labor Statistics, 2023), which is approximately $7,000 more per year than the average salary for fully credentialed teachers in Arkansas. Those individuals who comprise the "bench" of teachers in the study by Goldhaber et al., (2022) could then perceive less of an opportunity cost for remaining on the bench as compared to prospective teachers in Arkansas. Future research is needed to determine the role of these larger labor market factors in inducing individuals towards a "bench" for the teaching profession.

At present, the size of the bench that we observe indicates that policy innovations intended to induce these prospective teachers to enter the teaching workforce would have only marginal impacts on aggregate teacher supply in the state. While even a small number of additional teachers in the classroom could have positive impacts on students' outcomes, it is important to note that most of the "bench" in Arkansas is located in areas that do not, at present or historically, struggle with teacher shortages (e.g., Central and Northwest Arkansas). Our results would suggest that political and fiscal capital intended to expand students' access to effective teachers should be spent elsewhere, perhaps in retaining Black and STEM teachers that we observe leaving the education sector at higher rates than white and non-STEM teachers.

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Figures

Figure 1 - Educator Preparation Program Enrollees, 2011-2022

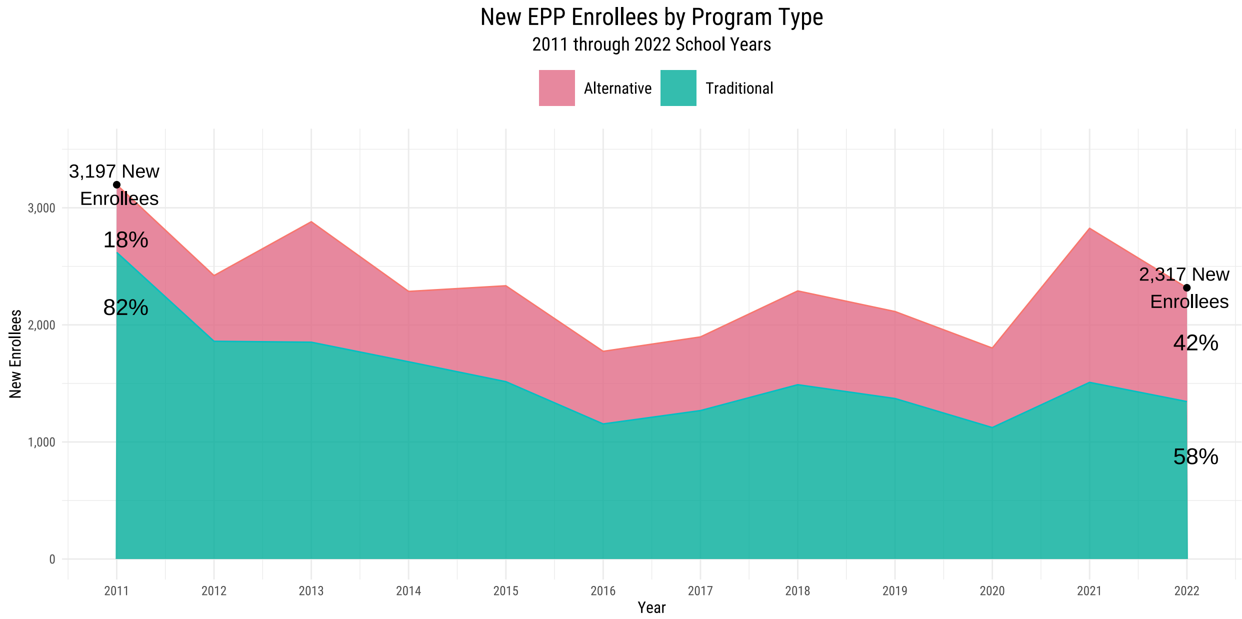


Figure 2 – Percentage of Teachers on Licensure Waivers by District, 2022

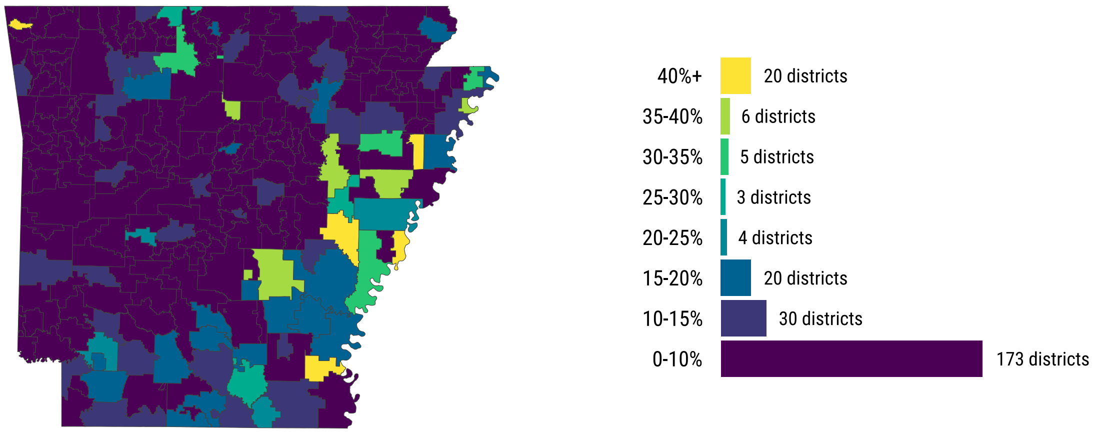


Figure 3 – Career Trajectories of EPP Enrollees, Year 1

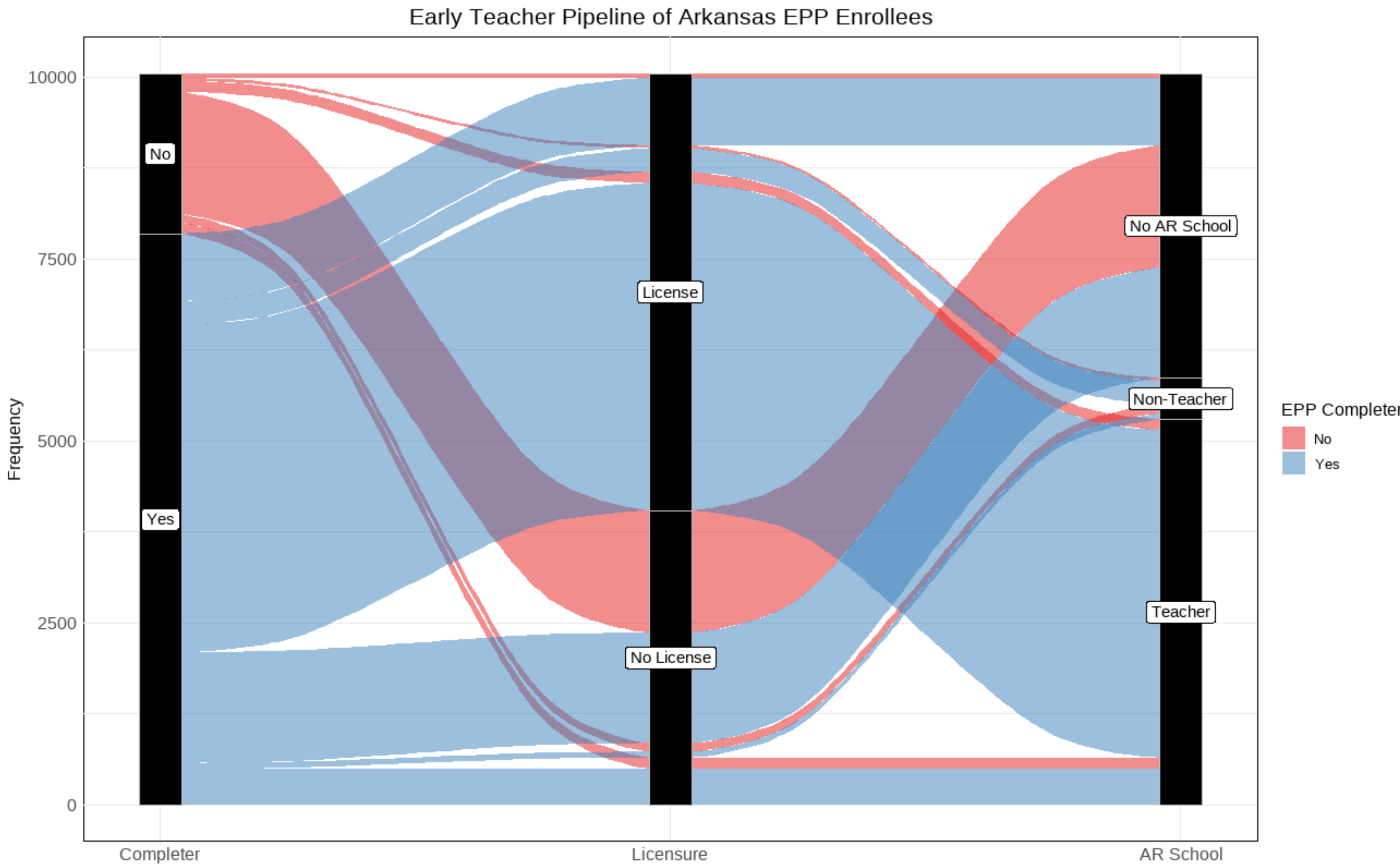


Figure 3 – Career Trajectories of EPP Enrollees, Year 1

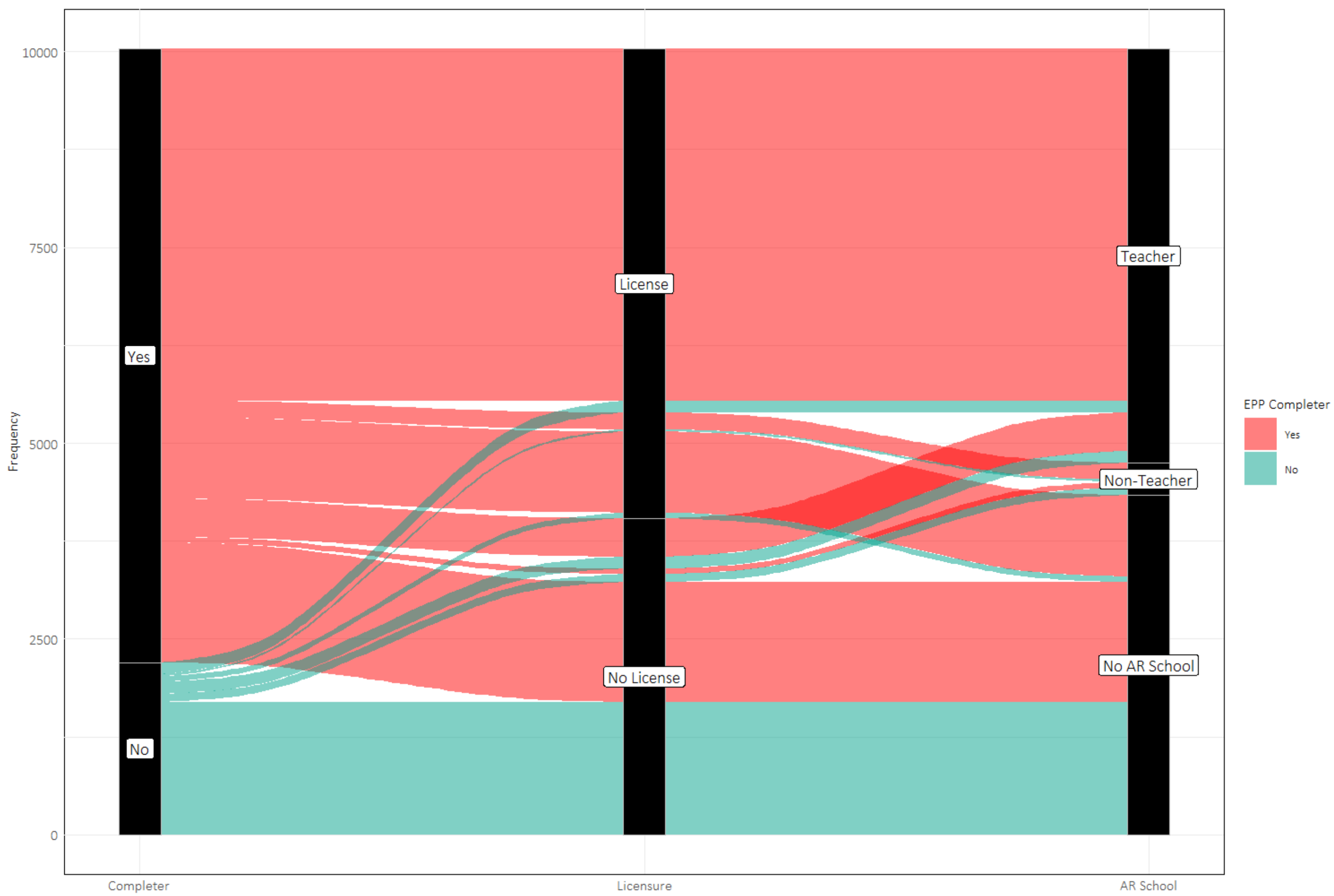


Figure 4 – Transitions of Enrollees in Non-Teaching Positions, Year 1 to Year 5

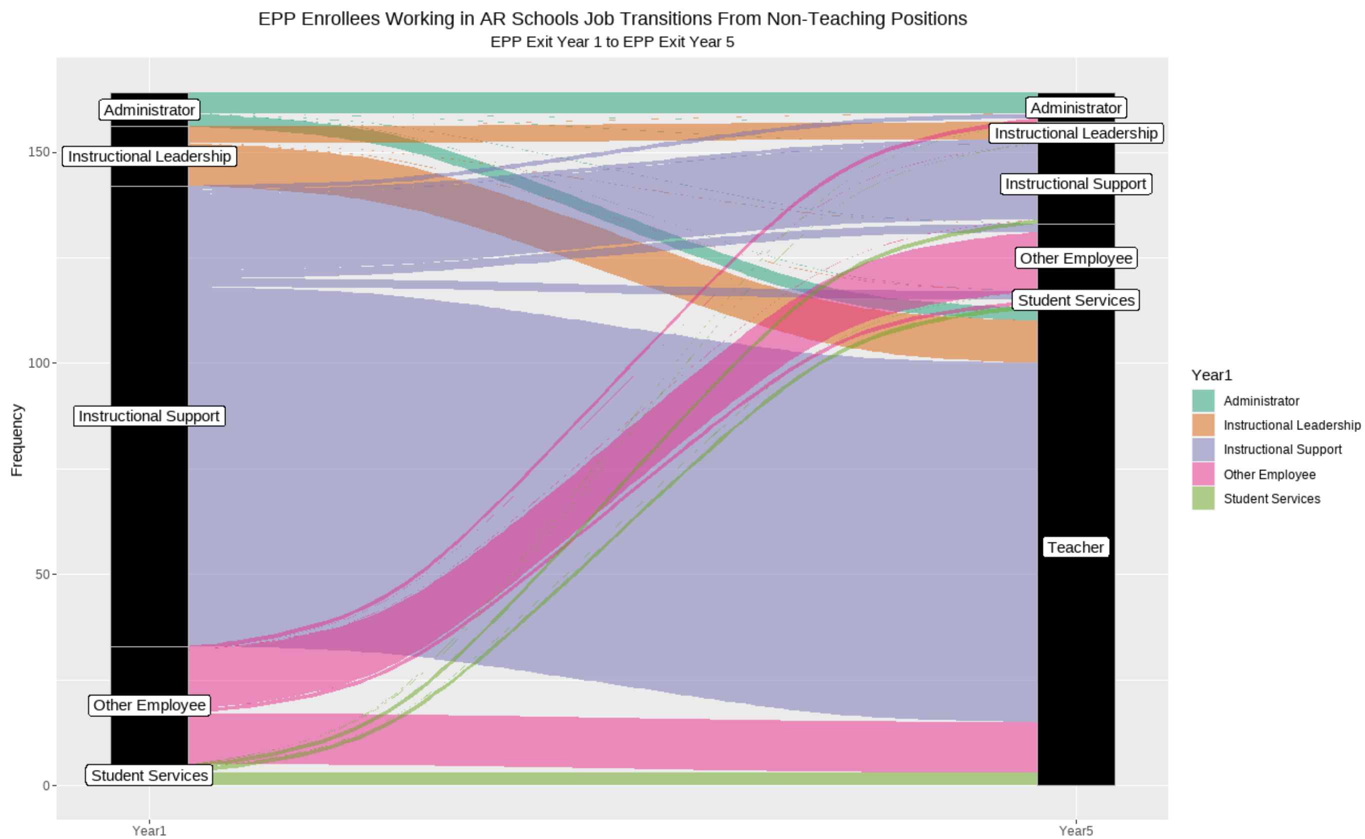


Figure 5 – Maps of Percentage of Enrollees in Teaching and Teaching-Adjacent Areas, Year 1

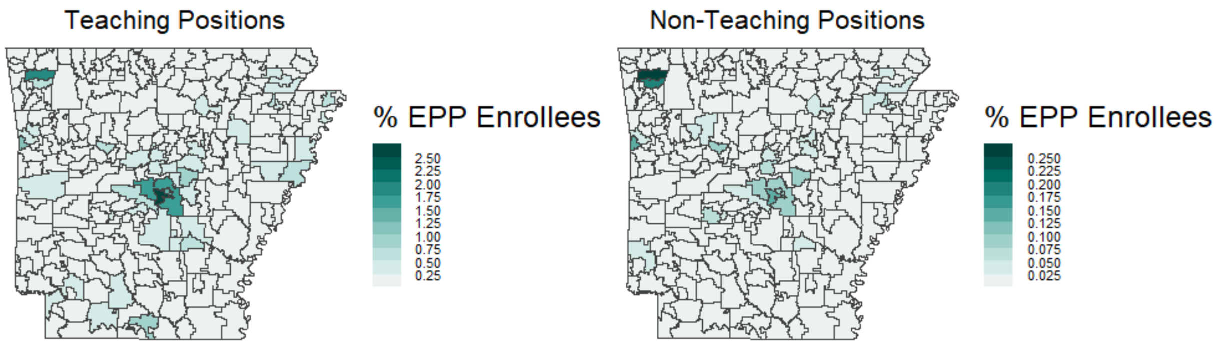
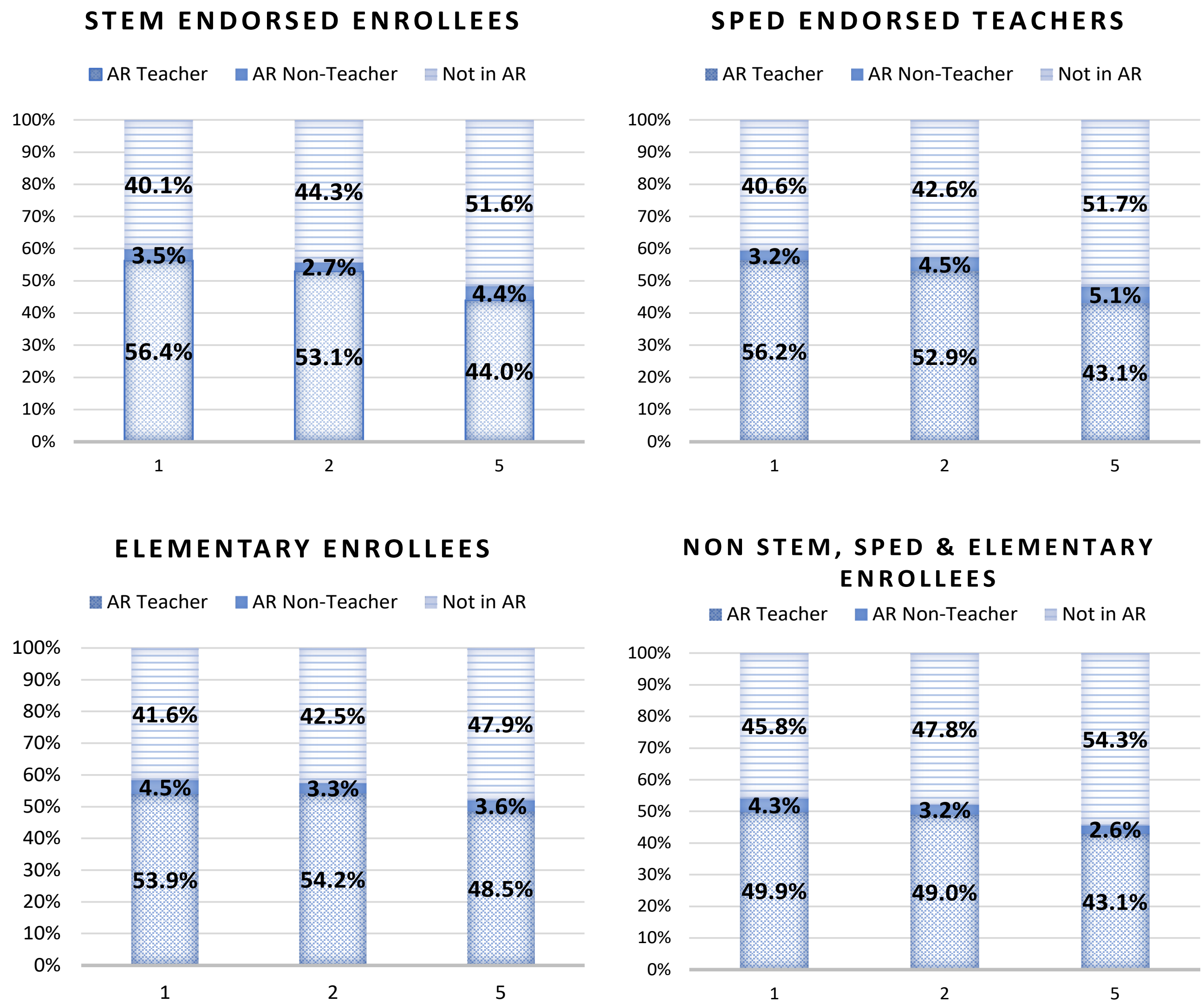


Figure 6 – Transitions of Enrollees in Non-teaching Positions, Year 1 to Year 5



Tables

Table 1 - Summary Statistics, Year One After EPP Exit

	Total	Employment Outcomes (%)		
		Arkansas Public School Teacher (52.7%)	Arkansas Public School Non-Teacher (4.1%)	Not in Arkansas Public Schools (43.2%)
Traditional EPP	64.9%	50.3%	3.7%	46.0%
EPP Completer	78.1%	63.6%	3.6%	32.7%
Traditional X Completer	54.1%	59.8%	3.8%	36.4%
White	80.0%	54.9%	3.8%	41.3%
Black	6.7%	53.8%	5.5%	40.8%
Hispanic	2.3%	52.6%	6.9%	40.5%
Asian	0.7%	23.5%	4.4%	72.1%
Other Race	10.3%	37.3%	4.9%	57.8%
Female	73.3%	54.9%	4.0%	41.1%
Licensed	59.8%	77.5%	4.0%	18.5%
Middle/High Certification	69.7%	53.9%	4.4%	41.6%
Elementary Certification	64.8%	52.1%	4.0%	43.9%
STEM Certification	17.6%	56.7%	3.6%	39.6%
SPED Certification	2.8%	55.6%	3.6%	40.8%
Other Certification	2.0%	23.5%	7.8%	68.6%
N	10,041	5,294	413	4,334

Table 2 - Summary Statistics, Year Five After EPP Exit

	Total	Employment Outcomes (%)		
		Arkansas Public School Teacher (45.6%)	Arkansas Public School Non-Teacher (3.4%)	Not in Arkansas Public Schools (51.0%)
Traditional EPP	71.5%	47.5%	2.7%	49.8%
EPP Completer	79.2%	53.5%	3.4%	43.2%
Traditional X Completer	58.2%	54.2%	2.8%	43.0%
White	82.0%	47.4%	3.2%	49.5%
Black	6.1%	45.7%	6.2%	48.2%
Hispanic	1.9%	48.0%	5.5%	46.5%
Asian	0.8%	24.4%	0.8%	74.8%
Other Race	9.2%	31.5%	3.4%	65.1%
Female	74.2%	47.7%	3.3%	48.9%
Licensed	55.1%	79.5%	4.8%	15.7%
Middle/High Certification	71.0%	48.5%	3.6%	48.0%
Elementary Certification	63.6%	43.4%	3.3%	53.3%
STEM Certification	22.6%	44.2%	4.4%	51.4%
SPED Certification	2.1%	43.1%	5.1%	51.8%
Other Certification	1.4%	26.4%	4.8%	68.8%
N	16,988	7,753	576	8,659

Table 3 - Factors Associated with EPP Enrollees Labor Transitions 1, 2, and 5 Years after Exit (Multinomial Logit-Average Marginal Effects)

	Year 1			**Year 2**			**Year 5**		
	Teacher	Non-Teacher	Non-School	Teacher	Non-Teacher	Non-School	Teacher	Non-Teacher	Non-School
Traditional EPP	-0.365***	-0.004	0.369***	-0.009	-0.022***	0.030*	0.019	-0.028***	0.009
	(0.034)	(0.010)	(0.030)	(0.017)	(0.005)	(0.016)	(0.016)	(0.007)	(0.014)
EPP Completer	0.121***	-0.047***	-0.075***	0.151***	-0.028***	-0.122***	0.058***	-0.026***	-0.032**
	(0.015)	(0.007)	(0.015)	(0.014)	(0.005)	(0.014)	(0.015)	(0.006)	(0.013)
Traditional X Completer	0.284***	0.009	-0.293***	-0.026	0.009	0.017	0.009	0.008	-0.018
	(0.035)	(0.011)	(0.031)	(0.018)	(0.007)	(0.018)	(0.017)	(0.007)	(0.016)
Black	0.053***	0.006	-0.059***	0.052***	0.010**	-0.062***	0.016	0.018***	-0.035***
	(0.016)	(0.007)	(0.016)	(0.014)	(0.005)	(0.014)	(0.011)	(0.005)	(0.011)
Hispanic	-0.012	0.025**	-0.013	-0.015	0.018**	-0.004	0.012	0.020**	-0.032*
	(0.025)	(0.010)	(0.025)	(0.021)	(0.008)	(0.021)	(0.019)	(0.008)	(0.018)
Asian	-0.139***	0.013	0.126**	-0.116***	0.004	0.112***	-0.052	-0.042	0.095***
	(0.054)	(0.024)	(0.050)	(0.042)	(0.018)	(0.040)	(0.036)	(0.033)	(0.030)
Other Race	-0.031**	0.011	0.019	-0.037***	0.008	0.029**	-0.008	0.004	0.004
	(0.015)	(0.007)	(0.015)	(0.013)	(0.005)	(0.012)	(0.010)	(0.005)	(0.010)
Female	-0.000	-0.005	0.005	-0.007	-0.001	0.007	-0.010	-0.008**	0.018***
	(0.010)	(0.005)	(0.010)	(0.008)	(0.004)	(0.008)	(0.007)	(0.003)	(0.006)
Licensed	0.372***	0.003	-0.375***	0.426***	-0.002	-0.424***	0.437***	-0.001	-0.436***
	(0.005)	(0.004)	(0.005)	(0.004)	(0.002)	(0.004)	(0.005)	(0.002)	(0.004)
Middle/High School Cert.	-0.035***	-0.003	0.037***	-0.033***	-0.005	0.037***	0.016**	-0.013***	-0.002
	(0.010)	(0.005)	(0.010)	(0.008)	(0.004)	(0.008)	(0.006)	(0.004)	(0.006)
STEM Certification	0.059***	-0.013**	-0.046***	0.028***	-0.004	-0.024**	-0.011	0.013***	-0.002
	(0.011)	(0.006)	(0.011)	(0.010)	(0.004)	(0.009)	(0.007)	(0.004)	(0.007)
SPED Certification	-0.025	-0.001	0.025	-0.034	0.010	0.024	-0.015	0.022***	-0.007
	(0.025)	(0.013)	(0.025)	(0.021)	(0.009)	(0.021)	(0.018)	(0.008)	(0.018)
Other Certification	-0.150***	0.012	0.138***	-0.065**	0.015*	0.050*	-0.005	-0.011	0.016
	(0.036)	(0.013)	(0.034)	(0.030)	(0.008)	(0.029)	(0.026)	(0.013)	(0.024)
Observations		9,745			13,419			16,606	
Pseudo R^2		0.274			0.305			0.443	

Note: *** refers to p-value < 0.01; ** refers to p-value < 0.05; * refers to p-value < 0.10.
Standard errors are shown in parentheses.

Table 4 – Among Those in AR Schools, Factors Associated with an Enrollee Taking on a Main Teacher Position (Logit Model-Average Marginal Effects)

	Year 1	**Year 2**	**Year 5**
Traditional EPP	-0.061***	0.013	0.038***
	(0.020)	(0.010)	(0.015)
EPP Completer	0.112***	0.071***	0.054***
	(0.014)	(0.010)	(0.013)
Traditional X Completer	0.029	-0.010	-0.009
	(0.022)	(0.012)	(0.016)
Black	0.007	-0.001	-0.028***
	(0.015)	(0.010)	(0.010)
Hispanic	-0.030*	-0.012	-0.035**
	(0.017)	(0.014)	(0.015)
Asian	-0.073*	-0.039	0.056
	(0.039)	(0.029)	(0.057)
Other Race	-0.019	-0.012	-0.010
	(0.012)	(0.010)	(0.011)
Gender	0.010	0.001	0.011
	(0.008)	(0.006)	(0.007)
Licensed	0.068***	0.072***	0.088***
	(0.008)	(0.006)	(0.008)
Middle/High School Certification	-0.007	-0.006	0.024***
	(0.008)	(0.006)	(0.007)
STEM Certification	0.014	0.006	-0.026***
	(0.011)	(0.008)	(0.007)
SPED Certification	0.008	-0.012	-0.043***
	(0.020)	(0.014)	(0.014)
Other Certification	-0.055**	-0.042***	0.009
	(0.025)	(0.015)	(0.024)
EPP Distance *(10s of miles)*	-0.002***	-0.001	-0.001
	(0.001)	(0.000)	(0.001)
Salary Differential *(1000s of dollars)*	-0.008***	-0.005***	-0.000
	(0.001)	(0.001)	(0.001)
Observations	4,762	6,611	7,414
Pseudo R^2	0.147	0.140	0.076

Note: *** refers to p-value < 0.01; ** refers to p-value < 0.05; * refers to p-value < 0.10. Standard errors are shown in parentheses.